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COMMENTARY

The Effects of Climate Change on Biodiversity: How Anthropocentric Climate Frameworks Undervalue Animal Welfare Losses

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Climate change is overwhelmingly the result of anthropogenic processes, such as fossil fuel combustion, deforestation, and industrialised agriculture (IPCC, 2023). While human lives and health are undoubtedly threatened, humans are not the only beings suffering. As temperatures rise, and human activities infringe on delicate ecosystems, countless species are being pushed to their limits (Emert, 2024); vital habitats are changing or being lost faster than many species can adapt. Animals and ecosystems are facing rapid, large-scale disruptions that they did not cause, yet they bear some of the most severe and irreversible consequences of human-driven warming.

Despite this, climate change policy and economic analysis are overwhelmingly centred on human welfare. This bias stems from a long history of human detachment from nature and a tendency to value biodiversity primarily for its contributions to human well-being (Dasgupta,

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2021). In the 1970s, nature was first incorporated into macroeconomic models of growth and development; however, it appeared only as a nonessential component, reflecting the assumption that humanity might eventually free itself from nature's constraints (Dasgupta, 2021). This legacy anthropocentric framework has resulted in continuous growth and expansion at the expense of nature, even though nature is, as Dasgupta (2021) stressed, “an essential entity in our economic lives” (p. 4).

The Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services (IPBES) similarly highlights that the global biodiversity crisis and our ability to address it is closely tied to the ways in which nature is valued in political and economic decision-making. Although more than 50 valuation methods exist for assessing nature's diverse contributions, most policymaking approaches continue to prioritize human-centred, market-based instrumental values at the expense of both nature and society (Pascual et al., 2023). As a result, the non-market, relational, and intrinsic values of species are often excluded (Pascual et al., 2023), leading to a persistent under-recognition of the severe climate impacts on non-human species.

The tendency to undervalue non-human species becomes clearer when examining the tools used to measure climate damage. In principle, climate damages are evaluated based on changes in human welfare, whether defined in utilitarian, Rawlsian, or other normative terms. However, even within these frameworks, nature typically enters only as a constraint or as an input into human well-being, rather than as a bearer of welfare in its own right (Dasgupta, 2021). As a result, standard economic assessments, such as the social cost of carbon (SCC), capture losses to human productivity, health, and consumption, while largely excluding harms to ecosystems and non-human species (Fleurbaey et al., 2019).

Dasgupta (2021) argues that this treatment reflects a deeper flaw in economic systems that view nature as an externality rather than as a living asset. Without expanding the valuation frameworks beyond anthropocentric boundaries, the substantial climate-related harms borne by other species, including polar bears, may remain largely invisible in policymaking.

The case of the polar bear demonstrates this valuation gap. Polar bears rely on sea ice for hunting seals, yet this crucial habitat has declined in extent and thickness in every decade since 1979 (WWF Global Arctic Programme, 2022). Sea ice now melts earlier in the spring and refreezes later in the fall (WWF Global Arctic Programme, 2022), forcing bears to travel greater distances, expend more energy (Emert, 2024), rely more on terrestrial food sources, and come into greater conflict with humans (WWF Global Arctic Programme, 2022). These shifts have led to reduced reproduction (Emert, 2024), lower cub survival, declining body condition, and

decreasing populations (WWF Global Arctic Programme, 2022). Humans also face detrimental effects from this warming, including disrupted transportation, decreased food access, infrastructure damage, and loss of tourism revenue, but current economic valuation frameworks prioritize these human losses. A Canadian study assessed the economic value of polar bears across various anthropocentric categories (Government of Canada, 2011).

Table 1 outlines the anthropocentric components of the total economic value of polar bears, including both use values (viewing, sport hunting, and subsistence) and non-use preservation value. While preservation value is a non-use value reflecting households' willingness to pay to ensure the species does not become extinct, intrinsic value is not monetized because it reflects welfare independent of human preferences and thus lies outside the scope of standard economic valuation methods. However, the preservation value dwarfs all other categories, amounting to over $8.8 billion per year, several hundred times greater than the combined use values. The dominance of preservation value in Table 1 highlights that even anthropocentric measures reveal far deeper societal concern for polar bears than market-based use values alone suggest.

Table 1: *Anthropocentric and Intrinsic Values Associated with Polar Bears in Canada*

Value Category	Description	Estimated Annual Value (in millions CAD)
Preservation Value	WTP of Canadian households to prevent polar bear extinction	$8,850
Viewing Polar Bears in Their Natural Habitat	Consumer surplus (for visitors) Producer surplus (for travel agencies) in Churchill	$10.13 (aggregate value of Canadian and Foreign visitors)
Sport Hunting	Willingness to pay (for sport hunters) Producer surplus (for the Inuit community)	$1.82 (Nunavut & NWT)
Subsistence Hunting	Value of meat and pelts used or sold by Inuit communities	$0.84
Intrinsic Value	Welfare of polar bears independent of human benefits (habitat, survival, reproduction)	Not monetized / Not captured

Note. Government of Canada, 2011. All amounts converted from 2009 CAD to constant 2024 dollars using the all-items Consumer Price Index (CPI), annual average, Canada (2002 = 100), from Statistics Canada, Table 18-10-0005-01. The CPI increased from 114.4 in 2009 to 160.9 in 2024.

As a result of the current anthropocentric frameworks, many species—including polar bears—bear disproportionate harms under human-caused warming. Our values are shaped by our interactions with nature. If we continue distancing ourselves from the natural world, we will continue to perpetuate economic frameworks that miss the true value of biodiversity. By reconnecting with nature, surrounded by its effortlessly beautiful interactions and processes, we may soon begin to understand that we as humanity are not external to nature, but rather are embedded within it. Only then can we develop sounder economic reasoning that understands the value of biodiversity, not only for its instrumental value to humans, but its existence having both intrinsic value and moral worth (Dasgupta, 2021). Integrating a biocentric perspective into economic decision making would allow climate policy to account more fully for the losses experienced by non-human species and help us to save the natural world, "and in doing so, save ourselves" (Dasgupta, 2021, p.2).

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Building on this early experience, Kathleen developed a strong interest in ecological processes and gained field-based research experience as an undergraduate research assistant, contributing to projects in wildfire science and dendrochronology. Her academic interests span multiple areas of ecology, driven by a desire to understand how interacting ecological processes shape landscapes. Following graduation, Kathleen aims to pursue her Registered Professional Biologist (RPBio) designation and work in environmental consulting, applying ecological science in support of long-term environmental stewardship.