Denial of unsustainability

Bare basics:

Topics such as climate change, deforestation, soil depletion, ocean acidification, mass species extinction and loss of biodiversity, microplastics pollution, oil and other toxic spills, increased occurrences of "freak weather", arctic ice and permafrost melting and many others have increasingly been making global headlines for several decades now. However, in spite of abundance of data, the level of awareness of seriousness and depth of global sustainability-related issues remains fairly low. Further, sustainability is often understood exclusively in environment-related terms.

However, exploitative and extractive practices, such as forced and child labour, modern slavery and wide-spread abuse of workers are equally unsustainable, yet it is precisely these practices that sustain (enable) the continuation of a significant part of the modern economy. Sweatshops, maquiladoras, and armed conflicts over limited resources (such as fossil fuels, minerals and water) are as much part of our unsustainable global economy as are speculative behaviour of investors, quantitative easing (even "helicopter money"), and consequential booms and crashes on stock, commodity and real estate markets. Those that try to protect the environment often pay with their lives as do those that fight for social, racial and gender justice.

Many of the unsustainable economic practices are fuelled by the global free trade agreements that, thanks to cheap (carbon-dependent) transport – subsidized by cheap fossil fuels, enable global flows of goods and commodities that are often unnecessary in terms of physical availability of resources, yet profitable.

The previous paragraphs indicate that unsustainability and systemic violence are inextricably related and should therefore always be considered together. However, considering also the high level of complexity and magnitude of these global issues (something that is discussed in more detail in Units 1 and 4), this text takes a deliberate choice of focusing more on those sustainability-related issues that effect the lives of all living beings on this planet, human and other-than-human alike. Among those, climate change, accompanied by a loss of biodiversity and high levels of (micro)plastic pollution, are arguably among the most visible, and long-term dangerous ones.

Climate change, "freak weather" and melting ice

Arguably the most long-term effect of climate change is cumulative global warming. According to NASA's Goddard Institute for Space Studies, the average global temperature has already risen for more than 1˚C since the beginning of the industrial age in the 1880s. Nineteen of the warmest years on record have occurred since 2000, and the year 2020 tied with 2016 for the warmest year on record, despite the overall economic downturn of Covid-19. The future is unpredictable, with global warming expected to reach between 1,5˚C (best-case scenario) to 5˚C (worst-case scenario) until 2100, according to different models. UNEP's Emissions gap report 2020 suggest that we are currently heading for an increase of more than 3˚C until the end of the century.

Another recent study, published in PNAS, suggests not only that historic data tracks closest with the RCP 8,5 scenario (5˚C increase), but that this scenario is also the best match out to mid-century under current and stated policies. In other words: the "worst-case" scenario is at the same time also the most realistic one. The overall lack of serious engagement with the reality of global warming is arguably one of the main reasons why the required reductions of $C0_2$ emissions (laid out in the Paris Agreement), are not being met. Further, several new climate simulations suggest that older models may have severely under-estimated the cumulative effect of $C0_2$ emissions and other contributing factors on global warming, meaning that the world could heat up much faster than what was previously believed possible. According to UNEP, in order for the world to stay below 1,5˚C existing climate commitments would have to be increased approximately fivefold.

One of the reasons why our planet has not yet warmed quicker is that global oceans not only act as important carbon sink – absorbing up to 39% of all human-produced carbon, they also absorb 90 % of the excess heat from global warming. However, the oceans' capacity to absorb heat and carbon is limited and this absorption is causing major disturbances for marine life. A recent long-term study shows that 2020 was the warmest year on record for global oceans. This research indicates that in 2020 the upper 2,000 meters of the world's oceans absorbed 20 more Zettajoules of energy than in 2019. That amount of heat could boil 1.3 billion kettles, each containing 1.5 liters of water. As the ocean warm and absorb more and more carbon their Ph levels change which leads to ocean acidification. Changes in the oceans' temperature and increased acidification are already causing coral bleaching and damaging entire marine ecosystems.

Perhaps the most visible effect of climate change is the melting of sea ice and terrestrial ice. Observed ice-sheet losses in Greenland and Antarctica are following IPCCs worst-case scenario projections and new research suggests that the melting of West Antarctic ice sheet may cause higher sea rise than previously assumed due to the bounce-back of the bedrock on which the ice sheet is sitting. The combined effect of complete melting of ice in Greenland and Antarctica would raise the sea level by 65m. The glaciers on Greenland alone can contribute 7m to the sea-level rise. The warmer air and oceans have already pushed Greenland's ice mass past its balance point – meaning that the glaciers are melting faster than they can recover and they will be lost, regardless of how much we curb the carbon emissions. In the last 50 years, temperatures across Alaska and the Arctic have increased twice as fast as in other parts of the world, which has led to scientists to believe that by 2050 the Arctic sea may be ice-free for the first time in 2 million years. New research suggests that this may happen as early as in the summer of 2035.

Our planet currently loses 1,2 trillion tons of ice each year and the rate of ice loss has increased by 57 % since the 1990s. Most of this ice is sea-based, but the Greenland and Antarctic terrestrial ice sheets together also lose 429 million metric tons of ice per year, contributing to changes in rising sea-levels, ocean's salinity and changes in distribution of Earth's overall mass. Greenland and Antarctic terrestrial ice also contain 99 % of all our planet's freshwater. The melting of terrestrial ice, combined with other human activities, such as excessive pumping of groundwater, has been found to be big enough to influence changes in the Earth's rotation, causing the Earth's poles to begin to drift to new locations. The average speed of drift has increased by 17 times in the 1995-2020 period, compared to 1981-1995 era. It is not just the Arctic and Antarctic that is melting. World's 220.000 mountain glaciers are losing 298 million metric tons of ice per year, enough to put Switzerland under 7.2 meters of water each year, and 31 % faster than 15 years ago. Half of the world's glacial loss is coming from Canada and the US. Historic pictures of disappearing mountain glaciers demonstrate the extent of ice loss around the world.

In 2020, the last intact ice-shelf in Canada collapsed into the sea. This event was caused by the same Artic heat wave that incurred record temperatures and months-long tundra and peatlands fires in Siberia. Scientists believe that this heat-wave was made at least 600-times more likely because of human induced climate change. Peatlands usually act as carbon sinks, accumulating organic matter over several centuries, but under present conditions they are becoming new sources of atmospheric carbon. Warming of the Arctic has led oil companies to begin to explore technologies that would freeze the thawing permafrost so that oil extraction in the North could proceed in spite of climate change. Permafrost melting is one of the major sources of methane (a much more potent greenhouse gas than $C0_2$) emissions. A recent study found that permafrost buried under the Arctic sea contains 60 billion tons of methane and 560 billion tons of organic carbon that have not been included in the current climate projections. Depending on the rate of release, which itself depends on the speed of Arctic warming, these methane and carbon stocks could significantly accelerate the rate of global warming in the coming decades. Release of frozen carbon and methane represents only one of the many feedback loops and tipping points of climate change that are believed to be both self-propelling and mostly irreversible. The projected costs and benefits of climate change also show that these have been highly unevenly distributed between the countries of the Global North and Global South.

Mass species extinction and biodiversity loss

The rate of biodiversity loss and species extinction due to human intervention is high enough to the be labelled the 6th mass extinction. The current rate of loss is unprecedented in the last 65 million years, when a presumed meteor hit exterminated 75 % of all then existing species. The exact rates of extinction are difficult to determine, because it is not known how many species actually exist, but even the most conservative estimates show that since 1900 the rate of extinction has been up to 100 times the "background rate". UN's Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services (IPBES) report, the most comprehensive to date, suggests that up to 1 million species could be threatened with extinction, many of them within decades. This loss is related to the fact that 75 % of terrestrial environment (and 66 % of marine environment) has been "severely altered" by human activity. More than 40 % of amphibian species are threatened with extinction and 680 species of mammals have already gone extinct since 16th century, a period which corresponds with the expansion of European colonialism. Ceballos et al. estimate that as much as 50% of the number of animal individuals that once shared Earth with us are already gone, as are billions of populations. A 2019 study suggests that 40 % of all insects are threatened with extinction and could be gone within decades. Habitat loss due to agriculture and pesticides used in the production of food are considered to be the main culprits. Even natural reserves are not safe. A study of 63 protected areas in Germany revealed that 75 % of insects were lost in less in than 30 years. In Puerto Rican Luquillo rainforest the number of ground insects dropped by 98 % in 35 years, with cascading effects on birds, frogs and lizards that feed on them. US beekeepers reported a record loss of 40 % of their bee colonies between 2018 and 2019. Apart from varroa mites and parasites, poor nutritional value of pollen from impoverished plants, pesticide exposure and other environmental reasons are considered to be driving the decline in bees' health. Honeybees are just one of many species of animal pollinators that are responsible for reproduction of more than 300.000 (or 87,5 %) of all flowering species. By volume, a third of all food crops that humans consume depends on animal pollinators, but by diversity more than 75 % of all main crops (fruits, vegetables and seeds) depend on it. The trophic cascades (loss of other species) resulting from wide-spread insect extinction can hardly be imagined.

Deforestation, and other changes to the physical environment (both terrestrial and marine), such desertification, expansion of monocultural agriculture, ocean acidification and deep-sea trawling are all contributing to the shrinking habitat of countless endangered species, but it is not possible to engage with all of these topics here, although they arguably among the main causes of the loss of species. The last part of this text speaks about how in less the a century humans have introduced a completely new and biologically harmful material to the natural world – plastic, and how this material has now become a permanent presence and threat to many forms of life on Earth.

Plastic waste and microplastics

In a relatively short period of time, from the invention of the first fully synthetic plastic material – Bakelite in 1907 until 2017 (last data available), humans have produced 8.3 billion metric tons of plastic materials. That is more than 1000 kg of plastic for every person alive today. According to research by Geyer, Jambeck and Law, half of all the virgin plastic produced between 1950 and 2017 was produced in the last 13 years. More than 6.3 billion metric tons of all plastic produced ended up as waste. Less than 10 % of it was recycled and approximately 80 % ended up in landfills or was simply discarded in the environment. Geyer et al. predict, that if the current trends continue, 12 billion metric tons of plastic will end up in the landfills or in the environment by 2050. Such numbers may be difficult to imagine, but considering the average weight of about 10g for a 500ml plastic bottle, this amounts to about 150.000 plastic bottles for each person alive today. According to the UNEP, we produce annually 300 million metric tons of plastic waste – almost equivalent to the weight of entire human population. UNEP warns, that if current trends continue, our oceans could contain more plastic than fish by 2050. Recent research shows that older studies may have severely under-estimated the amount of plastic already accumulated in the oceans. Most of this plastic is invisible to the naked eye due to its size.

Plastic in the environment breaks down into tiny particles, known as microplastics. These particles have now been found virtually everywhere in the world. Microplastics were found in the natural reserves in Swiss Alps, on the world's highest mountain – Mount Everest, and in the deepest recesses of the ocean, including the Mariana Trench. Researchers from UBC found evidence of microplastics more than 1000 m deep in the Beaufort Sea in the Arctic Ocean, presumably from laundry waste water from Canada and the US. The same research found microplastics in all 71 samples of near-surface sea water in the Arctic, including the North Pole. A recent study by International Pollutants Elimination Network (IPEN) and the National Toxins Network (NTN), found microplastics and other chemical pollutants to be among the main causes of the alarming decline of global fish populations and other aquatic life forms. The research shows chemical pollution is adversely impacting the aquatic food chain that supports all life on earth.

A research, commissioned by WWF and carried out by University of Newcastle, Australia found that people may already be eating up to 5g of microplastics every week – that is an equivalent of a credit card. According to this research, potentially the largest source of microplastic particles in human bodies could be our drinking water – both tap and bottled. More than 94 % of samples of tap water in the US contained plastic fibres. Researchers from Arizona State University found microplastics in all the samples of human tissue that they examined. Microplastics were found in placentas of unborn babies, in drinking water, table salts and air. In other words, the available research suggests that humans – and most other animal beings alive today eat, drink, breathe and excrete plastic – something that did not even exist a little more than a hundred years ago.