Symbioticism


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Art, text & design by:
Zoe Allgaier
Created:
02/2025
zoeallgaier.com
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Zoe

A Personal Relationship with Earth

I am deeply familiar with the Earth's lifespan, on a cosmic scale. I know how the moon was formed. I know when and where cellular life first began–according to the most recent scientific theories. For as long as I can remember, I have been awestruck by prehistory. As a child, I was infatuated by the existence of dinosaurs; I watched all the documentaries and read all the books I could about the epochs of Earth, spanning billions of years. When I wasn't pretending to be a dinosaur, I wanted to be a paleontologist, marine biologist, or some kind of artist when I got older. Someone who studied life (this is partially why my chosen name is Zoe, a Greek name that means "life"). Regardless of career, I've always had a very intense desire to understand life around me.

Because I have a sensitive awareness of the ancient past–I am acutely attuned to and devastated by the effects of the human-induced climate catastrophe. The progress life has made thus far is not linear. Life exists in fluctuating diversity with the tide of the planet's dynamic cycles. Every mass extinction event our planet has ever seen has been primarily driven by changes in the climate. Though the planet we reside within is familiar with her ever changing anatomy, I fear for life. The climate is comically delicate and constantly undergoing metamorphosis; yet, it is what allows for life to exist in the first place. As humans, because we are aware of our existence, I believe we have a responsibility to care for the well-being of the planet in a much more profound way than we do now.

The Tasmanian Tiger

"It's ironic that we know more about their death than we ever knew about them in life, despite the fact that we lived side by side with them for millennia."

Dr Christy Hipsley, Evolutionary Biologist at Museums Victoria

The Tasmanian Tiger (Thylacine) was a marsupial resembling a wolf or a dog. Little is known about their behavior. In 1830, the Van Diemen's Land Company introduced a bounty scheme to control Thylacines on its North West sheep properties; Thylacines lost their environment due to industry and those that remained were hunted or kept in captivity. The consequences of this action drove the Thylacine extinct in 1936. The extinction of this unique, beautiful marsupial is one miniscule example of a much larger crisis that is facing us right now.

Because the Tasmanian Tiger was driven to extinction so recently, scientists have studied the precursors behind their deaths. Of note is that the population possessed limited genetic diversity between 1852 and 1909 (caused by a myriad of reasons, most intensely human activity). This is a vital metric–the Tasmanian Tiger is not the only victim of lack of genetic diversity.

"Far from being appreciated, European settlers deemed the thylacine a threat to the developing colonial sheep industry and it was aggressively targeted for eradication by the government with a £1 bounty paid for every animal killed. Mothers with pouch young or live specimens could be sold to zoos or museums for even greater remuneration."

Menzies BR, Renfree MB, Heider T, Mayer F, Hildebrandt TB, Pask AJ. Limited genetic diversity preceded extinction of the Tasmanian tiger. 2012

Extinction Events

Mass extinction has no singular cause, however there is a pattern: extinction events are defined by massive loss of life, preceded by loss of biodiversity, due to a change in the composition of the environment. Because of the interdependence of life, when the Earth's biota becomes unbalanced in one way or the other, a tipping point is reached and life must adjust itself to new parameters. Mass extinction events are not uncommon. Throughout the eons, life has experienced a plethora of large-scale loss–from asteroids and volcanic eruptions, to overproduction of greenhouse gases by ancient flora.

In order for life to exist at all, an atmosphere and water are both of utmost necessity. These are the lungs and the heart of our planet; they work dependently to sustain our existence. What is given is also received. We depend on them as much as they depend on us. When external or internal forces change the composition of any part of this symbioticism, the effects can be devastating. Although there is a background rate of death that is always occuring, there are five large-scale events in which the majority of all life on Earth has nearly ended. These events are clearly visible in the fossil record and occurred quickly (on a geological timescale). Special techniques (radiometric dating, carbon dating, analyzing minerals, chemicals, fossils, etc. etc.) are used, which tell us when and how these tragedies struck.

The Big 5

Ordovician-silurian Extinction

440 million years ago

Small marine organisms died out.

Devonian Extinction

365 million years ago

Many tropical marine species went extinct.

Permian-triassic Extinction

250 million years ago

The largest mass extinction event in Earth's history affected a range of species, including many vertebrates.

Triassic-jurassic Extinction

210 million years ago

The extinction of other vertebrate species on land allowed dinosaurs to flourish.

Cretaceous-tertiary Extinction

65 million Years Ago

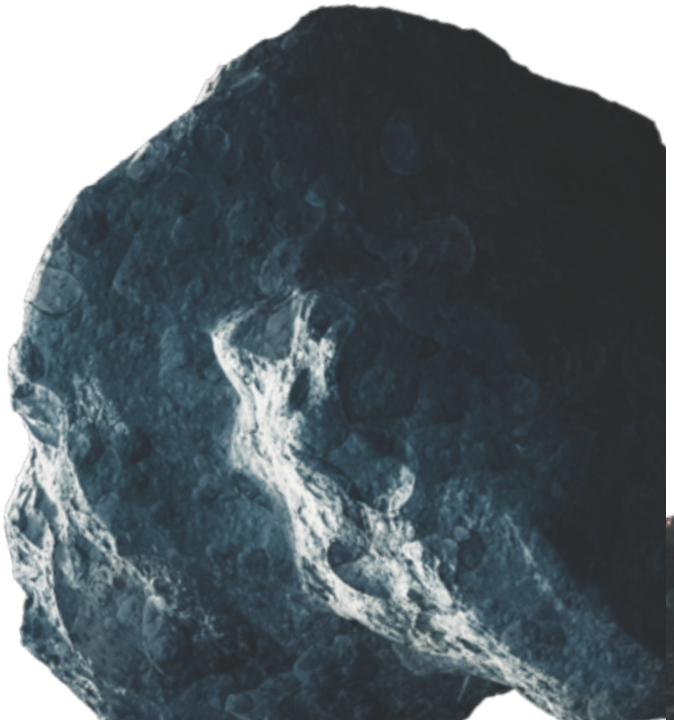
The extinction of non-avian dinosaurs and subsequent rise of mammalian life.

End Cretaceous Extinction

It wasn't just the Chicxulub asteroid that eviscerated the dinosaurs–it was the changes to the environment brought about by the collision. Obviously, an asteroid over 6 miles wide striking earth is enough to wipe out thousands of species immediately, but on the other side of the earth, it was the debris clouding the atmosphere and subsequent release of vast amounts of sulfur (a greenhouse gas) that killed even more species–classifying the time period as a mass extinction event. The ash from the asteroid clouded the atmosphere setting off a viscous, cyclical set of events.

"Clearly, the asteroid impact was devastating to Earth's climate, leading to freezing temperatures on land, even at the tropics; disrupting large faunal food supply; and destabilizing all trophic levels."

A.A. Chiarenza, A. Farnsworth, P.D. Mannion, D.J. Lunt, P.J. Valdes, J.V. Morgan, & P.A. Allison, Asteroid impact, not volcanism, caused the end-Cretaceous dinosaur extinction



The Great Dying

Long before the dinosaurs existed, life on Earth almost ended permanently. In a geological blink-of-an-eye, 96% of all life ceased to exist. Groundbreaking research has revealed that over 250 million years ago (during the late Permian period), the Earth's surface was punctured by volcanic activity below the crust. The evidence is seen in the fossil record, as well as by dating volcanic "traps" in Siberia which stretch an unfathomable 3 million square miles. The result was an atmosphere that suffocated all living beings. The atmosphere was transfigured by the gasses that pierced through Earth's outer crust–namely sulfur, methane and carbon dioxide–smothering every being on earth.

"The Permian mass extinction in the oceans was caused by global warming that left animals unable to breathe. As temperatures rose and the metabolism of marine animals sped up, the warmer waters could not hold enough oxygen for them to survive."

Hannah Hickey, What caused Earth's biggest mass extinction?

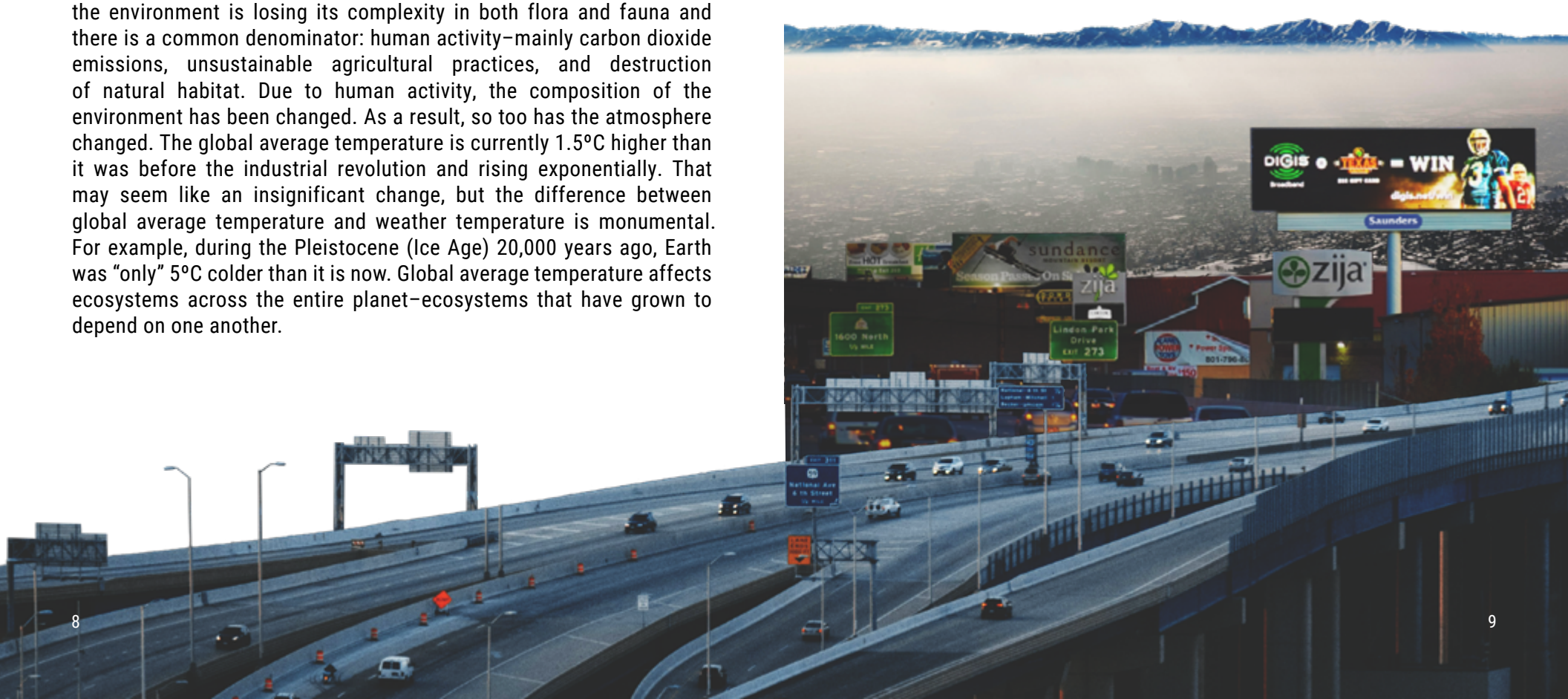
End Holocene Extinction?

I grew up close to and still live near the Great Salt Lake. Over the course of my life I have seen the lake dry up. Utah Lake has become a hazardous muck. A thick smog often hazes the view of the beautiful mountains I used to live at the base of. At the same time, human infrastructure (mostly for the purpose of commerce) has increased at a dizzying rate. Our now 10-lane freeways, urban streets and shopping/business centers are designed with zero forethought of future design or impact–an increasingly frustrating circumstance beginning to affect the daily lives of the people residing here.

This is not a singular or an original experience. Across the entire world, the environment is losing its complexity in both flora and fauna and there is a common denominator: human activity–mainly carbon dioxide emissions, unsustainable agricultural practices, and destruction of natural habitat. Due to human activity, the composition of the environment has been changed. As a result, so too has the atmosphere changed. The global average temperature is currently 1.5°C higher than it was before the industrial revolution and rising exponentially. That may seem like an insignificant change, but the difference between global average temperature and weather temperature is monumental. For example, during the Pleistocene (Ice Age) 20,000 years ago, Earth was "only" 5°C colder than it is now. Global average temperature affects ecosystems across the entire planet–ecosystems that have grown to depend on one another.

"The situation in the late Permian – increasing greenhouse gases in the atmosphere that create warmer temperatures on Earth – is similar to today. Under a business-as-usual emissions scenarios, by 2100 warming in the upper ocean will have approached 20 percent of warming in the late Permian, and by the year 2300 it will reach between 35 and 50 percent."

Hannah Hickey, What caused Earth's biggest mass extinction?



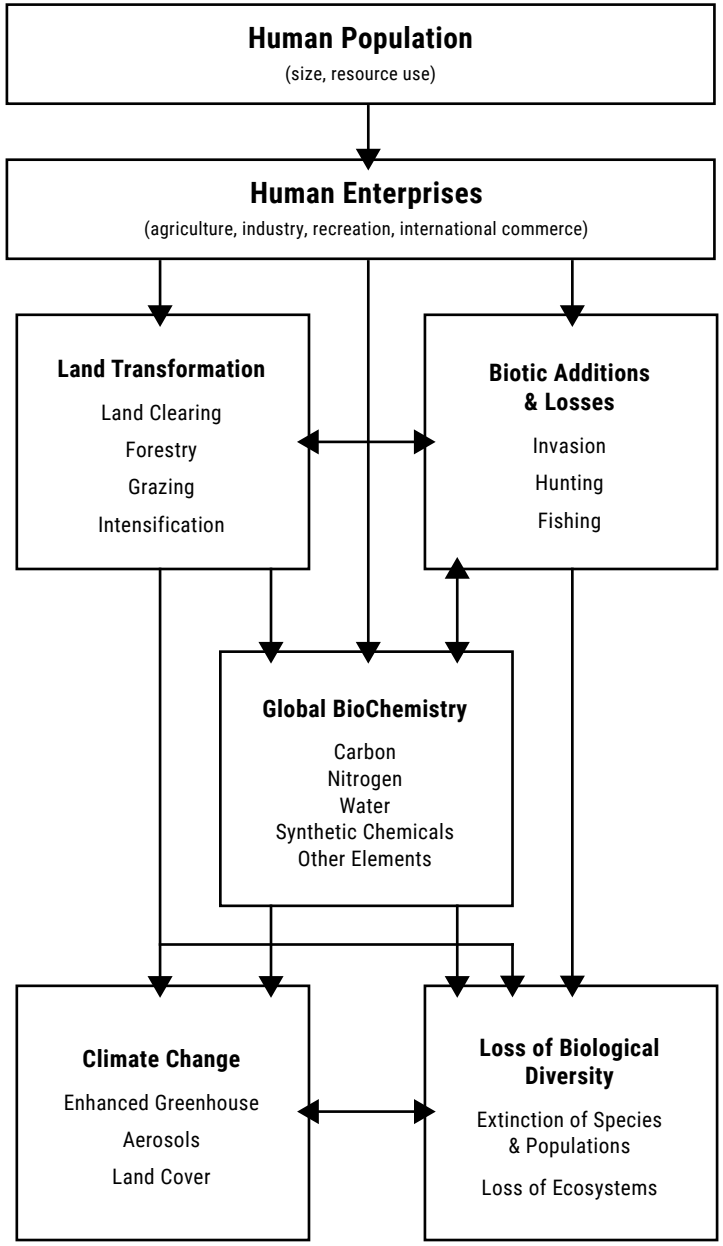
The Holocene Extinction is not a part of “The Big Five.” That’s because it didn’t happen millions of years ago–it is happening right now. The increase in global temperature is unequivocally caused by human activities. This has been studied, documented and proven for decades. The effect is cascading and reducing genetic diversity across the globe–a precursor seen before every single extinction event. Scientists are still determining the rate at which species are going extinct, however one thing is explicitly clear: a major pulse of biological extinction is and will continue to take place. Currently, more than 46,300 species are threatened with extinction–28% of all assessed species (IUCN Red List). In 2002, the number of species threatened was 11,167. Because of the sheer size of the human population (exploding due to the industrial revolution) and the drastically increasing rate at which we consume resources, we’ve uprooted the Earth’s ecosystems in order to sustain ourselves. The current climate catastrophe cannot be understated. It is thus necessary to educate ourselves on previous and current extinction events of Earth in order to mitigate mass calamity. It may seem as though everything humanity touches devastates the Earth, but this is not true. Humanity itself is not killing the planet, it is the systems we use (agriculture, deforestation, resource misuse, capitalistic economies, etc. etc.) that contribute to the massive loss of biodiversity seen. The evidence for this is substantial, and undeniable.

“Currently, the species extinction rate is estimated between 1,000 and 10,000 times higher than natural extinction rates—the rate of species extinctions that would occur if we humans were not around. If we do not course correct, we will continue to lose life-sustaining biodiversity at an alarming rate. These losses will, at best, take decades to reverse, resulting in a planet less able to support current and future generations.”

World Wildlife, What is the sixth mass extinction and how do we stop it?

All lifeforms change their environment to suit their needs, the fact that humans use resources is not the cause for this crisis; it is the systems with which we control the environment. The industrial revolution arose out of necessity to sustain the economic systems we use to trade materials amongst ourselves en masse–primarily this system has been varying forms of capitalism, i.e. trading resources for capital and vice versa. By placing value of imaginary capital over tangible materials and quality of life, the Earth has become a soulless commodity. The result of this is that your habitat is slowly being carved away, in order to create products, stores, factories and housing that don’t fulfill you as a human being, while also ridding animals and plants of their homes. Tech and oil barons might be profiting, however they too are losing their Earth just the same; Our current way of being benefits no one.

Though the reality of the state of the climate is dire, and worthy of grief–life as a whole is extraordinarily resilient. Life will endure in one form or another. The question is: Will we endure? Will we move forward with enough awareness and action to create a more holistic Earth? Damage has already been done, but we are more capable now than ever before to not only survive, but thrive. The answer lies in material changes to our systems of being, and empathy for life and our resources. If we are capable enough to terraform the planet to such a biblical extent, surely we can also terraform it for the better.



Peter M. Vitousek et al. ‚Human Domination of Earth's Ecosystems. Science277,494-499(1997).DOI:10.1126/science.277.5325.494

Quick Facts

Over 50% of all habitable land on Earth has been transfigured by human activity.

Over 50% of surface freshwater is in-use by humanity.

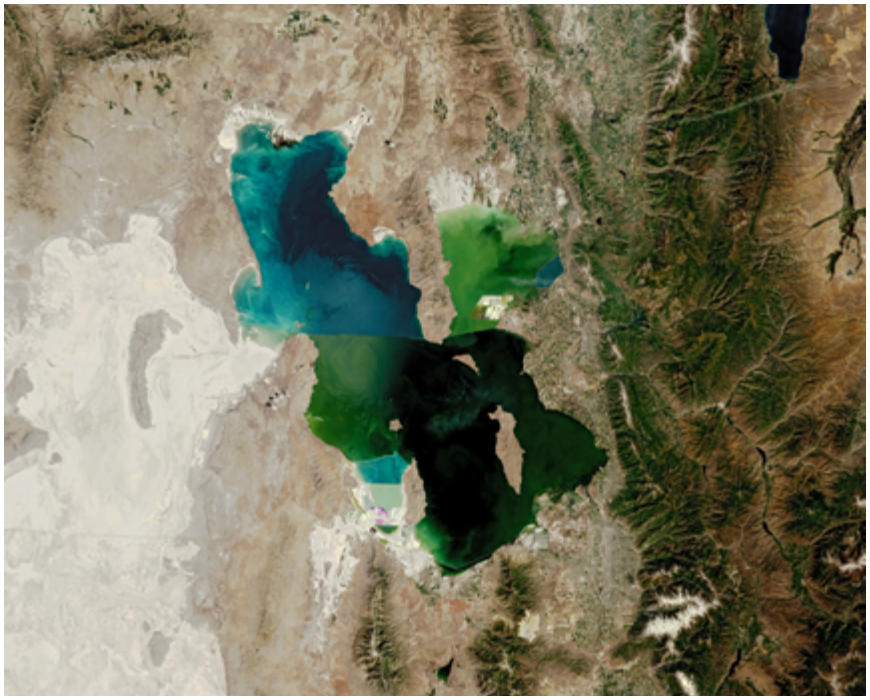
Of all the mammals on Earth, 96% are livestock and humans, only 4% are wild mammals.

Current Global Temperature is 1.5ºC higher than pre-industrial levels

2ºC of warming will cause:

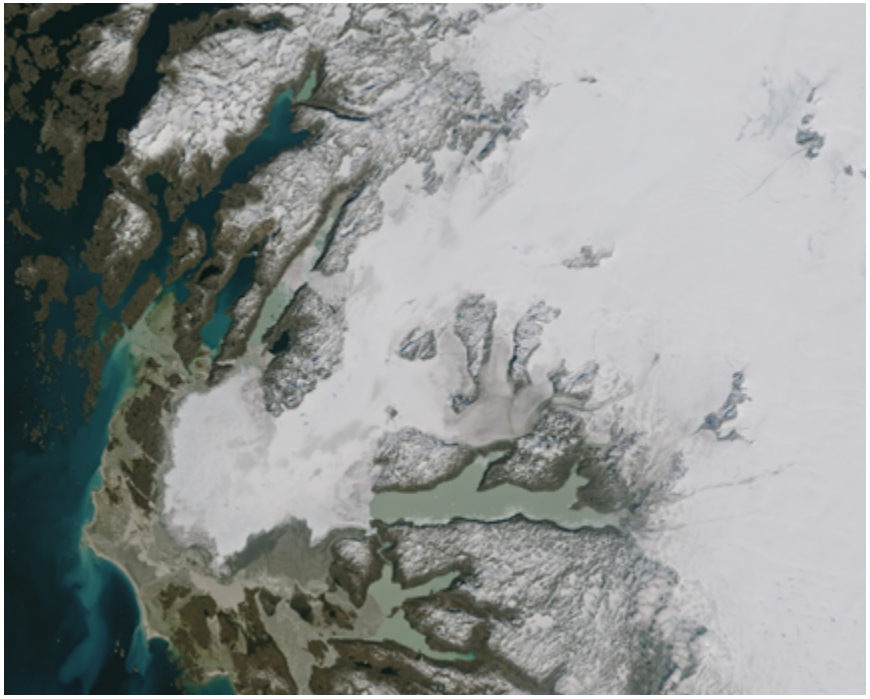
- Increased deadly heat waves
- Increased flooding and precipitation
- Increased sea levels
- Decreased water availability
- Decreased biodiversity
- Decreased rainforest biomass
- Death of all coral reefs
- Ocean acidification
- Food shortages
- Increased economic instability/collapse

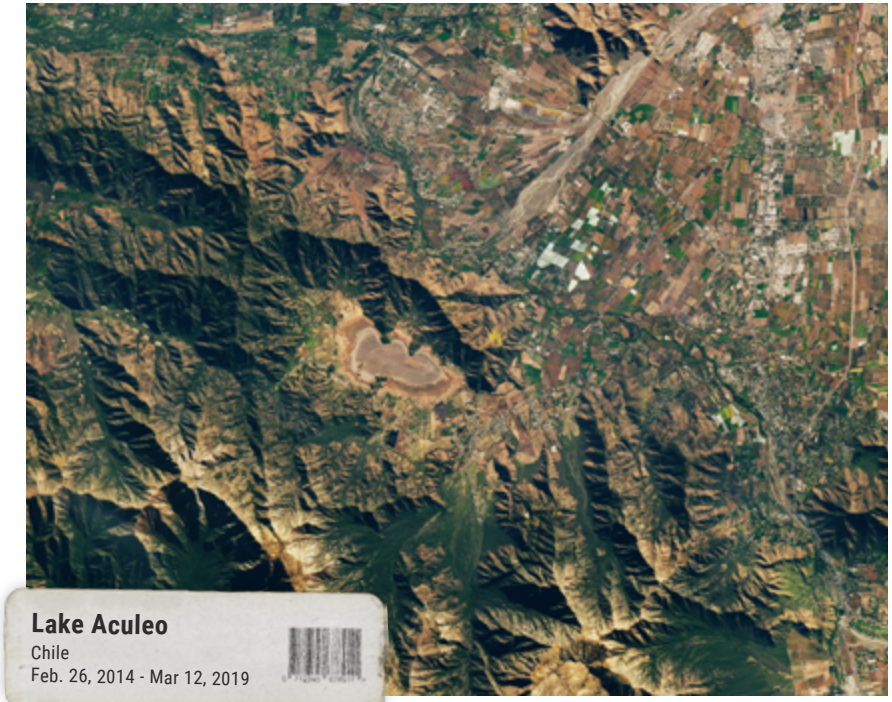
The current rate of global average temperature increase is 0.20°C per decade. **Earth is on track to be 4ºC warmer by the end of the century.**



Great Salt Lake
Utah
June 1985 - July 2022

Chiquitano Forests
Bolivia
July 2, 1986 - Aug 22, 2022





Lake Aculeo
Chile
Feb. 26, 2014 - Mar 12, 2019

Frederikshaab Glacier
Southern Greenland
June 14, 2023 - July 24, 2023

Solutions

Not only is human climate change harming the environment, the rate at which we are doing so is also speeding up. Both of these are happening at an exponential rate. Solutions proposed must take this into consideration, as we must mitigate our impact while also preparing for the human population to continue increasing in size and resource usage. In doing so it is crucial to examine where resources are being most used, where defaunation is happening, and the reasons why individuals, organizations, and communities are abusing resources inefficiently.

"There are profound and diverse consequences for failing to address defaunation immediately. Ecological and extinction cascades will make it increasingly difficult to arrest the momentum of defaunation. Left unchecked, defaunation will impoverish our planet by severely reducing its faunal diversity—ultimately undoing the work of millions of years of evolution."

Hillary S. Young, Douglas J. McCauley, Mauro Galetti, and Rodolfo Dirzo, Patterns, Causes, and Consequences of Anthropocene Defaunation

Exxon was one of the first organizations to study the effects of their own emissions. In 1978, they released a shockingly accurate study, detailing how their product would make the climate warmer and have disastrous effects on the wellbeing of us, animals, plants, and our collective home. 40 years later, organizations such as the Carbon Disclosure Project track and study large fossil fuel companies and the emissions they're responsible for.

Multiple studies and organizations come to the same conclusion: Fossil fuel companies (such as Exxon, BP, Chevron, etc.) are responsible for producing more than half of humanity's total emissions of greenhouse gasses. Further, the rate at which these companies are poisoning our air is increasing. The reasons for increasing emissions are population growth, and deliberate campaigns and lobbying efforts made by fossil fuel companies to increase individual reliance on oil–in order to increase profits, as capitalism demands infinite growth.

"Fossil fuels are the largest source of anthropogenic greenhouse gas emissions in the world. The fossil fuel industry and its products accounted for 91% of global industrial GHGs in 2015, and about 70% of all anthropogenic GHG emissions. If the trend in fossil fuel extraction continues over the next 28 years as it has over the previous 28, then global average temperatures would be on course to rise around 4°C above preindustrial levels by the end of the century. This would entail substantial species extinction, large risks of regional and global food scarcity, and could cross multiple tipping points in the Earth's climate system, leading to even more severe consequences."

The Carbon Majors Database, CDP Carbon Majors Report 2017

The rapidity by which defaunation is proceeding globally necessitates that we proactively work to address this global threat, even in the face of data insufficiencies. Due to the immensity of biodiversity loss, individual solutions are not sufficient to alleviate the crisis. Collective action and a shift in our social paradigm must happen now. The solutions to climate change are inherently complex, however they are demonstrably achievable. Though changes in our methods of production are required, these changes wouldn't just benefit the environment–they'll benefit you too.

Current solutions can be broken into three categories:

Infrastructure, Public Policy, and Production.

Each of these categories require support from the others. Acting on these solutions will have a cyclical effect, leading us to discover more effective methods of restoring the Earth to its beautifully complex state.

Infrastructure

Infrastructure includes policy and collective efforts to create healthy living spaces, transportation systems, and facilitate the regrowth of our lost ecosystems. Each of these subsects of creating better infrastructure should be implemented with the goal of increasing biological diversity, decreasing resource usage, and bettering our quality of life in the places we live and work. The basis of these changes should be rooted in scientific and accurate knowledge.

Revising zoning laws to allow for denser, more efficient housing would allow for increased satisfaction of living in cities, while also allowing for increased efficiency of resource use, cities are the largest users of resources, and most of the growing population will live in cities.

Designing these re-zoned cities to be green, would also increase quality of life while mitigating the impact that cities have on the environment. For example, some cities have required that whatever land is built on, the same square footage must be replaced with plants–this creates a greener, healthier city with cleaner air, happier citizens and less impact on the environment.

If these green cities are developed not for cars but for people, less of the land will need to be dedicated to concrete and asphalt–some of the most harmful materials to the environment. The alternative is to create cities that are walkable, and/or use bike paths and public transportation. This would drastically reduce individual emissions coming from cities. Further, this would also increase quality of life–offering citizens the freedom to walk where needed (workplaces, extracurricular places, restaurants, etc) strengthens community bonds, fosters connection, and gives citizens the right to the city (rather than giving the city to cars, private industry, etc. and the taxing requirements they demand of infrastructure).

Refaunation and replenishment of flora should be considered infrastructure as they are both necessary to keep the planet livable for humanity. Some countries and cities have already begun efforts to replenish both animals and plants with great success. By creating environments that allow for a greater number of species, we can increase genetic and biological diversity, mitigating the effects of climate change.

"Ultimately, we need to permit or enhance the resilience of natural systems so that they can continue to adapt and function into the future. The best way to do this is to look back at paleontological history as a way to understand how ecological resilience is maintained, even in the face of change."

Barnosky et al., Merging paleobiology with conservation biology to guide the future of terrestrial ecosystems

Public Policy

The easiest, most effective way of creating a healthier Earth, will be through the use of revised public policy. In this way, changes can be enacted on a sociological scale, rather than individual. There are a myriad of steps that the government (on a federal and state-wide level) can take to mitigate greenhouse gas emissions, facilitate an economy that increases quality of life, and oversee projects that can reduce the harm we are causing the planet.

Public goods and basic needs (housing, water, food, internet) should be decommodified and subsidized by the taxes we already pay. Doing so is not only easily possible, it would allow for a basic quality of life to be met–allowing more people to contribute to the economy, communities, their families, and climate change mitigation. By revising the purpose and function of the economy, the government can ensure that basic needs are met while allowing resources to be allocated to fostering a better, healthier country and world. Our current economy is designed to maximize profit: a simple, singular goal that has no regard for humanity, the soul, or the planet. The economy as it currently stands produces an excess of materials, most of which do not get used effectively (single-use products, overuse of plastic, zero regulations on the largest producers of emissions). The current economy does not benefit the super-majority of working class people, and is creating a hostile environment for future generations. The economy must be revised and better planned to facilitate long-term support of citizens, rather than profit for the few who have already accumulated an unfathomable amount of capital.

First steps in creating an economy for the people and the planet include regulations on fossil fuel companies–in order to lessen our dependence on them and decrease emissions. In regulating fossil fuel we must also regulate their most popular product–plastic. Plastic is a material that is found in almost every single consumer good. So much so that plastic has been found in the human body. Such a resilient, quality material should be reserved for necessary purposes, such as medical materials and devices–rather than coffee cups and shoes.

Public policy should also be used to fund research and initiatives to solve the climate crisis. Decommodifying basic needs and reformatting the economy will benefit more people, thus more labor and resources can be dedicated to improving the lives of people, animals, plants, and the Earth. This cycle of improvement would have great and lasting benefits for a multitude of future generations.

Production

Finally, our methods of production must also be looked at with scrutiny. Many of the methods we use to produce food, water, products, and more are done so in the name of profit and not well-being. Not only that, but the methods in doing so have also been devised in such a way to increase owner profit-margins, rather than create in sustainable ways. In revising our approach to creating materials and goods, we can move forward with a more holistic mode of production that will increase quality of life and mitigate the detrimental effects we have on wildlife.

First we must consume less, both in how we produce and what we produce. Many of our needs are met through the use of products which are produced, packaged and shipped in ways that produce excessive carbon emissions and use excessive materials. If production was to become localized and less harmful materials were used, the rate of production would slow without cutting access to materials that are needed by people.

The costs of such materials should also reflect the true social and labor cost required of such materials/products/goods. As it stands currently, most of the goods we produce do not accurately reflect the true social costs that were required to create them; rather, increasing profits is the primary motive in devising the cost of goods. Alternatives in cost, shipping, production and creation are needed.

Agriculture and water usage should also be revised. Because these are absolutely necessary to human function, we need to find more effective methods of retaining the necessary amount of production, while also devising methods to increase efficiency and decrease environmental impact. Our current methods (involving the smothering of pesticides and removal of natural habitat) require change. Vertical farming methods and water efficiency technologies have already been produced which greatly mitigate our impact, however more research and development is needed.

“Unified action must be boldly undertaken by all sectors of society to prevent defaunation from accelerating.”

Hillary S. Young, Douglas J. McCauley, Mauro Galetti, and Rodolfo Dirzo, Patterns, Causes, and Consequences of Anthropocene Defaunation

For so long, our definitions of success and innovation have been based on creating more powerful, more resource-heavy technology and systems. This paradigm must be deconstructed as it no longer serves humanity. The effects of designing this way have caused the climate crisis, exploitation of human and animal lives, and an unstable economy. Our new paradigm should be primarily focused on long term success and innovation.

I urge you to consider: What would truly be more innovative–a new iPhone stuffed with artificial “intelligence” to siphon your data, or a new social mode of being that will create a better world for generations to come? Where should our focus be as a culture? How can we act on principles of empathy and facilitation of Earth’s natural beauty? How can we become stewards of the Earth, rather than adversaries?

Lil’ Personal Changes

(That Don’t Completely Suck)

Use a refillable water bottle/coffee mug, rather than plastic single-use cups.

Stop upgrading technology every year. At this point, there are no features being added that will significantly improve your life–spend more time on other hobbies, or find fun alternatives.

Shop local! Buy from friends or local thrift stores or farmer’s markets, rather than mega-corporations. This builds and supports the local community both socially and economically.

Advocate for better climate action from the local government. Speak up at committee hearings if possible, call politicians, and talk to others about what can be done.

Foster Local Community–if you have a hobby, skillset or a place you like to hang out, invite friends and friends of friends to participate.

Use public transportation!

Get a houseplant and keep it alive! It adds life to your space so long as you foster its growth.

Recommended Reading

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Zoe

About the Author

Zoe Allgaier is a digital artist from Utah. She is inspired by the early age of digital art; Her abstract work explores the intersectionality of digital and physical life. Using overlays, textures and recursive geometry, Zoe creates graphics that explore visual nuance, as well as reject the minimalist design trends that have become the standard in the postmodern era. She has a lifetime of experience as an artist, and 7 years of professional experience in digital media and design roles.


Zoe
Symbioticism is a brutally honest look at the reality of climate change and its effects over the course of the Earth's history–based on scientific sources and personal anecdotes.
zinesbyzoe.neocities.org