



PLANETARY HEALTH GUIDE

an environmental sustainability overview

by enviroverse

KEY INFO:

In this guide we examine **two scientific definitions** of the exact environmental problems threatening planetary health and leave space for cool quotes at the end.

Chapter 1 - Planetary Boundaries (Stockholm Resilience Centre)

- i. *Problems + Solutions Overview (pg 3-7)*
- ii. *More Details on Problems (pg 8-16)*

Chapter 2 - Tipping Points (IPCC)

- i. *Definition and Examples (pg 17)*

Chapter 3 - Cool Quotes Afterparty

- i. *Hear from histories greats (pg 18-27)*



Chapter 1: The Nine Planetary Boundaries

Developed by the [Stockholm Resilience Centre](#), the Planetary Boundaries framework defines nine environmental limits within which humanity can thrive.

Crossing these boundaries increases the risk of destabilizing Earth's systems. These boundaries are interconnected. Crossing one can exacerbate others.

[Link to their website.](#) We highly recommend you read their reports. They're one of the best sustainability research organisations on the planet.

**Woah bro,
you've crossed the line.**



As of 2023, six planetary boundaries have been crossed (they can be fixed):

1. **Greenhouse gas emissions** are driving global warming, leading to extreme weather, sea-level rise, and ecosystem disruption.
2. **Biodiversity loss** and species extinction are occurring at alarming rates, threatening ecosystems and food security.
3. **Deforestation and land degradation** are reducing the planet's ability to absorb carbon and support life.
4. **Fertiliser pollution** from agriculture is polluting waterways, causing eutrophication and creating dead zones.
5. **Pollution from plastics, chemicals**, and other human-made substances is overwhelming natural systems.
6. **Overuse and mismanagement of freshwater** resources are depleting rivers, lakes, and aquifers.

> The remaining three boundaries are still within safe limits:

- **Stratospheric Ozone Depletion:** The ozone layer is recovering thanks to global cooperation under the Montreal Protocol.
- **Ocean Acidification:** While concerning, this boundary has not yet been crossed.
- **Atmospheric Aerosol Loading:** Regional impacts are severe, but the global boundary remains intact.

The 6 Big Problems:



Greenhouse Gas Emissions



Biodiversity Loss



Deforestation + Land Degradation



Fertiliser Pollution



Plastic + Chemical Pollution



Freshwater Mismanagement

Some Solutions:



Shop Local



Diet Change, Vertical & Urban Farming



Repair Skills



Rewilding & Green Urban Spaces



Alternative Fertilisation



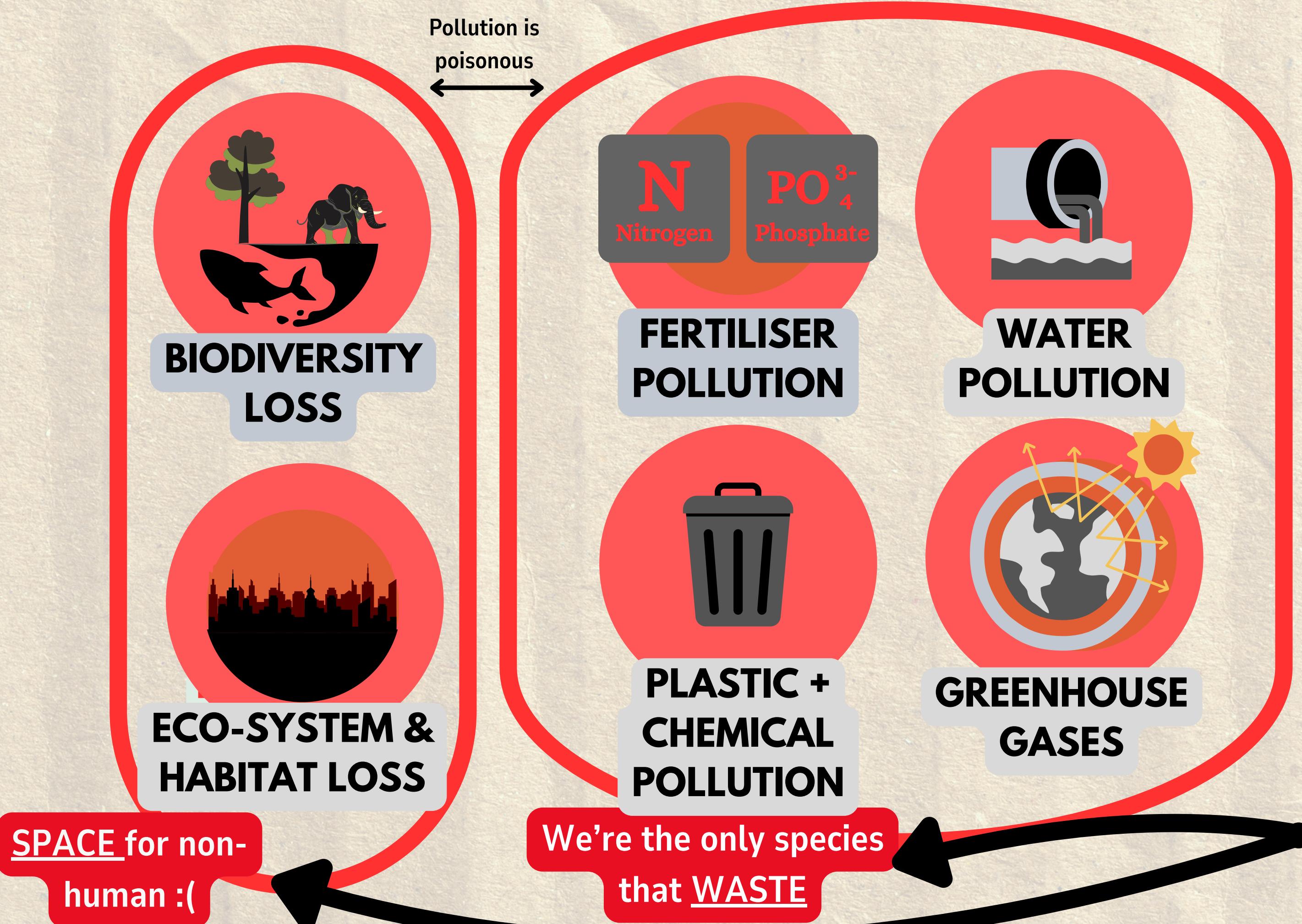
Clean Water

Solutions:

1. **Clean Energy & Shopping Local:** Clean energy often comes from renewables. Without air pollution, local people can breathe happy. Shopping Local reduces Scope 3 supply-chain emissions by shortening transport distances and supporting regional production.
2. **Rewilding & Green Urban Spaces:** Rewilding restores native habitats for species recovery. Green Urban Spaces create biodiversity refuges in cities and in some cases unique habitats.
3. **Diet Change, Vertical & Urban Farming:** Diet change reduces emissions and land use as plant-based foods use significantly less space. Vertical Farming grows food in compact indoor systems with minimal land/water. Urban Farming uses rooftops/vacant lots for hyper-local production, reducing rural land expansion into greenbelts.
4. **Alternative Fertilisation:** For example, Fungi-Based Fertilisation use mycorrhizal networks to boost soil health and crop resilience. This method replaces synthetic inputs and improves carbon sequestration.
5. **Learn to Repair:** Repair Skills reduce waste and demand for new goods by extending product life. Community repair events and DIY culture are great circular economy practices.
6. **Clean & Protect Water:** Cleaning requires filtration to remove pollutants. We can implement conservation policies for sustainable aquifer and river management.

There are way more! These are just some examples. People have disagreements on which solutions are best for budget to be spent on.

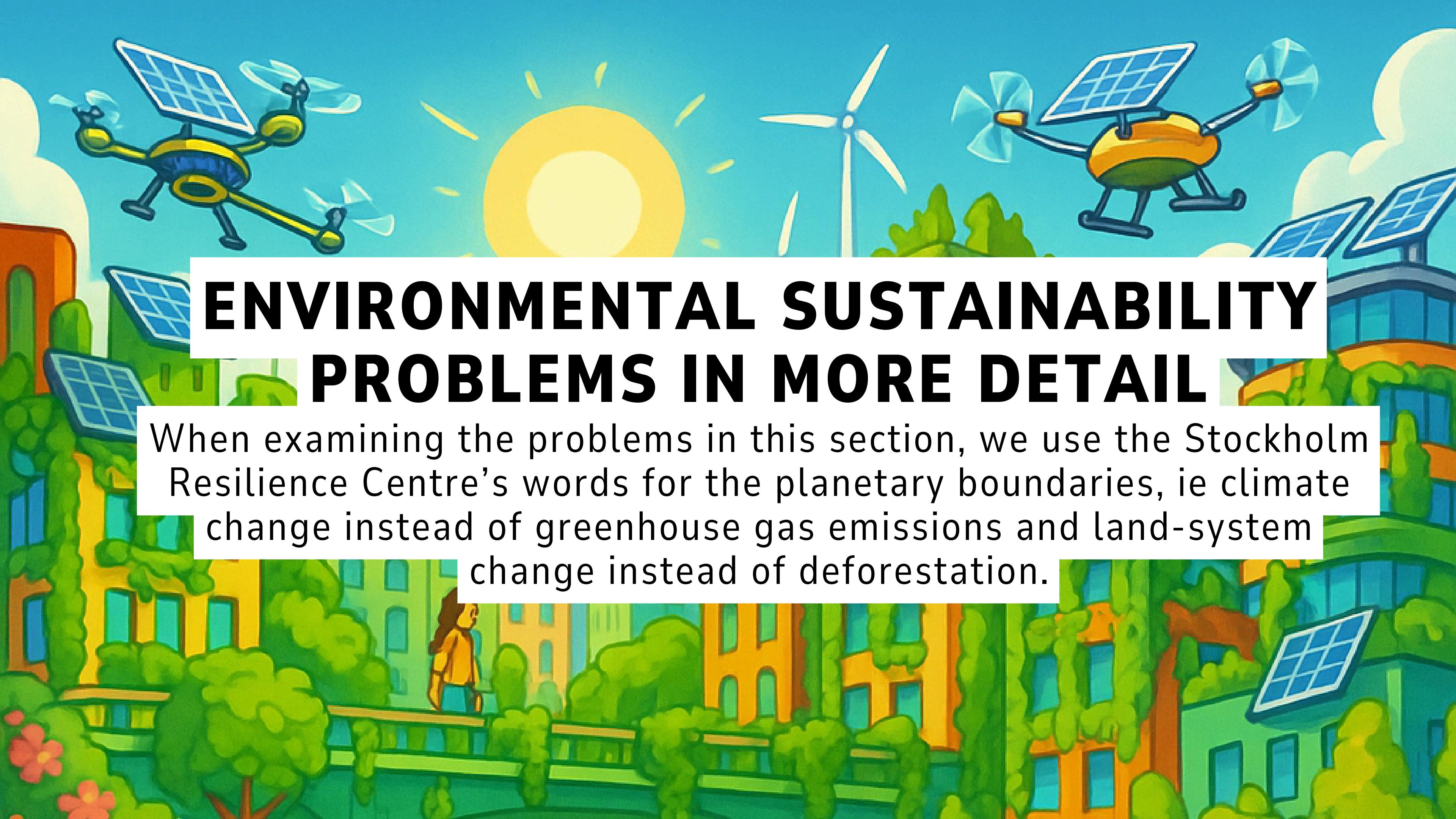
ENVIRONMENTAL PROBLEMS



Our environmental problems can effectively be summarised as our use of space and managing our waste

WHAT YOU CAN DO





ENVIRONMENTAL SUSTAINABILITY PROBLEMS IN MORE DETAIL

When examining the problems in this section, we use the Stockholm Resilience Centre's words for the planetary boundaries, ie climate change instead of greenhouse gas emissions and land-system change instead of deforestation.

Problem: Climate Change // Root Cause: Greenhouse Gas (GHG) Emissions

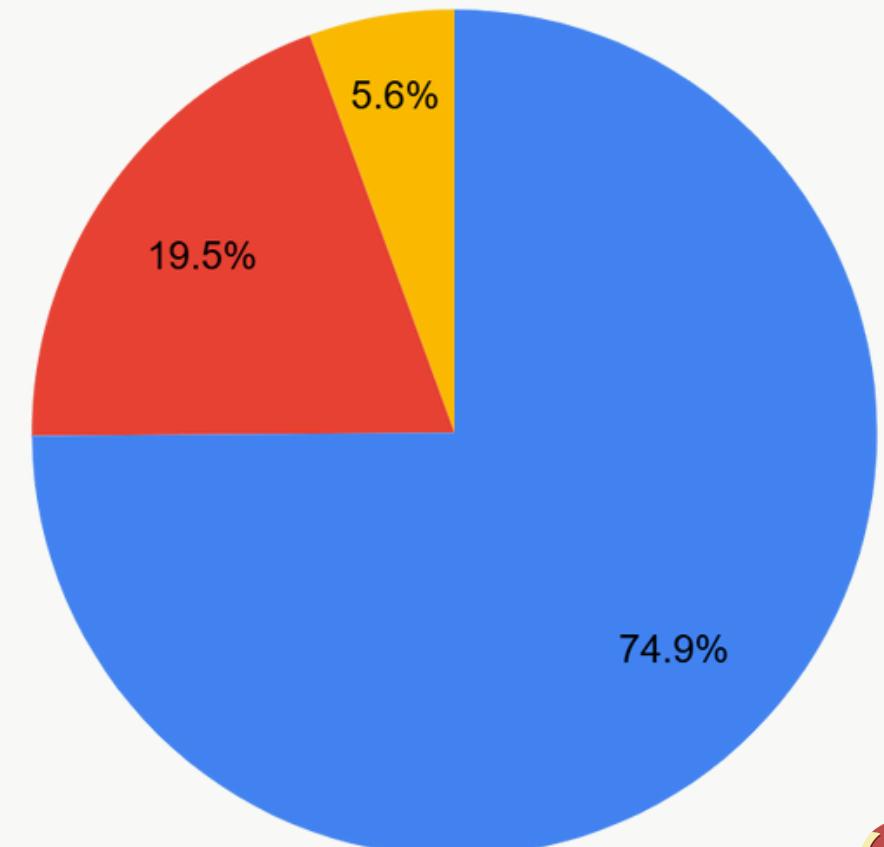
Greenhouse gases directly cause climate change.

The pie chart on the right shows the percentage breakdown of global greenhouse gas emissions by end use in 2021. This data is from the World Resource Institute and they go into more detail on their website [here](#).

Below is the 2023 greenhouse gas emission split by type according to [ourworldindata.org](#). Although they are emitted in smaller quantities, methane and nitrous oxide are significantly more potent greenhouse gases than carbon dioxide (UNEP and CCAC, 2021; IPCC, 2021).

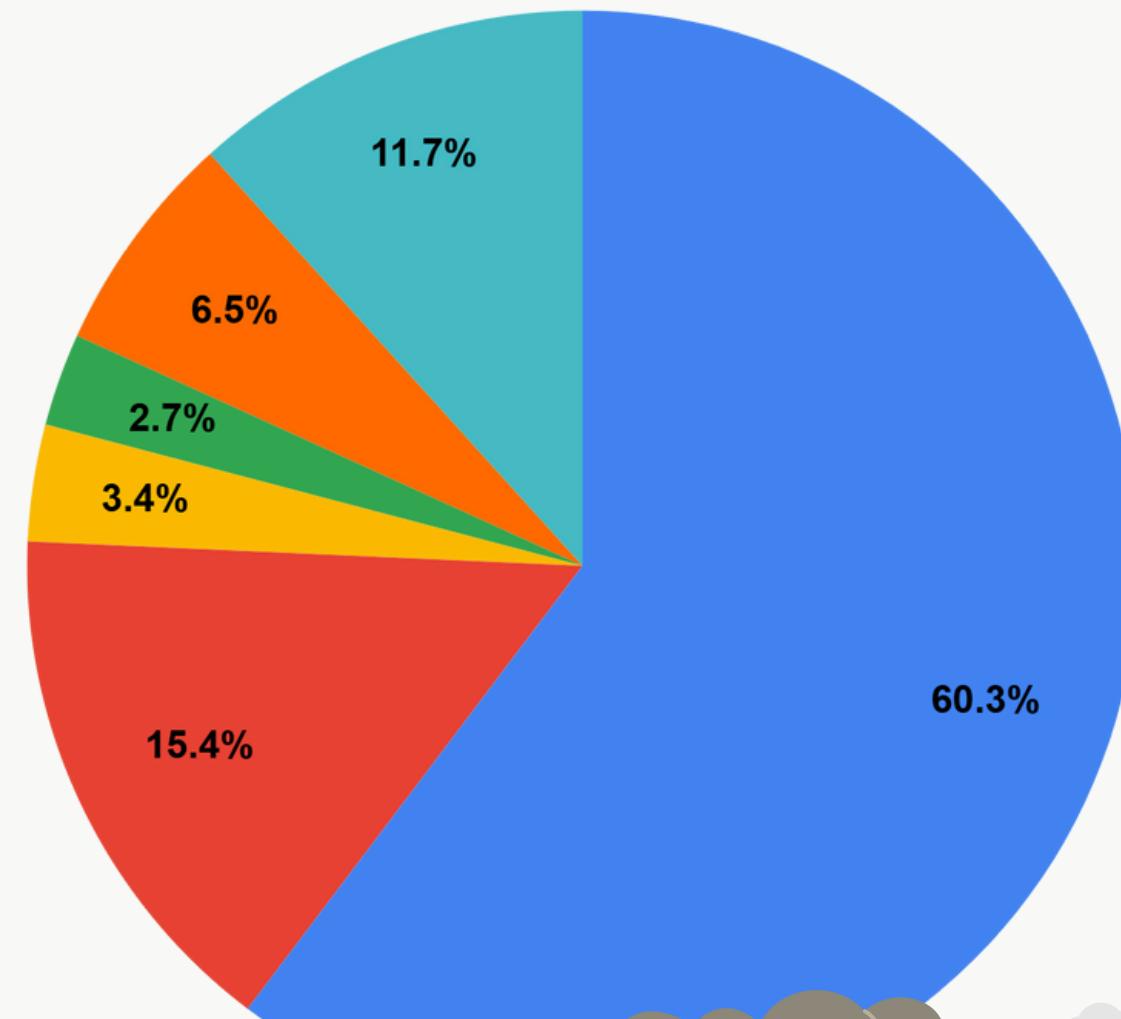
Pie Chart showing 2023 Global Greenhouse Gas Emissions by type (%)

● Carbon Dioxide ● Methane ● Nitrous Oxide



Pie Chart showing 2021 Global Greenhouse Gas Emissions by End-Use (%)

● Energy (Heating & Electricity) ● Transport (Road, Air, Boat, Rail)
● Waste ● Land Use Change & Forestry ● Industry Processes
● Agriculture



Problem: Climate Change // Root Cause: Greenhouse Gas (GHG) Emissions

Solution: Clean Energy from Renewable Systems

Clean energy systems produce heating and electricity without emitting greenhouse gases.

How many clean, renewable energy systems can you see in this image?



Problem: Climate Change // Root Cause: Dependence on Global Supply



Earth as an interconnected system >

**Supply chains =
60%**

of global
greenhouse
gases

- accenture, 2023

How come 60.3% of greenhouse gas emissions end up being used for heating & electricity but 60% of all greenhouse gas emissions come from supply chain operations? These facts co-exist because the first measures end use, the second measures source. The supply chain extracts and transports fossil fuels to be used for heating & electricity.

How can we make the supply chain less polluting? Shop Local, Cleaner Energy Sourcing
How can we make our heating & electricity more efficient and less polluting?

There's lots of ways including: Insulation, Cleaner Energy Sourcing, Computational Hardware Developments, Planting Trees to counter the Urban Heat Island effect, Ecosystem Restoration, Soil Care...

Air and Water emissions are globally connected. We all breathe the same air and share the same oceans. The WHO says 99% of air globally is over-polluted (WHO, 2022) and when sea levels rise, they rise everywhere. To address this, movements such as global citizenship aim to inspire new globalised unity. Let us work together for mutual benefit.

Problem: Climate Change // Root Cause: Dependence on Global Supply

Sustainability:

Global supply chains produce 3rd scope emissions which account for at least 60% of all greenhouse gas emissions.

Ethics:

Global supply chains are hard to track. They contribute to child labour, slavery and other human right violations.

Cost of Living & Security:

Dependence on global supply chains impacts lives.

Global supply chains are impacted by geopolitical tensions. For example, the Russian war has raised monthly energy prices across Europe for citizens and pushed people into a cost of living crisis. Global trade is stopped by wars and trade wars which can mean access to important goods is limited.



Solution: Be Local

Have you ever considered growing your own food?

Local food and goods has significantly less air miles. It ensures that the economic benefits exist within your local area and contributes to community identity.

Having a fully established local currency can help your local area avoid poverty. A local exchange means if the global supply chains are disturbed your local area will be resilient.

It also helps your local area reinforce its own culture. Rather than buying clothes designed to be basic and made internationally in factories, buy a local artists sweater.

Solution: Decentralised Energy

Decentralised renewable energy systems are not only cleaner. The energy can be cheaper and these systems operate independently, giving your community greater control and resilience in the face of global disruptions.



Problem: Land System Change & Biosphere Integrity

Root Cause: Food System

From this amazing [National Food Strategy Graph \(link\)](#) you can see the UK is actually a cow's world. There are more efficient food systems which we must implement because we need space to regenerate habitats. Read more about the UK's [national food strategy](#) and [climate change strategy](#).

How can we use our land more efficiently?

We cannot 'expand' any more (unless we colonise another planet), we must be more efficient with what we have.

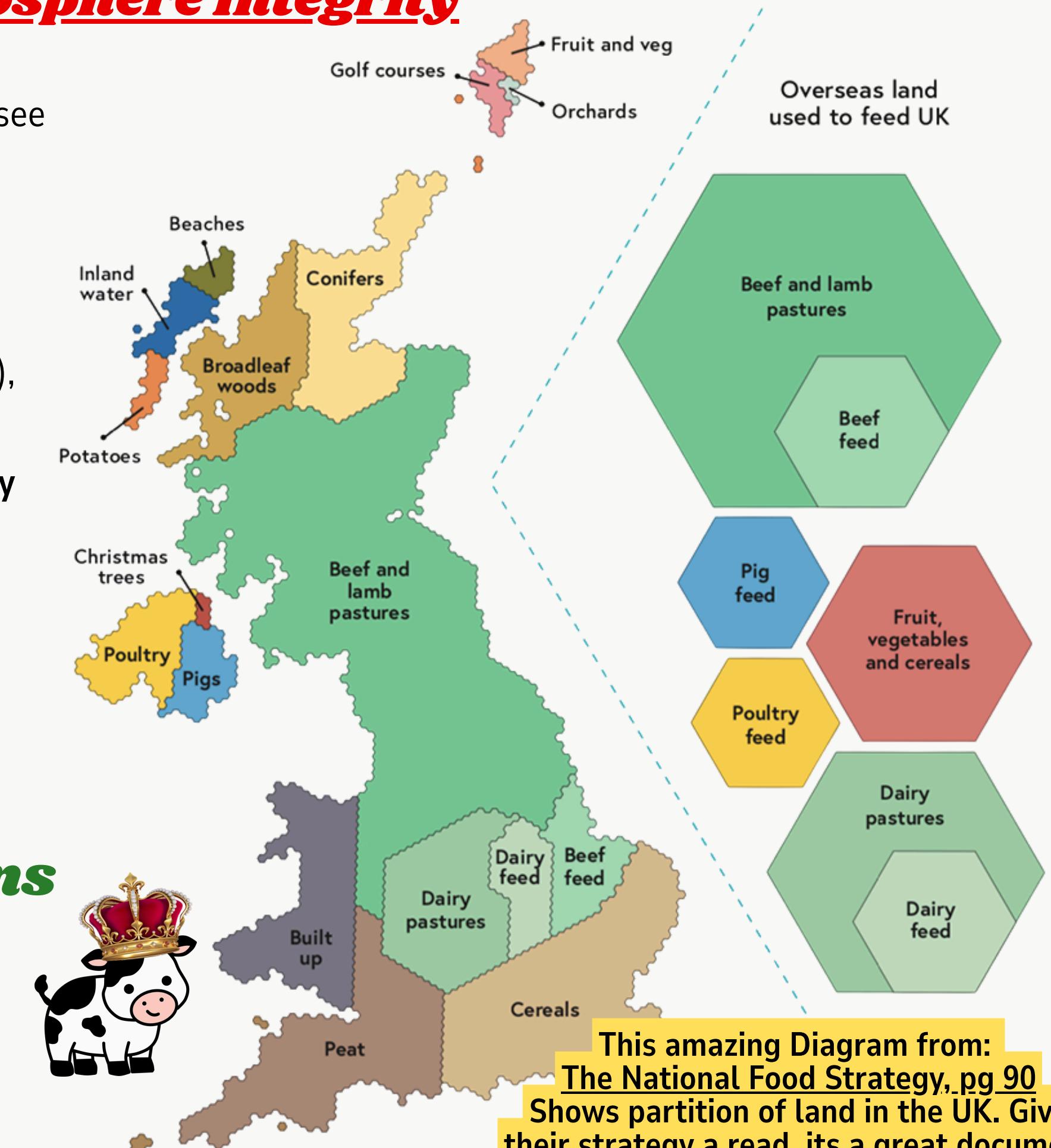
The food system is the single biggest contributor to biodiversity loss (UNEP, 2021).

Solution: Diet

Encouraging vegan or vegetarian diets is not only one of the best ways to reduce pollution but it also saves land.

Solution: Agricultural Innovations

With a history of inefficient land use we should consider the cost of land use versus value. Advancements in technology can revolutionise the agricultural systems globally. For instance - vertical farming.



Problem: Biogeochemical Flows

Root Cause: Fertilisers

Sustainability:

Modern agriculture often relies on heavy doses of nitrogen and phosphorus to fertilise the soil. This leads to nutrient overloads in soil and water which causes **eutrophication** leading to dead zones in oceans, freshwater algal blooms, and long-term soil damage.

Root Cause: Synthetic Nitrogen & Phosphate Fertilisers

Industrial food systems rely heavily on synthetic nitrogen and phosphorus fertilisers. These are often overapplied, poorly absorbed by plants, and easily washed into waterways.

Solutions:

- **Alternative Fertilisers:**

Compost, cover crops, biochar, and animal manures can nourish soil without destabilising nutrient cycles. They release nutrients slowly and build long-term fertility.

- **Fungi-Based Soil Innovation:**

Mycorrhizal fungi form natural partnerships with plant roots, improving nutrient uptake and reducing the need for added fertilisers. These fungal networks enhance soil structure, water retention, and ecosystem resilience.



Problem: Novel Entities

Root Cause: Linear Economy

Ethics:

Novel entities such as plastic and chemical pollution have contributed to polluted air and water, impacting personal and environmental health. Look up microplastics.

Sustainability:

Humans are the only species to produce 'waste'. Linear economies don't account for the accumulation of waste product. The linear economy boost profits through consumerism. Things are designed to break and become wasted so people must buy them again.



All this waste over the years can be seen as litter on the ground. It's cheaper in the short term to throw away waste and used-resources rather than manage them. In a planet with limited space, decades of mass production and subsequent wastage has polluted our home. We even have concerns about pollution in our planetary orbit.

DON'T LITTER

Solution: Circular Economy

To prevent the build up of pollution we must adopt a circular economy. This means:

- 1) Changing Design** → products must be designed to be repairable or reusable. They mustn't contain toxic chemicals.
- 2) Learning New Skills** → Learn the skills to repair your own goods to save money and natural resources.
- 3) Turning waste into value** → Globally, there were 62 million tonnes of e-waste generated in 2022, containing approximately US \$62 billion worth of recoverable materials, yet only about a quarter of it is formally recycled (ITU & UNITAR, 2024).

One person's waste is another person's treasure and we need people to develop systems and methods that can turn waste into a productive resource. This is key for a circular economy. Many people around the world have been working on such solutions. **Can you think of any?**

Circular Economy examples:

- State of Green
- World Business Council for Sustainable Development
- World Economic Forum
- innovate-eco.com
- Ellen MacArthur Foundation

Problem: Freshwater Pollution

Root Cause: Fertilisers, Plastic, Chemical

What's the issue?

Our rivers, lakes, and oceans are overloaded with waste - from toxic chemicals to plastic to excess nutrients - threatening ecosystems and human health.

We need to stop viewing water as an economic sector and start recognising the natural water cycle as a dominant system.

Root Cause: Diffuse and Industrial Runoff

Pollution comes not just from pipes, but from widespread "non-point" sources: farms, factories, cities. Many industries treat water as something to use and dump.

Solution: Mindful Industry

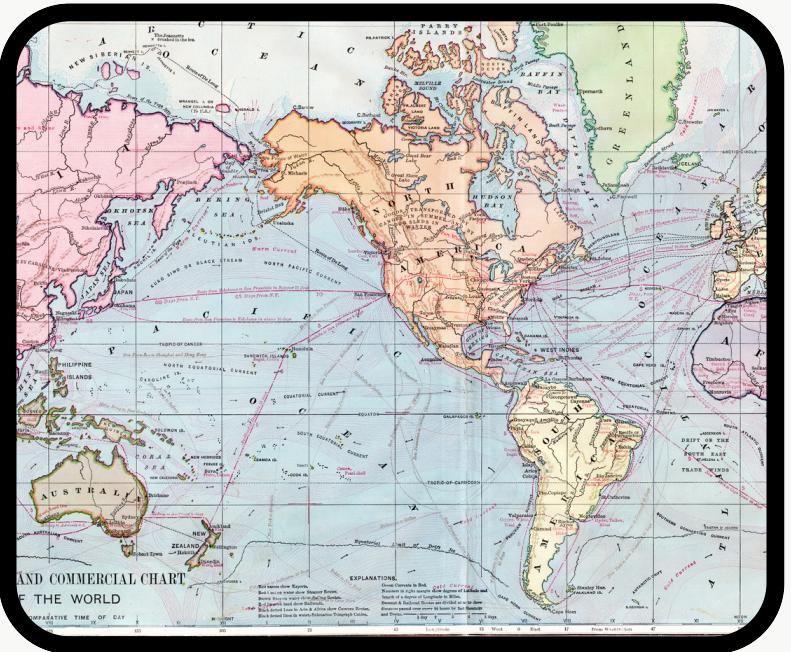
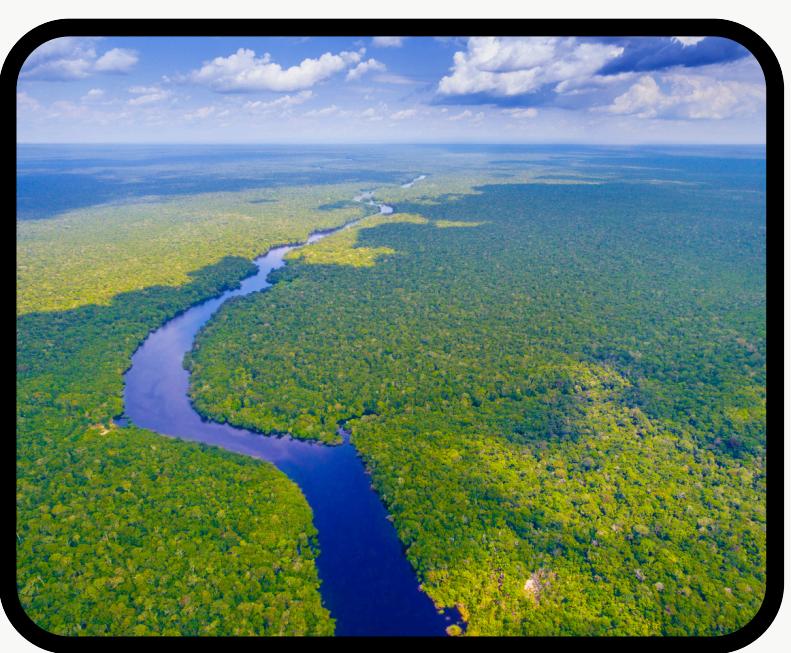
- **Closed-Loop Systems:** Industries can reuse water within production cycles, cutting waste and preventing discharge.
- **Green Chemistry:** Replace harmful inputs with safer alternatives that break down naturally.
- **Accountability and Stewardship:** Regulation helps but deeper change comes when industries see water as a shared, living system they are part of, not apart from.

Mindful industry means aligning production with planetary boundaries - not pushing past them.



Another Framework: Tipping Points

While Planetary Boundaries define the limits of Earth's systems, Tipping Points represent critical thresholds within those systems. Once crossed, tipping points can trigger abrupt, irreversible changes with cascading effects.



Some of the most concerning tipping points include:

- **Collapse of Ice Sheets:** The melting of Greenland and Antarctic ice sheets could lead to several meters of sea-level rise, displacing millions of people (Lenton, 2025; Sime, 2025).
- **Amazon Rainforest Dieback:** Deforestation and climate change could turn the Amazon from a carbon sink into a carbon source, accelerating global warming (Nobre, 2025).
- **Permafrost Thaw:** Thawing permafrost could release vast amounts of methane, a potent greenhouse gas, further warming the planet (Lenton, 2025).
- **Coral Reef Collapse:** Ocean warming and acidification are causing mass coral bleaching, threatening marine biodiversity and coastal communities (Lenton, 2025).
- **Atlantic Ocean Circulation Collapse:** Disruption of the Gulf Stream could alter weather patterns, affecting agriculture and ecosystems worldwide (Lenton, 2025; Rahmstorf, 2024).

The risk of crossing these tipping points increases as we push further beyond Planetary Boundaries. Once triggered, the changes may be unstoppable, leading to a fundamentally different - and less hospitable - planet.



COOL QUOTE PARTY

YOU'RE INVITED

“The best way to predict the future is to create it”

Peter Drucker



The future already exists in someone's mind

Wisdom from I Ching





“the anthropocentric infatuation with humans, the colonial zeal for extractivism, the neoliberal obsession with individual wealth, and the patriarchal disdain for care”

(Verlie, 2022, pg112).

“the anthropocentric infatuation with humans”

Anthropocentric thinking puts humans as the most influential part of the universe. Verlie’s words here describe how humanities self obsession with itself is causing its downfall. We don’t respect that there are more-than-human powers in this world that humans depend on to survive, such as the water cycle.

“the neoliberal obsession with individual wealth”

builds on the colonial foundation by embedding economic systems that prioritise profit, competition, and personal gain over collective well-being. Neoliberal ideology promotes deregulation and privatisation, reinforcing inequalities and incentivising environmental degradation in the name of economic growth.

“the colonial zeal for extractivism”

The start of these environmental problems is intertwined with European Colonialism in recent history. The colonial mindset is to keep expanding and extracting more resources from land further away. But, there is finite resources and land on this planet which we must manage wisely.

“and the patriarchal disdain for care”

points to how dominant social systems often undervalue or ignore the importance of care, empathy, and nurturing - qualities traditionally associated with femininity or marginalized groups. Designed by and for men, current systems prioritizes competition, control, and productivity over the well-being of people and the planet. As a result, essential forms of care - whether for communities, ecosystems, or future generations - are sidelined, making it harder to build a just and sustainable world.

“the environmental crisis is an outdated manifestation of a crisis of mind and spirit. There could be no greater misconception of its meaning than to believe it to be concerned only with endangered wildlife, human-made ugliness and pollution. These are part of it, but, more importantly, the crisis is concerned with the kind of creature we are and what we must become in order to survive”

Lynton K. Caldwell





“Never doubt that a small group of thoughtful, committed citizens can change the world, indeed it is the only thing that ever has”

Margaret Mead

**“when skiing down a mountain through a forest:
look at the path between the trees - not at the trees”**

a comment online





“When we try to pick out anything by itself, we find it hitched to everything else in the universe.”

John Muir

“Another thing I have noticed travelling here is that everybody is on their mobile phones, totally disconnected from each other. Even families that are out together are not connecting with each other, but with their devices. It feels like there’s a real spiritual poverty .”

Nemonte Nenquimo



**“We are not only responsible for what we do, but
also for what we fail to do.”**

Molière



THANKS FOR READING

Bibliography:

- Carrington, D. (2016) The Anthropocene epoch: Scientists declare dawn of human-influenced age. The Guardian, 29 August. Available at: https://time.com/4475604/the-anthropocene-should-bring-awe-and-act-as-a-warning/?utm_source=chatgpt.com (Accessed: 2 July 2025)
- Stockholm Resilience Centre (2023) Planetary Boundaries. Available at: <https://www.stockholmresilience.org/research/planetary-boundaries.html> (Accessed: 2 July 2025).
- World Resources Institute (2024) 4 Charts Explain Greenhouse Gas Emissions by Sector. Available at: <https://www.wri.org/insights/4-charts-explain-greenhouse-gas-emissions-countries-and-sectors> (Accessed: 2 July 2025).
- IPCC, 2021. Climate Change 2021: The Physical Science Basis. Contribution of Working Group I to the Sixth Assessment Report of the Intergovernmental Panel on Climate Change. [online] Available at: <https://www.ipcc.ch/report/ar6/wg1/> [Accessed 2 Jul. 2025].
- UNEP and Climate and Clean Air Coalition (CCAC), 2021. Global Methane Assessment: Benefits and Costs of Mitigating Methane Emissions. Nairobi: United Nations Environment Programme. [online] Available at: <https://www.unep.org/resources/report/global-methane-assessment-benefits-and-costs-mitigating-methane-emissions> [Accessed 2 Jul. 2025].
- Ritchie, H. (2024) Greenhouse gas emissions. Our World in Data. Available at: <https://ourworldindata.org/greenhouse-gas-emissions> (Accessed: 2 July 2025).
- National Food Strategy (2021) The Plan. Available at: <https://www.nationalfoodstrategy.org/> (Accessed: 2 July 2025).
- Climate Change Committee (2025) Climate Change Committee. Available at: <https://www.theccc.org.uk/> (Accessed: 2 July 2025).
- UNEP (2021) Our global food system is the primary driver of biodiversity loss. United Nations Environment Programme. Available at: (accessed 2 July 2025).
- Henley, J. (2017) 'Having more, owning less: how to fight throwaway culture', The Conversation, 27 September. Available at: <https://theconversation.com/having-more-owning-less-how-to-fight-throwaway-culture-81493> (Accessed: 2 July 2025).
- Natural History Museum (2023) Calls for a treaty to tackle space pollution in Earth's orbit. Available at: <https://www.nhm.ac.uk/discover/news/2023/march/calls-for-treaty-tackle-space-pollution-earths-orbit.html> (Accessed: 2 July 2025).
- International Telecommunication Union & United Nations Institute for Training and Research, 2024. Global E-waste Monitor 2024: Electronic Waste Rising Five Times Faster than Documented E-waste Recycling. [pdf] Available at: <https://ewastemonitor.info/the-global-e-waste-monitor-2024/> [Accessed 3 July 2025].
- State of Green (2017) '10 Examples of Circular Economy Solutions'. Available at: <https://stateofgreen.com/en/news/10-examples-of-circular-economy-solutions/> (Accessed: 2 July 2025).
- World Business Council for Sustainable Development (2025) News. Available at: <https://www.wbcsd.org/news/> (Accessed: 2 July 2025).
- World Economic Forum (2022) '21 circular economy solutions for a more sustainable world'. World Economic Forum, 15 March. Available at: <https://www.weforum.org/stories/2022/03/21-circular-economy-solutions/> (Accessed: 2 July 2025).
- Innovate Eco (2019) '12 Examples of Circular Economy Solutions That Give us Some Hope!'. Available at: <https://innovate-eco.com/circular-economy-solutions/> (Accessed: 2 July 2025).
- Ellen MacArthur Foundation (2021) 'Examples of circular economy'. Available at: <https://www.ellenmacarthurfoundation.org/topics/circular-economy-introduction/examples> (Accessed: 2 July 2025).

THANKS AGAIN!

Bibliography (continued):

- Accenture (2021) The supply chain is key to winning the fight against climate change. Available at: <https://www.accenture.com/content/dam/accenture/final/a-com-migration/r3-3/pdf/pdf-170/accenture-the-supply-chain-key-to-winning-fight-against-climate-change.pdf> (Accessed: 2 July 2025)
- Cheng, E. (2022) 'Forty percent of all shipping cargo consists of fossil fuels', Quartz, 16 November. Available at: <https://qz.com/2113243/forty-percent-of-all-shipping-cargo-consists-of-fossil-fuels> (Accessed: 2 July 2025).
- Lenton, T. (2025) "A cascade can be more positive": social tipping points expert on fixing climate crisis', The Guardian, 28 June. Available at: <https://www.theguardian.com/environment/ng-interactive/2025/jun/28/tipping-points-social-expert-on-fixing-climate-crisis> (Accessed: 2 July 2025).
- Nobre, C. (2025) "We are perilously close to the point of no return": climate scientist on Amazon rainforest's future', The Guardian, 26 June. Available at: <https://www.theguardian.com/environment/ng-interactive/2025/jun/26/tipping-points-amazon-rainforest-climate-scientist-carlos-nobre> (Accessed: 2 July 2025).
- Sime, L. (2025) "It looks more likely with each day we burn fossil fuels": polar scientist on Antarctic tipping points', The Guardian, 27 June. Available at: <https://www.theguardian.com/environment/ng-interactive/2025/jun/27/tipping-points-antarctica-arctic-sea-ice-polar-scientist> (Accessed: 2 July 2025).
- Rockström, J. et al. (2009) 'Planetary boundaries: exploring the safe operating space for humanity', Ecology and Society, 14(2), p. 32. Available at: <https://www.stockholmresilience.org/research/planetary-boundaries.html> (Accessed: 2 July 2025).

