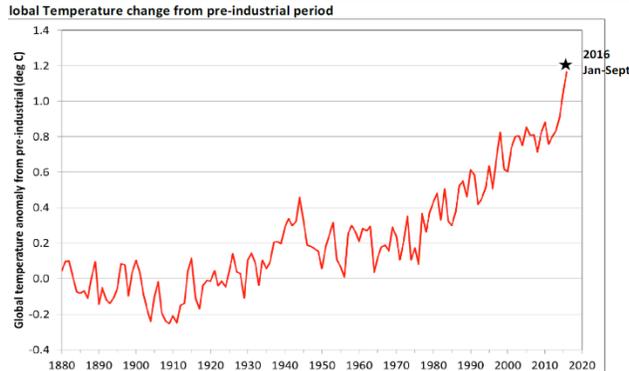


The Impact of Climate Change on Indigenous Populations

History of Climate Change



While climate change has recently become a widely discussed and debated phenomena, the roots of climate change stretch back to the 1800s with the advent of the industrial revolution. The industrial revolution began in the 1800s in Europe. It saw the agrarian economies become industrialized and the start of the use of machinery in manufacturing and production.¹ These machines were typically run by energy

produced by burning wood, but as the industrial revolution progressed, coal and oil became important sources of energy. Since the beginning of the industrial revolution, temperatures and sea level have risen. A scientist from the University of Reading estimates that since 1850 the global average temperature has risen by over 1 °C, a number which is widely accepted among the scientific community.² While an increase of 1 °C in global temperature may not seem like a large increase, it corresponds to a nearly twenty centimeter increase in global sea levels since 1880.³ The rise in sea level is a product of both melting ice, including ice in the Arctic, as well as the expansion of water, which gets larger as it gets warmer.

Moreover, while carbon dioxide usually attracts most of the blame for climate change, other greenhouse gases have played an important role both historically and currently. For example, the greenhouse gas methane is a byproduct of burning coal and natural gas and raising livestock.⁴ Methane's historical role is considered rather limited, but it has played an important role in contributing to present day climate change given that the warming effects of methane are felt later than the warming effects of carbon dioxide.⁵ This means that sources of methane burned decades ago are just beginning to contribute to climate change and will continue to contribute until it dissipates. If historical amounts of greenhouse gases are emitted, climate change will lead to the destruction of the global environment, with particularly dire consequences for the marginal populations, such as indigenous peoples.⁶

¹ "Industrial Revolution." *History.com*. <https://www.history.com/topics/industrial-revolution>.

² "This animation shows how the Earth has warmed up since 1850." *World Economic Forum*. <https://www.weforum.org/agenda/2016/05/this-animation-shows-how-the-earth-has-warmed-up-since-1850/>.

³ "Causes of Sea Level Rise: What the Science Tells Us (2013)." *Union of Concerned Scientists*. http://www.ucsusa.org/global_warming/science_and_impacts/impacts/causes-of-sea-level-rise.html#.WUiIP8a1vIV.

⁴ "Overview of Greenhouse Gases." *EPA*. <https://www.epa.gov/ghgemissions/overview-greenhouse-gases>.

⁵ David Archer, *Global Warming Understanding the Forecast*.

⁶ "COP21: The Impact of Climate Change on the World's Marginalized Populations." *Human Rights Watch*. <https://www.hrw.org/news/2015/10/27/cop21-impact-climate-change-worlds-marginalized-populations>.

Future Estimates for Climate Change

The long-term impacts of climate change would devastate the globe. If greenhouse emissions continue on their current trajectory, the world will be 8 °F warmer in 2100 than it was in 1900.⁷ This increase in temperatures would cause a 1 to 4 ft. increase in sea level, placing many major cities, such as New York City and Shanghai, underwater as well as many islands, particularly those in the Pacific.⁸ At our current rate of greenhouse gas production, more than 600 million people would be directly submerged by rising sea levels.⁹

Furthermore, the ocean will become more acidic; as CO₂ dissolves into the ocean, preventing the emissions from reaching the atmosphere, the ocean becomes more acidic.¹⁰ As we continue to emit high quantities of CO₂ these emissions will dissolve into the ocean making it even more acidic; eventually it will reach a point at which marine species, such as fish, crabs, mollusks and corals, (which form a crucial part of the food system for indigenous populations) will struggle to survive. Ocean acidification could lead to mass extinctions, seriously endangering the food supply across the globe, particularly in regions dependent on the ocean for food, such as the islands of the Pacific and Caribbean, and the Arctic.

Additionally, if climate change deals as hard a blow to governments around the world as most groups predict, then the governments of the future will be even less well-equipped to deal with the worsened environmental degradation. For example, if sea levels rise to cover many of the world's major cities, then governments will be preoccupied dealing with providing humanitarian relief, rebuilding cities, and massive refugee crises, leaving fewer and fewer resources to address the unique needs of indigenous populations. The effects of climate change will force governments to make difficult decisions with fewer resources as they are forced to deal with a worsening environment.¹¹

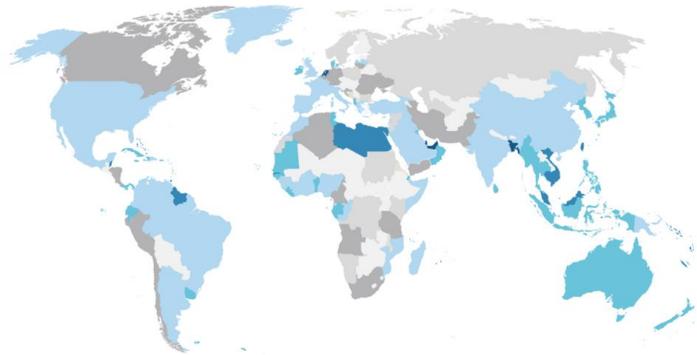
The Current Impacts on Indigenous Populations

Already the globe has begun to see the effects of climate change, with sea levels higher than they were 100 years ago, rapidly changing weather patterns, prolonged periods of drought, and melting sea ice and glaciers. While climate change impacts everyone, its costs and its effects are not evenly

Populations at risk

Percentage of national populations who live in places that will be drowned by a rise in long-term sea levels - even if global warming is held at 2C

0% 0.1-5 5-10 10-25 25-50 50-75 75-100



Guardian graphic

Source: Nature Climate Change

⁷ "Future Climate Change," National Climate Assessment. <https://bit.ly/2Mlj489>.

⁸ "Are the Effects of Global Warming Really that Bad?" *National Resource Defense Council*. <https://www.nrdc.org/stories/are-effects-global-warming-really-bad>.

⁹ "Waterworld: Hong Kong and Shanghai will be under water if temperatures rise by 4 degrees Celsius." *South China Morning Post*. <http://www.scmp.com/news/world/article/1877028/waterworld-hong-kong-and-shanghai-will-be-under-water-if-temperatures>.

¹⁰ Melissa Denchak, "Are the Effects of Global Warming Really that Bad?"

¹¹ Gwynne Dyer, *Climate Wars: the Fight for Survival as the World Overheats*, Oxford (GB).

distributed, with developing countries and marginalized populations more harshly impacted than developed nations. Indigenous populations in developing and developed nations are typically marginalized by either a nation's legal system or through dominant societal and cultural norms that push them to the periphery of society and politics. This marginalization even plays out in climate change politics where the plight of Pacific island nations, such as Kiribati, Vanuatu, and Micronesia, to hold temperature rise below 1.5°C was ignored at the Paris Climate Conference in 2015.¹² These nations are worried as they have already seen sea level rise impact their daily lives, with salt water intrusion into crucial fresh water sources, increased flooding and beach erosion, and the destruction of crops.¹³ These effects have caused 20,000 indigenous island residents from the Marshall Islands to be among the first climate refugees relocating to the United States.¹⁴ Even if these residents were able to continue to inhabit the islands, which will become uninhabitable by 2050, climate change threatens coral reefs which are the basis for their food systems and economies.¹⁵

Far from the serene islands of the Pacific climate change continues to wreak havoc. In Kenya, the indigenous Maasai and Oromo people, who predominantly live in rural areas as herders and subsistence farmers, are being forced to move to cities and abandon their traditional practices due to prolonged drought and desertification of the savannah.¹⁶ The very way of life of these peoples is threatened by climate change, displacing them from their homelands and exacerbating tensions in Kenya's urban areas. A similar crisis is facing indigenous Quechua-speaking groups in the Andes Mountains. These farmers have depended on the glaciers as a crucial source of water for drinking and their crops. As temperatures have risen glaciers have shrunk, depriving farmers of crucial water.¹⁷ This has created food insecurity and forced some farmers off their land, crowding them into slums in major cities in Peru and Bolivia. These populations then become targets for radicalization efforts and criminal groups who seek to capitalize off their dire economic situations.

To policymakers a simple situation would be to continue to invest in renewable energy and environmentally sustainable projects, but even those efforts come at a cost to indigenous peoples. In Brazil deforestation to clear land for corn to be converted into ethanol is pushing indigenous communities off of their land.¹⁸ Deforestation also contributes to climate change by releasing stored carbon into the atmosphere and destroying a potential storage for future carbon. Some believe that deforestation, alone, contributes 15% to carbon emissions over a given year.¹⁹ While Brazil sought to

¹² "The Pacific Islands." *COP23 Fiji*. <https://cop23.com/fj/fiji-and-the-pacific/pacific-islands/>.

¹³ "See How Pacific Islands Are Living with Climate Change." *National Geographic*. <https://www.nationalgeographic.com/photography/proof/2017/02/climate-change-pacific-islands/>.

¹⁴ "The Pacific Islands." *COP23 Fiji*

¹⁵ "Climate Change Will leave Pacific Islands Uninhabitable Mid-Century, Study Says." *Inside Climate News*. <https://insideclimatenews.org/news/25042018/rising-sea-level-projections-pacific-islands-military-sites-kwajalein-atoll-usgs-climate-change-research>.

¹⁶ "As The Climate Changes, Kenyan Herders Find Centuries-Old Way of Life in Danger." *NPR*. <https://www.npr.org/sections/parallels/2017/07/23/538373985/as-the-climate-changes-kenyan-herders-find-centuries-old-way-of-life-in-danger>.

¹⁷ "Climate Change Equals Cultural Change in the Andes." *Scientific American*. <https://www.scientificamerican.com/article/andes-climate-change-glacieramaru-agriculture/>.

¹⁸ "Five ways climate change harms indigenous peoples." *Climate Change News*. <http://www.climatechangenews.com/2014/07/28/five-ways-climate-change-harms-indigenous-people/>.

¹⁹ "Deforestation and Its Extreme Effect on Global Warming." *Scientific American*. <https://www.scientificamerican.com/article/deforestation-and-global-warming/>.

reduce deforestation beginning in 2000, since 2012 there has been a notable uptick.²⁰ While logging is an important employer throughout the Amazon it has also seen loggers kill a previously uncontacted tribe.²¹ But deforestation is not limited to the Brazilian Amazon, with indigenous communities living in the Congo Basin in Africa at particular risk of climate change and deforestation. The livelihood and traditional practices of these communities is intrinsically linked to the forests and as they are cut down their community structures begin to fall apart and we lose their traditional practices.²² Deforestation has serious consequences not only for isolated indigenous communities but also those that have chosen to make contact and indigenous people living far from the Amazon that will see sea levels rise and glaciers melt.

Ultimately, indigenous peoples from the African Sahel to Pacific islands and the peaks of the Andes are facing the effects of climate change today. Unless a solution is found that both alleviates their immediate challenges as well as works to prevent climate change these populations will reach a crisis point that will push them, and their cultural practices, to the brink of extinction.

International Efforts to Combat Climate Change

Failure of Kyoto and Potential for Success with the Paris Climate Accord

The two most prominent past actions on climate change are the Kyoto Protocol from 1997 and the Paris Agreement from 2015. While both treaties dealt specifically with climate emissions, they took radically different paths in seeking to curb greenhouse emissions and stave off climate change.

The Kyoto Protocol was the first international treaty dealing with climate change. The authors of the Kyoto Protocol tackled climate change as the product of greenhouse emissions from industrialized nations; therefore, in their view, these countries should work to decrease their emissions to 5% below 1990 levels.²³ Emissions cuts were not expected from developing nations, such as Brazil, China, and India, at the time, as it was not expected that these countries would see an explosion in their emission of greenhouse gases. Unfortunately, the Kyoto Protocol failed to reduce global greenhouse emissions as China's economy rapidly increased and the United States never committed to a reduction of its greenhouse gases.²⁴ However, even countries that did sign onto the treaty, such as Canada, saw its greenhouse gas emissions increase 29% above its target level for greenhouse emissions in 2006.²⁵ Additionally, a key feature of the Kyoto Protocol was the Clean Development Mechanism, which allowed for an industrialized country to fund a program that promoted sustainability in a developing country instead of directly reducing its emissions.²⁶ For example, Germany could fund a reforestation project in India rather than shut-down one of its coal

²⁰ "Business as usual: A Resurgence of Deforestation in the Brazilian Amazon." *Yale Environment*.

<https://e360.yale.edu/features/business-as-usual-a-resurgence-of-deforestation-in-the-brazilian-amazon>.

²¹ "Brazilian police investigate gold miners for 'killing uncontacted Amazon tribe members.'" *Independent*.

<https://www.independent.co.uk/news/world/americas/brazil-police-amazon-tribe-kill-gold-miners-uncontacted-massacre-chopped-up-a7944776.html>.

²² "Profiling climate change vulnerability of forest indigenous communities in the Congo Basin." *CIFOR*.

<https://www.cifor.org/library/4151/profiling-climate-change-vulnerability-of-forest-indigenous-communities-in-the-congo-basin/>.

²³ Gwynne Dyer, *Climate Wars*.

²⁴ "Kyoto Treaty Fizzled, But Climate Talkers Insist Paris is Different." *National Public Radio*.

<http://www.npr.org/2015/11/30/452971667/kyoto-treaty-fizzled-but-climate-talkers-insist-paris-is-different>.

²⁵ Gwynne Dyer, *Climate Wars*.

²⁶ "Clean Development Mechanism (CDM)." *The United Nations Framework Convention on Climate Change*.

http://unfccc.int/kyoto_protocol/mechanisms/clean_development_mechanism/items/2718.php.

power plants. However, this program was nearly impossible to administer as it was difficult to calculate the number of emissions that were saved by such projects and ensure that these projects actually produced some type of reduction in greenhouse gases.²⁷

The 2015 Paris Agreement tried a different approach in its effort to curb climate change. Rather than mandating a certain percentage reduction in greenhouse emissions, the Paris Agreement requires voluntary pledges to reduce emissions in order to prevent an average global temperature increase of 2 °C by 2100.²⁸ The agreement also includes a mandatory check-in every five years to evaluate how well countries are reducing their emissions in line with their voluntary pledges.²⁹ Additionally, the Paris Agreement includes references to indigenous peoples in several sections. It recognizes the importance of ingenious peoples and traditional forms of knowledge in addressing climate change.³⁰ Most importantly, the Paris Agreement includes a climate fund to finance emissions-reducing projects in developing countries.³¹ This fund will go toward projects such as establishing renewable energy sources like wind or solar power in the developing world.³² The Paris Agreement is not enforceable or mandatory, something exemplified by the withdrawal of the United States in 2017.³³

Although it is impossible to know how successful the Paris Agreement will be, as it was only signed three years ago, it has many similarities to the Kyoto Protocol, which it superseded. For example, neither agreement is enforceable, no penalties are applied if nations do not reach their targets nor are there any repercussions. Additionally, the climate fund of the Paris Agreement is alarmingly similar to the Clean Development Mechanism, which was poorly implemented and had little to no effect in terms of emissions reduction.³⁴ Finally, both treaties have failed in keeping the United States engaged in the treaty and committed to greenhouse gas reductions. While other countries can cut their emissions, it will be incredibly difficult to avoid increasing global temperatures more than 2 °C if the major greenhouse emitters, such as the United States, Japan, and China, are not committed to making greenhouse reduction as well.

Past Templates for Future Success

The international community has also come together in order to establish treaties that fight dire environmental problems. For example, the Montreal Protocol helped cut chlorofluorocarbons (CFCs) and is largely responsible for preventing the total erosion of the ozone layer.³⁵ The ozone layer is an area of the atmosphere that absorbs most of the harmful radiation from the sun, preventing it from reaching the surface and harming life. CFCs were causing a hole to develop in the ozone layer,

²⁷ Gwynne Dyer, *Climate Wars*.

²⁸ "The Paris Agreement." *The United Nations Framework Convention on Climate Change*. http://unfccc.int/paris_agreement/items/9485.php.

²⁹ Ibid.

³⁰ "References to Indigenous Peoples in the Paris Agreement." *UNFCCC*.

https://www.edf.org/sites/default/files/textreferences_ips_adopted_paris_agreement.pdf.

³¹ "What is the in the Paris climate agreement?" *BBC News*. <http://www.bbc.com/news/science-environment-35073297>.

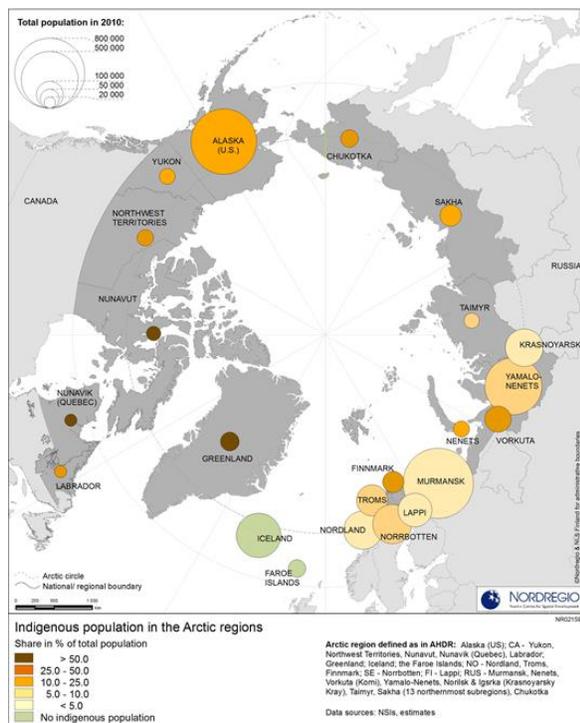
³² "The United States Left the Paris Agreement. Good," *Council on Foreign Relations*. <https://www.cfr.org/blog-post/united-states-left-paris-agreement-good>.

³³ Ibid.

³⁴ Gwynne Dyer, *Climate Wars*.

³⁵ "The Montreal Protocol on Substance that Deplete the Ozone Layer." *United Nations Environmental Programme*. http://ozone.unep.org/new_site/en/montreal_protocol.php.

allowing an increase in harmful ultraviolet light to get to earth, harming the environment as the increased radiation increases the incidence of cancer in human and non-human organisms.³⁶ This treaty found creative solutions, such as incentivizing reductions in CFC use in the private sector, involving nations which emitted the most CFCs, and providing for the financial support for eliminating CFCs in developing countries.³⁷ The hole in the ozone layer is predicted to be completely gone by 2050, a far cry from the concern that ensued when the hole was first announced in the 1980s.³⁸ A similar treaty is the Minamata Convention on Mercury signed in 2013. It seeks to regulate and reduce mercury from human sources.³⁹ The treaty will reduce or limit the amount of mercury emitted from coal power plants and mining operations and contained in everyday-products such as batteries and light bulbs.⁴⁰ While some exceptions exist, such as for vaccines and traditional practices (such as religious ceremonies), the convention will significantly limit the exposure of humans and animals to mercury.⁴¹ The Montreal Protocol and Minamata Convention provide a way forward on



finding solutions to climate change and their effects on indigenous peoples. When the international community comes together in good faith there is little it cannot accomplish.

Case Study: Article Indigenous Peoples

While all humans will be impacted by climate change, perhaps the most susceptible are the indigenous peoples of the Arctic. Arctic peoples rely on the ice for their homes and sustaining the animals that make up their diet, such as fish and seals. The effects of climate change will literally melt the ground out from under them. Even where indigenous communities do not literally live on the ice, the melting of permafrost threatens their homes.⁴² The immediate problem associated with melting permafrost is that it destabilizes buildings

constructed on this previously frozen ground. In Nadeshda, Russia, 60% of all buildings have been impacted by melting permafrost, becoming unstable or cracking to the point where they are no

³⁶ "International Actions- The Montreal Protocol Substance that Deplete the Ozone Layer." *Environment Protection Agency*. <https://www.epa.gov/ozone-layer-protection/international-actions-montreal-protocol-substances-deplete-ozone-layer>.

³⁷ "About the Multilateral Fund." *Multilateral Fund for the Implementation of the Montreal Protocol*. <http://www.multilateralfund.org/aboutMLF/default.aspx>.

³⁸ "The Ozone Hole Was Super Scary, So What Happened To It?" *The Smithsonian*. <http://www.smithsonianmag.com/science-nature/ozone-hole-was-super-scary-what-happened-it-180957775/>.

³⁹ "Minamata Convention on Mercury." *Environmental Protection Agency*. <https://www.epa.gov/international-cooperation/minamata-convention-mercury>.

⁴⁰ "The Minamata Mercury Convention: 12 Things it Does and Doesn't Do." *Scientific American*. <https://www.scientificamerican.com/article/the-minamata-mercury-convention-12-things-it-does-and-doesnt-do/>.

⁴¹ *Ibid*.

⁴² "What is permafrost and how does it relate to climate change?" *The Guardian*. <https://www.theguardian.com/environment/2012/mar/05/permafrost-climate-carbon-emissions>.

longer suitable for occupants.⁴³ Long-term, melting permafrost releases methane and carbon, two leading greenhouse gases and causes of increased temperatures.⁴⁴ Scientists, working from the University of California, Santa Barbara, estimated that there are 1672 billion metric tons of carbon trapped by permafrost, double the amount of carbon currently in the atmosphere.⁴⁵ Additionally, as melting in the Arctic continues it will become economically viable to exploit the region for rare metals and oil. This exploitation will contribute to climate change and push these communities from their land and traditional practices.

Questions to Consider

- To what extent can indigenous populations be involved in address climate change?
- To what degree should indigenous populations influence national and international climate change policy?
- How can indigenous populations be protected best against climate change?
- To what extent can the international community lessen the effects of climate change?

⁴³ Alec Luhn, "Slow-motion wrecks: how thawing permafrost is destroying Arctic cities," *The Guardian*, October 14, 2016, Accessed July 15, 2017, <https://www.theguardian.com/cities/2016/oct/14/thawing-permafrost-destroying-arctic-cities-norilsk-russia>.

⁴⁴ Clark, Duncan. "What is permafrost and how does it relate to climate change?"

⁴⁵ C. Tarnocai, J.G Canadell, E.A.G Schuur, P. Kuhry, G. Mazhitova, and S. Zimov. "Soil organic carbon pools in the northern circumpolar permafrost region," *Global Biogeochemical Cycles* 23, no. 2.