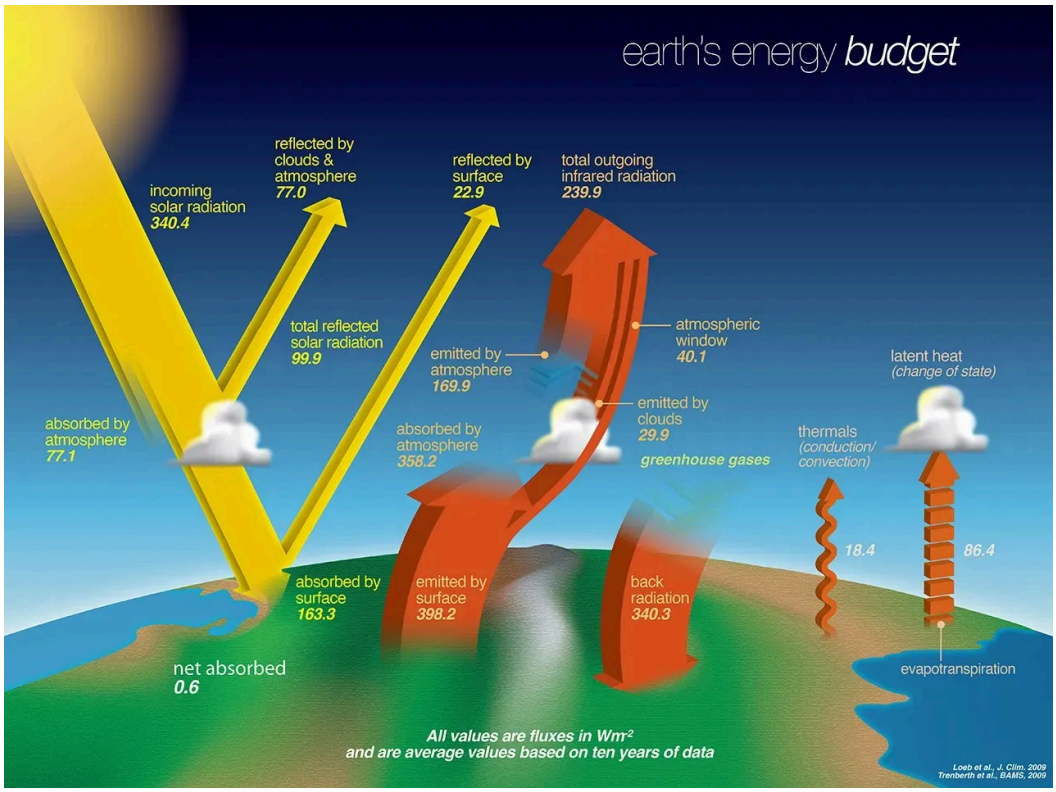
A is for Atmosphere



The atmosphere and the environment are intricately connected. It is an indispensable part of shaping the environmental conditions, impacting the climate and the overall ecosystems.

The atmosphere includes five layers: Troposphere, stratosphere, mesosphere, thermosphere, and exosphere. It is composed of nitrogen (78%) and oxygen (21%), with trace amounts of other gases such as argon, carbon dioxide, and water vapor. These gases are essential for various biological and chemical processes that sustain life. The atmosphere helps maintain the Earth's temperature by trapping heat through the greenhouse effect, which is called climate regulation. Greenhouse gases, such as carbon dioxide and methane, absorb and emit infrared radiation, keeping the temperature warm.

The ozone layer, located in the stratosphere (the second lowest layer), is another important component of the atmosphere that protects the environment. It absorbs and scatters the majority of the sun's harmful

ultraviolet radiation (UV), preventing it from reaching the Earth's surface. Once the ozone layer gets damaged, all lives will be exposed to the UV, leading to skin cancer, and risk for wildlife and ecosystems.

The atmosphere also affects weather patterns. Weather phenomena, such as precipitation and wind, are driven by the interactions between the atmosphere and the Earth's surface. These patterns impact the distribution of water resources, the health of ecosystems, and agricultural productivity.

By promoting sustainable practices and reducing pollution, we can protect the atmosphere and ensure a healthy and resilient environment for future generations. The atmosphere is not just a layer of gases; it is the lifeblood of our planet, sustaining and nurturing the delicate balance of life on Earth.

https://www.nasa.gov/general/what-is-earths-atmosphere/

B is for Biodiversity

Biodiversity is a testament to the interconnectedness and interdependence of all living things. It encompasses the diversity and the genetic variation of species, plays an important role in preserving the environment and sustaining life on Earth.

Biodiversity is of paramount importance with regards to maintaining ecological balance. Every species has a specific role in the ecosystem, where it interacts with other types of species, forming a close-knit web that ensures the stability and productivity of the environment.

Ecosystems with high biodiversity are more resilient to environmental changes and disturbances, such as climate change and natural disasters. Diverse ecosystems can better withstand and recover from these stresses because they have a greater variety of species that can adapt to changing conditions.

The effects of biodiversity on the environment are far-reaching, it influences the ecological balance, human well-being, and the resilience of natural systems. By recognizing the value of biodiversity and taking action to mitigate threats, we can preserve the environment and safeguard the ecosystem.

https://www.britannica.com/science/biodiversity

C is for Carbon Footprint

A carbon footprint is a measure of the total amount of greenhouse gases, mainly carbon dioxide (CO2), that are emitted through human activities. These activities include burning fossil fuels for energy, transportation, and industrial processes.

A high carbon footprint not only contributes to climate change, but also impacts the environment tremendously. For instance, the burning of fossil fuels releases pollutants such as sulfur dioxide and nitrogen oxides, which can cause acid rain. Acid rain harms aquatic ecosystems, forests, and soil quality. Deforestation, another major contributor to carbon emissions, results in the loss of biodiversity and the disruption of ecosystems.
Aware of the impacts and consequences, it is necessary that we make efforts to reduce our carbon footprint on Earth. There are several ways to accomplish that, we can use energy-efficient appliances, opt for public transportation, recycle and reduce the consumption of single-use plastics, or eat a plant-based diet.

https://www.britannica.com/science/carbon-footprint

D is for Desertification

Desertification is the process of fertile land becoming desert as a result of drought, deforestation, etc. It poses a significant threat to the ecosystem, particularly in arid and semi-arid regions.

Desertification can be caused by numerous factors. Climate change such as prolonged droughts and increased temperature can make the land more susceptible to being desertified. The removal of trees for agriculture, logging, or urban development can also reduce the land's ability to retain water and protect the soil from erosion. Practices such as monocropping, excessive irrigation, and the use of chemical fertilizers can degrade soil quality and fertility.

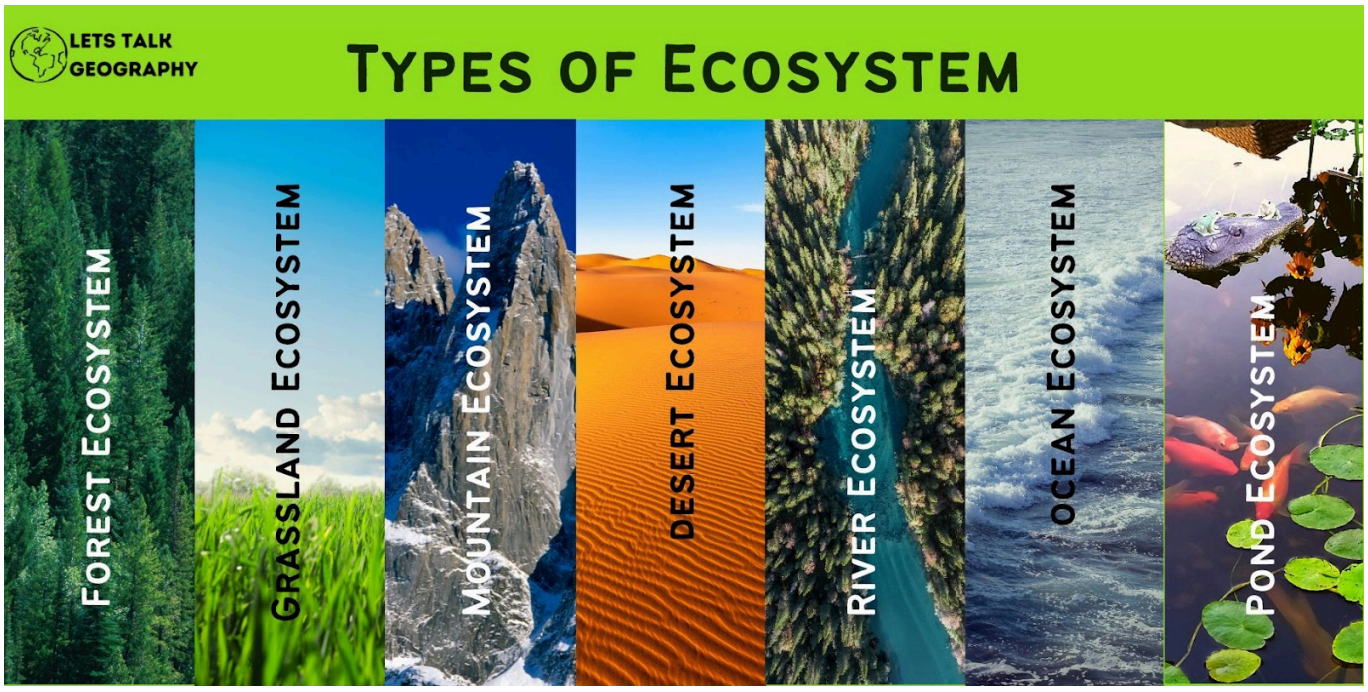
As land becomes desertified, habitats for animals and plants are destroyed, leading to a decline in biodiversity and possibly extinction for some species. Lower ability to retain underground water leads to scarcity in water resources. Finally, degraded land is more prone to wind erosion, resulting in dust and sandstorms that can negatively impact human health.

Desertification and its close relationship with climate change underscore the need for solutions to address both challenges. By adopting sustainable land management practices, we can protect our land resources

and ensure a resilient and sustainable future for all. Desertification is not just an environmental problem, it is a call for global cooperation and sustainable development.

https://www.nationalgeographic.com/environment/article/desertification

E is for Ecosystem



Ecosystems, communities of living organisms that interact with each other, are fundamental to life on Earth. They provide resources that sustain biodiversity, regulate climate, and support human well-being.

Ecosystems consist of biotic (living) and abiotic(non-living) components. Biotic components include plants, animals, and microorganisms. Abiotic components include elements like sunlight, water, air, and minerals.

Climate change affects ecosystems in various ways, whether it is habitat destruction or loss of biodiversity, all lead to ecosystem degradation. On the other hand, healthy ecosystems are important in mitigating climate change. Forests, wetlands, and grasslands absorb CO_2 from the atmosphere, storing carbon in biomass and soils, which helps reduce the concentration of greenhouse gases and mitigate global warming. Processes like evapotranspiration from ecosystems can cool the air and regulate humidity. Diverse and healthy ecosystems are also more resilient to climate change impacts, providing natural buffers against extreme weather events and supporting species adaptation.

F is for Forests

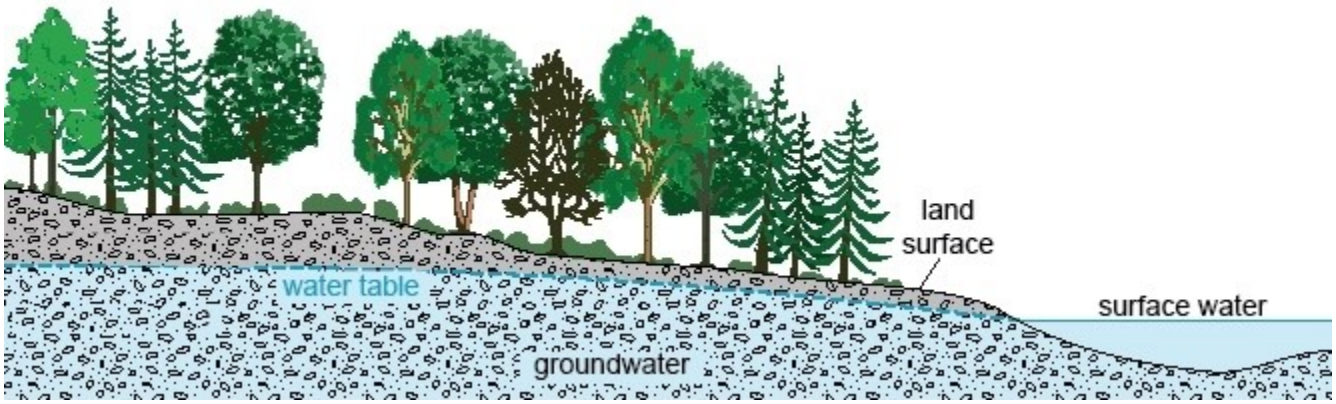
Where is it cooler, the meadow or the forests? The answer is forests. However, our world is not becoming cooler but rather hotter. Why is this happening? The answer is forests.
When trees are cut down for lumber in places like the Amazon, the surface temperature of the earth gradually increases. In 2023, there was a total of 3.7 million hectares of forests removed from our surface, for reference, that is losing about 10 football fields of forests a minute. There are about 518,400 minutes in a year. Deforestation, while decreasing yearly, is still a major problem for our Earth.

Not only does cutting down trees increase the temperature of the Earth, it also decreases the biodiversity of plants and animals in places like the Amazon where biodiversity should be the greatest. Decreasing biodiversity is a snowball effect in the sense that if species start to die off, then the other species that rely on the deceased ones to survive will also start to die off. It will go on and on until there are no species left in an ecosystem.

If ecosystems get to this point, returning back to what the ecosystem was before deforestation, it may never fully return. Even if we start now to help regenerate and reverse the effects of deforestation, it will take decades for the ecosystem and habitat that the species thrived in to restore.

https://www.aljazeera.com/wp-content/uploads/2022/04/2022-04-08T160611Z_1643099778_RC24JT9M7I6P_RTRMADP_3_BRAZIL-ENVIRONMENT.jpg?resize=770%2C513&quality=80

G is for Groundwater



Groundwater is water below the surface of the land. It is a source of freshwater that humans can access through a well. However, groundwater has been significantly impacted by the side effects of climate change. With climate change, there is irregular weather patterns which can cause droughts and floods. When droughts occur, the availability of groundwater access greatly depreciates which is detrimental to humans as a lot of our water consumption in places like Nevada comes from groundwater.

Groundwater is also affected by climate change because as the sea level increases, the chances of salt water from the ocean can infiltrate the fresh groundwater. When salt water mixes with freshwater, it is no longer suitable to drink without treatment. Reverting fresh water that has been mixed with salt water can be done but it is extensive and expensive. Another way that groundwater can be contaminated is through runoff from the land surface. Specifically, fertilizers and oil from farms and cars can contaminate groundwater. This makes the water unsafe to drink.

https://www.epa.gov/superfund/superfund-groundwater-introduction
https://www.un-igrac.org/areas-expertise/groundwater-climate-change

H is for Hope

Throughout this book, there will be a lot of terrible things that are happening to the planet that cause climate change or things that are caused by climate change. However, there is hope. The fact that you are reading this page means that there are people out there, including yourself, that care about our planet and the different things that are effecting its well-being.

Carbon emissions are very high for our planet which comes from burning fossil fuels. However, while carbon emissions are high, there is an increase in usage of wind and solar energy. In addition, electric cars are becoming more prevalent in today's society which will reduce carbon emissions because gas cars burn fossil fuels but electric cars run on batteries.

Another reason for hope is that there are several potential solutions that can help reduce the effects of climate change. Some are easier than other. For example, planting trees can help decrease the surface temperature because forests are cooler than a meadow and a meadow is cooler than a city. Another potential plan to help reduce climate change effects is to make sustainable choices like buying an electric car and not using gas to get around. One can also choose to use public transportation to reduce carbon emissions as well.

https://academic.oup.com/bioscience/advance-article/doi/10.1093/biosci/biae087/7808595
https://www.newyorker.com/magazine/2022/11/28/climate-change-from-a-to-z

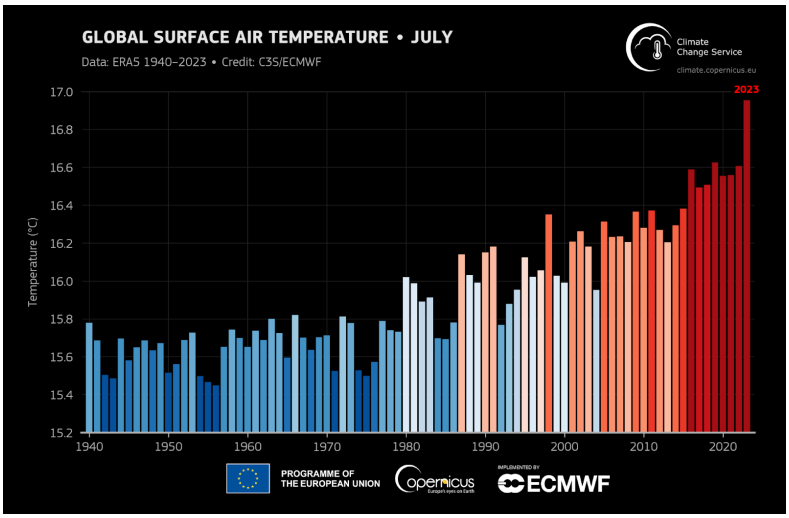
I is for Icebergs

Throughout history, it has been shown that global warming has caused icebergs to rapidly decrease in size. The warming of the surface of the Earth causes ice in the icebergs to melt at a faster rate than in previous years. With an increase in surface temperature, the sea temperatures are also increasing which melts the icebergs even further. Above is Glacier National Park in the same spot, 99 years apart.It is evident that the iceberg in Glacier National Park is melting. It is melting so fast that in another 100 years, there will be no glacier in Glacier National Park. The difference between the sea temp melting the icebergs is that it belts the icebergs from the bottom where it is not as noticeable and it makes the icebergs melt twice as fast. As the icebergs go from ice to water, this causes an increase in sea levels. Icebergs melting are the cause of 50% of the sea levels rising. The other 50% is from the thermal expansion of the water in the ocean.

If humanity continues to keep heating up the world at this pace, the melting of the icebergs will cause the ocean to creep up onto more of the land where humans reside. It can lead to more cities being underwater, all due to humans' actions to continue to heat up the world by cutting down trees and burning fossil fuels.

https://www.britannica.com/science/iceberg/Climatic-impacts-of-icebergs
https://www.jstor.org/stable/26891410?seq=2

J is for July



It has been felt by almost everyone, July has been hotter the past couple of years than when we were all children. According to the graph above, July 2023 had the highest surface temperature recorded at about 17.0 degrees Celsius. This temperature was an increase of about 0.4 degrees Celsius from the previous year. This temperature increase can be explained by several individual factors. However, the main factor is climate change. As humans are cutting down more trees and polluting our atmosphere with more and more greenhouse gases, the temperature of the surface of the Earth is increasing. The increase in heat is not felt by one country, state, or city but by the entire world. Across the globe in July, countries are reporting high temperatures that are way above normal temperatures, all because of global warming and climate change.

Extreme heat in the month of July is not only impacting our sweat glands but also people's health. As the temperatures are so high, some individuals with heart conditions can go into heat stroke which leads them dead or in a hospital. In the past 20 years, heat-related deaths have increased by 85% for individuals over the age of 65. Numerous heat waves have occurred in Asia that have lead to thousands of individuals dying from heat-related injuries. Increasing temperatures not only melt icebergs but they also cause people to melt and some to die.

K is for Kyoto Protocol

The Kyoto Protocol is an international treaty that has been in effect for almost twenty years. It was enacted to establish legally binding restrictions on reducing greenhouse gas emissions. After the scientific community established that greenhouse gasses cause global warming, which in turn harms the ecosystems on the planet, plans to mitigate and control these harmful chemicals were determined to be necessary. This protocol was first adopted in Kyoto, Japan in 1997.

The Kyoto Protocol is applied to seven greenhouse gasses that are known. They are carbon dioxide (CO_2), methane (CH_4), nitrous oxide (N_2O), hydrofluorocarbons (HFCs), perfluorocarbons (PFCs), sulfur hexafluoride (SF_6), nitrogen trifluoride (NF_3). The protocol was founded on the principle of shared but differentiated responsibilities. This recognized that countries have different capacities to combat climate change based on their economic status. This resulted in the protocol mandating that developed countries limit their emissions and take the initiative in reducing climate change.

The main goal of enacting the protocol was to reduce greenhouse gasses by 5% below 1990 levels between 2008 and 2012. To achieve this goal, the protocol established a system of emissions trading, known as the Clean Development Mechanism (CDM), which allowed industrialized countries to offset their emissions by investing in clean energy projects in developing countries.

This protocol was a good step in limiting climate change but it faced a lot of challenges, particularly because it did not include major developing countries such as China and India. Both of these countries were rapidly increasing greenhouse gas emissions and population. Other countries had resistance to this protocol because they were already facing economic challenges and by placing these restrictions on them it created more financial responsibilities. Despite these challenges the Kyotot protocol was a crucial step in addressing climate change as a planet, as well as create reason to have more sustainable technologies.

L is for Landfills

What do you think when you hear about landfills? Is it pollution, waste, or diseases? How about the classic movie Wall-E? Wall-E is an iconic Pixar movie that explores the dangers of excessive waste and consumerism. It shows what the future could hold for humanity. Wall-E first takes place on a planet with no humans and only a little robot with his cockroach friend. This poor lonely robot experiences hardships and lack of love very early in the film due to their loneliness. The planet has natural disasters, is filled with clutter, and only a little robot who is programmed to sift through the trash. As the robot sifts through the trash it begins to exhibit embarrassment and grief in the viewer. The opening scene of Wall-E is a strong message of what humanity has done to Earth. This film effectively explores the need for efficient waste management and the flaws in our current way of life. The film aims to inspire us for a better future.

According to the University of Colorado Boulder, the United States has 3,000 active landfills and 10,000 closed landfills. Landfills are an important part of life, however, humans' over-reliance on them have created many issues. This is something that is not uncommon. It is important to reduce the amount of goods you consume when you can, reuse items until you cannot, and recycle acceptable items. Landfills negatively impact the environment by releasing methane gas and causing groundwater contamination. Landfills, a common method of waste disposal, have significant environmental consequences, as depicted in the film Wall-E, which highlights the dangers of excessive waste and consumerism, inspiring us to adopt more sustainable practices like reducing, reusing, and recycling.

https://en.wikipedia.org/wiki/Landfill
https://www.colorado.edu/ecenter/2021/04/15/hidden-damage-landfills#:~:text=The%20United%20States%20has%20over,their%20effects%20on%20the%20biosphere.&text=The%20average%20landfill%20size%20is,of%20habitat%20have%20been%20lost.

M is for Microplastics

Microplastics are small bits of broken-down plastic waste. Once the plastics are broken down to 5mm or less they are considered microplastics. They then begin polluting the environment. They come from packaging, cosmetic products, or synthetic fibers. The small plastics enter into the lithosphere, atmosphere, hydrosphere and ultimately the biosphere. Once they enter the biosphere major harm begins. Plastic causes harm to plants and wildlife because of the chemicals they contain. Due to plastics' absorptive nature, it concentrates chemicals. Microplastics enter the human body through inhalation, ingestion, or skin ingestion. This leads to asthma, inflammation, and intestinal and organ damage.

Reducing microplastics is important and can be done through several methods. First, we can take individual steps by choosing plastic-free alternatives. Choosing to use reusable items and preventing single-use plastic waste eliminates plastics in the environment. Another way is disposing of plastic properly. When it is put in a proper place and cannot enter into the hydrophere or lithosphere then it reduces pollution. Supporting businesses to take sustainable action towards consumption is another way to take action. Ultimately plastic pollution is a problem caused by humans that impacts all life on Earth.
https://epa.illinois.gov/topics/water-quality/microplastics.html#:~:text=Microplastics%20are%20generally%20defined%20as,millimeters%20%5Bmm%5D)%20in%20size.

N is for Natural Disasters

Natural disasters are a force of nature. They are caused by the natural processes of weather and temperature changes. They have devastating impacts on humans, animals, and infrastructure every year. These events typically happen in late summer or early fall but can be at different times based on the region and type of natural disaster. The effects of these events can be extreme or minimal. Natural disasters have increased due to climate change.

Warmer oceans have resulted in stronger hurricanes, typhoons, and rains. The warm temperatures are basically fuel for the storm. The energy allows the hurricane to keep churning creating heavy winds. The warmer water also creates more moisture from the evaporation. Sea level also rises with warmer water temperatures. When this happens costal regions flood.

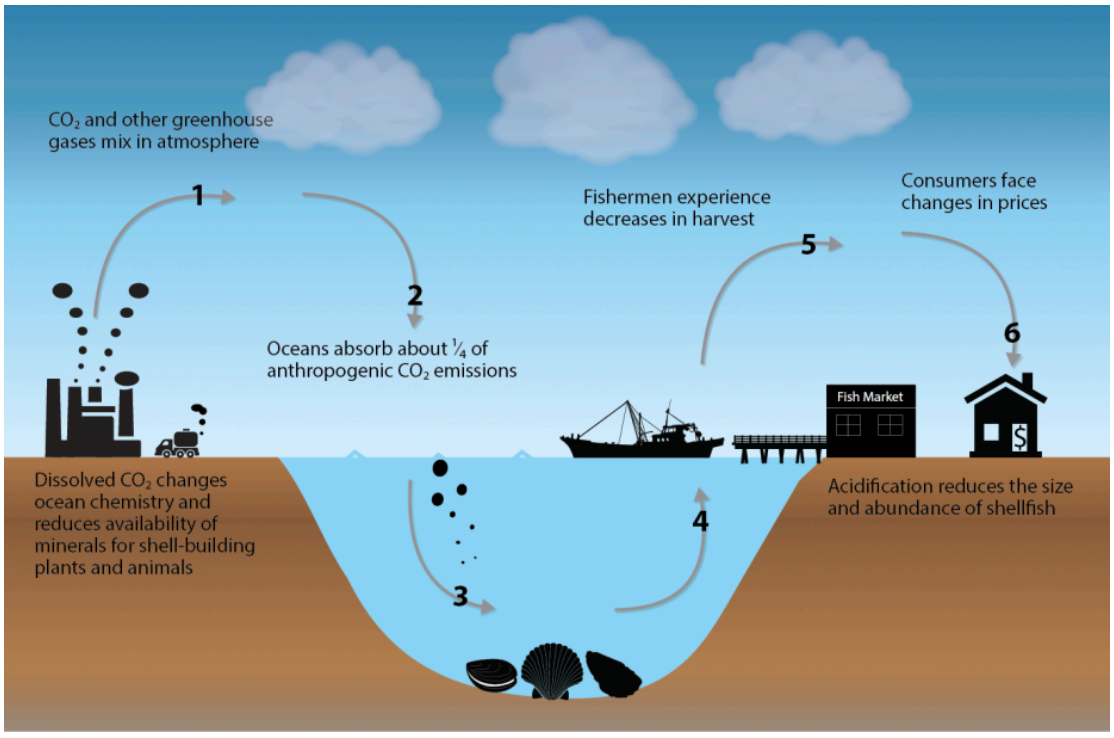
Climate change has caused shifted precipitation patterns causing prolonged drought. These changes can alter weather patterns, leading to more extreme weather events, such as heatwaves, cold snaps, and heavy precipitation. However although there is increase moisture some areas are also more dry. Climate change can create drier conditions, making forests and other vegetation more susceptible to wildfires. Warmer temperatures and earlier snowmelt can extend fire seasons, increasing the risk of large and destructive wildfires. This can all lead to economic loss for all humans. Extreme weather events can force people to flee their homes, leading to displacement and migration. Heatwaves, air pollution, and waterborne diseases can pose serious health risks to vulnerable populations. To mitigate the impacts of climate change-related natural disasters, it's crucial to reduce greenhouse gas emissions, invest in climate adaptation measures, and build resilient communities with ideas such as low impact development.

https://www.sciencemill.org/blog/2023/2/2/february-focus-engineering
https://www.bgs.ac.uk/discovering-geology/earth-hazards/earthquakes/what-causes-earthquakes/#:~:text=Earthquakes%20are%20the%20result%20of%20sudden%20movement%20along%20faults%20within%20the%20Earth.

O is for Oceans

Billions of years ago, Earth was a molten, hostile environment. But as the planet cooled, water vapor from volcanic eruptions condensed and fell as rain, collecting in the depressions that would eventually become our oceans. This primordial ocean, teeming with dissolved minerals and gases, set the stage for life to emerge. The oceans are often referred to as the "cradle of life." Simple organisms, such as bacteria and algae, thrived in the nutrient-rich waters. Over millions of years, these early life forms evolved into more complex creatures, such as fish, marine reptiles, and soon mammals. The oceans have been a constant source of life and evolution, shaping the biodiversity of our planet.

Oceans are not static bodies of water. They are constantly changing due to various factors, including tectonic plate movement, climate change, and ocean currents. They are also changing due to pollution. Plastic waste, from bags and bottles to microplastics, accumulates in oceans, harming marine life. Excessive nutrients, primarily nitrogen and phosphorus from fertilizers and sewage runoff, can trigger algal blooms. Some algal blooms produce toxins harmful to marine life and humans. Oceans absorb a significant amount of carbon dioxide from the atmosphere. Increased carbon dioxide levels in the ocean lead to lower pH levels, making the water more acidic. Ocean acidification can harm marine organisms, particularly those with calcium carbonate shells, such as corals and shellfish.



https://www.epa.gov/ocean-dumping/protecting-our-oceans-pollution

P is for Paris Agreement

The Paris Agreement was a landmark decision/international treaty made by the United Nations Climate Change Conference in paris. The Paris Agreement was made in December 2015. The Paris agreement was aimed at combating climate change and the impacts of climate change. The agreement had several key objectives. The first was to limit global temperature rise. The main goal with limiting global temperature rise is to keep the increase of the average global temperature under 2 degrees celsius. This is a very crucial step to limiting the effects of climate change. The next objective was for each country to create their own nationally determined contributions (NDC's) which basically are a country's own climate change action plan. These NDC's outline how the country will reduce emissions and adapt/combat climate change impacts. Another main objective of the Paris agreement was climate finance. Of course changing the course of our planet is costly. In this agreement developed countries committed to helping developing countries finance their efforts to combat climate change. This was a very important aspect of the Paris Agreement. The next objective of the Paris Agreement is global stocktake. This means that every five years (starting in 2023) there is a global stocktake in which the progress towards achieving the

long term climate goals that are stated in the Paris Agreement are assessed and talked about. The first Global Stocktake took place in 2023 and it resulted in more discussion and changes that needed to be made to ensure that this agreement would follow through and make a difference in climate change efforts. Overall the Paris Agreement is considered a crucial part in the efforts to combat climate change.

Q is for Quota (Environmental trends)

Referring to climate change and environment quota is a very important term. It refers to a regulated limit or cap on the amount of a resource or pollutant that can be harvested, used, or emitted within a certain time frame. The concept of quota is used commonly in management practices of things like natural resources. It is also used in environmental protection. The overall goal of using a quota(s) is to prevent overuse, the degrading of the environment and pollution. There are a couple ways that quotas can be used in environmental trends. The first example is carbon emission quotas. Basically a country or company may be given a specific quota of greenhouse gas emissions under agreements such as the Paris agreement (as mentioned above). These emission quotas are made to help limit the amount of carbon dioxide (CO2) or other greenhouse gasses released into the atmosphere. The next common use of quotas in environmental trends is Fishing quotas. This is when the government places a limit or quota on the amount of fish that can be caught in either a particular region and or a particular species. This helps tremendously with overfishing and helps populations recover. Fishing quotas provide an outlet for the growth of biodiversity and maintaining sustainability of marine environments. The next use of quotas is in water usage. Water usage quotas are particularly utilized and implemented in areas that are facing water scarcity. These quotas are implemented on things like agriculture, households, and industry. Water usage is a very prominent problem in our world. Based on statistics gathered by the Environmental protection Agency (EPA) “The average family can waste 180 gallons per week, or 9,400 gallons of water annually, from household leaks. That's equivalent to the amount of water needed to wash more than 300 loads of laundry.”(EPA). Overall quotas help manage environmental resources in a sustainable way therefore helping fight climate change.

R is for Renewable Energy

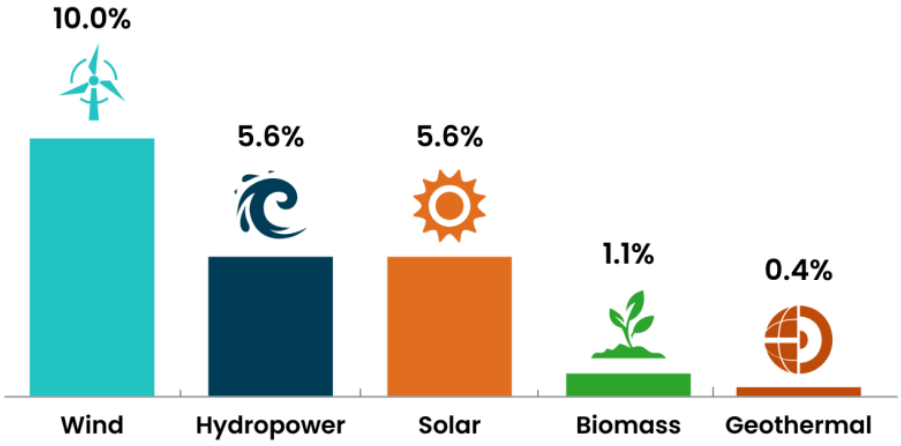
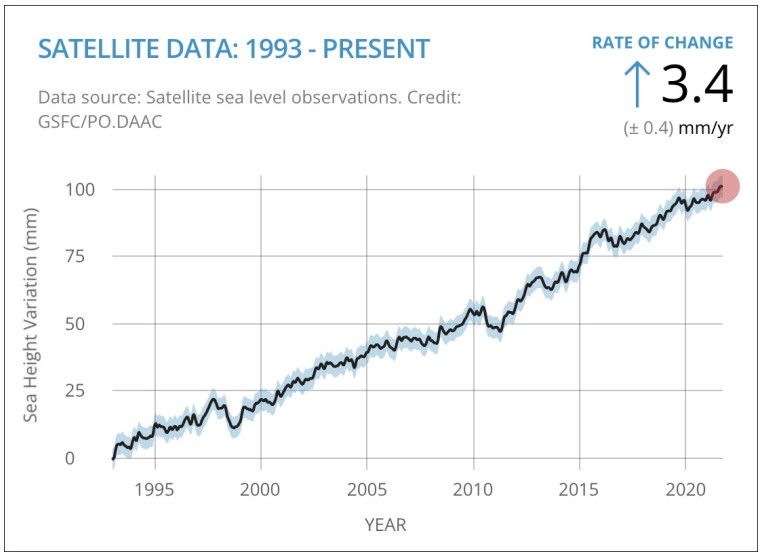


Figure 1

Renewable energy is a very important aspect in climate and climate change. Renewable energy refers to energy that comes from sources that can be naturally replenished. Renewable energy is more sustainable in the long run due to the fact that they do not deplenish over time and have minimal impact on the environment. According to Energy.gov, " Renewable energy generates over 20% of all U.S. electricity" (Energy.gov). The breakup of these energies can be seen in figure 1 above. This figure shows the various types of renewable energy. The first type is solar energy. Solar energy is just as it sounds, it is energy that is harnessed from the sun with technologies. These technologies include solar panels and solar thermal systems. There are a lot of benefits to using solar panels. According to the Co Clean Energy Fund, "Unlike fossil fuels, which release harmful emissions into the atmosphere when burned, solar energy does not produce any pollution or greenhouse gasses. This makes it a much more sustainable and environmentally friendly option for generating electricity."(CCEF). Solar panels also are really financially efficient in the long run. The next form of renewable energy is wind energy. This is generated by

converting wind into electricity through wind turbines. These turbines are located both onshore and offshore. Next is hydropower, which is power harnessed through moving water. Hydropower is one of oldest but reliable forms of renewable energy. Geothermal energy is yet another source of renewable energy. This is energy from the heat stored beneath the earth's surface. Geothermal energy can be used for direct heating purposes as well as electricity generation. There are other forms of renewable energy as well. The benefits of renewable energy are low carbon footprint, sustainability, and energy security. Overall renewable energy plays a crucial role in combating climate change.

S is for Sea Level Rise



Sea level rise is one of the most significant impacts of climate change. Sea levels rising results from 2 major factors, thermal expansion and melting ice caps and glaciers. Thermal expansion is the fact that water expands when it is heated/when it warms. So therefore as ocean temperatures rise (due to climate change) the water in the ocean expands. Which overtime results in the rise of sea levels. As for the second factor contributing to sea level rise, as global temperatures rise, ice and glaciers worldwide start to melt at accelerating rates. This in turn adds freshwater into the ocean rising sea levels. There are a lot of negative effects resulting from sea levels rising. These negative impacts include coastal flooding, increased storm surges, saltwater erosion, erosion and habitat loss. These negative impacts are causing irreversible damage. There are some ways to address sea level rise. Doing things like building seawalls,restoring natural coast barriers, and improving urban planning can help with the future rising of sea levels. Another

way we can decrease sea levels is by reducing global greenhouse gas emissions. This can help with the melting of ice sheets and thermal expansion which therefore helps limit sea levels rising and create stabilization of sea levels.

T is for Tipping Points

Tipping points in the terms of climate change refer to the thresholds at which a small change in environmental conditions or global temperature can cause irreversible damage and shifts in earth's systems. Once tipping points are reached and exceeded it can set off reactions that accelerate the rate of climate change impacts. There are a lot of different examples of tipping points. The first example is melting ice sheets. Warming temperatures are causing ice sheets to melt. Once it reaches a certain point the ice sheets could reach a state of irreversible and unstoppable decline which could potentially cause significant sea level rise. Another example are boreal forest shifts. Boreal forests in the northern hemisphere have adapted to cold climates. But the rise in temperature and the increased frequency of wildfires can lead to a lot of shifts in these forests and cause them to turn them from carbon sinks into carbon sources. Ice sheets and boreal forests are just 2 of many examples. There are many consequences of reaching or crossing these tipping points. Once tipping points are crossed it can lead to an increase in

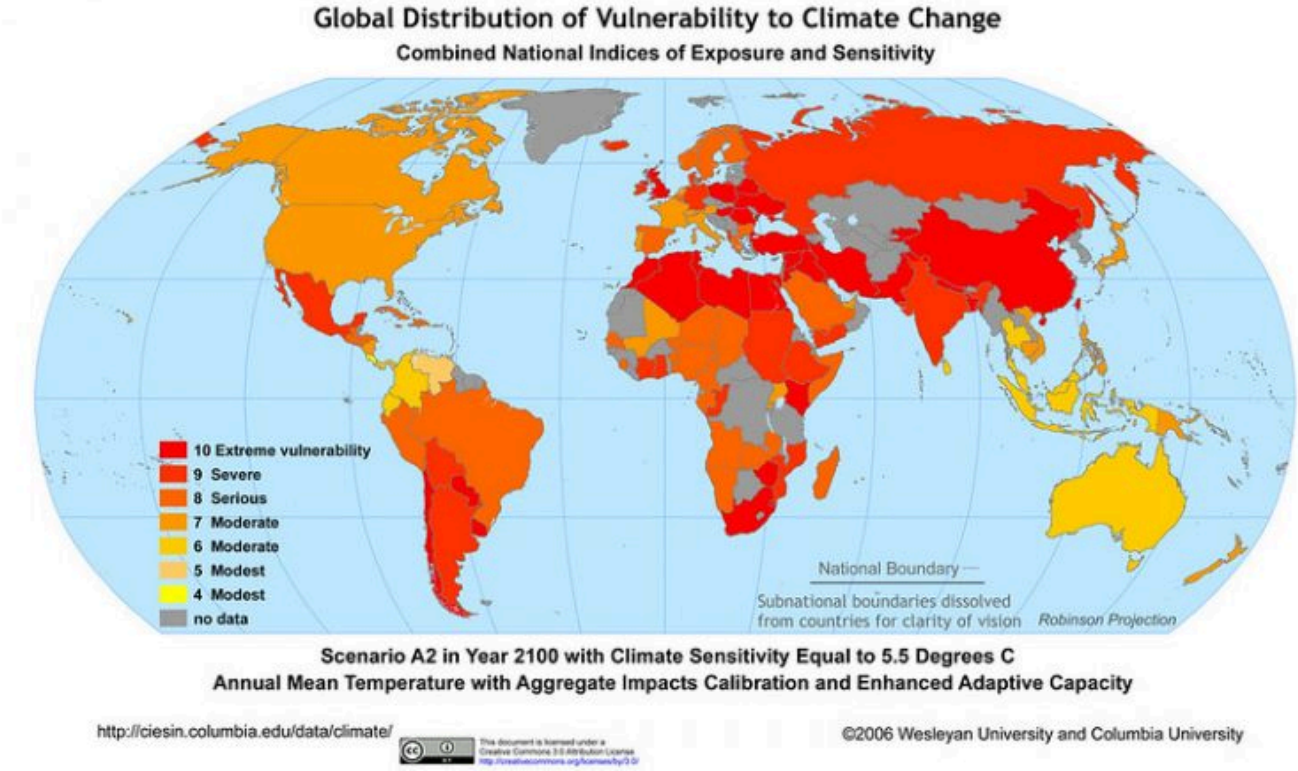
warming, changes in weather problems, and disrupted ecosystems. Although there are some ways that we can prevent reaching and or crossing tipping points. This includes reducing greenhouse gas emissions and keeping global warming below thresholds. Tipping points have become a very crucial area of study surrounding climate change.

U is for Upcycling

It is a known fact that richer countries tend to have more greenhouse gas emissions than poorer countries. While there are many factors contributing to these numbers, the Journal of Industrial Ecology published a study showing that nearly 60% of global greenhouse gas emissions come from consumerism in its many forms (Ivanova et al., 2015). If we can change our consumption habits, then we could have less waste in our landfills releasing harmful emissions.

Upcycling is the simple practice of reimagining a product and creating a new use for it. It can be a fun and easy way to make your day-to-day life more sustainable at no cost! Many people upcycle old clothes, glass jars, or even some things we may want to throw away (egg cartons, milk jugs, etc). Upcycling is very beneficial to the environment as it would reduce products being thrown away because they would simply be being reused. In addition, it also decreases consumerism which may lead to less products being made and less materials needed to make those products (Taubenfeld, 2022). It is also common practice for people to not only upcycle their own materials, but additionally use thrift or second-hand stores to find sustainable materials.

V is for Vulnerability



Climate Change vulnerability assessments are very important to deciding where resources are most needed. Vulnerability is measured based on exposure and sensitivity to climate change and its effects. These assessments can be specific to different species, natural resources, communities and several other categories.

In using vulnerability assessments, climate scientists are able to predict and better understand how a certain group of species, resources, etc may respond to crises in the future. Based on how they may respond and adapt to future issues, resources are distributed accordingly. This assessment can also relate and open us to a discussion regarding climate justice. Some communities or even countries may have much higher rates of vulnerability due to their lack of resources to help adapt and recover from climate disasters (Tee Lewis et al., 2023). There is data showing a correlation between social, economic, and technological progress to the degree of vulnerability.

W is for Water Pollution

Water pollution is a growing concern around the globe. It is a broad term covering chemical, sewage, heat, and general trash waste. All of these forms of water pollution cause great harm to the species and organisms that live in the water. Common issues that wildlife face are oiling (birds can't use their wings) and dealing with the toxicity and the dangerous impacts it has on wildlife health. The marine and wildlife communities are not the only ones suffering with oil spills. For example in 2023 there was a large oil spill off of the Philippines coast. This spill was so large and so close to a coastal town that it caused the people of the town to fall ill.

Although water pollution is a large and daunting climate issue, there are ways in which we can help reduce our footprint and the waste that ends up in the water. For example, we could use less plastic! Plastic makes up near 80% of all of the pollution currently in the ocean (Fava, 2022). By using less plastic (or even reusing our plastics) we could reduce the amount that ends up in the "floating landfills of the ocean". Another solution which can apply to the individual but also larger companies is paying more attention to how we dispose of our waste. For example, taking more precautions and paying more attention to how we dispose of chemical and medical waste could help to reduce the harmful materials that we find in the water waste.

X is for eco-anXiety

Eco-anxiety is becoming a more prominent mental health concern. It is often defined as the feeling of worry and helplessness when it comes to climate change and how it may impact our future. Many people report feeling like humanity is doomed and that the lack of action only worsens these emotions. Studies have shown that younger generations seem to experience eco-anxiety at much higher rates. This may be due to the greater use of social media among younger generations and the amount of negative climate news that is being constantly released.

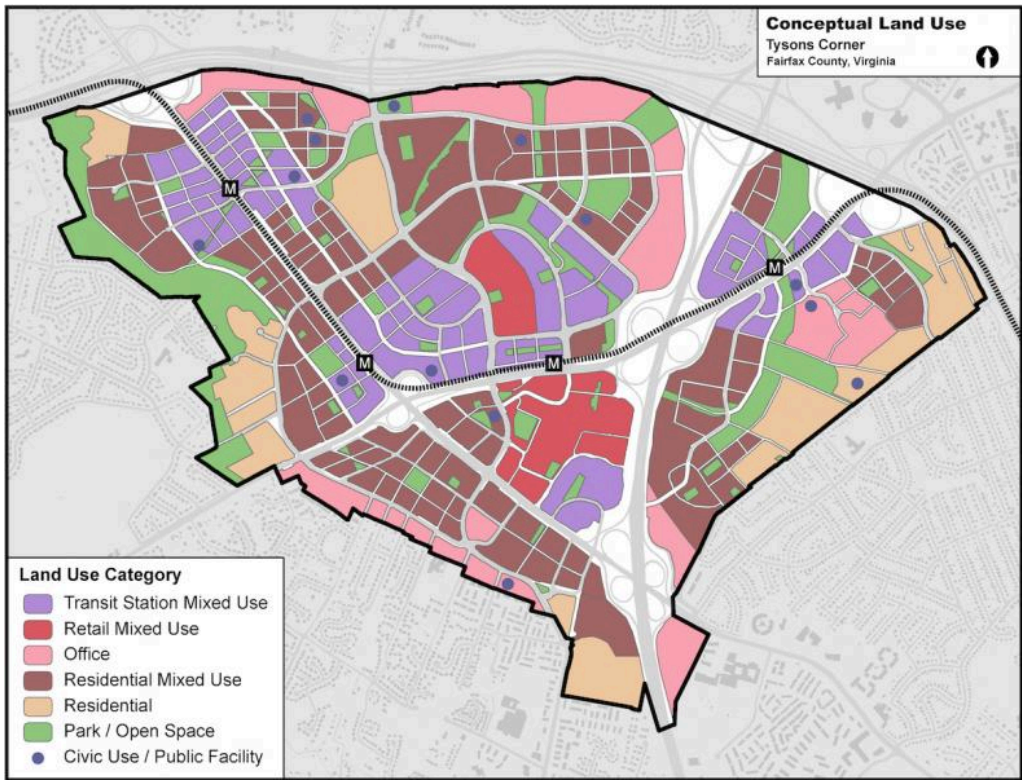
There are ways in which we can combat eco-anxiety. One proven way to help reduce our eco-anxiety is to spend more time in nature. It produces more motivation to take action against climate change and turns feelings of worry into empowerment. Understanding and practicing empathy for yourself, can help you reduce feelings of eco-anxiety (*How to Tackle Eco-Anxiety, according to the Experts*, 2024). Finally, one of the best ways to reduce eco-anxiety is to get involved in your community! Even if there aren't environmental organizations you can volunteer to help with, you can host your own clean-ups or start a garden.

Y is for Youth

Educating the younger generations about climate change is very crucial to paving a pathway to change. By teaching the youth about climate change and its repercussions, we can cultivate the knowledge needed to create and drive change. Educating younger generations also helps to slow and prevent the spread of dangerous misinformation regarding climate change. This may also help motivate others to get involved in their communities and reduce feelings of eco-anxiety. Teaching children easy ways that they can help reduce their carbon footprint could help reduce that footprint and that could follow them into adulthood.

Teaching students about the climate crisis could also help increase demand for action. It also builds a foundation of knowledge that could impact future policies and prioritize sustainability. Teaching students about climate change can also create a sense of empathy for others. If students can understand the ways in which climate change is affecting people (even if they aren't experiencing it) it would increase the initiative and drive to help others.

Z is for Zoning



Regulating land use is another great climate adaptability solution. By taking into account physical vulnerabilities, certain land can be used in more sustainable ways. Water-smart landscaping in parks is a great example of zoning and green infrastructure! This helps increase water quality in areas where flooding is common.

Being aware of climate vulnerable areas when planning cities and other community zones could help increase adaptability to climate disasters. This reduces the need to rebuild or reconstruct, reducing the amount of materials needing to be reduced. Agricultural zoning also helps to preserve farmland and proper use of that farmland ensures that soil quality remains good enough to maintain crops.

Finally, zoning for climate change is another way to address climate injustices among lower income communities. Lower income communities suffer from climate disasters at higher rates than high income communities due to the lack of resources. With better planning and land usage, the damage from climate disasters (and climate change in general) is mitigated and prevents the need for excessive resources to constantly be rebuilding.

References

https://en.wikipedia.org/wiki/Kyoto_Protocol
https://unfccc.int/kyoto_protocol
Taubenfeld, E. (2022, June 1). *What Is Upcycling, and How It's Good for the Earth*. Reader's Digest. https://www.rd.com/article/upcycling/

Ivanova, D., Stadler, K., Steen-Olsen, K., Wood, R., Vita, G., Tukker, A., & Hertwich, E. G. (2015). Environmental Impact Assessment of Household Consumption. *Journal of Industrial Ecology*, *20*(3), 526–536. https://doi.org/10.1111/jiec.12371

Lindwall, Courtney. "Climate Tipping Points Are Closer than Once Thought." *Be a Force for the Future*, 15 Nov. 2022, www.nrdc.org/stories/climate-tipping-points-are-closer-once-thought.

Madden, Allie. "All about Solar Energy." *Collective Clean Energy Fund*, 9 Apr. 2024, cocleanenergyfund.com/all-about-solar-energy/?gad_source=1&gclid=Cj0KCQjwveK4BhD4ARIsAKy6pMJrOxBKigqerbnX9clU-wcXDMuAzfA3DLdnunZQif5iGGj8ByQQDlUaAj-IEALw_wcB.

Renewable Energy | Department of Energy, www.energy.gov/eere/renewable-energy. Accessed 29 Oct. 2024.

"Statistics and Facts." *EPA*, Environmental Protection Agency, www.epa.gov/watersense/statistics-and-facts. Accessed 28 Oct. 2024.

"What is Earth's Atmosphere?" NASA, NASA, www.nasa.gov/general/what-is-earths-atmosphere/. Accessed 28 Oct. 2024.

"Biodiversity." Britannica, www.britannica.com/science/biodiversity. Accessed 28 Oct. 2024.

"Carbon Footprint." Britannica, www.britannica.com/science/carbon-footprint. Accessed 28 Oct. 2024.

"Desertification." National Geographic, www.nationalgeographic.com/environment/article/desertification. Accessed 28 Oct. 2024.

"Ecosystem." National Geographic, education.nationalgeographic.org/resource/ecosystem/. Accessed 28 Oct. 2024.

"Is the Rate of Sea-Level Rise Increasing? – NASA Sea Level Change Portal." *NASA*, NASA, sealevel.nasa.gov/faq/8/is-the-rate-of-sea-level-rise-increasing/. Accessed 28 Oct. 2024.

Coffey, Y., Bhullar, N., Durkin, J., Islam, M. S., & Usher, K. (2021). Understanding Eco-anxiety: A Systematic Scoping Review of Current Literature and Identified Knowledge Gaps. *The Journal of Climate Change and Health*, *3*(3), 100047. https://doi.org/10.1016/j.joclim.2021.100047

Fava, M. (2022, May 9). *Ocean Plastic Pollution an overview: Data and Statistics*. Ocean Literacy Portal; UNESCO. https://oceanliteracy.unesco.org/plastic-pollution-ocean/

How to Tackle Eco-Anxiety, According to the Experts. (2024). Psychology Today. https://www.psychologytoday.com/us/blog/a-subtle-impact/202407/how-to-tackle-eco-anxiety-according-to-the-experts

Ivanova, D., Stadler, K., Steen-Olsen, K., Wood, R., Vita, G., Tukker, A., & Hertwich, E. G. (2015). Environmental Impact Assessment of Household Consumption. *Journal of Industrial Ecology*, *20*(3), 526–536. https://doi.org/10.1111/jiec.12371

National Oceanic and Atmospheric Administration. (2020, August 1). *Oil spills*. Www.noaa.gov; National Oceanic and Atmospheric Administration. https://www.noaa.gov/education/resource-collections/ocean-coasts/oil-spills

Robinson, D. (2022, July 3). *What Are the Causes of Water Pollution and Sources of Water Contamination?* Earth.org - Past | Present | Future. https://earth.org/what-are-the-causes-of-water-pollution/

Schottland, T. (2019, April 5). *Parks as a Solution to Climate Change | Health & Wellness | Parks and Recreation Magazine | NRPA*. Www.nrpa.org. https://www.nrpa.org/parks-recreation-magazine/2019/april/parks-as-a-solution-to-climate-change/

Tee Lewis, P. G., Chiu, W. A., Nasser, E., Proville, J., Barone, A., Danforth, C., Kim, B., Prozzi, J., & Craft, E. (2023). Characterizing vulnerabilities to climate change across the United States. *Environment International*, *172*, 107772. https://doi.org/10.1016/j.envint.2023.107772

Unesco. (2023). *Climate change education | Articles*. Www.unesco.org. https://www.unesco.org/en/climate-change/education

https://research.wri.org/gfr/latest-analysis-deforestation-trends?utm_campaign=treecoverloss2023&utm_medium=bitly&utm_source=GFWBlog
https://www.globalforestwatch.org/blog/data-and-tools/2023-tree-cover-loss-data-explained/
https://education.nationalgeographic.org/resource/ecosystem/
https://press.un.org/en/2024/sgsm22319.doc.htm

https://www.jstor.org/stable/26891410?seq=2

https://academic.oup.com/bioscience/advance-article/doi/10.1093/biosci/biae087/7808595

https://www.epa.gov/facts-and-figures-about-materials-waste-and-recycling/national-overview-facts-and-figures-materials#:~:text=The%20total%20generation%20of%20municipal,pounds%20per%20person%20per%20day.
https://oceanexplorer.noaa.gov/facts/hurricanes.html#:~:text=Recent%20studies%20have%20shown%20a,waters%20fuel%20more%20energetic%20storms.

https://www.dhs.gov/natural-disasters