

Why it's green to go vegetarian



Vegetarian
SOCIETY

Contents

3.....	Introduction
4-5.....	Climate Change
6-7.....	Water Use & Contamination
8-9.....	Fishing & The Oceans
10-11.....	Land Use
12-13.....	Why Vegetarian?
14-15.....	References
16.....	About Us



Introduction

There were approximately 6.5 billion people living on earth in 2005^{1, 2} and as the world's population continues to grow, our requirement for food will also increase. Worldwide food production requires 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 and tropical deforestation for ranches, in addition to their gaseous emissions and manure products. Studies on world food security estimate that an affluent diet containing meat requires up to 3 times as many resources as a vegetarian diet⁵.

Global production of meat has risen dramatically from 130 million tonnes in the late 1970s to 230 million tonnes in the year 2000⁶. Meat is now the single largest source of animal protein in all affluent nations⁷ and demand for animal flesh is expected to more than double by the year 2050⁸. 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.

Going vegetarian is an easy way to lower your own environmental impact and help ensure worldwide food security^{4, 9, 10}. This booklet explains why.

Climate Change

However much we might like to believe the sceptics, there is a very broad scientific consensus that our climate is changing and mankind is, at least in part, responsible.

“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.

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 to 6.4°C)¹¹. 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 will just get worse as the expanding oceans

Livestock farming contributes significantly to climate change. Stop eating meat and your “carbon footprint” will be smaller.

increase further, thanks to the melting of ice sheets covering Greenland and Antarctica.

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

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 (measurements from 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 ppb¹¹. 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 agriculture¹¹.

Farmed animals produce more greenhouse gas emissions (18%) than the world’s entire transport system (13.5%). Cows’ flatulence, alongside animal excrement, makes the headlines due to both of them being extremely damaging. However, farming 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 globe⁸.

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 feed⁸) and the use of fossil fuels for farm operations¹².

Methane has 23 times the global warming impact of CO₂⁸ and ruminant mammals (cows and sheep) are responsible for 37% of the total methane generated by human activity.

There are approximately 1.5 billion cattle and 1.7 billion sheep on the planet. A single cow can produce as much as 500 litres of methane per day¹³.

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 rain⁹.



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 sanitation. 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 activity¹⁴ and demand for water-intensive food items like meat and dairy products is placing increased stress on food production systems¹⁵.

Farming accounts for around 70% of all freshwater withdrawn from lakes, waterways and aquifers (the accessible underground layer of water)¹⁴. Meat production, especially the feeding of cattle, is a particularly water-intensive process^{16,17}.

Livestock production accounts for over 8% of global human water consumption⁸.

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'

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.

feed. As a result, estimates of the water required to produce a kilo of beef vary, from 13,000 litres¹⁴ right up to 100,000 litres¹⁸. 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 fish¹⁹.

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 nitrogen⁷ finding its way into our water system.

In 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 miles¹⁹.



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 is polluting our rivers and streams.

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

Over-fishing has resulted in tuna, cod, swordfish and marlin populations declining by 90% during the last century²⁰ and 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!

A recent major study predicted that all commercial fisheries could die out by 2050²¹. This four-year analysis is the first to examine all existing data on ocean species 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. The study concluded that marine biodiversity loss is increasingly impairing the ocean's capacity to

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 important eco systems.

provide food, maintain water quality, and recover from small changes in the physical environment.

Despite huge publicity and much political debate, the International Council for the Exploration of the Sea (ICES) states that fish stocks did not improve between 2005 and 2006. It reports numerous stocks as being too heavily fished and cites depletion of cod and sand eel in the North Sea²² to name just two. ICES has recommended a zero catch of cod for the last 5 years due to low numbers and advised no catch in 2007 for all southern cod.

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 and almost a third of catches from the Mediterranean alone arise from illegal and unregulated fishing²³. Japan recently made a rare admission that its fishing vessels have exceeded quotas. The country has now agreed to halve its catch of southern blue-fin tuna for the next 5 years. However, the World Wide Fund for Nature (WWF) is concerned that this will still not give the fish population chance to fully recover²⁴.

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 seabed. 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 blast²⁵.

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 salmon²⁶. Farming also produces waste and reports indicate that Scottish salmon farms alone have breached pollution limits more than 400 times in the past 3 years²⁷. 'Genetic pollution' is also a serious problem, with wild salmon populations weakened by breeding with farm escapees.



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 animals⁹.

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/grain fed to animals is not converted into edible fat and protein⁷. Cattle require approximately 7kg of grain in order to generate 1 kg of beef and pigs require 4kg grain for 1 kg of pork¹⁰.

Livestock farming can lead to overgrazing causing soil erosion, desertification and deforestation¹⁰. Twenty percent of the world's grazing land has already been designated as degraded due to the rearing of animals for their meat⁹.

Forests are one of the world's most valuable resources, providing a home

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.

for approximately 300 million people (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 food²⁸. Tropical rainforests are thought to hold over half of the Earth's plant and animal species.

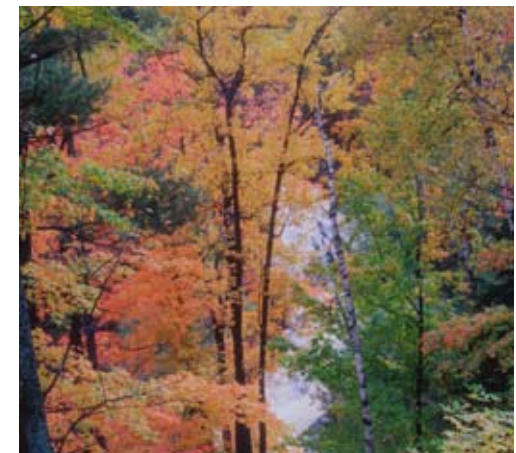
Our forests are being destroyed at a rapid rate. Between 2000 and 2005, 90 million acres of forest were destroyed and the World Resource Institute estimates that 39% of the world's remaining frontier forest is at risk²⁸. Today's main threats include clearing land for agriculture and overgrazing as well 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 pastures⁹.

Deforestation increases greenhouse gas emissions by releasing carbon previously stored in the trees. It is also a major driver in the loss of biodiversity – a pressing concern when one considers the fact that just a few species of livestock now account for about 20% of total terrestrial animal biomass⁹.

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 proteins⁷. In order to supply meat producers with cheap animal feed, large areas of tropical forests have been cleared²⁹.

It has been calculated that someone living on a vegetarian diet in the UK requires less than half the area of land to grow their food than someone following a conventional diet. A vegetarian population could farm less intensively and still have space to increase production of bio-fuel crops.



Why Vegetarian?

0161 925 2000
whygreen@vegsoc.org
www.vegsoc.org/whygreen

What we choose to eat is one of the biggest factors in the personal impact we have on the environment. A recent study, examining the impact of a typical week's eating, showed that plant-based diets are better for the environment than those based on meat²⁹. 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. 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 further 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.

Want to know more?

Food for Thought 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 pet.

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.



References

1. Eshel, G. and Martin, P. A. 2006. Diet, Energy and Global Warming. *Earth Interactions*. 10(9).
2. The United Nations Population Database <http://esa.un.org/unpp/>
3. Nonhebel, S. 2004. On resource use in food production systems: the value of livestock as 'rest-stream upgrading system'. *Ecological Economics*. 48, 221-230.
4. Goodland, R. 1997. Environmental sustainability in agriculture: diet matters. *Ecological Economics*. 23, 189-200.
5. Penning de Vries, F.W.T., Van Keulen, H. and Rabbinge, R. 1995. Natural resources and limits of food production in 2040. *Eco-Regional Approaches for Sustainable Land Use and Food Production*. Kluwer Academic Publishing. Dordrecht. 65-87.
6. National Research Council. Nutrient Requirements of Poultry. Washington, DC: National Academy Press, 1994.
7. Smil, V. 2002. Worldwide transformation of diets, burdens of meat production and opportunities for novel food proteins. *Enzyme and Microbial Technology*. 30, 305-311.
8. Food and Agriculture Organisation of the United Nations. 2006. Livestock's Long Shadow – Environmental Issues and Options. Rome.
9. Carlsson-Kanyama, A. 1998. Climate change and dietary choices, how can emission of greenhouse gases from food consumption be reduced? *Food Policy*. 23, 277-293.
10. White, T. 2000. Diet and the distribution of environmental impact. *Ecological Economics*. 34, 145-153.
11. Intergovernmental Panel on Climate Change. 2007. Climate Change 2007: The Physical Science Basis. Summary for Policy makers.
12. Dyer, J.A. and Desjardins, R.L. 2003. The impact of farm machinery management on greenhouse gas emissions from Canadian agriculture. *Sustainable Agriculture*. 20, 59-74.
13. BBC News 10th December 2006. <http://newsvote.bbc.co.uk/mpapps/pagetools/print/news.bbc.co.uk/1/hi/uk/6046340.stm>
14. Food and Agriculture Organisation. 22nd March 2007. FAO urges action to cope with increasing water scarcity. Rome. <http://www.fao.org/newsroom/en/news/2007/1000520/index.html>
15. Stockholm International Water Institute (SIWI) and the International Water Management Institute (IWMI). 2004. Water – More nutrition per drop.
16. Smil, V. 2001. Enriching the Earth Fritz Haber, Carl Bosch, and the transformation of world food production. Cambridge, MA: The MIT Press.
17. Fallenmark, M. 1989. Water scarcity and food production. Food and natural resources, San Diego (CA): Academic Press. 164-191 in Pimental, D., Hall CW (eds).
18. Pimental, D., Houser, J., Preiss, E., White, O., Fang, O., Mesnick, L., Barsky, T., Tariche, J.S. and Alpert, S. 1997. Water Resources: Agriculture, the Environment, and Society. *Bioscience*. 47 (2), 97-106.
19. Natural Resources Defense Council. 2005. Facts about pollution from Livestock Farms. <http://www.nrdc.org/water/pollution/ffarms.asp>
20. Nicholson-Lord, D. 2004. 'Poisoning Ourselves'. August 28th 44-45.
21. Worm, B., Barbier, E.B., Beaumont, N., Duffy, J.E., Folke, C., Halpern, B.S., Jackson, J.B.C., Lotze, H.K., Micheli, F., Palumbi, S.R., Sala, E., Selkoe, K., Stachowicz, J.J. and Watson, R. 2006. Impacts of biodiversity loss on ocean ecosystem services. *Science* 314, 787-790.
22. International Council for the Exploration of the Sea. Press Release. October 16th 2006. <http://www.ices.dk/aboutus/pressrelease/ICESPressReleaseOct2006.pdf>
23. The World Wide Fund for Nature. 2006. Fish Dishes - the unacceptable face of seafood http://www.panda.org/about_wwf/what_we_do/marine/help/seafood_lovers/fish_dishes/index.cfm
24. BBC News. "Japan agrees to halve tuna quota". October 17th 2006. <http://news.bbc.co.uk/1/hi/world/asia-pacific/6057576.stm>
25. Marine Conservation Society 2006. www.fishonline.org/information/methods
26. Brown, R. 2000. 'Fish farming may soon over take cattle ranching as a food source.' World watch Institute.
27. Sunday Herald. '400 breaches of fish farm pollution limits in three years'. 1st October 2006. <http://www.sundayherald.com/58261>
28. The World Wide Fund for Nature. 2007. The Bio-Diversity Code. <http://www.daversitycode.com/earthscope/>
29. Baroni, L., Cenci, L., Tettemanti, M. and Berati, M. 2006. Evaluating the environmental impact of various dietary patterns combined with different food production systems. *European Journal of Clinical Nutrition*. 1-8.