

## Climate Change, Ecology, and Justice

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### **Abstract:**

The world is in a global environmental crisis as a result of powerful human-caused situations: climate change, human-induced destruction, environmental injustice, and ecological devastation of our land, air, water, and living beings. The consequences are now being felt across generations with vulnerable populations feeling the heaviest burden of environmental injustice. The pace at which our planet is heating and the damaging impacts are repeatedly described by scientists as greatly outpacing their predictions. The urgency of the situation requires immediate action through interdisciplinary approaches with people from within communities taking leadership. For those who hold official positions of power, there is no longer room for the denial of the climate science; now is the time for enacting policies to protect the planet and all life.

**Keywords:** Climate change | Global environmental crisis | Global warming | Paris Agreement | Anthropocene | Environmental injustice | Interdisciplinary responses | Climate justice | Wicked problems

### **Article:**

Youth climate activist Greta Thunberg did not mince her words as she spoke before the Intergovernmental Panel on Climate Change in front of world leaders in 2018, telling them boldly that her generation was done with asking world leaders to take action and that change would be coming with or without their approval (World Economic Forum, 2018). Thunberg demonstrated to the world and particularly to young people that the devastating and lasting impacts of climate change would land in the laps of today's children and that children can and do have a voice. She began a global school climate strike movement bringing over six million people into the streets in September 2019 (Taylor, Watts, & Bartlett, 2019). When she was accused of pulling children out of their educational environments, Thunberg noted that the case for attending school is weak if there is to be no future for youth. She bluntly argued that we—the adults and those in power—are stealing our children's future by not acting quickly to preserve the delicate balance of our ecosystems. The science tells us that the planet is warming faster than predicted or imagined; the rate is so dangerous that scientists have already predicted a

CO<sub>2</sub> tipping point—the point of no return when our earth will be irrevocably warmed beyond repair affecting nearly all life.

Importantly, the brunt of the initial environmental crises are borne by the poorest countries and most vulnerable communities (Intergovernmental Panel on Climate Change [IPCC], 2018). They are usually hit the hardest by ecological destruction and subsequent disasters, which is exacerbated by the fact that these populations have the fewest resources for combating them. Often those who are currently paying the highest price are not those who created the problem. This is known as environmental injustice, a concept further explored in coming chapters.

We say *initial* crises because eventually everyone, including the wealthy, the privileged, and those living in the safest regions of the world, will suffer under the impact; that point is rapidly approaching. Climate change and other human-caused ecological destruction are global issues. Polluted air circulates and becomes the air all of us breathe, and the permanent loss of potable drinking water affects the viability for all life. The health of the Amazon rainforest in Brazil is critical not only to Brazil but to the entire planet as a major absorber of carbon and producer of oxygen. This is how the forest got its nickname as the “lungs” of the Earth. Even if we were not concerned with the poor and the vulnerable, the state of our planet’s health and habitability is worthy of attention and concern to every person on Earth.

In fact, a majority of people now believe what science has proven, climate change exists, and humans are responsible for this phenomenon. Yet the impact can feel amorphous, making it difficult to link the effects and see the possibilities for change. We are faced with record heat, increasingly turbulent weather, loss of ecology, the degrading of air and water, and the loss of land to water or extreme dryness. Climate change is the new normal which ironically means there is no static *normal* to adjust to as long as we are not acting to slow the change.

A place of fear exists about the future of our children, our grandchildren, and those that come after them. While it is true that future generations will suffer terribly if we do not take stronger action, this is not an issue resting solely with future generations. It is a crisis here and now for all of us. As Greta Thunberg expressed so powerfully to global leaders at the World Economic Forum in Switzerland in 2018:

I don't want you to be hopeful. I want you to panic. I want you to feel the fear I feel every day. And then I want you to act. I want you to act as you would in a crisis. I want you to act as if the house was on fire—because it is. (World Economic Forum, 2018)

At the same time, with all of the impending doom that today’s climate-induced crises present, an ounce of hope emerges as we listen to youth like Greta Thunberg, calling on world leaders to step up or step aside and reminding an older generation of leaders, and all who listen, that we, the people, are the ones with the power to create change. Our youth are forging a path by facing the global environmental crisis occurring at the intersection of climate change, ecological degradation, and environmental injustice, which includes human-induced environmental destruction, including a wide range of activities such as dumping toxic waste or building in fragile habitats.

As the earth heats, all the forecasts predict increasing ecological destruction that will impact our daily lives in large and small ways: from the type and quantity of energy we can use to combat summer heat and violent storms to immigration crises as homelands become uninhabitable, food and water shortages become the norm, and war breaks out as we have seen in places like Syria. Climate change impacts our social, economic, and political systems. For decades, the prevailing message about climate change was that it was unfolding slowly, a concern that was more about our grandchildren than us. However, the pace at which our planet is increasingly stressed with lasting effects is repeatedly described by scientists as greatly outpacing their predictions. The consequences are far-reaching with rising seas, raging forest and prairie fires, droughts in some places, and floods in others. This is to name only a few results. The context for life has to be reformed (Wallace-Wells, 2019). Each new scientific report reveals that the estimates were too conservative, underestimating the magnitude and pace of at which it is warming. This attitude permitted our denial to mask the urgency of the situation, leading us to believe palpable change was but a distant possibility.

### **Climate Change and the Importance of 1.5 °C**

You may have heard references to an increase of 1.5 °C and wondered what that means; it does not seem like much of an increase. First, the increase is a comparison to *preindustrial* global temperatures (IPCC, 2018), referring to the global climate before we began pumping carbon into the atmosphere. Second, an increase of 1.5 °C converts to 2.7 °F. This is not the same as warming your living room or yard or even your city by 1.5 °C. Imagine instead all the warming that must take place, of the air, the land, and of the vast expanse and depth of the oceans; *all* must be heated up to accumulate to a measurable global increase. Or imagine having an increase of 2.7 °F in the body creating a fever of 101.3 °F and that it is projected to continue rising. We would likely be concerned and we would likely do something about it. Our planet has a fever and it will keep rising until we take global action to address it.

The consequences of temperatures rising 1.5 or perhaps 2.0 °C are unimaginable for most of us. According to the Intergovernmental Panel on Climate Change (IPCC, 2018), however, we cannot sustain more than a 1.5 °C increase without devastating impacts worldwide. It is the line we should not cross to avoid the worst effects of climate change. While there will be regional differences, overall even at 1.5 °C, we will experience the impact of heat increases across the land and the ocean with extreme heat in most regions that are inhabited. You may have already observed changes in your own community. Perhaps you are seeing warmer summers or increases in rain, droughts, or wildfires. Depending on where you live, you may also be seeing bigger snowstorms. In fact, that is precisely what scientists predict, increasingly uneven distributions of precipitation and more dramatic weather, including snow in some places. Warmer air is capable of holding more moisture which leads to more intense weather events.

Sea level rise due to melting polar ice sheets will destroy countless coastal communities, especially those dependent on the sea for food and their livelihoods. The more we can limit sea level rise, the more likely we are to adapt to the changes. Coral ecosystems will be dramatically impacted and possibly gone entirely; this has already started. If the temperature rises to 2.0 °C, the consequences will be more drastic, lowering our odds of adaptation.

The Secretary-General of the World Meteorological Organization (WMO), Petteri Taalas, stated at a news conference during a United Nations conference in November 2018 that greenhouse gas concentrations, instead of decreasing since the Paris Agreement, have reached record high levels. We are quite literally moving in the opposite direction from what is needed. He warned that if we continue this trend, we will reach temperature increases of 3–5 °C by the end of the century. For those more familiar with Fahrenheit, a 3–5 °C increase is equivalent to 5.4–9.0 °F. Our planet has seen this before and it resulted in mass extinction. The late Triassic period was sparked by global temperature increase of 5–11 °F. Such increases would yield devastating results, making vast regions of the world inhospitable (Wallace-Wells, 2019, p. 6).

Perhaps the end of the century feels too far away to worry about. When is all this expected to occur? If we do not reduce our carbon emissions, we are on track to hit 1.5 °C as early as 10 years from the production of this book, in 2030. This is not about our grandchildren. This is about us. Right here. Right now.

### **The Anthropocene Age**

We are now in a geologic age called the Anthropocene. *Anthro* means *human*. It was named by scientists based on the overwhelming evidence that humans have caused substantial and lasting changes in the Earth's atmosphere, water systems, and biosphere—the diversity of life (Ellis, 2013). Geologic periods, eras, and epochs define major shifts for the earth in terms of life-forms and extinctions, climate, topography, and other aspects of the planet. Many of us are familiar with terms like Jurassic, the time of the big dinosaurs, and are aware that the era of dinosaurs likely ended with a sudden and cataclysmic asteroid that abruptly and dramatically changed the climate. Similarly, the Anthropocene marks the end of the era that most of us were born into and begins a new one named in honor of the impact humans have had on every part of the environment (Gornitz, 2013; Wallace-Wells, 2019). In geologic terms, the pace at which humans have impacted the planet is unimaginably fast, and that rate is increasing.

The heating planet alone, ignoring pollution and other destruction, has already resulted in increases in severe weather events which means more and stronger hurricanes, tornadoes, floods, droughts, and forest fires, to name a few. These in turn will have, and in some cases already have, created devastating economic, social, and personal losses to communities and sometimes to entire countries (Kemp, 2011).

The coming chaos will result in major social, political, and economic changes for the human *community*. For example, as a result of climate change, conflicts over resources, and environmental damage caused by industrial air, ground, and water pollution, we are now witnessing global migration and violent conflicts as has played out in Syria (Wallace-Wells, 2019). There are surging crises in the Global South increasing the destabilization. It is communities marginalized by color, poverty, gender, and locale which are impacted, ignored, and demonized. Power, race, and wealth influence who contributes to and benefits from environmental degradation and who suffers as a result (Wallace-Wells, 2019).

### **What Are We Doing About Climate Change? The Paris Agreement**

What are we doing about this crisis? The answer is frustrating: a lot and not nearly enough. This book explores many activities for combating climate change and other environmental destruction, but let's start with one of the biggest global efforts: *The Paris Agreement*. It is nearly impossible to read anything about climate change without mention of the Paris Agreement.

In December 2015 in Paris, the United Nations Framework Convention on Climate Change (UNFCCC, 2016) reached a global agreement about greenhouse gas emissions in response to climate change. The goal was to obtain buy-in from nations around the globe. So rather than set any specific goals for nations, they asked each nation to determine what they could contribute. On Earth Day, April 22, 2016, at the United Nations Headquarters in New York City, 55 countries that produced 55% of global emissions ratified the agreement to reduce emissions. This has since increased to 125 countries. The Paris Agreement's central aim was:

To strengthen the global response to the threat of climate change by keeping a global temperature rise this century well below 2 degrees Celsius above pre-industrial levels and to pursue efforts to limit the temperature increase even further to 1.5 degrees Celsius. (UNFCCC, 2016)

Under the agreement, the United States pledged to cut its greenhouse gas emissions to 26–28% below our 2005 levels. We agreed to achieve this by 2025 and committed up to \$3 billion in aid for poorer countries by 2020. As part of this effort, participating states agreed to track and report progress to the global community and push new and existing policies to reduce carbon pollution and promote clean energy at both state and federal levels (United States Climate Alliance, 2019).

As of 2019, 197 states plus the European Union had signed and ratified the Paris Agreement which represents nearly every country in the world, save a few important holdouts like Russia (Apparicio & Sauer, 2018). It is important to note that on June 1, 2017, President Trump withdrew the United States from the Paris Agreement (Shear, 2017). Nevertheless, the withdrawal cannot take place until after the 2020 elections which could result in a reversal of that decision, depending on the outcome of that race.

### **Not Only About Climate Change**

The global environmental crisis expands beyond climate change to include human-induced ecological and environmental destruction. Not only have humans dramatically increased global temperatures by putting carbon, methane, and other greenhouse gases into the air at unprecedented rates, but we have also created other changes, many of which may be permanent. Species are going extinct at a rate more rapid than ever recorded since humans walked the planet. For example, in the oceans, we have depleted fish populations—many to the point of collapse—destroyed major animal habitats through deforestation and growing cities, and polluted our waterways, air, and land (Kemp, 2011). There is virtually no ecosystem that has not been negatively impacted by human activity.

An old phrase referring to a *canary in a coal mine* provides an ominous warning. Coal miners brought canaries into mines because they were more sensitive to poisonous carbon monoxide than humans; when the canary stopped singing (died), humans knew it is time to exit quickly.

This metaphor is now before us as a reality on a global scale. To highlight just one of many possible examples, in September 2019, it was discovered that North America has lost three *billion* birds since 1970, largely due to habitat loss (Rosenberg et al., 2019). These are not the already-threatened birds. These are everyday common birds like the red-winged black bird, which have thrived in abundance (Fig. 1.1). This is a loss of 29% of *all birds* in North America in less than a half century (48 years). The proverbial canary is silent. However, we have no option to exit like a coal miner; action is our only hope. As individuals and professionals, we are now called to action.



**Fig. 1.1.** Seabirds: northern gannets. (Published with kind permission of © Ande A. Nesmith 2020. All Rights Reserved)

A defining characteristic of the Anthropocene age is mass extinction. Earth's geologic and ecological history is replete with extinctions. We have had five major extinctions caused by naturally occurring events in which nearly 75% of all living species disappeared (Richter, n.d.; Kolbert, 2014). These were caused by events like an asteroid and volcanic activity. True, extinction is a natural part of our evolutionary cycle; in fact, 99% of all species to ever exist are extinct (Greshko et al., 2019). However, we are in the middle of a sixth extinction that is human-caused through pollution, habitat loss, overharvesting, and climate change. Extinctions of species today are occurring at hundreds of times faster than under natural conditions. It is complicated to measure because we do not actually know precisely how many species there are on the planet, though we have currently identified from 1.4 to 1.8 million species. According to the United Nations, currently nearly one million species are threatened with extinction (United

Nations, 2018). More specifically, the average number of native species in most major land-based habitats has fallen by at least 20%, mostly since industrialization. And more than 40% of amphibian species, almost 33% of reef-forming corals, and more than a third of all marine mammals are threatened (United Nations, 2018).

Much of this speaks to the future. Critically, we are currently *already* experiencing devastating impacts of climate change. At the writing of this book, the last 5 years were among the hottest ever recorded (Dennis, Freedman, & Muyskens, 2020). Winter Arctic temperatures (critical for sustaining the polar ice sheet) have already risen 3 °C, and we are quickly facing ice-free seasons in the Arctic with the end of polar bears and other Arctic wildlife.

### **Mobilize Change: A Call to Action**

This is the moment to move into action. The planet “was brought to the brink of climate catastrophe within the lifetime of a single generation, the responsibility to avoid it belongs with a single generation, too” (Wallace-Wells, 2019, p. 6). Denial of course interferes with our ability to take action. Even when we know cognitively that climate change is real and urgent, the immensity of it can seem unimaginable (Norgaard, 2011). As professionals and individual human beings, however, we owe it to our collective children to do *something* given that denial is threatening their future (Mann & Toles, 2018). Ironically, our capacity for creativity and change has established roadblocks for us. Our rapid technological advances have in fact led us to this climate crisis.

#### **This Is No Time to Give Up: Action Can Yield Real Change**

Despite the bleakness of this message, it is no time to throw in the towel. In fact, we sit on the brink right now, and while the fate of life on earth is on the line, there is still time to thwart the worst impacts of climate change (Romm, 2016). At 1.5 °C, we need to make rapid changes in land use, urban planning, industrial policies, infrastructure, and energy policy and use (IPCC, 2018). Adaptations, if carefully implemented, have the potential to benefit sustainable development and poverty reduction (IPCC, 2018). Change requires a commitment to stop this spiral and be a part of creating transformative change. In order to accomplish this, we must maintain optimism to guide and energize us.

We begin this journey without a map and with limited resources (Orr, 2016); but we must remember, there are some models for change. McKibben (2019) encourages optimism in the ongoing struggle to disrupt destructive climate change. He finds hope in the technological developments including solar and wind power, activism engaging nonviolent action, and the nature of humans as team players who value community. Human survival is linked to our collective nature over individualism.

The political turmoil of nation states and cooptation by individualistic shortsighted goals based on greed brings to the fore the necessity for local control and action. And there are indeed local and global models for action. With the United States pulling out of the Paris Climate Agreement, more localized entities have stepped in as states, cities, and organizations have developed plans

and are taking action (Beaumont, Bonfiglio, & Beaumont, 2019). These entities “must cascade up to change the larger systems of governance and economy” (Orr, 2016, p. xi).

For example, 25 states have joined the United States Climate Alliance (2019), which is setting its own standards more in line with the Paris Agreement, toward mitigating climate change. Many in the United States are mobilizing to create change at the local level. When the US President, President Trump, announced his decision to pull the United States out of the Paris Climate Agreement, cities, states, and organizations stepped up to fill that void. As of mid-2019, there were 75 cities and 25 states committed to meeting and exceeding the Paris Agreement thresholds for the United States.

### Wicked Problems

We must recognize the complexity of real-world problems and the multidimensional and interdisciplinary efforts required to address them. *Wicked problems* are complex, large-scale, multilayered, dynamic, value-laden, highly contested issues that cross multiple natural and human-created systems and strata (Rittel & Webber, 1973). Climate change, not surprisingly, is a *wicked problem*.

Climate change amplifies the intersectionality of risk, identity (gender, race/ethnicity, poor), and vulnerability. This expands the multidimensional complexing of responding to the cumulative risks and exposures as people who suffer under the vulnerability of poverty, sexism, racism, and geography are most burdened by environmental hazards (Bullard, Mohai, Saha, & Wright, 2007; Klinenberg, 2002; Peeples, 2003; Sexton & Linder, 2010).

While we tend to think about climate change in terms of meteorological statistics, there is a very human side to it as well. As Gus Speth, cofounder of the Natural Resources Defense Council explained, “the top environmental problems are selfishness, greed, and apathy...and to deal with those we need a spiritual and cultural transformation. And we as scientists don’t know how to do that” (Hickman, 2019, para. 4). This occurs within a global sociopolitical context that inherently supports unsustainable growth models:

Unsustainable models of development, unequal power dynamics and unequal distribution of resources ... exacerbate structural inequalities and affect most poor and low-income people. (Dominelli, 2013, p. 431)

Hence the problem must be tackled at multiple levels, including structural, political, and economic inequality, access to resources, and the relationship between greed, power, and culture.

### Complexity and Interdisciplinary Responses

Climate change at the complicated juncture with human-induced ecological destruction and the resulting environmental injustice is a deeply complex issue that likely can only be resolved through interdisciplinary collaboration. Essentially, at this juncture, we need *all hands on deck* to resolve it. While the natural, biological, and technological sciences have an extensive history of working on these issues, the social sciences have remained on the sidelines until recently



(Schmitz, Matyók, Sloan, & James, 2012). Change means expanding the lens of the social sciences to embrace the ecological environment. This requires drawing on the strengths of collaborative, justice-based, community practice as we join with communities and educate for interdisciplinary response (Nesmith & Smyth, 2015; Schmitz, Stinson, & James, 2010).

Interdisciplinary partnerships, embedded in relational association with local communities facing environmental threats and inequality, are required (Kemp, 2011). The complexity and immediacy necessitate the multifaceted response. The individual and community are the central actors at the core of the issues and are vital to change. Response, ideally, is interdisciplinary engaging the social, biological, physical, and natural sciences along with technology (Schmitz et al., 2012). Social work, peace, and conflict studies and critical studies bring complimentary lens to the analysis and action. As we continue to partner with biological, geologic, environmental, chemical, and social scientists; medical professionals; engineering; policy-makers, lawyers, planners, and economists; and artists, the potential for creative response expands.

### **Book Outline and Rationale**

Throughout this book, we use several ecological, environmental, and environmental justice-related terms. We support learning that crosses the personal, communal, and professional as we progress through this book. In *Chap. 2, Water, Air, Land: The Foundation for Life*, explores the role of place and belonging which is anchored in the land, water, and air upon which we depend to meet our personal, communal, and physical needs. *Chapter 3* further scrutinizes the *web of life* recognizing that human life is not at the center. The survival of humans is dependent upon the same needs as all of ecology. In *Chap. 4, Environmental Justice: Injustice and Transformative Change*, we tackle vulnerability of marginalized communities and populations that occur at the intersection of race, poverty, geography, and gender. In *Chap. 5*, human health and well-being are studied in more depth, highlighting the interconnection across global environmental crisis. *Chapter 6*, with the focus on power and politics, considers the role of engagement in political decision-making processes and potential opportunities for change and empowerment. In *Chap. 7*, the struggles to create change at the local within the global context are explored from the perspective of individuals, the community, and the professions committed to transformative change. Finally, in *Chap. 8*, we explore the global pandemic of 2020 as it comes from and provides lessons for engaging the global environmental crisis.

### **Discussion Questions**

In order to grasp the significance of the issues and their centrality in your community, you must first grapple with your personal history. The following questions guide that reflection:

1. Consider your history of awareness about climate change. When were you first aware of climate change? Environmental injustice? How has your understanding changed over time?
2. How much of the information presented in this chapter is new to you? What stands out? What is your reaction to it?
3. What is happening in your community/state/country in regard to action to protect (or degrade) the environment?

4. What role can you play in your community to ameliorate the impact of climate change?
5. What steps can your community take to adapt and mitigate the increasing risk?

### Activity

Think about our changing climate and its relationship to an environmental injustice in your community or region. Answer the following questions and then discuss with a peer, colleague, or community group:

- What changes are occurring in the climate, weather, or storms that you are aware of?
- Why is environmental injustice? How do changes in weather interact with vulnerability?
- Who and what is immediately impacted?
- Who and what will be impacted in the future if it is allowed to persist?
- What actions are underway to address this environmental injustice?
- What are the steps you can or have taken to come alongside your community (either as an insider or outsider) to take action for climate justice?

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