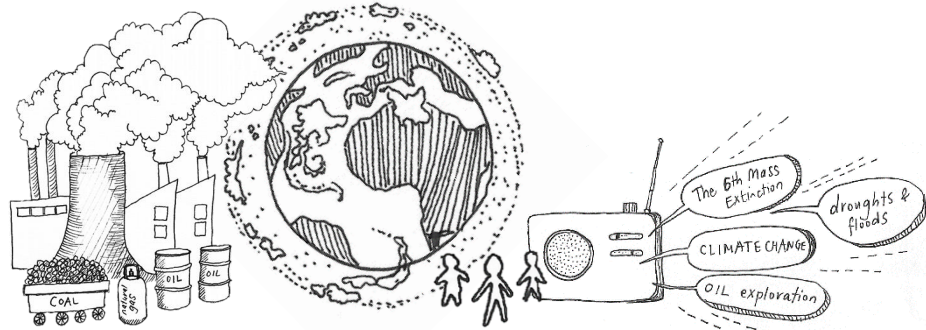


TEACH for ESD



THE ENVIRONMENTAL CRISIS

OVERVIEW

Our Earth needs help. We are more globally interconnected than ever before. By now, we have all heard that there are pressing environmental and social problems that continue to exponentially grow and need our attention.

We face an **environmental crisis** and need to understand the **causes** of the crisis, e.g. global population growth and increased consumption.

Understanding **ways of tracking** the environmental crisis will help us to monitor and evaluate our risks and our progress. Concepts such as the **planetary boundaries** and earth's **carrying capacity** should inspire us to do more.

We must explore approaches that can measure and reduce our **ecological footprints**. Nevertheless, trying to understand these **wicked problems** and apply **systems thinking** to face an ever-looming crisis.

1. ENVIRONMENTAL CRISIS

While scientists have known and warned about this unprecedented phenomenon since the 1970s, leaders worldwide have only recently recognized and acknowledged that we are within the midst of a global **environmental crisis** - an entanglement of serious, interconnected, complex environmental problems!

"The ongoing sixth mass extinction may be the most serious environmental threat ... because it is irreversible."

CEBALLOS et al. 2020



*"Global warming is **likely** to reach 1.5°C between 2030 and 2052."*

IPCC

RESOURCE CHECK

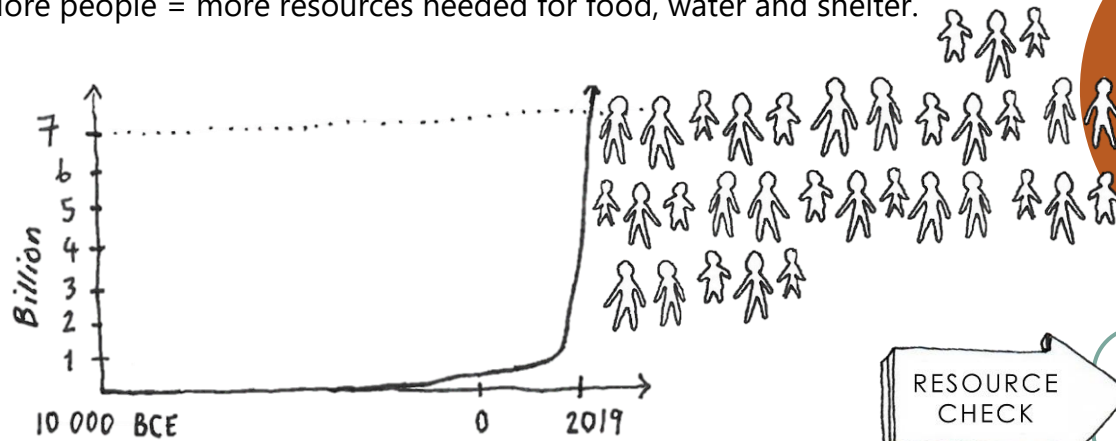
Understand these environmental problems by watching the videos in the **Environmental Problems Videos** folder.

RESOURCE CHECK

Inform yourself with science! Read and study the graphs in the **WWF Living Planet Report 2020**, the **WWF Climate Risks** infographic, **IPCC's special report Global Warming of 1.5°C** and the paper on **Vertebrates on the brink**.

2. WHAT IS CAUSING THE ENVIRONMENTAL CRISIS?

One of the main reasons we currently face this global environmental crisis is due to the **exponential human population growth** of the past few decades. More people = more resources needed for food, water and shelter.



The 2021 world population is 7.9 billion and is projected to reach 9 billion by 2050.

OUR WORLD IN DATA

RESOURCE CHECK

Watch the video **Human Population Through Time.**

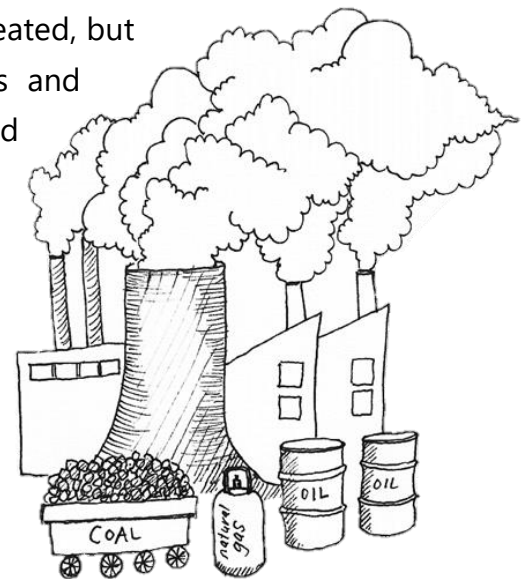
The environmental crisis is also fueled by our **economic system**, which is based on competition and accumulating **short-term profits** at the cost of negative long-term social and environmental impacts.

One example to illustrate this is Big Oil – the world's largest oil companies- profiting from the extraction of non-renewable oil reserves. Locally, job opportunities may be created, but nevertheless the extraction process will destroy natural habitats and threaten ecosystem services (such as water purification, flood protection etc.). On a global scale, once the fossil fuels are burned the carbon emissions will increase, thereby contributing to global warming and climate change.

This **degradation and overexploitation** of communal natural resources is known as *the tragedy of the commons*.

RESOURCE CHECK

Watch the video **What is the tragedy of the commons?**



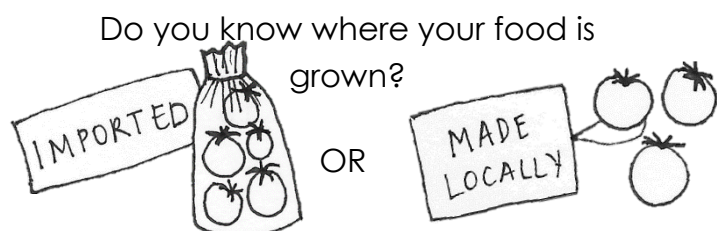
The profits made through the overexploitation of resources has resulted in **extreme income inequality**. Currently, the wealthiest 20% of the world consume 80% of global resources. As we know from our own context in Namibia, wealth distribution is also not equal *within* countries. Namibia has one of the highest income inequalities in the world!

RESOURCE CHECK

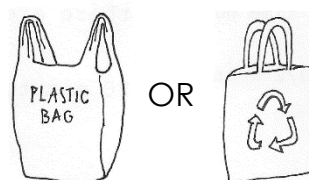
Watch the video **Can we have green equality?** and read **The Rich, the Poor & the Future of the Earth** to understand the impact of global inequality.

TOOLKIT 1.2 THE ENVIRONMENTAL CRISIS

Through globalization, many people have adopted resource-intensive modern lifestyles, while others remain dependent on the natural resources around them. The **environmental impact of our lifestyles** is tightly connected to the exponential growth of consumerism, the overexploitation of natural resources and unsustainable levels of pollution. Our daily actions (by choice or lack of options) either help combat or exacerbate environmental problems. These actions include what we eat and what fuel source we use to cook it, how we travel, what we buy and who we buy from (local vs imported)? Everyone is faced with these decisions on some level within their own context (rural vs urban; rich vs poor).



How do you choose to carry items home from the shop?



To understand where coal fits into a sustainable (or not) future, read **pgs. 14, 48 and 50** of *The Coal Atlas*.
To learn how meat consumption affects the planet read **pgs. 20, 34 and 52** of *The Meat Atlas*.

3. WAYS OF TRACKING & MEASURING THIS CRISIS

Scientific research plays a vital role in measuring, understanding and identifying ways in which to overcome this environmental crisis. Communicating scientific knowledge to the public and giving people the tools to measure (and thereby reduce) their environmental impact is just as important.



Visit the **Our World in Data** website to get up-to-date research and data in an easy to understand format about topics such as population, consumption and access.

Two scientific models that can help us understand how the crisis is being monitored are the **Planetary Boundaries** and **Carrying Capacity** concepts.

3.1 PLANETARY BOUNDARIES

Our planet has undergone several climatic changes, due to natural phenomena (e.g. the ice age meteors, volcanic eruptions etc.). However, during the past 10 000 years the Earth's climate has stabilized and has allowed humanity to thrive. This epoch is known as the Holocene. Some scientists now say that we have entered the **Anthropocene**: a new geological time where humans are the dominant driver of change to the Earth System. We are changing our biosphere to such an extent that we threaten to destabilize the Earth System.

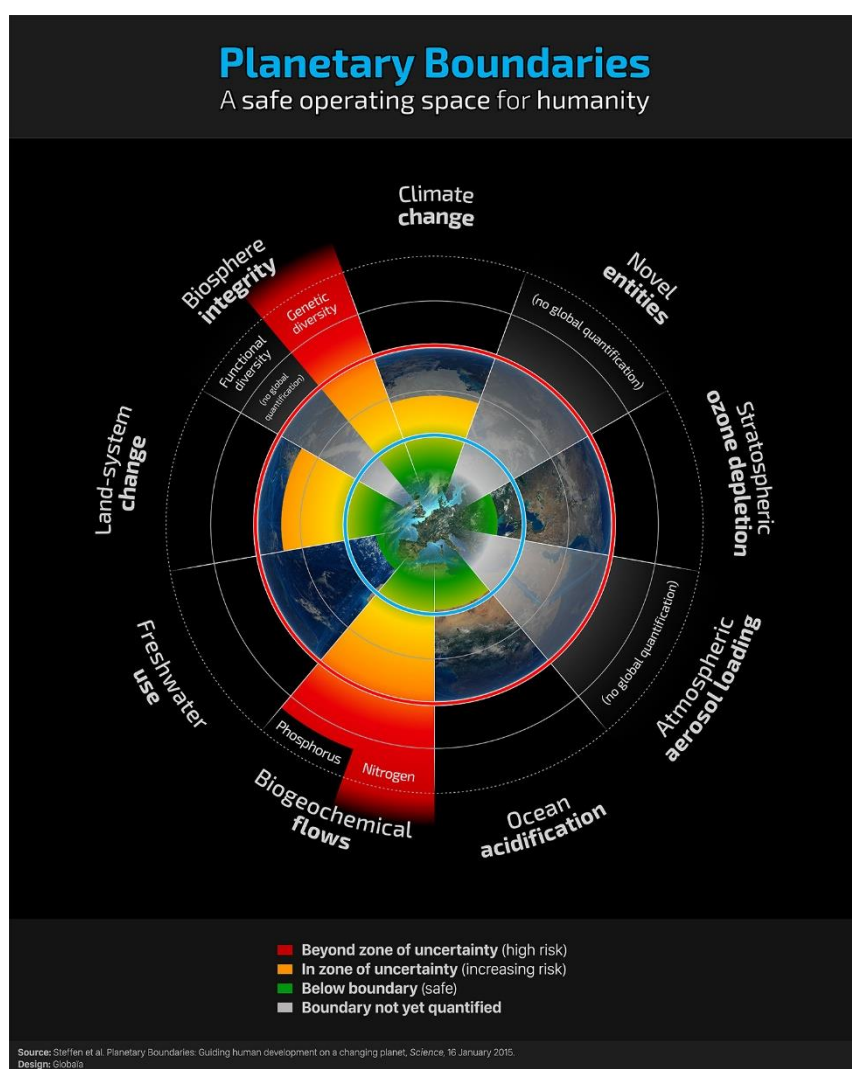


TOOLKIT 1.2 THE ENVIRONMENTAL CRISIS

Researchers from the Stockholm Resilience Centre set out to **measure how “far”** we are from destabilizing the planet and identified nine systems that together regulate the stability of the Earth System. They assessed how much humanity had changed each of the systems and determined at which level of change each of these systems would be entering a **“danger zone”**. Thereby they came up with the concept of the **nine planetary boundaries**. Within these boundaries are Earth’s ‘safe operating zones’ within which humanity can prosper, but if too many of the boundaries are “crossed” we could tip the Earth System into an entirely different state, where extreme weather conditions would be the norm.

RESOURCE CHECK

Watch the video **Let the Environment Guide our Development** where researcher Johan Rockström from the Stockholm Resilience Centre introduces the planetary boundaries concept in 2010.



The updated model (2015) shows that four boundaries have been crossed:

- biosphere integrity (*biodiversity loss*)
- climate change
- land-system change
- biogeochemical flows

As planetary boundaries are for maintaining and regulating the Earth system, it is vital that we **move back into the safe operating spaces** of these boundaries.

RESOURCE CHECK

Read the short article **Planetary Boundaries: A Safe Operating Space for Humanity** from the Stockholm Resilience Centre to understand how our world economy must change their methods of operation.

Credit: F. Pharand-Deschênes /Globala

RESOURCE CHECK

Watch Johan Rockström with his updated **10 years to transform the future of humanity – or destabilize the planet.**

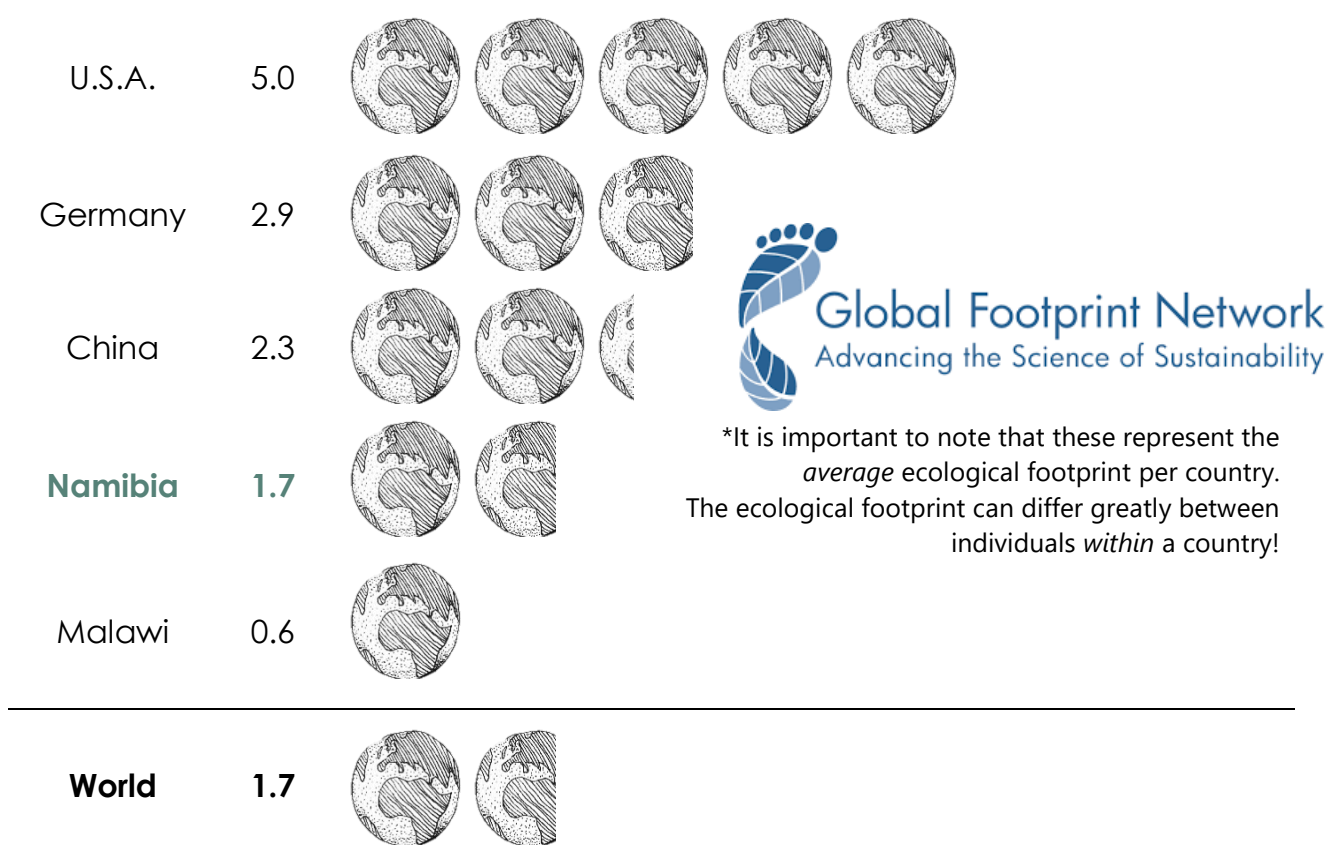
3.2 CARRYING CAPACITY & EARTH'S OVERSHOOT DAY

In ecological terms, **carrying capacity** is the maximum number of individuals from a species that an environment can support with its resources - *indefinitely*. For example, only so many cattle can survive on a given grazing area. If there are too many cattle, the grass will be overgrazed and cattle will run out of food and die. As the human species, we are about to exceed the planet's ability to support us all. This is measured by calculating the **ecological footprint** of the human lifestyle.

The **Global Footprint Network** is an international organisation that provides the biggest database on our ecological footprints worldwide. It also offers individuals and organizations the ability to calculate our own ecological impact with the online **footprint calculator**.

How many Earths would we need

if the world's population lived like people in...



Adapted from data source: Global Footprint Network's Open Data Platform.

RESOURCE
CHECK

Calculate *your* ecological footprint with the **Global Footprint Calculator** and find out how *you* can reduce your environmental impact!

Earth Overshoot Day is the date in a given year when humanity collectively reaches the limit of how many resources we can use that year without risking the planet's ability to replenish those resources for the future. By 'borrowing' more resources from the future, we are decreasing the Earth's biological productivity each year and, as a result, are reaching Earth Overshoot Day earlier and earlier. This is another way to illustrate and educate about how quickly we are using up our resources. We can compare the Namibian overshoot day with other countries around the world.

Country Overshoot Days 2021

When would Earth Overshoot Day land if the world's population lived like...



Source: National Footprint and Biocapacity Accounts, 2021 Edition
data.footprintnetwork.org



RESOURCE
CHECK

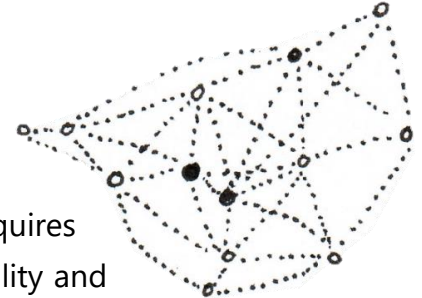
Watch the video on **Earth Overshoot Day 2018 (August 1)** for more on what Earth Overshoot Day means and how we could move the date of our 'Overshoot Day.'

4. WICKED PROBLEMS & SYSTEMS THINKING

The environmental crisis is a **wicked problem**. Wicked problems are problems that are difficult or near impossible to solve, where there is no single solution and where one solution might cause another problem. Climate change is considered a “super wicked problem”.



Watch the video **Climate Change – a wicked problem**.



Addressing a wicked problem requires a new way of seeing the world; it requires that we adopt a **Systems Thinking approach**. Systems thinking is the ability and skill to recognize and understand complex systems.



Watch the following two videos **Systems Thinking** and **What is a Complex System?** to gain a better understanding of these relatively new fields.

Our understanding of ecosystems (Section 1.1) is already encouraging us to think in systems by looking at the interactions between organisms and their environment.



Take a closer look at ecosystems: watch the video **Feedback Loops: How nature gets its rhythms** to understand how the organisation and diversity within ecosystems help them be more resilient to change.

Systems thinking helps us to understand how people interact with and impact each other; and to recognize that our social systems are actually part of – and not separate from – ecological systems: our biosphere consists of many interconnected socio-ecological systems. It helps us to understand how environmental problems and social problems are interlinked, e.g. poverty and poaching.



Globally, the COVID-19 pandemic has affected us all in so many different ways. Using systems thinking, we can examine the complexity behind the root causes of this global crisis.



Watch the TED Talk by Steve Woodsmall on **Systems Thinking is Not Optional: Lessons from a Pandemic** that highlights why systems thinking is needed to solve complex problems.

Using a systems approach to planning, decision-making and education is crucial to addressing our existing environmental crisis and hopefully preventing future ones.

RESOURCES

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1. ENVIRONMENTAL CRISIS

Environmental Crisis videos



VIDEO: A set of eight videos illustrating some of the major environmental issues we are facing today.

AUTHOR: AL Jazeera English (2020) **Link:** <https://www.youtube.com/watch?v=dcBXmj1nMTQ>

AUTHOR: NASA Climate Change (2021) **Link:** <https://www.youtube.com/watch?v=FsX4qHgDIZM>

AUTHOR: It's Okay to be Smart (2014) **Link:** <https://www.youtube.com/watch?v=z9gHuAwxwAs>

AUTHOR: BBC News (2019) **Link:** <https://www.youtube.com/watch?v=nho73BtDQtE>

AUTHOR: Nutrien (2018) **Link:** <https://www.youtube.com/watch?v=RMu7NtScdhU&t>

AUTHOR: National Geographic (2016) **Link:** <https://www.youtube.com/watch?v=HQTUWK7CM-Y>

AUTHOR: ACCIONA (2017) **Link:** <https://www.youtube.com/watch?v=71IBbTy-n4>

AUTHOR: BBC News (2019) **Link:** <https://www.youtube.com/watch?v=lrst59O9Q1Q>

AUTHOR: TED Ed (2015) **Link:** <https://www.youtube.com/watch?v=6xINyWPpB8>

AUTHOR: National Geographic (2018) **Link:** <https://www.youtube.com/watch?v=aU6pxSNDPhs>

AUTHOR: National Geographic (2016) **Link:** <https://www.youtube.com/watch?v=mQ10xBI8XMQ&t>

WWF Living Planet Report 2020 – Bending the curve of biodiversity loss



REPORT SUMMARY: An analysis and mapping of the current state of biodiversity on a global level, including how the earth and humans are affected by the loss of biodiversity.

AUTHOR: World Wildlife Fund (WWF) & Zoological Society of London (ZSL) (2020)

Link: <https://www.icriforum.org/wp-content/uploads/2020/09/ENGLISH-SUMMARY.pdf>

WWF Climate Risks



INFOGRAPHIC: Summarised information illustrating how a global increase in temperature from 1.5 degrees compared to 2 degrees will affect the world in terms of the cost on both the natural world and, in turn, the world's population.

AUTHOR: WWF (2018)

Link: <https://www.wwf.org.uk/updates/our-warming-world-how-much-difference-will-half-degree-really-make>

Vertebrates on the Brink as Indicators of Biological Annihilation and the Sixth Mass Extinction



RESEARCH PAPER: This article assesses the extinction crisis and how close we are to a sixth mass extinction as a result of human activities. Through the examination of 29 400 species and identifying which of these are close to extinction, this article explores the major affect species loss has on biodiversity, what that means for the world and the irreversible nature of this extinction.

AUTHOR: G. Ceballos, P.R. Ehrlich and P.H. Raven (2020)

Link: https://www.researchgate.net/publication/341827206_Vertebrates_on_the_brink_as_indicators_of_biological_annihilation_and_the_sixth_mass_extinction

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2. WHAT IS CAUSING THE ENVIRONMENTAL CRISIS?

Human Population through Time



VIDEO: This time lapse shows human population growth over the past 200 000 years, when our species first appeared on earth.

AUTHOR: American Museum of Natural History (2015)

Link: https://www.youtube.com/watch?v=PUwmA3Q0_OE

What is the Tragedy of the Commons?



VIDEO: This animated video explains what happens when many individuals share a limited resource. It presents how unsustainable practices by humans, driven by the desire to sustain themselves on an individual basis, rather than thinking of the collective leads to collapse of natural resources.

AUTHOR: TED Ed (2017)

Link: <https://www.youtube.com/watch?v=CxC161GvMPc&t=2s>

Can we have Green Equality?



VIDEO: This video explores the connection between equality and sustainability. It asks how can humanity practice sustainability whilst tackling the issue of equality for all in a rapidly growing world population.

AUTHOR: GROW, Oxfam (2012)

Link: <https://www.youtube.com/watch?v=9U1COenXMfl>

The Rich, the Poor and the Future of the Earth



BOOKLET: This booklet explores the interconnectedness of socio-economic disparities, the state of the natural world and the future of the planet as a whole. Through analysis of the issue, this source suggests sustainable development models that take into consideration the environmental and humanitarian crisis.

AUTHORS: Christian Aid (2012)

Link: https://www.christianaid.org.uk/sites/default/files/2017-08/rich-poor-future-earth-equity-constrained-world-april-2012_0.pdf

The Coal Atlas



BOOKLET: This booklet is a publication with facts and figures all to do with coal; at an environmental level through to socio-economic and political. It shows how this fossil fuel has affected and effects the world.

AUTHOR: Heinrich Böll Foundation and Friends of the Earth International (2017)

Link: <https://www.boell.de/en/dossier-coal-atlas-facts-and-figures-fossil-fuel>

The Meat Atlas



BOOKLET: This booklet is a publication with facts and figures all to do with meat consumption. It looks at the industry from all angles, giving insight to the current state of the meat market.

AUTHOR: Heinrich Böll Foundation and Friends of the Earth International (2014)

Link: <https://www.boell.de/en/meat-atlas>

RESOURCES

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3. WAYS OF TRACKING & MEASURING THIS CRISIS

Our World in Data



WEBSITE: A site dedicated to the collection and presentation of data across different fields and sectors. For the purposes of furthering your knowledge and understanding of human's impact on the earth as well as how the world has changed over time, explore this site's graphic representations.

Author: Global Change Data Lab

Link: <https://ourworldindata.org/>

Let the Environment Guide our Development



VIDEO: In this Ted Talk by Johan Rockström, he presents Planet Earth as a primary stakeholder who has not been considered in discussions on decisions that will affect the future. He explores the various ways humans have increased pressure on the planet over time and introduces the concept of planetary boundaries as a response to how humans are destabilizing the Earth's self-regulating systems.

AUTHOR: TED Talks (2010)

Link: <https://www.youtube.com/watch?v=RgqtrlixYR4>

Planetary Boundaries: A Safe Operating Space for Humanity



ARTICLE: This article outlines the planetary boundaries framework followed by specifying the key updates since their launch in 2009. It goes on to explore the relationship between the boundaries and the global business sector specifically, showing the role of businesses to respond sustainably to the planetary crisis.

AUTHOR: Stockholm Resilience Centre (2015)

Link: <https://www.stockholmresilience.org/download/18.6d8f5d4d14b32b2493577/1459560273797/SOS%20for%20Business%202015.pdf>

10 Years to Transform the Future of Humanity – or Destabilize the Planet



VIDEO: Ten years since the previous TedTalk, Johan Rockström reflects on the planetary boundaries and gives an account of the current state of the planet, warning that we have ten years left to change and avoid tipping the Earth into a new state.

AUTHOR: TED Talks (2020)

Link: <https://www.youtube.com/watch?v=8SI28fkrozE>

Global Footprint Network



WEBSITE: This site allows you to measure your own footprint. It is a database of resources on all things to do with the human "footprint" on earth. The Global Footprint Network aims to change how the world uses its natural resources through providing data, insight and tools to guide better decision making.

AUTHOR: Global Footprint Network

Link: <https://www.footprintcalculator.org/> and <https://www.footprintnetwork.org/>

RESOURCES

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Earth Overshoot Day 2018 1 August



VIDEO: This video explains the concept of 'Earth Overshoot Day' and gives examples of how we can reduce our ecological footprint in our food system

AUTHOR: Global Footprint Network and Barilla Centre for Food and Nutrition (2018)

Link: <https://www.youtube.com/watch?v=BakY1CI2EPs&t=4s>

4 WICKED PROBLEMS & SYSTEMS THINKING

Climate Change – A Wicked Problem



VIDEO: This video briefly explains the theory of Wicked Problems, but then uses the specific example of Climate Change to bring further understanding of what that actually means. It also includes some ideas, goals and methods we can use to go about facing and solving this challenge.

AUTHOR: Root Ed (2018)

Link: <https://www.youtube.com/watch?v=XRoCxS6n53U&t=1s>

What is a Complex System



VIDEO: This animated video looks to define a complex system. It shows how complex systems are multidimensional and interconnected in nature through a series of examples.

AUTHOR: Systems Innovation (2017)

Link: https://www.youtube.com/watch?v=vp8v2Udd_PM&t=1s

Feedback Loops: How Nature Gets its Rhythms



VIDEO: This animated video briefly explains a feedback loop. It looks at how these interlinked systems help to build resilience and function as an interdependent unit in our natural world.

AUTHOR: Ted ED (2014)

Link: <https://www.youtube.com/watch?v=inVZol1AkC8&t=15s>

Systems Thinking



VIDEO: This animated video begins by explaining different types of analysis. By unpacking these strategies of problem solving, it shows the benefit to the systems thinking methodology.

AUTHOR: Systems Innovation (2015)

Link: <https://www.youtube.com/watch?v=Miy9uQcwo3U&t=46s>

Systems Thinking is Not Optional - Lessons from a Pandemic



VIDEO: In this video, Steve Woodsmall illustrates the benefits of systems thinking. He talks on the relevancy of the four laws of systems thinking and how they apply to the Covid-19 pandemic.

AUTHOR: TEDx Talks (2021)

Link: <https://www.youtube.com/watch?v=yuvHvi84TFw>