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WR 327

The Most Underrated Way to Be Sustainable

The health of our planet should be at the top of our concerns as a species, without a functioning planet, life ceases to exist. Human beings in particular have an immense impact on the planet's sustainability and longevity; this has been increasingly true since the industrial revolution. Despite our important role we often disregard environmental conservation, and as a result the survival of our planet is in question. Indeed, humans are responsible for a lot of the problems, but we also have many solutions. One of those solutions is to roll back or even eliminate our consumption of animal products. Transforming the way we produce and consume animal products is absolutely essential to the sustainability of our planet and life as we know it.

Problems

Warming: One of the main problems is global warming, this is where a large portion of environmental issues stem from. Since 1910, our average global temperature has increased 2 degrees Fahrenheit. This doesn't seem like much, but when you consider how old our planet is, that is a big increase in a short period of time. Some estimates say that on our current trend we will likely be 5-10 degrees warmer than 1910 by the end of this century. Deniers will argue that our planet has generally been warming for some time now. While this is true, it hasn't risen this fast in well over 1,000 years.

- **Causes:** So how is the planet warming? Well, the sun is the primary thing heating our planet (while the core is very hot, heat doesn't easily escape to the surface). So how is the planet's temperature

increasing from the sun? The three biggest things that mitigate the earth's surface temperature from the sun are the ozone layer & atmosphere, the rainforest, and the ocean.

- Greenhouse gas emissions deplete our ozone layer, which blocks the sun's heat. While the ozone layer has actually been improving in the last 50 years, it's still partially depleted, and needs continued attention. Additionally, greenhouse gases also act as a blanket that traps energy in the earth's atmosphere - this energy heats the planet. CO₂ from cars is the largest contributor, but other gases like methane play a role as well. Methane has a shorter atmospheric life cycle than CO₂, but its heating potential is 80 times greater.
- Trees absorb CO₂ during photosynthesis, and expel oxygen, which help mitigate the onslaught to the ozone layer - deforestation reduces the amount of trees and other plants available to filter our air.
- Lastly, oceans help regulate the weather and temperature. The ocean acts as a massive sponge and can absorb large amounts of heat. However, there are two problems with this. The first is that this is a finite solution, and the ocean can only take so much - currently it's absorbed one third of the CO₂ caused by humans, and 90% of the excess heat caused by greenhouse gases. Secondly, due to its ability to absorb, the ocean itself is warming even faster than the surface.
- Effect: Warming has many effects on the planet's ecosystem. It melts the polar ice caps, which rises sea levels. Agriculture is affected and food shortages increase. Freshwater is drying up and draughts are becoming more common; water shortage affects not only animals, but human beings. Warmer temperatures means an increase in wildfires that hurt people and destroy animal habitat; warm temperatures also cause increased animal migration - the result is a loss of species at a rate 1,000 times the norm. Similarly, warmer oceanic temperatures mean difficult living conditions for marine life and coral - The Great Barrier Reef lost 50% of its coral I between 2016-2017 alone from

Coral Bleaching, a fatal byproduct of rising temperatures - it's estimates that on current greenhouse trends, all of the globe's coral could cease to exist by the end of century.

Melting ice / rising sea levels: The polar ice caps have been declining at 13% per decade, and the global sea level has risen 7-8 inches since 1900.

- Causes: See above
- Effect: Melting of the polar ice caps means a reduced habitat for species that live and migrate there. This has a revolving effect on heat because thriving ice caps help cool the planet. It also means rising sea levels which encroach into communities and destroy infrastructure; cause soil erosion; affect farmland; and causes heavy rainfall from increased evaporation that can lead to flooding, and massive storms.

Deforestation: Deforestation is when forest lands are permanently converted to be used for something else, like agriculture; degradation is when the forest temporarily loses its capacity to function and sustain the way it was intended, like a forest fire. Over the last 100 years we've lost 1 billion hectares (bha) of forest to deforestation (1 hectare = 2.5 acres), roughly 21%. Previously it took 10,000 years to lose that much forest.

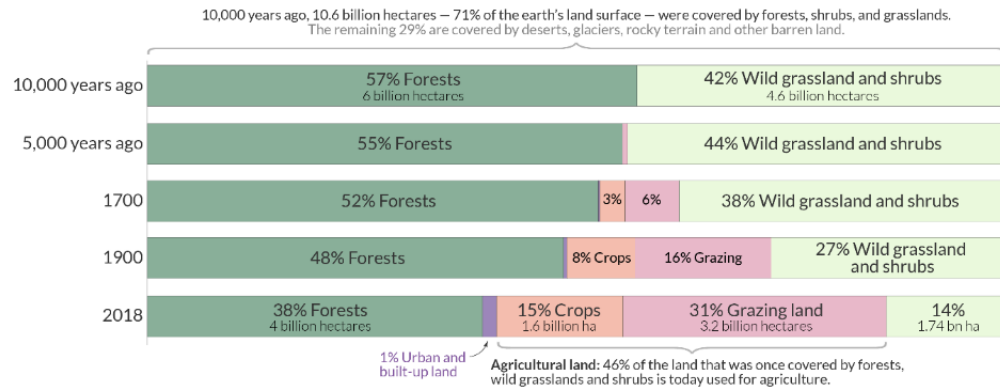
- Causes: By far the main cause is agriculture, contributing to 70% of overall deforestation. Every year 5.8 mha is lost to agriculture, of which beef (2.71M) is by far the largest contributor, followed by soy (480K), and palm (270K), however the majority of soy production goes towards feeding livestock. By contrast, timber industries only account for roughly 380,000 hectares of deforestation, most of our paper is actually recycled, and for every tree cut, 3 more are planted. Timber and forest fires do contribute 5.4 mha, and 4.8 mha to degradation every year, respectively. Of the available land on earth, 1% is occupied by urban land (i.e. cities), 14% is occupied by grassland, 38% is occupied by

forests, and a whopping 46% is occupied by agriculture (of which, 31% or 3.2 bha is livestock grazing). That means there is nearly as much livestock land as there is forest.

Humanity destroyed one third of the world's forests by expanding agricultural land



Agriculture is by far the largest driver of deforestation. To bring deforestation to an end humanity has to find ways to produce more food on less land.



Data: Historical data on forests from Williams (2003) – Deforesting the Earth. Historical data on agriculture from The History Database of Global Environment (HYDE). Modern data from the FAO. OurWorldinData.org – Research and data to make progress against the world's largest problems. Licensed under CC-BY by the authors Hannah Ritchie and Max Roser.

- Effect: In addition to the effect on global warming, deforestation also has a direct impact on the wildlife it's displacing. Loss of habitat means animals must migrate to areas they might not be adapted to, and likely unable to survive in. Less trees also means dirtier air for humans and animals. Deforestation is another cause of flooding since trees help the land to retain water and topsoil.

Pollution: Pollution poisons our water, plants, and animals.

- Causes: Greenhouse gasses. Littering - the Great Pacific Garbage Patch is an island of floating trash 1.6 million square kilometers, or 2 times the size of Texas. Dumping chemicals, livestock, and other water contamination - 40 percent of US rivers and streams are contaminated, with agriculture being the main culprit. Livestock produces 500 pounds of manure in the US alone, and this often finds its way into our rivers and streams. Those numbers are much higher in undeveloped countries that we outsource production of agriculture to.
- Effect: Greenhouse gasses deplete the ozone layer and create unhealthy air for plants and animals. Littering can often kill animals on land and in the sea, as well as pollute oceans and streams.

Polluted water can create unhealthy water for animals and humans - in the US **most** contaminated water is treated successfully, but roughly 2 million people around the world use contaminated water. Consuming untreated water with fecal matter can cause poisoning from E. coli or Salmonella (Typhoid), Diarrhea, Chlamydia, Hepatitis E, and Hookworm. In addition to the impact on humans, manure can contribute excess levels of nitrogen and phosphorous into contaminated stream and rivers, which cause blooms of algal. Too much algal will deplete oxygen in the water and end up killing large amounts of fish.

Ocean Ecosystem Damage: The ocean is constantly abused, and as a result much of the ecosystem is failing.

- **Causes:** In addition to warming and pollution, the ocean faces additional problems that are direct result of fishing. This category is somewhat unique compared to the others, other categories have multiple culprits, but many of these problems are mostly or entirely caused by fishing. Pollution plays a part is seabed destruction, but its pennies compared to the effect of bottom trawling. Bottom trawling is the act of dragging large pieces of metal and netting across the ocean floor in order to catch fish and other marine life. Bottom trawling almost always results in bycatch. Bycatch is what happens when species that aren't meant to be caught, are caught in the large trawling nets. Other fishing techniques include poison (cyanide), and explosives (potassium nitrate). Last but certainly not least is overfishing. Some species have been fished to the point of near extinction - during the 1990's the Atlantic Cod had declined by 99% and 75% in Newfoundland and Canada respectively - laws are currently in place to protect the species because it has not yet recovered.
- **Effect:** Bottom trawling disturbs the ocean floor, meaning habitats and microorganisms are destroyed, often taking 1-2 years to recover. Shelf seas and deep continental slopes are both affected. The Mediterranean Sea has experienced damages between 200m - 800m, where there is

loss of organic matter by 52%, biodiversity by 50%, and slower carbon turnover by 37%. Bycatching from bottom trawling results in the death of roughly 300,000 whales, dolphins, and porpoises each year, many of which are protected species; this is the largest cause of death for small cetaceans, many of which face extinction. Coral reefs have a 50% - 80% mortality rate when effected by poison and explosives used in fishing practices. And let's not forget that overfishing directly alters the population of the native species. Unlike farming which can breed and control the population of their livestock, many species of fish are not bred the same way, and therefore cannot be controlled. This can result in extinction or a severe decrease in population, that change severely alters the ecosystem.

As you can see this is truly a wholistic problem, many of these things are mutually inclusive and symbiotically affect one another. Notably mutual is relationship between animals and ecosystems - with the extinction of animals, ecosystems begin to fail, which in turn affects more animals - aside from this being an ethical tragedy, this will eventually affect the way humans are able to live and prosper.

Solutions

Overview: Humans engage in many sustainable activities every day: we walk or ride the bus instead of driving, this reduces the amount of CO2 our cars release into the atmosphere. We buy local products, also reducing the amount of transportation, waste, and often pollution associated with larger manufacturers. We reuse and recycle items, eliminating the amount of energy and resources needed to produce more goods. Indeed, there are a lot of ways to help the planet, but reducing our consumption of animal products is not only the most overlooked solution, but also one of the most crucial.

Warming: Reducing animal consumption would have a direct and positive impact on global warming.

- How it would have an impact: Large farms of livestock release the greenhouse gas methane in their flatulence that warms the atmosphere. Agriculture is the largest contributor of methane, and livestock the biggest within that spectrum. When measured in kg of greenhouse gasses emitted for 100g of protein produced, beef comes in at 50kg, eggs are the lowest animal product at 4kg, and the most “dangerous” plant-based products are grains at 3kg. Reducing animal consumption would mean less livestock needed, less methane emitted, and ultimately cooler temperatures.
- Effect: This would result in more habitable climates for land and marine animals, less coral bleaching, less draught, less melting of the polar ice caps, less wildfires, and less of an effect on other agriculture.

Deforestation: Lowering our reliance of animals would also mean less deforestation.

- How it would have an impact: Reducing our consumption of animals would cut back the amount of land needed to feed them, which would mitigate deforestation. Roughly 80% of agriculture land is used to produce livestock, but that only supplies 20% of the world’s calories. If we were to completely eliminate meat from our diet in favor of plants, it would decrease farmland from 4 bha to 1 bha, or 75%.
- Effect: Reduced deforestation would increase photosynthesis, cleaning our air and reducing global warming. It would stop the displacement of species to uninhabitable places. Lastly, it would free up land that is used to feed livestock, for crops that can feed humans; there cannot be enough emphasis put on the fact that livestock not only requires land to graze, but also land to grow their food. This would greatly reduce food shortages around the globe.

Pollution: Decreasing animal dependency will lower the amount of pollution that escapes from farms.

- How it would have an impact: In addition to reducing greenhouse gases, less animal agriculture would also mean less potential pollution in our streams and rivers.
- Effect: Less people would get sick from contaminated water, especially in underdeveloped countries. This would prevent nitrogen and phosphorous contamination, keeping algal levels low, and maintaining a healthy environment for fish and other freshwater animals.

Ocean Ecosystem Damage: Lowering our consumption of marine life will have a direct impact on the health of the ocean’s ecosystem.

- How it would have an impact: Less fishing will mean less bottom trawling, bycatch, poisoning, explosions, and overfishing. While many of these acts are illegal, they still occur, and the only way to truly eliminate them is to eliminate the demand.
- Effect: Ecosystems on the ocean floor will remain healthy, coral reef will begin to heal, endangered species will not be killed as bycatch, and overfishing won’t threaten to collapse healthy populations.

Use of Resources: Lastly, livestock require a lot of resources when compared to other agriculture.

Reducing animal consumption will mean more conservation.



- How it will have an impact: Beef requires an absurdly large amount of water to produce. Second to beef is nuts, which requires half as much water. Every other food requires less water than meat and most other animal products. Lowering our consumption of animal products, especially beef, will lower our water usage. Additionally, whether you attribute it to deforestation, or to consuming resources, livestock feed needs a second mention. Using grains to feed livestock is a resource we consume with diminishing returns.
- Effect: Lower water usage means more water to go around! Less draught for plants and less malnutrition for people. Lowering the use of grains and other feed for livestock means more available for people to eat.

Other Benefits

In addition to sustainability, let's briefly touch on three other benefits of reducing our reliance on animal products.

- 1) It's far too much to list, but the health benefits of consuming primarily fruits and vegetables are plentiful. Reduced cholesterol, lower fat content, higher vitamin & mineral content are just a few. There are also debates on how animal products can increase risks of cancer and Alzheimer's. Protein and B12 are often mentioned as deficiencies in a vegan or vegetarian diet, but these are relatively easy to obtain through selective eating, or supplementation.
- 2) The second benefit is infectious disease. Zoonotic diseases are those that are born and spread from animals. Farming in close proximity to animals, in unsanitary conditions only increases the probability of a zoonotic outbreak. Genetic diversity is also a major factor; genetic diversity naturally creates disease resistance, when we house large amount of genetically similar animals together, that resistance never gets built. Covid 19 is a perfect example of a zoonotic disease.

- 3) The last benefit is the peace we can give to other animals. We have an obligation as not only the most intelligent beings, but also the most destructive of all the animals, to take care of the other sentient beings that we share the planet with.

Objections

To recap, some deniers will argue that the earth has been constantly warming for some time now.

While this is true, it's been warming much faster than in recent history. Pro-meat eaters will argue the protein risks of a plant-based diet, but those arguments are folly. Beans are one of many ways to get protein from plants, 1 cup of pinto beans (15g) will provide slightly less protein than a 4oz steak (21g), but it yields higher fiber, iron, and calcium, with no cholesterol and less fat; Field Roast is a meat alternative made out of wheat gluten that provides 22g of protein per 3oz serving, with no cholesterol and less fat than a steak. Lastly, many will argue that we will need more farmland to grow enough plants to feed the planet. This is simply not true, and it's estimated we will reduce farmland by 75% if we eliminated animal agriculture.

Cost and How to Implement

Less meat sounds great, but how easily can we transition our agriculture?

- On a consumer level, this has already been done. Meat alternatives are well developed and established. Impossible Burgers, Beyond Burgers, tofu, tempeh, seitan, and soy curls are just a few meat alternatives, and that doesn't even mention all the milk alternatives! Companies like Higher Taste in Portland, OR have been making packaged vegan and vegetarian burritos and sandwiches since 1987. They use a combination of meat alternatives: Butler Foods soy curls, Ota tofu, and they convert wheat gluten from Australia to make their own version of seitan.

- On an agricultural level, there will certainly need to be some transition since the crops that feed livestock are more limited in variety than the crops we would need to feed humans. This can either be viewed as a threat or an opportunity. The transition will take time and money, but the end product will be more lucrative for farmers that have to spend far less to produce plants than they do meat. In the UK, farmers actually lose an average of £18,650 a year on meat production, they are kept afloat by large government subsidies that make up 62% and 84% of income in England and Scotland, respectively. The farmers that thrive without support are those in horticulture.

Final Thoughts

Many are unwilling to give up animal products entirely, even vegetarians still consume dairy and eggs. The point of this paper is not to convince people to give up all animal products overnight. While that would be wonderful, it's incredibly unrealistic. The point of this paper is to give readers another tool they can use for sustainability. There are 2 additional options readers can take towards being sustainable other than adopting a vegan or vegetarian diet.

- Option 1: Choose one day out of the week where you completely remove meat, or all animal products from your diet. This means every week, on vacation, on holidays, every week. Additionally, if you choose to still consume some animal products other than meat, that doesn't mean you replace your meat with more cheese, you find an alternative that is completely plant-based. If you want to see the environmental impact of this option, look at the charts above, or take this one on for size - if you were to eliminate meat for one day every week, by the end of the year you would have reduced the same amount of emissions as you would walking instead of driving for 348 miles.

- Option 2: Permanently replace something in your diet with something plant based. This could be milk for oat milk, hummus for mayonnaise, or seitan for beef (seriously beef is the biggest problem here). Again, this doesn't mean you get to replace beef for extra chicken, that doesn't count.

One of humanities great strengths is our empathy, another is our ability to solve problems. Our stubborn and often selfish nature are certainly weaknesses. Somehow empathy and selfishness can coexist. If we want to survive as a species, we need to have empathy for the other beings on this planet and solve problems for the generations that have yet to inhabit it. There are so many solutions available to us. Whether we choose to implement enough of them, fast enough, is an entirely different question.

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