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The Detriment Wildlife Faces From Climate Change

Climate change has become a hot topic of discussion worldwide and for good reason. It affects everyone in different ways, but nevertheless, we're all affected. From natural disasters, and food supplies diminishing, to an evolving and even declining ecosystem, climate change is only getting worse. However, human beings aren't the only ones being affected by these dramatic changes. Our precious wildlife is feeling this burden even more. Sadly, they aren't able to voice their concerns as we are able to. That is why it is important to determine what climate change is, view examples of what it has done to varying species, and come up with ways we can slow down these disastrous patterns destroying our animal friends.

Determining what climate change can help understand the severity of the issue early on. According to the World Wildlife Fund (WWF), climate change is a significant shift in the planet's weather patterns and average temperatures, with an average global warming of nearly 1°C in the past century. To prevent the worst effects, the global agreement is to keep temperature rises below 2°C from the pre-industrial era, with an ambition to keep it below 1.5°C. However, assessments suggest that we are on course for temperature rises of up to 4°C or higher. Recent developments due to climate change include 16 of the 17 warmest years on record, with 2016 being the warmest yet. The current levels of greenhouse gasses have been unprecedented in the last 800,000 years, and scientists have declared a new geological time period, the Anthropocene, where human activity is the dominant influence on the environment, climate, and

ecology of the earth. As the planet continues to warm, extreme and unpredictable weather will become more common, with drastic impacts on all life on Earth (Mramstead, 2017).

Next, looking at examples can further explain the detriment of climate change on the earth's wildlife. The Everglades, an area known for its diverse wildlife, is experiencing significant changes due to climate change. It's projected that wildlife in the area will face higher temperatures, drier conditions, and rising seas in the coming years. Recent modeling efforts have revealed the potential impacts of temperature and precipitation changes on threatened and endangered species in the area. Climate change could pose significant challenges to wildlife, especially Key deer, found only on upland islands in the lower Florida Keys. Climate suitability suggests they may not tolerate changes within their range. Small pockets of suitable conditions may appear on the distant mainland, but Key deer may not survive (*WEC383/UW428: Climate Changes, Shifting Ranges: Climate Change Effects on Wildlife in the Florida Everglades and Keys*, n.d.).

Another example that contrasts the key deer in Florida are large carnivores such as the snow leopard, polar bears, African wild dogs, cheetahs, and lions. One wouldn't suspect these apex predators as falling victim to climate change, but that couldn't be further from the truth. Journal of Wildlife Law and Policy states "When species that are not typically thought of as vulnerable to climate change— such as lions (Panthera leo), cheetahs (Acinonyx jubatus), and African wild dogs (Lycaon pictus)—nevertheless start feeling its impact, the writing is on the wall." Climate change impacts ecosystems and

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wildlife in various ways, including shifting species to higher altitudes and latitudes, more frequent droughts, floods, cold spells, and heat waves. However, successful adaptation is hindered by rapid environmental change and the pressure on biodiversity from human-induced habitat loss, unsustainable use, human-wildlife conflict, invasive alien species, and pollution. Rapid environmental change has become a major factor to challenge these species. Polar bears and wolves are facing habitat loss due to climate change as snow begins to melt away at faster rates, causing them to flee for other unsustainable areas to live. Wolverines need snow for dens. Ethiopian wolves, restricted to highlands and mountain tops, may lose their entire habitat as suitable bands move upslope. This could lead to a loss of mountain habitats for these species. Climate change can also increase human-wildlife conflict by bringing carnivores into human-dominated areas and out of their natural habitats due to prey scarcity. This can also result in people moving into carnivore ranges under climate change, as seen with the Ethiopian wolf and polar bears. Climate-mediated changes in disease ranges can also lead to conflict between humans and large carnivores. For example, the prevalence of bovine trypanosomiasis, a cattle disease, has limited cattle husbandry in Eastern and Southeastern Africa, allowing lions and other African predators to persist. Rising temperatures may shift the disease's range, lowering disease risks and potentially attracting people and livestock into remaining strongholds of lions and predators, such as Selous Game Reserve in Tanzania, Niassa Game Reserve in Mozambique, and Hluhluwe-iMfolozi Park in South Africa (Trouwborst & Blackmore, 2020).

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Moving into different territories, the discussion of species affected by climate change in our oceans is important to highlight. Ocean warming is a result of both long-term climate change and short-term climate variability, such as marine heat waves. Species' responses to warming vary but often involve shifts in their distributional range. Severe heat waves in the northeast Pacific during 2014-2016 triggered poleward expansions in various species. Climate variation is also altering seasonality in the ocean, shifting the annual cycle of surface temperatures towards earlier seasons. Few studies have observed changes in the migratory timing or phenology of marine species, but seasonal migrations of highly mobile fishes to their northerly range are occurring earlier in the year. Key research priorities in climate change ecology are to determine and predict these shifts in space use and species movements. According to Global Change Biology, a study analyzed 9 years of satellite tracking data, environmental information, habitat modeling, and 40 years of conventional tagging data to assess potential changes in tiger shark distribution, migratory timing, and spatial protections in response to ocean warming in the western North Atlantic. Tiger sharks are considered another apex predator of the ocean that eats teleosts, elasmobranchs, sea turtles, seabirds, and marine mammals. The studies were conducted in the western North Atlantic where tiger sharks inhabit Massachusetts to South Florida and the Bahamas. What the studies concluded is that climate-driven changes could alter predator-prey dynamics and redistribute sharks into areas of potential human-wildlife conflict. Understanding, predicting, monitoring, and mitigating these impacts is crucial for research and socio-economic priorities. Ocean warming has already shifted tiger shark

movements into unsafe territories where they can be caught and killed by fisheries (Hammerschlag et al., 2022).

Another habitat that has seen dramatic climate change is Antarctica. Antarctica is crucial in regulating global climate and oceanographic patterns, with terrestrial ecosystems dominated by cryptogams like lichens, bryophytes, and algae. The region's vegetation is highly adapted to extreme conditions but susceptible to climatic fluctuations. Biological responses to temperature, water availability, wind patterns, snow, and ice cover are complex and taxa-specific. In maritime Antarctica, vegetation is expected to show increased productivity, abundance, and cover, while in continental Antarctica, evidence suggests drier and harsher conditions for survival (Colesie et al., 2022). University Corporation for Atmospheric Research (UCAR) states “The Antarctic Peninsula, the part of Antarctica furthest from the South Pole, has been warming rapidly, five times faster than the global average. Since 1950, the Antarctic Peninsula has warmed almost 3°C (5.4°F). That's more warming than anywhere else in the Southern Hemisphere. Overall warmer temperatures along the peninsula are increasing ice melt and have caused several ice shelves to break apart.” Furthermore, Between 1992 and 2017, Antarctica lost over three trillion tons of ice, primarily from the West Antarctic Ice Sheet. The most significant impacts of warming include collapsing ice shelves in West Antarctica, which support ice sheets and glaciers. When an ice shelf collapses into the ocean, glaciers slide into the sea at an accelerated rate. While Antarctic ice shelves do not directly contribute to sea level rise, the collapse can indirectly contribute to sea level rise by accelerating glacier flow and moving faster

towards the Southern Ocean. While there isn't as much wildlife on this continent compared to the rest of the continents, penguins here are being highly affected. Antarctic Peninsula Adélie penguin colonies are being abandoned due to reduced winter sea ice, leading to the destruction of their simple rock nests. Many have moved south to colder areas, and climate change is causing gentoo penguins to struggle to relocate. Emperor penguins are also facing a decline due to melting sea ice, and if greenhouse gas emissions continue to rise, the penguin population will diminish slowly until 2040, then steeply decline by 2100. Nearly 98% of Emperor penguin colonies are at risk of disappearing (Education, n.d.).

In addition to numerous species that are in danger due to climate change, other factors to consider are the physically harmful human-wildlife interactions because of climate change. Over the past decade, there has been a significant increase in newspaper articles about human-wildlife encounters related to climate change, with an average annual increase of 24%. The majority of articles are from Europe, Asia, and the Middle East, with a smaller percentage from Oceania, Africa, and North America. Central- and South America and the Caribbean makeup only around 3% of the total. Studies have shown that venomous animals, primarily jellyfish, were the most common in coded articles (48%). Large terrestrial carnivores were the second largest category (28%), followed by aquatic carnivorous species (18%) dominated by sharks. Terrestrial omnivores and herbivores (14%), dominated by elephants, accounted for 14% of the dataset. Additionally, 6% of the dataset included general references to wildlife without specific animals. Climate change has led to four trends in wildlife-human interactions

(WHI): increased resource competition due to drought, temp displacement of wildlife due to extreme events, range expansion of dangerous animals due to higher temperatures, and changes in temporal behavior patterns of wildlife. These trends confirm Abrahms et al. 's (2023) findings that climate drivers can negatively impact human-wildlife interactions, causing spatial, temporal, and behavioral changes. Climate change threatens both humans and wildlife, necessitating strategies to manage rapidly changing landscapes. Understanding and addressing climate change's impact on wildlife health is crucial for effective management (Newsom et al., 2023).

As you can see, climate change is not only a detriment to our wildlife, but it directly affects us as well when it comes to our interactions with animals. With this said, there are ways that we can combat climate change. Currently in the US, The Biden presidency has passed two significant legislations, the Bipartisan Infrastructure Investment and Jobs Act of 2021 and the Inflation Reduction Act of 2022, which will significantly reduce US carbon emissions. These laws, combined with over $430 billion in spending, are expected to reduce emissions by nearly 1,150 million metric tons in 2030. Although the US has passed two major climate change legislations, these do not signal the end of US efforts. The Treasury Department must quickly implement these laws by promulgating regulations to address tax-related questions, developing directives and programs by the Department of the Interior, Department of Energy, and Federal Energy Regulatory Commission, and addressing property owners' objections. New staff will be hired at the Department of Energy to administer funding, and wind farm lease

auctions will be held for areas off the West Coast and in the Gulf of Mexico (Smith, 2022).

Other ways to fight climate change individually are to save energy at home by reducing heating and cooling use, switching to LED bulbs, using cold water for laundry, hanging clothes instead of drying, and improving home energy efficiency with insulation and electric heat pumps. Next, if possible, changing your home's energy source by switching to renewable energy sources like wind or solar can reduce your carbon footprint by up to 1.5 tons of CO2e per year, and you can also install solar panels on your roof for energy generation. Another step you can take literally is by walking or using a bike or public transit system instead of using your vehicles, with most of them burning diesel or gasoline. Switching to electric cars offers a cost-effective solution to reduce air pollution and greenhouse gas emissions, but they still rely on fossil fuels and require rare minerals. Switching to electric or hybrid vehicles can reduce carbon footprint by up to 2 tons of CO2 annually. When traveling, consider how you travel. Reduce your environmental impact by reducing long-haul flights, using virtual meetings, taking trains, or skipping long-distance trips, which can save up to 2 tons of CO2e. Another tip is recycling. Carbon emissions from electronics, clothes, and plastics are a significant global issue. To protect the environment, reduce consumption, shop second-hand, and repair items. Plastics alone accounted for 3.4% of global emissions in 2019, and every kilogram of textiles produces 17 kilograms of CO2e. Next, consuming plant-based foods, such as vegetables, fruits, whole grains, legumes, nuts, and seeds, reduces environmental impact by reducing greenhouse gas emissions, energy, land,

and water consumption. Also, throwing away food wastes resources and energy, and landfills release methane, a greenhouse gas. Purchase only what you need, use what you buy, and compost leftovers. Other ways you can help is by cleaning up your and your pet's environment, choosing products from companies that use resources responsibly and are committed to cutting their gas emissions and waste, and most importantly, speaking up to Congress and making your voice be heard. These are all helpful ways to slow climate change (United Nations, n.d.).

Climate change will continue to be a hot topic of discussion worldwide. It is affecting everyone in dramatic ways. With the ways listed above, these are steps we can all take to battle climate change and help our wildlife on every continent. Now knowing what climate change is and the different examples of what it has done to different species and how it directly affects the human population, can help us to take a stand for a cleaner tomorrow for not only ourselves but our precious animals on this earth.

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