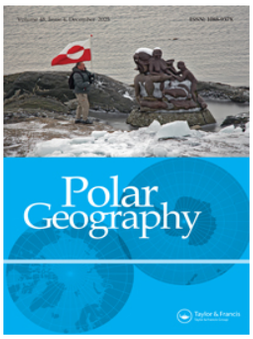

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Framing conservation in the Anthropocene: global insights from inviolate areas in Antarctica

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ABSTRACT

Inviolate areas represent a physical and conceptual manifestation of an approach to conservation based on protecting nature from people. Debates over inviolate areas in Antarctica offer useful insights into the values that underpin conservation in the Anthropocene. Antarctica is governed by an international treaty system that declares the continent to be a 'natural reserve, devoted to peace and science' and which requires consensus decision-making among a wide range of cultural and political views. Drawing on Antarctic governance and conservation scholarship, as well as the wider geographical and humanities literature, this article examines the contested interpretations and framings of inviolate areas in Antarctica. Starting with international debates over 'Prohibited Zones' in Belgium's 2023 proposal for a new protected area, we trace historical and contemporary perspectives on inviolate areas in the Antarctic. We then propose four frames through which stakeholders might engage inviolate areas, each of which reflects a set of assumptions and values about how Antarctic conservation should be approached, ranging from increasing human presence to re-imagining the region as an autonomous, rights-bearing entity. We offer these frames as a heuristic device for those seeking new ways of navigating disagreement and achieving better conservation outcomes in Antarctica and beyond.

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Inviolate areas; critical physical geography; interdisciplinarity; frame reflection; protected areas; wilderness

1. Introduction

The American Heritage Dictionary defines the word 'inviolate' as 'Not violated or profaned; intact' (American Heritage Dictionary, 2025). While much of the world has moved away from forms of environmental protection that seek a strict separation of people and nature, in Antarctica there is an ongoing debate over 'inviolate areas'. In 2023, for example, Belgium proposed two Prohibited Zones in its management plan for an Antarctica Specially Protected Area (ASPA) in East Antarctica (Figure 1), one of which has no record

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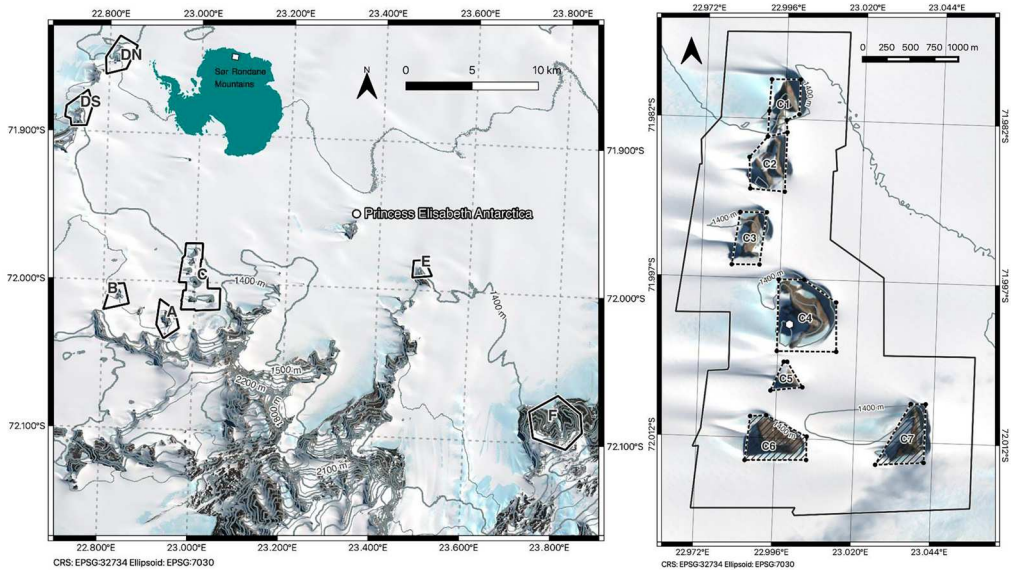

Figure 1. Maps showing the location of the new Antarctic Specially Protected Area proposed by Belgium and its two Prohibited Zones (C6 and C7) in the Sør Rondane Mountains, Dronning Maud Land, East Antarctica (Belgium 2023 Management Plan).

of humans ever visiting (Belgium, 2023, p. 1). These zones were proposed 'to allow future research to compare these inviolate reference sites with similar localities that have been affected by human activities' (Belgium, 2022, p. 5). Although the proposal received support from most representatives to the Antarctic Treaty's Committee for Environmental Protection, it was opposed by the Chinese delegation, which argued that Prohibited Zones are contrary to the principle of freedom of scientific research (ATCM, 2023, para 90 and 94). In response, Belgium modified its proposal, changing 'Prohibited Zones' to 'Restricted Zones', which allows access based on permitting awarded at the national level and the revised proposal was adopted by consensus later that year.

This episode raises two important questions: (1) Does the concept of inviolate areas, and the separation of humans from nature that it implies, make sense in the context of the Anthropocene, even in a continent where nobody lives permanently? And (2) Can the urge to draw lines around pieces of 'untouched' land in Antarctica teach us something about human-nature relationships in the rest of the world?

Although the related notion of wilderness has been widely studied in the Antarctic context, few scholars have written directly about the concept of inviolate areas (but see Coetzee et al., 2017; Hughes et al., 2011; Hughes et al., 2015; Leihy et al., 2020). Despite their rarity in the literature, inviolate areas in Antarctica are interesting to consider in relation to wider environmental debates, due to the starkness of the binary between people and nature that the word inviolate implies. Once an area, territory, or continent has been 'violated' it is not clear whether it can ever be considered inviolate again, although the binary nature of the term would suggest that the answer is likely 'no'. These questions become even more complicated with intersecting geographic scales; smaller areas declared as inviolate risk being tarnished by association if they are located within a larger region that has previously been 'violated'.

Moreover, as a highly international space, Antarctica is also an interesting location for thinking comparatively: Much like 'wilderness' can mean different things to different

people, the word 'inviolate' may have very different meanings and, in some languages, not exist at all. The concepts of both 'inviolate' and the associated idea of 'violation' have also changed considerably over time, even within similar cultural contexts. As a result, any discussion of the term inviolate quickly raises difficult questions about what it means 'to violate' a particular area, territory or continent. The answers to these questions, and their implications for what violation means in theory and practice, are therefore always already culturally situated.

As Lee et al. (2024) note in their study of the Antarctic Peninsula, 'conserving landscapes used by multiple stakeholder groups requires understanding of what each stakeholder values' (p. 1). This is not an easy task, however, as policy based on seemingly-straightforward concepts (e.g. 'inviolate' or 'wilderness') can lead to conflicts based on different frames. A frame is similar to a paradigm – it is a set of ideas that people use to organize, interpret, and understand an issue or situation (Lane & Lave, 2025). Frames establish what facts are relevant and are often so embedded in a community that they are rendered invisible (Halffman, 2019). Recent work has drawn attention to how frames are reflected in conservation research (Chignell & Satterfield, 2023), language (Elliott, 2020), and messaging (Gregg et al., 2022), and how interrogating taken-for-granted terms and concepts that comprise a given frame can help us understand the facts and values behind our assumptions or diagnosis of a problem (Evans, 2021; Tadaki et al., 2023).

Building from this work, this paper argues that understanding attitudes toward inviolate areas in Antarctica – and the range of ways this concept can be framed – has much to tell us about conservation science and practice more broadly, and about how human-environment relationships are perceived and operationalized at the level of institutional decision-making. Debates over inviolate areas in Antarctica may function to some extent like Rorschach tests used in psychology, where psychologists analyze participant responses to inkblots; how we respond to inviolate areas in Antarctica may reflect our underlying assumptions and values about the relationships between people and nature. These contrasting values in turn highlight the multifaceted challenges facing environmental governance in the Anthropocene. Our intention is not to offer a definitive definition of 'inviolate areas' or what it means 'to violate' any particular region. Rather, we seek to highlight the problematic nature of the concept of inviolate areas in Antarctica – despite its potential utility as a conservation tool – and propose a framework for interpreting disagreement rather than prescribing solutions.

We begin by outlining the history of inviolate areas in the Antarctic, tracing the origins of the concept and its application in Antarctic environmental policy (Section 2). Using contemporary scholarship to reflect on this history (Section 3), we propose four positions by which stakeholders might engage Antarctic inviolate areas: Anthropocentric Proponent, Non-Anthropocentric Proponent, Anthropocentric Opponent, and Non-Anthropocentric Opponent (Section 4). After outlining how each position frames inviolate areas, we speculate how each might approach the concept in the future. We then distil these four positions into a single figure, and demonstrate its use as a heuristic device for understanding different actors' perspectives in Antarctica (Section 5). We conclude by reflecting on how such analyses might help make sense of current conservation debates in other parts of the world (Section 6).

2. History of inviolate areas in the Antarctic

The history of inviolate areas in Antarctica has taken place in the context of wider debates in global conservation (Guha, 2000; McCormick, 1991; Rolston III, 2002). Although not

unique to any particular culture, the concept of inviolate areas has been particularly associated with parts of the world and historical contexts where there has been a strong distinction between nature and culture. John Muir, for example, a well-known early advocate for the appreciation and protection of American wilderness, called for national parks to be held 'absolutely inviolate' in his 1908 address before the White House Conference on the Conservation of Natural Resources (Muir, 1908, quoting J. Horace McFarland). 'Inviolate areas', however, have not been a common designation in the history of conservation, with only a small number of international examples such as forest reserves in British Colonial India, especially for tigers (Jhala et al., 2021; Menon & Borah, 2024), and parks in the Yukon (Lewis et al., 1943). In many parts of the world, wilderness tends *not* to be synonymous with inviolate areas, and in international nature conservation law, explicit wilderness protection (including conservation of inviolate areas) is relatively rare (Bastmeijer, 2016).

2.1. Early attitudes toward the Antarctic, 1820s–1960s

The first formally recorded human sightings of the Antarctic continent occurred in 1820. At this point in time, attitudes towards the continent focused on geographical discovery through scientific voyages and commercial exploitation, initially through sealing and then through whaling (Basberg & Lintott, 2023; Zarankin & Senatore, 2005). As exploration intensified in the early twentieth century, it was not uncommon for explorers implicitly to frame their activities in the language of violation, as demonstrated by the title of a 1935 speech given by Douglas Mawson to the Australian and New Zealand Association for the Advancement of Science titled 'the unveiling of Antarctica' or the American James Gordon Hayes history of Antarctic exploration from 1906–1931 titled *The Conquest of the South Pole* (Hayes, 1932; Mawson, 1935). These attitudes reflected the vision, at that time, of Antarctic environments as harsh, lifeless, and something to be overcome or conquered (Howkins, 2010).

Between 1908 and the early 1940s, seven countries – Argentina, Australia, Chile, France, New Zealand, Norway, and the United Kingdom – laid territorial claims to parts of Antarctica. While a claim to territory might not immediately be considered as a 'violation', assertions of sovereignty reflected underlying attitudes of conquest, often with strong imperial dimensions (Dodds, 2002; Roberts & Mancilla, 2024; Scott, 2011; Scott, 2021). In the Antarctic Peninsula region, where the claims of Argentina, Chile, and the United Kingdom overlap, the active dispute led to contentions that sovereignty over territory was being violated by the rival claimants (Howkins, 2017).

In the build-up to the International Geophysical Year of 1957–1958, attention shifted further towards the scientific conquest of Antarctica, as twelve countries conducted scientific research in and around the continent (Collis & Dodds, 2008; Sullivan, 1957). While technology played a much more prominent role in facilitating science and exploration than during the heroic era, many of the underlying values remained similar. Alongside its collaborative dimension, International Geophysical Year science offered a sphere for international competition as countries vied with each other to do what they perceived as better science across the continent, especially in some of its most remote regions (Launius et al., 2010). The involvement of the Soviet Union and the wider Cold War context added additional layers of complexity to this geopolitical competition.

Signed on 1 December 1959 by representatives of the twelve countries with the most direct scientific interests in Antarctica during the International Geophysical Year, the

Antarctic Treaty (AT) provided a framework for managing the Antarctic in the interests of 'peace and science' south of 60 degrees south. The AT emphasized the importance of scientific cooperation (AT, Article III), the freezing of the existing sovereignty claims to Antarctica (AT, Article IV), and the prohibition of nuclear explosions and the disposal of radioactive waste material in the AT area (AT, Article V). Provisions for the expansion of membership to the AT were made, but to obtain decision-making rights (i.e. become a Consultative Party), Article IX of the AT required an acceding Party to demonstrate that it was 'conducting substantial scientific research activity [in the region], such as the establishment of a scientific station or the despatch of a scientific expedition' (ATS, 1959, p. 25), thereby making scientific activity and environmental management in Antarctica inherently geopolitical (O'Reilly, 2017).

2.2. Development of inviolate areas in Antarctica, 1960s–present

Following the entry into force of the AT in 1961, interest in protecting Antarctic flora and fauna soon became a topic for discussion at AT Consultative Meetings, and in 1964 regulatory mechanisms to ensure the protection of Antarctic species and environments were negotiated and adopted. Among other provisions, the Agreed Measures for the Conservation of Antarctic Fauna and Flora (1964) considered the AT area as a 'Special Conservation Area' and innovatively provided for the designation of Specially Protected Areas (SPAs) with the aim of enabling AT Consultative Parties to preserve 'areas of outstanding scientific interest' (Agreed Measures, 1964, Article VIII(1)). Although ideas of environmental conquest did not immediately disappear, this represented an important step in what Antonello (2019) has described as the 'Greening of Antarctica', a process by which Antarctica was reenvisioned from a frigid, lifeless wilderness into a delicate and expansive regional ecosystem.

The first fifteen SPAs were created in 1966. Access to these areas was prohibited, except by permit for 'a compelling scientific purpose that cannot be served elsewhere' (Hansom & Gordon, 2014, p. 270). In 1972, AT Consultative Parties recommended that the existing SPAs should be reviewed, and put forward five criteria for designation, the last being '[a]reas which should be kept inviolate so that in the future they may be used for purposes of comparison with localities that have been disturbed by Man' (Bonner, 1984, p. 842). At the same meeting, Sites of Special Scientific Interest (SSSIs) were introduced 'in recognition of the distinction between the need for virtually complete protection in some areas (SPAs) and the requirements to protect a resource for scientific research, including non biological interests (SSSIs)' (Hansom & Gordon, 2014, citing Heap 1994). It was agreed that 'the SSSI systems should be used only to protect sites where harmful interference was generally recognised to be likely' (Hughes et al., 2013, p. 121).

Many SPAs and SSSIs focused on the relatively few ice-free areas of Antarctica. Research on the soil ecosystems of ice-free areas such as the McMurdo Dry Valleys, for example, drew attention to the importance of preserving untouched areas as control sites for future scientific study and monitoring. Environmental concern in this region was raised by the Dry Valley Drilling Project of the mid-1970s, and as a result, environmental impact assessments were instituted for the first time on the continent (Antonello & Howkins, 2020; Parker & Vince Howard, 1977). In 1975, the Barwick and Balham Valleys area (now ASPA 123) was made a SSSI following a proposal from the United States on the grounds that it was 'one of the least disturbed and contaminated of the Dry Valleys of Victoria Land' and

was important as a reference base against which to measure changes in comparable ecosystems of the other Dry Valleys, where scientific investigations were being regularly conducted (ATCM, 2019, p. 1).

During the 1970s and 1980s, AT Consultative Parties began discussing the question of mineral resource extraction in Antarctica. Although Parties sought to put in place mechanisms to deliver extensive environmental protections, such discussions reflected some of the conquest mentality of earlier eras. In response to what some Non-Aligned Countries viewed as a 'colonial carve up' of Antarctica, the 'Question of Antarctica' became a regular item on the agenda of the United Nations General Assembly in the 1980s and 1990s (Beck, 2004; Dodds, 2006). During this period, as minerals negotiations continued, the protected area system for Antarctica continued to develop. In 1989, for example, a requirement was introduced that all SPAs should have a management plan, bringing them into line with the requirements for SSSIs.

Due to pressure from non-governmental organizations and civil society (Waller, 1989), and with the threat to the AT System (ATS) posed by the 'Question of Antarctica', the 1988 Convention on the Regulation of Antarctic Mineral Resource Activities was replaced by the negotiation and subsequent adoption of the 1991 Protocol on Environmental Protection to the AT (hereafter Madrid Protocol), a comprehensive instrument affording special status and significant levels of environmental protection to the AT area. The Madrid Protocol entered into force in 1998 and 'harmonised and expanded on a range of earlier provisions relating to protection of the Antarctic environment' (AAP, 2019). Annex V to the Madrid Protocol, which entered into force in 2002, adapted and adopted a scheme comprising three categories: ASPAs, Antarctic Specially Managed Areas, and Historic Sites and Monuments. In outlining one of its nine categories of values within potential ASPAs, Annex V drew on the earlier language of the SPA criteria, stating the need to identify 'areas kept inviolate from human interference so that future comparisons may be possible with localities that have been affected by human activities' (Article 3). Interestingly, wilderness and aesthetic values were a separate category.

At the time of the signing and ratification of the Madrid Protocol, environmental managers had a variety of tools for area protection, and there was little standardization across the continent (Harris, 1994, p. 284). Management plans for proposed ASPAs could list a variety of different characteristics to be protected, as set out in Annex V, with a zoning scheme used to do the protection. This had the consequence of breaking the link between the purpose of a protected area and the zoning that was used to protect it, which had – at least to some extent – existed in the earlier SPA and SSSI. In 2011 the Committee for Environmental Protection published its revised *Guide to the Preparation of Management Plans for Antarctic Specially Protected Areas* (CEP, 2011), in which Prohibited Zones had the broader purpose:

> To prohibit access into a particular part of the ASPA until such time it is agreed by the [Antarctic Treaty Consultative Meeting] (and not individual Parties) that the management plan should be changed to allow access. (p. 9)

By not explicitly stating a purpose, these revised guidelines effectively meant that Prohibited Zones can be used for not just inviolate area protection as defined by Annex V of the Madrid Protocol, but also wilderness protection, ecosystem preservation, and any other purpose that requires the exclusion of people. While the idea of prohibiting access to a particular area has much in common with keeping an area inviolate, prohibited zones are not

synonymous with inviolate scientific reference sites as defined by Annex V of the Madrid Protocol and can, in fact, be used for a variety of purposes, including wilderness protection.

With this context, we can see the reasoning behind Belgium's 2023 proposal to protect a scientific reference site that has never been visited by humans by using a Prohibited Zone. China's opposition, however, was not based on an objection to the idea of a scientific reference site per se, but to the *prohibition of access* implied by a Prohibited Zone. This debate and subsequent compromise resulted in the somewhat contradictory situation of Belgium using a Restricted Zone – which people may access with a permit – to protect a scientific reference site from which people are meant to be excluded. The remoteness of the region and the co-operation inherent to the ATS means that this contradiction is unlikely to be tested in reality. But the unsatisfactory logic of this arrangement highlights some of the ongoing challenges and contradictions of inviolate areas in Antarctica.

3. Contemporary perspectives

Contemporary perspectives offer different, and sometimes conflicting, ways of thinking about the inclusion or exclusion of humans from certain Antarctic locations. As with the historical section above, what follows is a curated (not comprehensive) summary based on our understanding of relevant recent scholarship. Although we present these as distinct themes for clarity, there is considerable overlap among them in the way they are taken up and applied in the literature.

3.1. Wilderness conservation

The contemporary global debate on wilderness conservation has become increasingly complex, with scholars engaging in nuanced discussions about its meaning, relevance, and application in the context of the Anthropocene's global environmental changes. Legal and philosophical debates reflect these tensions, with some scholars assuming an anti-dualist view that argues that humans are part of nature, which also includes wilderness (Callicott & Nelson, 1998; Oelschlaeger, 1991; Vannini & Vannini, 2016), while others defend the continued significance of wilderness in and of itself as a 'valid concept and distinct type of environment' (McCormack et al., 2021, p. 386). Wilderness protection remains nonetheless a key objective in global and regional conservation efforts, often framed within broader questions of biodiversity preservation, climate resilience, and human-nature relationships (e.g. European Union, 2024; Convention on Biological Diversity, 1992 (or 1993 if you count the entry into force)).

In Antarctica, however, the discussion of wilderness is less developed. The southern continent is sometimes explicitly excluded from wider discussions on wilderness as it lies beyond national jurisdiction, and Antarctic wilderness law is relatively undeveloped (McCormack et al., 2021). This exclusion may also be due to Antarctica being so consistently framed – in both academic and non-academic contexts – as a continent of and *for* wilderness (Summerson & Tin, 2018; Welch, 1991). Wilderness protection in the Antarctic primarily takes place within the environmental management framework of the Madrid Protocol (Roura, 2023). Wilderness values are protected under Article 3 of the Protocol, and under Annex V Parties 'shall seek to identify, within a systematic environmental-geographical framework, and to include in the series of Antarctic Specially Protected Areas: […] (g) areas of outstanding aesthetic and wilderness value.' While inviolate areas in Antarctica are

designated for science rather than wilderness preservation, they nonetheless reflect to some extent broader wilderness discourses, as they similarly impose limits on human activity. However, as Tin and Hemmings (2011) note, there are 'fundamental conceptual challenges' complicating wilderness conservation in Antarctica (p. 121). Antarctic governance involves various legal, cultural, and political perspectives, ranging from viewing Antarctic wilderness as sacrosanct (Rolston III, 2002) to considering it a place for potential economic development (see below). These various perspectives influence how wilderness is defined, valued, and protected in Antarctica.

3.2. Natural resource management

The concept of inviolate areas intersects with broader debates on natural resource management, where the prevailing approach often seeks to balance conservation with economic interests. Frameworks such as ecosystem services and natural capital attempt to integrate ecological preservation with economic valuation, viewing nature as both a provider of essential services and a resource for potential exploitation (Boyd & Banzhaf, 2007; Costanza et al., 1998). As such, there may be a reluctance to impose strict prohibitions on land use, as stakeholders aim to maintain future access to resources, including minerals. Given increasing pressures related to global resource demands, for instance in the context of increasing human population, a prohibition to access certain areas – whether as scientific reference sites or for conservation – may be met with resistance from states and industries with interests in maintaining extractive possibilities.

Similarly, in Antarctica, discussions surrounding inviolate areas tend to be shaped by underlying tensions between instrumental and intrinsic values. While environmental ethics distinguish between these two value frameworks, at least some Antarctic governance remains tied to instrumental concerns, as reflected by the Commission for the Conservation of Antarctic Marine Living Resources' notion of 'rational use' (Article II [2]), or the Convention for the Conservation of Antarctic Seals' idea of 'optimum sustainable yield' (Preamble [4]). Recently, these instrumental assessments have included ecosystem service assessments (Pertierra et al., 2021) and even economic valuation (Pu & Yan, 2024; Stoeckl et al., 2024). Scientific research itself can be understood as an instrumental activity, as inviolate areas themselves do not seek to protect a site for its own sake but rather for future human activity. As such, some Antarctic stakeholders may support restricted zones for pragmatic reasons, such as minimizing environmental degradation for tourism, but oppose prohibitions that could set a precedent limiting future activities. As debates over access evolve, AT Consultative Parties with economic and territorial interests may seek to keep options open for potential resource extraction, even if direct mineral exploitation remains unlikely due to the prohibition in Article 7 of the Madrid Protocol.

3.3. Rights of nature

Another contemporary perspective with relevance for inviolate areas is Rights of Nature. Approaches based on Rights of Nature seek to recognize nature as a 'rights-bearing partner' instead of a resource to exploit (United Nations, n.d.), encompassing various models such as legal personality and rights claims (Baard & Mancilla, 2024; Kahui et al., 2024). While RoN became more widely known after the publication of Stone's (1972) landmark article 'Should Trees Have Standing?', the concept draws heavily on Indigenous

cosmologies (Corrigan & Oksanen, 2021; O'Donnell et al., 2020; Tănăsescu, 2020). The first recognition of Rights of Nature in Western legal systems took place in 2006 in the United States, and it has since then been implemented in around 40 countries (Putzer et al., 2022).

There is a growing body of literature on the application of Rights of Nature to the polar regions in general, and the Antarctic in particular (see Makanse et al., 2024). Rights of Nature initiatives have found their way into Antarctic discourses with the recent draft of the Antarctica Declaration publicly released by Antarctic Rights at the United Nations Climate Change COP28 (Antarctic Rights, 2023). The Antarctica Declaration and, more generally, the Rights of Nature movement, raise important questions regarding the meaning of 'violation'. Inviolate areas, as described in Annex V, are centered around physical violations for scientific research. In the Antarctica Declaration, the term violation is associated, for instance, with provisions on the rights of Antarctica and the duties of humans and states. As such, applying the concept of inviolate areas to the legal developments in Rights of Nature would mean a shift in what is understood as a violation: rather than addressing physical violations of scientific sites, it would address violations of rights on a more normative level. In addition, Article IX of the Declaration suggests that such violations do not need to happen in the Antarctic itself, while simultaneously raising questions about whether there are any parts of the world that can still be described as 'pristine' or 'natural'.

3.4. Eco-social hybridity

A wide array of contemporary work in fields like the environmental humanities and geography seeks to interrogate and challenge the idea of a dichotomy between humans and nature, and is thus useful for understanding inviolate areas. Emerging from the wilderness debates described above, environmental historians like Cronon (1996) argued that there is nothing natural or given about the way that Western environmentalism has conceptualized 'wilderness', and that taking it to its logical conclusion results in a paradox wherein the only way to save nature is for humans to kill themselves. Fields like critical physical geography similarly reject ideas of 'pristine nature', and instead see landscapes (including our study of them) as fundamentally 'eco-social hybrids' (Lave et al., 2018). This term is distinct from, and a response to, the often simplistic treatment of humans and human culture in 'systems' approaches like social-ecological systems and earth system science, and is meant as a call for deeper philosophical and methodological integration among the humanities and sciences that study the Anthropocene (Biermann et al., 2021; Lane et al., 2018).

Scholarship that explores eco-social hybridity in Antarctica is rare and tends to lie on the margins of dominant scientific discourse. Perhaps the strongest example is from archaeologists like Zarankin and Salerno (2014) and Senatore (2020, 2023), who disagree with the conceptual separation of nature and culture in Antarctica, particularly because it underlies policies that remove historic structures and material traces of humans in order to 'return to wilderness':

> The Madrid Protocol has operated as a system of protection that separates natural and cultural realms, resulting in non-inclusive and non-sustainable outcomes. The application of the wilderness principle to environmental conservation has reinforced the dominant images of Antarctica (as a wilderness), selectively neglecting and erasing diverse human stories. (Senatore, 2023, pp. 55–56)

These scholars state that for conservation purposes, it is not possible to clearly distinguish cultural remains from natural ones, and argue instead for thinking in terms of 'cultural–

natural landscapes' (Senatore, 2023) and 'human-thing relationships' (Senatore, 2020). Other research has drawn attention to the ways in which knowledge production itself is enmeshed in and creates hybrid landscapes in Antarctica. For example, O'Reilly (2017) draws attention to the ways in which political, economic, and social factors shape Antarctic research. Additionally, in their bibliometric study of the McMurdo Dry Valleys, Chignell et al. (2022) draw on the notion of eco-social hybridity to explain why social network patterns of collaboration among disciplines studying the region resemble the biogeochemical relationships among respective landscape features.

4. Synthesis: four ways of framing inviolate areas

Synthesizing our historical overview with relevant contemporary scholarship, we identified four frames that reflect different ways of thinking about Antarctic inviolate areas (Table 1). These occur along a double dichotomy: Proponent vs. Opponent and Anthropocentric vs. Non-Anthropocentric. Below, we outline the main components of each frame and speculate how each might approach the concept of inviolate areas in the future. These frames are heuristic rather than prescriptive, and they are intended as a conceptual starting point for future discussion rather than offering rigid categories.

4.1. Anthropocentric proponents

Anthropocentric Proponents see inviolate areas as a useful and important tool for preserving pristine nature and wilderness in Antarctica from human interference and impact. While this position is deeply concerned about the Antarctic environment, it is 'anthropocentric' because its focus is ultimately on human use and values, and what humans can and should do to ensure these uses and values are protected into the future. While this position is not naive about the possibility of major disruption to the status quo (e.g. through geopolitical conflict), it broadly seeks a continuation and refinement of current environmental management and protection in the Antarctic into the future. The small number of existing inviolate areas would be maintained and others created. Concerns about human impacts may lead to a significant increase in Prohibited Zones and inviolate areas, especially in the parts of Antarctica least visited by tourists and scientists. The primary purpose of these areas would be for furthering science, especially the creation and maintenance of 'natural controls' against which change in other areas could be tested, including by scientific methods that have yet to be developed. Politically, a future based on anthropocentric proponents of inviolate areas would likely look much the same as the past and present: namely, the continuation of environmental conservation in the ATS in much the same form.

4.2. Anthropocentric opponents

Anthropocentric Opponents of inviolate areas tend to see human activity in Antarctica as necessary and hence oppose efforts to limit that activity. In particular, for many Anthropocentric Opponents of inviolate areas, access is paramount, and therefore they would see efforts to limit the freedom of science by limiting access as running counter to the terms of the AT, even if those limitations are put in place for the purpose of creating scientific reference sites. In some ways, anthropocentric opposition to the concept of inviolate areas might be seen as a continuation of the attitudes of the explorers of the heroic era

Table 1. Four ways of framing Antarctic inviolate areas and their primary characteristics.

		Anthropocentric		Non-Anthropocentric
In favor of inviolate areas ('Proponents')	1	Approach: Continuation of historically dominant (Western scientific) environmental management; 'Preservation' in the traditional preservation/conservation dichotomy	1	Approach: Prioritization of rights of nature
	2	Associated Academic Fields: Natural Resource Management, Conservation Science; Environmental Law	2	Associated Academic Fields: Green Political Theory, Environmental Ethics, Posthumanist Environmental Humanities
	3	Aims: Expand existing protection measures to protect the environment for scientific and other human values	3	Aims: Declares the Antarctic as an autonomous, self-regulating entity with rights that can be violated
	4	Values: Instrumental values ≥ Intrinsic values (science and environmental protection are paramount)	4	Values: Intrinsic values > Instrumental values (science and tourism and aesthetics are subordinate)
	5	Relationship to ATS: Business as usual with a particular emphasis on the Madrid Protocol	5	Relationship to ATS: Radical change to business as usual with new texts such as the Antarctica Declaration
	6	Beneficiaries: Favors established geopolitical actors in Antarctica	6	Beneficiaries: Favors the Antarctic as an actor (and shifts power from states to natural entities and their representatives)
	7	Attitude Toward Wilderness: Wilderness exists, and is managed	7	Attitude Toward Wilderness: Wilderness exists, and is exalted
Not in favor of inviolate areas ('Opponents')	1	Approach: Sees greater possibilities for future exploitation and 'rational use' in the Antarctic environment; 'Conservation' in traditional preservation/conservation dichotomy	1	Approach: Sees the Antarctic as an eco-social hybrid with humans as a fundamental part of the environment
	2	Associated Academic Fields: Natural Resource Management, Economics	2	Associated Academic Fields: Posthumanist Environmental Humanities, Political Ecology, Critical Physical Geography
	3	Aims: Keep Antarctica as open as possible to human use	3	Aims: Challenge anthropocentric perspectives, while not seeing humans as separate
	4	Values: Instrumental values > Intrinsic values (science and 'rational' human use are paramount)	4	Values: Intrinsic values = Instrumental values (science, tourism, aesthetics cannot be disentangled, and therefore none should be prioritized)
	5	Relationship to ATS: More in keeping with the Antarctic Treaty before the Madrid Protocol (especially The Convention on the Regulation of Antarctic Mineral Resource Activities); consistent with The Convention on the Conservation of Antarctic Marine Living Resources	5	Relationship to ATS: In keeping with much of the de facto working of the Antarctic Treaty, but in conflict with much of the spirit behind it
	6	Beneficiaries: Favors actors interested in resource use and/or full access for science	6	Beneficiaries: Seeks to not favor any particular actor while attempting to balance between humans and non-human nature
	7	Attitude Toward Wilderness: Wilderness exists, but is not exalted	7	Attitude Toward Wilderness: Wilderness does not exist, because everything (including humans) is nature

and the scientists of the International Geophysical Year, although it is important to acknowledge that the context is very different. For Anthropocentric Opponents of inviolate areas, there exists a frontier of 'untouched' areas, but nowhere is off limits. The drilling of Lake Vostok might serve as an example of the principle of accessibility outweighing concerns for contamination (Siegert & Kennicutt, 2018).

A future dominated by Anthropocentric Opponents of inviolate areas might see existing inviolate areas discontinued, and no new inviolate areas created. In one sense, this might

imply a return to a historical 'conquest of nature' scenario, although the urge, and related motivations, to 'violate' previously 'unviolated' areas of Antarctica would almost certainly not be as great as during the early years of Antarctic exploration. There is a possibility of active mineral exploitation under such a scenario driven by technological innovation, although that would require wider geopolitical and legal changes.

4.3. Non-anthropocentric proponents

This position assumes that inviolate areas are an important concept, but the element of their current orientation towards scientific research as 'reference sites' misses their potential for questioning human engagement with the region and rethinking values, interests, and rights in the Antarctic. Including non-human actors in discussions of inviolate areas is essential in this framing.

This position has significant consequences for human engagement with the global commons, contesting the traditional dominant framing of human use as default. The designation of inviolate areas would be based on the intrinsic values and rights of Antarctic non-humans, with potential for the deterritorialization of violations. An application of this non-Anthropocentric framing would result in a reorientation of inviolate areas and a substantial increase in its use in Antarctic governance. In an extended application of this perspective, the entire Antarctic region could be designated as an inviolate area, which is an idea articulated by Rolston III who wrote that 'we ought to set [the Antarctic] aside as a place to realise deeper perspectives' (2000, p. 290).

To some extent, this perspective would fit the Madrid Protocol's aim of comprehensive environmental protection and the status of Antarctica as a nature reserve, although this reserve would not necessarily be devoted to peace and science but rather to the ecosystems and natural entities themselves. Regarding the geopolitical power dynamics, the Non-Anthropocentric approach to inviolate areas would lead to a radical shift. In its most far-reaching application, this framing would shift political power from states towards non-human constituencies, prioritizing their rights and interests over scientific research, as they are the only residents of the Antarctic, while human interests are considered 'exported' and indirect (Rolston III, 2000, p. 289).

4.4. Non-anthropocentric opponents

This position sees the concept of inviolate areas as a notion that separates humans from nature and does more harm than good, a critique that has also been levied at ideas of 'pristine nature' and 'wilderness'. This view is 'Non-Anthropocentric' in that it embraces the ontological implications of the Anthropocene, and views the world as fundamentally an eco-social hybrid. It therefore opposes attempts at literally or conceptually separating the two.

Non-Anthropocentric Opponents of inviolate areas might also draw particular attention to potential assumptions and values embedded in the concept of inviolate areas (e.g. separation of people and nature; gendered connotations of purity and virginity). As a result of these assumptions, they might see the concept of inviolate areas as unwieldy and difficult to put into practice because of the range of questions it generates yet is not able to answer: At what point does a place become violated? Does it just take a person walking through it one time? What about helicopters or drones flying overhead? What about

long-range pollution or climate change? Who gets to decide when a place is violated? Once violated, can an area become inviolate again?

If Non-Anthropocentric Opponents of inviolate areas were to prevail in future scenarios, humans would be accepted as a part of the Antarctic eco-social hybrid landscape, and the concept of inviolate areas would become obsolete. Decisions about the best way to 'protect' the Antarctic environment would be taken on a case-by-case basis, without recourse to the external referent of 'minimizing impact'.

5. Discussion: putting the frames to work

Our analysis suggests that the concept of inviolate areas in the Antarctic is open to a multiplicity of potential interpretations and understandings. While the four frames proposed by this paper may not be exhaustive, they are useful for exploring possible positions that different stakeholders may take in relation to inviolate areas. Cultivating an awareness of the different frames through which inviolate areas might be viewed helps us to move beyond one-sided analyses of 'good' and 'bad' geopolitical actors, toward understanding why there is disagreement over the concept in the first place. This in turn can be a first step to more meaningful deliberation (Halffman, 2019).

It is important to emphasize that the boundaries between these frames are blurred in practice, and that they likely do not capture the complete range of possible perspectives at work in Antarctica. It is also important to acknowledge that the four frames should not be considered as equally possible within the contemporary reality of the ATS. The Anthropocentric Proponent position (i.e. 'business as usual'), is most in line with the orientation of the ATS, its legal documents, policies, and other measures. The recent opposition by China seems, nonetheless, to suggest a potential deviation towards the Anthropocentric Opponent position, even though China, as all other AT Consultative Parties, has agreed upon comprehensive environmental protection, including the designation of inviolate areas, by joining the AT and ratifying the Madrid Protocol. The two Non-Anthropocentric positions are much less strongly represented in the contemporary ATS, although some provisions of the Madrid Protocol, such as intrinsic values, could be considered Non-Anthropocentric.

To better represent the spectrum of possible positions on inviolate areas, we can refigure Table 1 as a Cartesian plane (Figure 2). Here, the vertical (y) axis represents the level of support for inviolate areas, and the horizontal (x) axis represents the reasons for that support or opposition. Although we have not conducted empirical research on the respective positions of AT Consultative Parties and other stakeholders, to demonstrate the utility of Figure 2 as a heuristic device, we have placed a few selected actors from the Antarctic case within each of the four quadrants, such that their position in the figure approximates their apparent perspectives with regard to inviolate areas (based on their arguments presented in AT-related meetings and the literature).

For example, Belgium can be classified as an Anthropocentric Proponent, justified by its position in favor of creating inviolate areas within Prohibited Zones and its support for a business-as-usual model of Antarctic conservation using existing tools. While Belgium's position is anthropocentric due to the nature of inviolate areas as scientific reference sites, the presence of notions of wilderness and pristine nature in its protected area proposal also suggest some non-anthropocentric aspects. China, on the other hand, opposed the initial proposal based on the freedom of scientific investigation, and can thus be classified

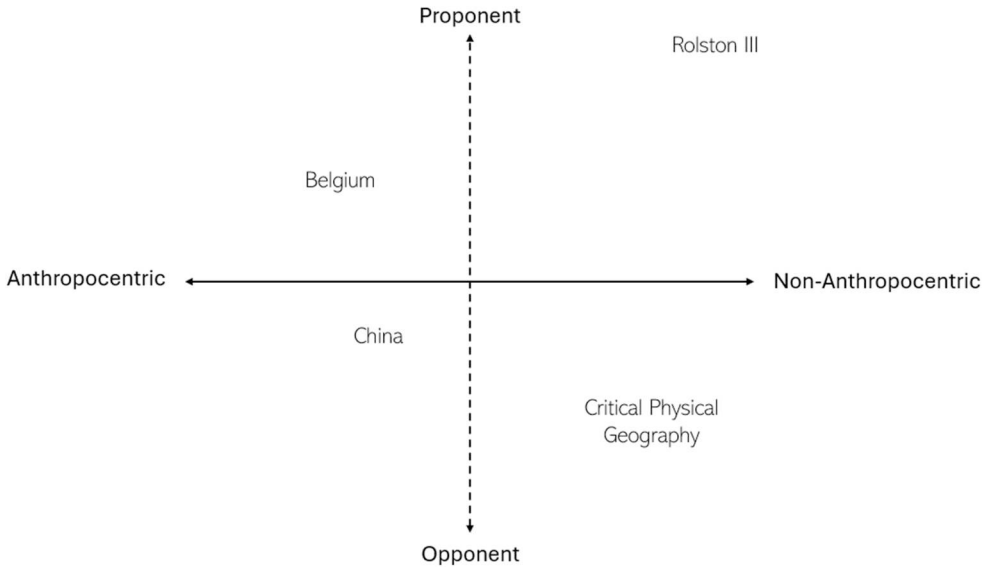

Figure 2. Four ways of framing inviolate areas in the Antarctic. Representative positions discussed in this paper are placed in each quadrant based on our interpretation of their perspective. The vertical axis is dashed to represent the greater subjectivity and fluidity of perspectives related to Anthropocentric vs. Non-Anthropocentric. The horizontal axis is solid to represent that one can only be either for or against inviolate areas.

as an Anthropocentric Opponent. However, since China ultimately agreed to inviolate scientific reference sites under the status of Restricted Zones, we can, therefore, only place China slightly down the axis of opposition. Additionally, as a society where there is little sense of the separation of people from nature (Greenspan & Tarocco, 2020), China should not be placed too far from the non-anthropocentric quadrants. Another actor discussed previously is the philosopher Rolston III who, as a proponent of making the whole of Antarctica off-limits to people, can be classified as an extreme Non-Anthropocentric Proponent of inviolate areas. In contrast, actors holding perspectives based on eco-social hybridity (e.g. critical physical geographers) can be placed in the center of the Non-Anthropocentric Opponent quadrant, given that they reject notions of pristineness while maintaining the ontological inseparability of people and nature.

While this analysis is of course somewhat speculative and relates only to a limited number of stakeholders, it demonstrates the potential utility in using this figure as a heuristic device for understanding potential factors underlying disagreements over environmental protection. The fact that Belgium's and China's positions are much closer than an initial reading of the debate over the former's proposal might suggest, also hints at the conciliation and compromise required in international consensus-based governance like the ATS.

6. Conclusions

The debates surrounding the use of inviolate areas in Antarctica appear to be closely entwined with broader debates over global conservation. As such, thinking about inviolate areas in Antarctica can function as a sort of Rorschach test: The act of reflecting on them

helps to reveal one's deeply held values and assumptions about environmental protection. Understanding these values is particularly pertinent to resolving debates over conservation in the Anthropocene, the central premise of which demands a re-evaluation of traditional ways of thinking about humans and nature.

Adapting the four frames that we developed in the Antarctic context may be useful for thinking about conservation in other parts of the world. It would be relatively easy to adapt Figure 2 by replacing 'inviolate areas' with any other concept implying the inclusion or exclusion of people from nature for the purpose of environmental protection. For example, debates over 're-wilding' in rural Britain (Monbiot, 2014), marine protected areas in Australia (Rist et al., 2019), and the creation of 'natural' world heritage sites in peopled places like Ethiopia (Chignell & Satterfield, 2023).

These frames can be used both to understand difference and to find common ground (see also Murali et al., 2026). As noted in our discussion of the Antarctic context, the boundaries between frames are often somewhat blurred, and there are connections across them. This does not mean that all differences can be reconciled, and there may even be recurrent disagreements between actors positioned within the same quadrant. But as we seek to respond to the disorientation of the Anthropocene, there is value in having tools to help us reflect, reorient, and creatively re-engage frame conflicts. The frames and figures we developed for understanding inviolate areas in Antarctica offer a starting point.

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Author contributions

All authors contributed to the conceptualization of the article. Author 1, Author 2, and Author 3 wrote the first draft. All authors contributed critically to the drafts and gave final approval for publication.

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