

Why it's green to go vegetarian



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Introduction

There were approximately 6.9 billion people living on earth in 2010¹, this number is expected to rise to 9 billion by 2050² and as the world's population continues to grow, our requirement for food will also increase. With dwindling resources and an already increasing number of undernourished people in the world, the effects could be devastating. Worldwide food production requires around 30% of the total soil available, 20% of fossil fuel energy and a major part of the fresh water flow³. Raising cattle is one of the most damaging components of agriculture⁴. They cause the most environmental damage of any non-human species through over-grazing, soil erosion, desertification, tropical deforestation for ranches and growing of soya for their feed, in addition to their gaseous emissions and manure products.

Meat and seafood are the two most rapidly growing ingredients in the global diet and also two of the most costly in resource use. In 2006, 276 million tonnes of chicken, pork, beef and other meat were produced, 4 times as much as in 1961. On average, each person eats twice as much meat as back then (43kgs). The fishing industry harvested 141 million tonnes of seafood globally in 2005, 8 times as much as in 1950⁵.

Meat is now the single largest source of animal protein in all affluent nations⁶ and demand for animal flesh is expected to more than double by the year 2050⁷. Within this timescale the livestock population is expected to rise from 60 billion farm animals to 120 billion⁸. In order to meet this growing appetite, animals will no doubt be reared more intensively and cheaply with factory farming and aquaculture (fish farming) causing further pollution, water and land usage. If nothing is done, the environmental impact of meat production can only increase.

Diet is an important tool in working to achieve environmental sustainability. Studies on world food security estimate that an affluent diet containing meat requires up to 3 times as many resources as a vegetarian diet⁹.

Going vegetarian is an easy way to lower your own environmental impact and help ensure worldwide food security^{4, 10, 11}. This booklet explains why.

Climate Change

Many scientists and world leaders believe that climate change is the most serious issue facing the whole human race.

At the beginning of 2007, the United Nation's Intergovernmental Panel on Climate Change (IPCC) reported that global temperatures will probably rise by between 1.8 and 4°C by the end of this century (the possible range being between 1.1 and 6.4°C)¹². This may not sound like a lot but the polar ice caps are already melting and the report predicted that these temperature changes would cause rises in sea levels and increases in the number of hurricanes and tropical storms. When the sea level rises, low lying land

around the world is threatened and over time things just get worse as the expanding oceans increase further thanks to the accelerated melting of ice sheets covering Greenland and Antarctica.

Research presented at the International Scientific Congress on Climate Change (March 2009) regarding rising sea levels (which range from levels of around 50 cm to that of one metre), indicated that if emissions of greenhouse gases are not quickly and substantially reduced that even the best case scenario will hit low lying coastal areas hard, these housing one in ten humans¹³.



Worldwide, farmed animals produce more greenhouse gas emissions than the entire transport system.

'Greenhouse gases' are so called because they act like the glass of a greenhouse, trapping heat from the sun to warm up the Earth. Most of these gases occur naturally and without them our planet would be too cold to sustain life, but the balance is a very delicate one. Modern humans are causing a massive increase in greenhouse gas emissions and with too much of these gases in the atmosphere, temperatures will rise higher and higher.

The most important greenhouse gases are carbon dioxide (CO₂), methane (CH₄) and nitrous oxide (N₂O). The atmospheric concentrations of all three have increased phenomenally in modern times. Comparing figures from 2005 with pre-industrialised levels (measured in 1750), carbon dioxide has increased from around 280 parts per million (ppm) to 379ppm, methane has increased from 715 parts per billion (ppb) to 1774ppb and nitrous oxide has increased from 270 ppb to 319 ppb¹². The increase in carbon dioxide is due mostly to the use of fossil fuels and changes in the way we use land. Increases of methane and nitrous oxide, however, are primarily caused by agriculture¹².

Between 1970 and 2004, global emissions of these three important greenhouse gasses increased by a massive 70% (from 28.7 to 49 gigatonnes of CO₂ equivalents). Agriculture emissions have grown by 27%¹².

Worldwide, farmed animals produce more greenhouse gas emissions than the world's entire transport system⁷.

The emissions from livestock are due to a number of factors including enteric fermentation (digestive process) by ruminants such as cattle and sheep, manure, deforestation and desertification. Cows' flatulence, alongside animal excrement, makes the headlines due to their both being extremely damaging. The farming of animals also generates gaseous emissions through the manufacture of fertilisers (to grow feed crops), industrial feed production and the transportation of both live animals and their carcasses across the globe⁷.

9% of human-related CO₂ emissions are caused by the livestock sector, mostly due to changes in land use (e.g. forests being cleared for grazing or growing animal feed⁷) and the use of fossil fuels for farm operations¹⁴.

Methane has around 25 times the global warming impact of CO₂⁷ and ruminant mammals (cows and sheep) are responsible for 37% of the total methane generated by human activity.

There are approximately 1.38 billion cattle and 1.07 billion sheep on the planet² which is a phenomenal number when you consider a single cow can produce as much as 500 litres of methane per day¹⁵.

Lifestyle changes can reduce GHG emissions. Livestock farming contributes significantly to climate change. Stop eating meat and your “carbon footprint” will be smaller.



Nitrous oxide is almost 300 times as damaging to the climate as carbon dioxide with 65% of the total quantity produced by human activity coming from livestock (mostly their manure).

The animals we rear for meat also account for 64% of all the ammonia we humans impose on our precious atmosphere, contributing significantly to acid rain⁷.

In the UK, food systems contribute 19% (one fifth) of greenhouse gas (GHG) emissions. Half of this comes from agriculture (with methane and nitrous oxide largely attributable, accounting for 87%) and the other half arising from food manufacture, retailing, transport, catering and domestic stages. Meat and dairy produce account for around half of food's total greenhouse gas emissions, with most of these impacts arising at the rearing stage of the animals¹⁶.

The IPCC raised concerns that under conditions without a climate policy in place then global mean temperature may rise by up to 7°C compared to pre-industrial levels by the end of this century¹⁷. In 2008 the Climate Change Act came into force, the aim of which is to reduce greenhouse gas emissions through action in the UK and abroad by at least 80% by 2050, and reduce carbon dioxide emissions by at least 26% by 2020¹⁸.

Fishing & The Oceans

Over-fishing is depleting the oceans; fishing practices cause untold damage to both wildlife and the sea itself; and industrial-scale fish-farming (aquaculture) is polluting our rivers and streams.

In 2008, the total world fisheries produced 142 million tonnes of fish, 90 million tonnes from capture and 52 million tonnes from aquaculture. 115.1 million tonnes (81%) was consumed directly by humans, with the remaining 27.2 million tonnes (19%) destined for non-food products such as fishmeal or fish oil¹⁹.

According to the Food and Agriculture Organisation (FAO), by the year 2030 an additional 37 million tonnes of fish per year

will be needed to maintain current levels of fish consumption, within a world population increased by two billion more people². The latest World Review of Fisheries and Aquaculture stated that 19% of major commercial marine fish stocks monitored by the FAO are overexploited, 8% are depleted and 1% ranked as recovering from depletion¹⁹.

The existence of many species is threatened by society's appetite for fish flesh.

A major study in 2006 predicted that all commercial fisheries could die out by 2050²⁰. This four-year analysis was the first to examine all existing data on ocean species



Whether it's farmed or caught in the wild, eating fish causes significant damage to wildlife and the oceans. Vegetarians don't eat fish so going veggie will help preserve precious eco systems.

and ecosystems in order to understand the importance of biodiversity at the global scale. The results revealed that the global trend is a serious concern and projects the collapse (90% depletion) of all species of wild seafood that are currently being fished by the year 2050.

Over-fishing, by-catch, climate change, invasive species and coastal development have resulted in a decline in the number of marine species. The International Union for Conservation of Nature (IUCN) Red List of Threatened Species 2008 showed that approximately 17% of sharks and their relatives, 27% of the world's coral, 845 species of reef-building corals, 25% of marine mammals, 27% of seabirds and six of the seven species of marine turtle are all threatened²¹.

Ministers for the European Union reached an agreement for 2009 fishing quotas. In the UK, fishermen secured greater quotas of some types of fish with increased catch limits including; 30% more North Sea Cod, 32% more mackerel, 13% more North Sea Plaice and 8% more Monkfish for the West of Scotland, along with a reduction in the prawn quotas¹⁸. The number of fish caught is likely to decline further for several decades to come, not because we are eating less fish but because they simply aren't there to be caught.

300,000 cetaceans are killed every year as 'by-catch' of the fishing industries.

A report published by the Whale and Dolphin Conservation Society (WDCS), 'Shrouded by the Sea', reveals the disturbing truth behind the entanglement of whales, dolphins and porpoises in fishing nets and gear. The investigation highlights the suffering of these animals and provides details of how cetaceans slowly meet their death in fishing nets, many suffering extreme injuries through their underwater struggle to free themselves when trapped²².

Safeguards are often ineffective and illegal fishing is widespread. Blue-fin tuna, for example, is one of the most valuable fish on the planet. There is an increasing demand for its capture. A report by the World Wide Fund for Nature (WWF), also in 2008, found that Italy was amongst those countries responsible for over fishing and violation of the fishery's management rules, having overshot their allocated quota by 38% in 2007²³.

The fishing industry is responsible for some of the most environmentally damaging practices affecting our seas and oceans today. Bottom-trawling (trawling for fish on the ocean floor) and dredging (to harvest oysters, clams and scallops) destroy the fragile ecosystem of the sea-bed. Dynamite

and poison are used to catch fish in South East Asia, including the use of explosives on coral reefs in the Philippines, where shock waves can kill fish up to 50 metres from the site of blast²⁴.

Aquaculture (fish farming) is also responsible for pollution and endangering wildlife.

Farmed fish have to eat, and the feeding of carnivorous fish intensifies pressure on the oceanic fisheries. For example, it takes 5 tonnes of wild caught fish to feed each tonne of farmed salmon²⁵. Aquaculture can affect existing wild stocks of fish through pollution of waters and escape of cultivated species. If, for example, species of farmed fish are

not already present in surrounding waters then fish-farming can have negative impacts on the already established fish fauna¹⁹. Pollution and ecosystem disturbances which arise from aquaculture production units, e.g shrimp farming in some tropical coastal regions, have had a negative impact on both marine and terrestrial environments. Problems are caused by open net cage fish farms and land-based fish farms, which can discharge significant amounts of waste water containing nutrients, chemicals and pharmaceuticals that impact on the surrounding environment²⁶. For example, reports indicate that Scottish salmon farms alone have breached pollution limits more than 400 times in a 3 year period²⁷.



Water Use & Contamination

Much of the world is running out of water. Over 1 billion people worldwide do not have access to clean water and more than double that number do not have proper sanitation².

The IPCC predicts that by 2020, between 75 and 250 million people are likely to be exposed to water stress as a result of climate change²⁸. The Food and Agricultural Organisation (FAO) estimates that by 2025 there will be 1.8 billion people living with absolute water scarcity and two thirds of the world's population could be living under water-stressed conditions. Agricultural production consumes more fresh water than any other human activity²⁹ and demand for

water-intensive food items like meat and dairy products is placing increased stress on food production systems³⁰.

Farming accounts for around 70% of all freshwater withdrawn from lakes, waterways and aquifers (the accessible underground layer of water)²⁹.

Meat production, such as the feeding of cattle, is a particularly water-intensive process^{31, 32} and livestock production accounts for over 8% of global human water consumption⁷.

The total water footprint of the United Kingdom is 102 Gm³ (billion cubic metres)



Food manufacture is one of the most water intensive activities in the world and it takes far less water to produce plants than meat. A vegetarian diet helps to decrease water consumption and pollution.

per year. This is equal to over 4,500 litres of water per person per day. Agricultural products account for 73% of the total water footprint³³ with meat, milk, leather and other livestock products accounting for 23% of global water use in agriculture, equivalent to more than 1,150 litres of water per person per day³⁴.

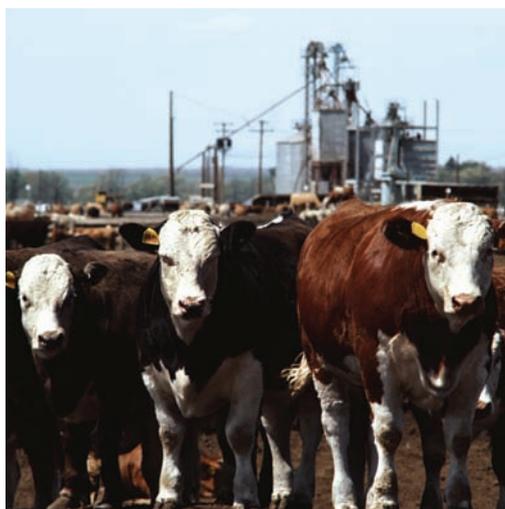
Meat produced in different parts of the world requires different amounts of water due to variations in species, rainfall, hygiene standards, drinking needs, slaughter, butchering, cleaning, packaging and also the water required to grow the animals' feed. As a result, estimates of the water required to produce a kilo of beef vary, from 13,000 litres²⁹ right up to 100,000 litres³⁵. Whichever figure you use, the damage is plain when you consider that the water required to produce a kilo of wheat is somewhere between 1,000-2,000 litres.

Rearing animals for meat also contributes significantly to water pollution, with animal waste, antibiotics and hormones entering the water cycle alongside chemicals from tanneries, fertilizers and the pesticides used to spray feed crops. Manure, or waste water containing manure, severely harms river and stream ecosystems. Once pollutants, including nitrogen, phosphorus, antibiotics and pesticides, reach the waterways they cause a great deal of damage to aquatic and human life. Algal blooms are a particular

problem, blocking waterways, using up oxygen as they decompose and killing the natural populations of fish³⁶.

In large amounts, animal waste can present major problems to the waterways and surrounding environment.

More than 2 billion tonnes of animal manure were produced worldwide during the late 1990s. Assuming an average nitrogen content of around 5%, this makes 100 million tonnes of nitrogen⁶ finding its way into our water system. In the waters of the Gulf of Mexico, pollutants in animal waste have contributed to a "dead zone" where there is not enough oxygen to support aquatic life. During the summer of 2004, this dead zone extended over 5,800 square miles³⁶.



Land Use

Thirty percent of the Earth's entire land surface – a massive 70% of all agricultural land – is used for rearing farmed animals.

Much of this is grazing land that would otherwise host a natural habitat such as the valuable rainforest, but crops are also grown specifically as animal feed. In fact, a third of the world's land suitable for growing crops is used to produce feed for farmed animals⁷.

Livestock farming is essentially inefficient as mammals in particular are inefficient converters of feed to meat. A vast percentage of gross energy (89-97%) and protein (80-96%) contained in the cereal or

grain fed to animals is not converted into edible fat or protein⁶. Cattle require approximately 7kg of grain in order to generate a 1kg of beef and pigs require 4kg grain for 1kg of pork¹¹.

Livestock farming can lead to overgrazing causing soil erosion, desertification and deforestation¹¹. Twenty percent of the world's grazing land has already been designated as degraded due to the rearing of animals for their meat⁷.

Forests are one of the world's most valuable resources, providing a home for approximately 300 million people



The vast amount of land used to raise animals is causing environmental problems such as habitat destruction and deforestation. Going vegetarian will halve the land-use of your diet.

(indigenous and non-indigenous) along with numerous unique plant and animal species. Over 1.5 billion people depend upon the forests, whether this be their livelihood, fuel wood, medicinal plants or food³⁷. Tropical rainforests are thought to hold over half of the Earth's plant and animal species.

Our forests are being destroyed at a rapid rate. Between 2000 and 2005, 90 million acres of forest were destroyed and the World Resource Institute estimates that 39% of the world's remaining frontier forest is at risk³⁷. Today's main threats include clearing land for agriculture and overgrazing as well as the more widely publicised commercial logging, energy development and mining.

Livestock production is responsible for 70% of the Amazon deforestation in Latin America, where the rainforest has been cleared to create new pastures⁷.

Deforestation increases greenhouse gas emissions by releasing carbon previously stored in the trees. It is also a major driver in the loss of biodiversity and a pressing concern when one considers the fact that just a few species of livestock now account for about 20% of total terrestrial animal biomass⁷.

Rearing animals away from precious habitats offers no easy solutions. It is becoming more common for cattle to be denied the opportunity to graze by moving them directly into feedlots after being weaned.

Intensive feeding on a diet consisting mainly of concentrates has been shown to be an inefficient way of producing dietary proteins⁶. In order to supply meat producers with cheap animal feed, large areas of tropical forests have been cleared³⁷.

A typical diet requires up to 2.5 times the amount of land compared to a vegetarian diet and 5 times that of a vegan diet³⁸. For example, a farmer can feed up to 30 people throughout the year with vegetables, fruits, cereals and vegetable fats on one hectare of land. If the same area is used for the production of eggs, milk and/or meat the number of people fed varies from 5-10⁸. The amount of agricultural land used worldwide has increased by over 10%, from 4.49 billion acres to 4.96 between 1965 and 2005²⁸. Switching to a plant-based protein diet could free up to 2,700 million hectares (Mha) of pasture and 100Mha of cropland whereby the re-growing vegetation would use a large uptake of carbon in the process¹⁷.



Sustainability

Food security exists when all people, at all times, have access to sufficient, safe and nutritious food to meet their dietary needs and food preferences for an active and healthy life².

According to the Food and Agriculture Organisation (FAO), the number of hungry people in 2010 was estimated at around 925 million.

Over the next few decades additional pressure will be put on existing food systems

due to population growth; the amount of energy, land and water required and, of course, climate change. The challenge facing agriculture will be to increase food production in ways that reduce hunger, while reversing the damage already done to the environment.

In the UK alone, livestock consume more than half of the 20 million tonnes of cereal grown, over 50% of wheat and over 60% of barley¹⁶. Globally one third of the world's



A meat-based diet requires more energy, land and water resources than a vegetarian diet making going veggie a more sustainable choice.

cereal harvest and around 90% of soya is used for animal feed³⁹. The amount of feed grains used to produce the animal products in a typical vegetarian diet are around half those of a meat-based diet³⁹.

Meat production is also putting a strain on our other valuable resources, such as fossil fuels.

The production of animal protein is extremely energy intensive. To produce meat such as beef and lamb, the ratio of fossil fuel expenditure (in production) to protein output (in the form of meat) is 40:1 and 57:1 respectively. The average fossil fuel energy input for all the animal protein production systems is around 25 kilocalories (kcal) fossil energy input per 1 kilocalorie of protein produced, more than 11 times greater than that for grain protein production³⁹.

The UK currently imports around 40% of its food. Switching from a diet based entirely upon imports to a diet of food produced entirely in the UK reduces a person's food footprint by 57%. Eating organic food can reduce the average food footprint by an additional 2%⁴⁰.

Comparisons of a healthy vegetarian diet (which is varied and rich in wholegrain products, vegetables, pulses and fruit, and includes moderate amounts of dairy products and egg) with that of diet low in meat that also meets nutritional recommendations have shown that a vegetarian diet can reduce the footprint by 40%. The ideal diet is one that meets both nutritional requirements and also has the lowest footprint possible. A diet that is healthy, vegetarian, local and organic could reduce the UK food footprint by 44% per capita⁴⁰.

A report by Oxfam (2009) states that reducing the demand for meat and dairy produce, as one of its four a week steps, is perhaps the most significant action that can be taken to reduce food's impact on both people and the planet. The report also goes on to mention that a drastic overall reduction in consumption of all types of meat and dairy products is urgently needed⁴¹.

Why Vegetarian?

What we choose to eat is one of the biggest factors in our personal impact on the environment. A 2006 study, examining the impact of a typical week's eating, showed that plant-based diets are better for the environment than those based on meat⁴². A vegan, organic diet had the smallest environmental impact, but the single most damaging foodstuff was beef and all non-vegetarian diets required significantly greater amounts of environmental resources, such as land and water. Similarly, a 2008 study found that the transition to less meat or even a complete switch to plant-based protein food has a dramatic effect on land use¹⁷. By feeding grain and vegetables directly to people (rather than livestock) we can increase the amount of food available to everyone.

By going vegetarian you will help to...

- Avoid excessive CO₂ production
- Reduce methane/nitrous oxide production
- Save large amounts of water
- Avoid pollution of our streams/rivers/oceans
- Reduce destruction of topsoil & tropical rainforest
- Reduce destruction of wildlife habitats & endangered species
- Reduce the use of antibiotics, growth promoters and chemicals

The environmental arguments are strong, but many vegetarians simply believe that it is wrong to kill when there is no need to. Others love and respect animals and want to minimize their suffering. Some vegetarians are specifically opposed to intensive farming and choose vegetarianism because it sends a strong signal, guarantees you won't be eating an animal reared in appalling conditions, and avoids the distress experienced by all animals slaughtered for their meat. Whatever their reasons for giving up meat, vegetarians benefit from much more than a clear conscience, with lower rates of heart disease, diabetes and certain cancers.

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Want to know more?

Going Veggie is the Vegetarian Society's **free guide** to going (and staying) vegetarian.

Season to Taste is a collection of **vegetarian recipes** making the most of UK-grown produce throughout the year.

The Vegetarian Society website includes **fact sheets** on everything from Vitamin B12 to keeping a veggie companion animal.

Join the Vegetarian Society and get access to our members-only mentor scheme and helpline. Visit www.vegsoc.org/join today.

Already Veggie?

Going vegetarian is a positive choice for the environment, but vegetarians can do more by eating organic, seasonal, locally-grown produce wherever possible. Order your copy of **Season to Taste** to give you some ideas or post your own suggestions on our website.



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About Us



The Vegetarian Society offers expert advice free of charge.

We talk to schools, colleges and community groups.

We work with the food industry to improve provision for vegetarians, challenging bad practice and rewarding the best.

We represent vegetarians in the press and behind the scenes.

We show professional chefs and ordinary people how to cook imaginative and tasty veggie fare.

If you found this information useful, please donate to the Vegetarian Society or consider becoming a member. By doing so you will help to support more vegetarians and their families, provide free information and resources like this one, and give all vegetarians a louder, stronger voice. Please join today and help us continue our work that benefits people, animals and the environment alike.

Visit www.vegsoc.org/join or call 0161 925 2000 to find out more.

Designed by UHC Design Ltd.
Printed by Armin and Butler Ltd.

Charity Number: 259358

Registered Company Number: 959115 (England and Wales)

Patrons: Rose Elliot MBE, Jerome Flynn, Mary McCartney,
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