

ARTICLE

Global Climate Change and UNESCO World Heritage

Kathryn Lafrenz Samuels^{1*}  and Ellen J. Platts²

¹Associate Professor, Department of Anthropology, University of Maryland, College Park, MD, United States

²Doctoral Candidate, Department of Anthropology, University of Maryland, College Park, MD, United States

*Corresponding author: Kathryn Lafrenz Samuels, email: lafrenzs@umd.edu

Abstract

This article considers the fiftieth anniversary of the 1972 United Nations Educational, Scientific and Cultural Organization's (UNESCO) World Heritage Convention in light of climate change, offering a state of the field review of climate responses for World Heritage sites (WHS). Opening with a brief review of UNESCO World Heritage activities around climate change, we then detail the primary impacts and risks that climate change pose for WHS and the reporting and monitoring systems in place to document and track these impacts. Looking forward, we examine the most promising pathways for World Heritage to advance in the domains of climate mitigation, adaptation, climate communication, and climate action.

Keywords: UNESCO World Heritage; climate change; climate crisis; global environmental change; cultural heritage

The World Heritage concept, and the institutional apparatus constructed to support it, has travelled a good distance since its founding with the 1972 Convention Concerning the Protection of the World Cultural and Natural Heritage (World Heritage Convention).¹ As with so much regarding World Heritage, and tracking alongside it, the world as we know it is also being altered. While conceptions and practices around heritage have been changing, so too has the natural and built environment globally, and the “world” half of World Heritage requires equal consideration for understanding the shifting purview and significance of the World Heritage Convention. Climate change, in particular, ushers in an unprecedented era of challenges for the United Nations Educational, Scientific and Cultural Organization's (UNESCO) World Heritage, and it is difficult to overstate just how profound an impact these challenges will be for the protection of World Heritage sites (WHS). So profound, in fact, that climate change will likely fundamentally alter the World Heritage apparatus itself, and the meaning and practice of heritage more broadly.

In some respects, the World Heritage Convention already holds affinity for the challenges of climate change, being born from concerns about decay, damage, and destruction. However, it would be a mistake to include climate change in the threats that the World

¹ Convention Concerning the Protection of the World Heritage and Natural Heritage, 16 November 1972, 1037 UNTS 151 (World Heritage Convention).

Heritage Convention was originally intended to address, even though the anthropogenic (human-caused) nature of climate change was not only already known in the 1960s but, by the late 1970s, had also risen to the level of heated discussion amongst policy-makers on what to do.² Yet, in the time since the drafting of the World Heritage Convention, the facts and impacts of climate change have precipitated hard realities for heritage practice, including for WHS. These developments therefore raise in sharp relief the evolving gaps implicit to a convention that is designed to address threats to the world's recognized heritage, but is woefully unprepared for the cascading threats posed by global warming, driven by increasing concentrations of greenhouse gases in the atmosphere and by deforestation.

In the following discussion, we examine this ambiguous gray zone, between intent and practice – between legal document and evolving text, between encountered strengths and limits – for the World Heritage Convention in the face of global climate change. After a brief summary of climate change responses undertaken thus far by the World Heritage Centre and its advisory bodies, we review the principal impacts of climate change to WHS and then devote our primary discussion in this article to those most promising ways forward in addressing climate change through adaptation, mitigation, and communication strategies.

World Heritage Centre's activities on climate change

Major interest in climate change from the World Heritage Centre, especially in formulating an official and public response, arose in the mid-2000s, following pressure from environmental non-governmental organizations (NGOs), which we address further below. A 2006 issue of the *World Heritage Review* (no. 42) was devoted to the subject, alongside a more technical publication on case studies, which provided a public outlet for the burst of activities in progress at the time to incorporate climate responses into the work of the World Heritage Centre and WHS.³ These activities included working group meetings in 2006 to prepare the *Strategy to Assist State Parties to Implement Management Responses* and the report *Predicting and Managing the Impacts on Climate Change on World Heritage*, which led to a 2007 working group meeting to draft the *Policy Document on the Impacts of Climate Change on World Heritage Properties*.⁴

Changing considerations on climate for carrying out the World Heritage Convention are also evident in periodic revisions made to the *Operational Guidelines for the Implementation of the World Heritage Convention (Operational Guidelines)*.⁵ As summarized by May Cassar, climate change is first mentioned in the 1997 revision of the *Operational Guidelines*, with reference to climate change as a potential impact on sites, as well as the relevance of the 1992 United Nations Framework Convention on Climate Change (UNFCCC).⁶ A 2005 revision added climate change as a source of environmental deterioration that needed to be addressed in nominations.⁷ At its 2008 meeting, the World Heritage Committee revised some wording in Article 179(b)(vi) of the *Operational Guidelines* (regarding inclusion on the List of World

² Weart 2003; Rich 2019.

³ *World Heritage Review* issue on climate change: UNESCO 2006; case studies: UNESCO 2007a.

⁴ The “Strategy to Assist State Parties to Implement Management Responses” and the report “Predicting and Managing the Impacts on Climate Change on World Heritage” are collected together in UNESCO 2007b. The *Policy Document on the Impacts of Climate Change on World Heritage Properties*: UNESCO 2007c.

⁵ UNESCO 2021b

⁶ Cassar 2021, 12; United Nations Framework Convention on Climate Change, 9 May 1992, 1771 UNTS 107 (UNFCCC). The relationship between the World Heritage Convention and the UNFCCC is discussed at length further below.

⁷ As discussed above, see UNESCO 2007a, 2007b, 2007c; see also Perry and Falzon 2014.

Heritage in Danger), changing the potential danger of “gradual changes due to geological, climatic or other environmental factors” to read instead “threatening impacts of climatic, geological or other environmental factors.”⁸ By the 2015 revision, climate change had taken on a larger focus through reference to previous documents and publications prepared by UNESCO on climate change. Taking into account this evolution, it is interesting that the first mention of climate change in the 1997 revision appears to avoid dealing with climate change by delegating this task to the UNFCCC, demarcating it as the appropriate convention for considering the impacts of climate change to WHS. And, further, even with the spate of activities in 2006 and 2007, climate change was not integrated into the *Operation Guidelines* until almost a decade later.

Over the years, additional publications from the World Heritage Centre and its advisory bodies—the International Council on Monuments and Sites (ICOMOS) and the International Union for Conservation of Nature (IUCN)—consider climate change through the various facets of its work and different site types. These have included the contributions of climate change to disaster risks for World Heritage, implications of climate change for tourism to WHS, the benefits of marine “blue carbon” resources as carbon sinks, and the impacts and responses for climate change for natural WHS, forests, and coral reefs.⁹ Within ICOMOS, a working group outlined a strategy document for ICOMOS members, including how to better align their work with the Paris Agreement, the international climate treaty adopted in 2015 as a successor to the Kyoto Protocol.¹⁰ More broadly, in 2017 UNESCO established the *Declaration of Ethical Principles in Relation to Climate Change*, which included the prevention of harm, a precautionary approach, attention to equity and justice, the relationship to sustainable development, the value of solidarity, and scientific knowledge and integrity in decision making.¹¹ There is also interest within UNESCO to integrate the various UNESCO designated sites (WHS, Biosphere Reserves, and Global Geoparks) into a “climate change observatory,” a distributed network of sites for coordinated observations and responses to climate change, which follows broader developments in coordinating scientific climate change research.

Of special note, the 2007 policy document is currently under revision, with a new title, the *Draft Policy Document on Climate Action for World Heritage*.¹² While the policy was expected to be adopted at the twenty-third United Nations General Assembly in November 2021, instead it was decided to convene another expert working group to address “significant legal and interpretative questions” raised by the draft policy, following the lead of an amendment proposed by Australia.¹³ Specifically, Australia called for a new working group to propose recommendations on: (1) whether a property should be inscribed if its potential outstanding universal value (OUV) may “disappear” due to climate change impacts; (2) if climate change impacts beyond the sole control of a state party could prompt a property to be inscribed on the List of World Heritage in Danger, or delisted from the World Heritage List entirely; and (3) to reconsider OUV as an “evolving” assessment since, even with adaptation and

⁸ Quirico 2012, 398.

⁹ Contribution to disaster risks (Vujicic-Lugassy and Frank 2010); implications for World Heritage sites (WHS) tourism (Markham et al. 2016); marine “blue carbon” (UNESCO 2020); natural WHS (Perry and Falzon 2014; Osipova et al. 2020); forests (Patry, Horn, and Haraguchi 2011; UNESCO, World Resources Institute, and International Union for Conservation of Nature 2021); and coral reefs (Heron, Eakin, and Douvère 2017).

¹⁰ International Council on Monuments and Sites (ICOMOS) Climate Change and Cultural Heritage Working Group 2019; Paris Agreement on Climate Change, UN Doc. FCCC/CP/2015/L.9/Rev.1, 12 December 2015; Kyoto Protocol, 11 December 1997, 37 ILM 22 (1998).

¹¹ Declaration of Ethical Principles in Relation to Climate Change, Doc. SHS/BIO/PI/2017/2, 2017. <https://unesdoc.unesco.org/ark:/48223/pf0000260129>.

¹² For most recent draft, see UNESCO 2021a.

¹³ Amended Draft Decision 44 COM 7C, 18 July 2021.

mitigation strategies in place, the original OUV at inscription will be difficult (Australia says “impossible”) to maintain. The friction around revising and adopting a new policy document on climate change is not surprising, nor is Australia’s lead in scuttling the draft to another expert working group, given the protracted battles around the legal status and reach of the World Heritage Convention with respect to climate change. These have played out on the international stage especially between high greenhouse gas (GHG) emitting countries and climate activist groups, and the government of Australia has been a particular target due to the deteriorating conditions of the Great Barrier Reef, and as one of the top GHG emitters per capita. We return to the legal battleground of the World Heritage Convention for climate change action below, as a promising direction for mitigation and communication strategies.

Risks and impacts of climate change on UNESCO WHS

The primary impacts of climate change to WHS map onto those expected for heritage sites more generally. Much of this focus for heritage sites continues to be on the material effects that these changes have on tangible heritage, both movable and immovable. By far, the impacts from sea-level rise and flooding have elicited the most attention and concern.¹⁴ Other major concerns include temperature increases, desertification, drought, ocean acidification, increasing frequency and intensity of wildfires, increased storminess and erosion both on land (including landslides) and coastal zones (coastal erosion), thawing (including of permafrost and glacial retreat), changing patterns of rainfall, and increased mold and pest activity.¹⁵ These impacts can occur to heritage exposed outdoors, or from the climate effects to the material fabric and collections inside uncontrolled buildings, and can foster mechanical, chemical, and biological degradation of heritage materials.¹⁶ For WHS, scholars have drawn on this knowledge of impacts for heritage sites more broadly to highlight the vulnerabilities to climate change – both natural and institutional – for these iconic sites.¹⁷

State of Conservation reports

Several reporting mechanisms within UNESCO World Heritage show the potential for systematizing knowledge and monitoring efforts on the climate change impacts to WHS. The State of Conservation (SOC) reports offer the most timely snapshot on the impacts of climate change to specific WHS (though they are still prone to a time lag, which is sometimes significant).¹⁸ The periodic reporting framework is also promising, particularly for a broader perspective, being organized by region (the Arab states; Africa; Asia and the Pacific; Latin America and the Caribbean; and Europe and North America) and reporting over a longer timescale of approximately every 10 years.¹⁹ However, monitoring and planning for climate change impacts has yet to be integrated into the periodic reporting framework in a meaningful way, except for limited instances.

The State of Conservation Information System categorizes the threats from “climate change and severe weather events” as: changes to oceanic waters, desertification, drought, flooding, storms, temperature change, and other climate change impacts.²⁰ Changes to

¹⁴ For example, see Cassar 2005; Chechi 2014; Hall et al. 2016; Carmichael et al. 2018.

¹⁵ Cassar 2005; UNESCO 2007a; Sabbioni, Brimblecombe, and Cassar 2012; Sesana et al. 2021.

¹⁶ Sesana et al. 2021.

¹⁷ Terrill 2008; Viikari 2009; Perry 2011, 2015; Marzeion and Levermann 2014; Perry and Gordon 2021.

¹⁸ On the time lag in reporting, see Morrison et al. 2019.

¹⁹ Cassar 2021, 15.

²⁰ State of Conservation Information System, <https://whc.unesco.org/en/soc/>.

oceanic waters (for example, sea level rise, ocean acidification, flooding) have especially impacted the Great Barrier Reef in Australia since 2011, the East Rennell WHS on the Solomon Islands since 2013, as well as the Stone Town of Zanzibar in Tanzania, the Sundarbans in Bangladesh, and the Forts and Castles, Greater Accra, Central and Western Regions WHS in Ghana. But we know that the impacts of sea level rise to WHS are much greater and more extensive than this, given the location of so many WHS along coastlines, and following on an important study that looked at present and future impacts to WHS from sea level rise.²¹ The climate change effects of desertification are especially visible in sites of earthen and mudbrick architecture, including Timbuktu in Mali, the Old City of Sana'a in Yemen, the Gebel Barkal and the Sites of the Napatan Region WHS in Sudan, and the Ancient Ksour of Ouadane, Chinguetti, Tichitt and Oualata in Mauritania. Drought is impacting iconic natural WHS such as Serengeti National Park in Tanzania, Mosi-oa-Tunya/Victoria Falls in Zambia and Zimbabwe, Niokolo-Koba National Park in Senegal, and Keoladeo National Park in India. Flooding threats are extensive, and have been found across 29 WHS and addressed in 109 SOC reports, as are the aftermath of major storms, impacting 36 WHS and included in 113 SOC reports. Temperature changes and other climate impacts affect 27 properties.

The SOC database offers a useful tool for tracking the impacts of climate change to WHS, including for patterns across regions, site types, and mode of impact; the site-specific conservation responses; the movement of sites on or off the List of World Heritage in Danger; and the potential for quantification purposes and modeling projections. Reviewing the database, several trends for climate change are clear, including an increasing attention to a broader range of climate impacts (with nevertheless some impacts still being ignored), the effects of categorization on the portrait of climate change being presented (such as, for example, the emphasis on environmental impacts and the exclusion of social impacts), the tendency to recognize environmental impacts on natural WHS over cultural WHS, and the challenges of connecting local impacts to global climate forces.

Overall, the SOC database is clearly partial and incomplete with respect to climate change impacts. As stand-alone instruments, the SOC reports and SOC Information System are not up to the task of accurately and comprehensively characterizing the impacts of climate change to WHS, and aspirations for a “climate change observatory” of sites will need to radically upscale data collection and tracking efforts. Further, as with any database or means of organizing information, there will be categorical choices that affect our understanding of the challenges at hand. For example, climate change and severe weather events are lumped together, and not all severe weather events can be ascribed to, or said to have been influenced by, climate change. There are climate threats that are missing or categorized under other headings, such as pest activity and “sudden ecological or geological events” like landslides and wildfires. Meanwhile, biodiversity loss, as a twinned calamity of global environmental change, is driven both by climate change as well as by its own devastating dynamics. Yet biodiversity loss is almost totally absent from the SOC Information System. This is despite increasing international calls to pay equal attention to the crisis of biodiversity loss, made louder by the dire projections of the recent expert report from the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services (IPBES), the equivalent body for biodiversity as the Intergovernmental Panel on Climate Change (IPCC) serves for climate change.²² Generally speaking, both reporting systems (the SOC Information System and the periodic reporting framework) remain ad hoc at best, so we are left to assess the scale of climate change impacts through what signals can be gathered from these systems.

²¹ Marzeion and Levermann 2014.

²² Díaz et al. 2019.

Social impacts

Some characteristics of the SOC database mirror broader trends in how climate impacts are understood. Notably, the social impacts of climate change on heritage sites and resources are rarely considered. This trend plays out in the database, which makes an apt reflection more generally of how UNESCO World Heritage treats the impacts of climate change to WHS. A category in the database called “other human activities” is separated from climate change impacts and is a bucket category that includes subcategories of civil unrest, deliberate destruction of heritage, terrorism, and war. In the climate change literature more broadly (beyond heritage matters), these are activities that experts argue have been influenced in part by climate change. Climate change also will likely influence an increasingly greater degree of the external circumstances that spark and drive these conflicts as well as forced migrations. The Syrian civil war is a sobering example of how climate change has contributed to the increased incidence and severity of conflict.²³ But given the conceptual separation of climate impacts from social ones within the World Heritage accountings, climate change will not be readily connected to the Islamic State of Iraq and Syria’s (ISIS) destruction of heritage sites in Syria and Iraq.

Climate change is a “threat multiplier,” which can intensify political and environmental threats that prompt migration and potential conflict.²⁴ In other words, while climate impacts might be initially registered as environmental, the social sequelae are inextricable, especially when considering that climate change is driven by societal forces, including extractive capitalism, mass consumption, and failures of governance.²⁵ Massive disparities of impacts exist, as those who are the most impacted by climate change are generally the least culpable for contributing to it and vice versa. The fundamental inequity of these disparities fuels the climate justice movement, and it is a source of conflict that will only grow, especially as the number and desperation of climate refugees increases. Indigenous communities and the global South are, and will be, particularly impacted. While conflict and forced migration present some of the most visible and acute social impacts, others include more broad-based trends over the long term with equally significant effects to WHS, including land use changes (for example, deforestation, conversion for cash crops and mono-cropping, urban development, and the resulting pressures on Indigenous land rights and sovereignty), and shifting tourism patterns (for example, as tourists pursue “last chance” tourism to see places before they irrevocably change, and the carbon footprint grows due to increasing international tourism).

The reluctance to consider the social drivers and impacts of climate change needs to change. It is matched by a similar tendency to focus climate change efforts on natural WHS since climate impacts are considered only natural, and not also social. Both seem to be artifacts of an aversion to complexity and to political embroilment. Of course, there is also the old institutional nugget of separating cultural WHS from natural WHS, which does not help (and to which we will return below). So long as the effects of climate change are treated as “merely” natural, and not as implicating social mechanisms of impact, then climate responses will be hamstrung and feeble, condemned to a futile exercise in hand waving. A merely natural focus fundamentally and foundationally ignores the anthropogenic character of climate change today. At the same time, cultural heritage and the policies that support, protect, and mobilize it can play a critical role “as a reconciliatory, proactive element of building and securing of sustainable peace” in the face of climate change.²⁶ WHS

²³ Gleick 2014; Greenwood 2014; Kelley et al. 2015; Brzoska and Fröhlich 2016.

²⁴ Reuveny 2007; Shaffer 2017.

²⁵ Lafrenz Samuels 2016; Feola 2020; Morrison et al. 2020.

²⁶ Schorlemer and Maus 2014, 17.

function not only as sites to observe the impacts of climate change but also as spaces of opportunity to foster new ways of adapting to these challenges and mitigating their causes.

Pathways forward for adaptation and mitigation

While the impacts of climate change both directly and indirectly present a great challenge to management of WHS, there are several promising directions for adaptation and mitigation strategies. “Mitigation” has a specific meaning in climate change discussions, different from its uses in heritage management. Climate mitigation seeks to reduce the drivers of climate change, especially through the reduction of GHG emissions. Deforestation is another principal driver, by virtue of losing a carbon sink. We wish to draw attention to three of these developments: (1) sustainability practices at individual WHS; (2) the increasing adoption of the cultural landscape site type for WHS, which embeds sites within their broader natural environment; and (3) carbon management strategies throughout the larger heritage tourism sector.

Best practices: Examples of sustainability at individual WHS

Adapting to the impacts of climate change and mitigating their causes is a difficult task for managers of WHS. Climate change continually poses new challenges, and barriers to effective adaptation and mitigation range from institutional bureaucracy, to international politics, and even to conceptual issues, such as not knowing how to prioritize sites, the question of whether one can even allow sites to be destroyed by climate change impacts, and the challenges of managing the same resources for both research purposes and interpretation for the public.²⁷ Approaches to assessing these barriers and the vulnerability of WHS to climate change often incorporate several avenues of data gathering, including geographic information systems (GIS) and remote sensing to track climate impacts, surveys in local communities, and interviews with site managers to ensure sustainability approaches are aligned with the local context.²⁸ The WHS monitoring system itself can function to address climate change impacts at WHS, especially when a landscape-driven approach is taken to consider the WHS within a larger context.²⁹

Case studies of best practices in sustainable management and the uptake of renewable energy provide examples of WHS that are working to maintain the OUV that the site was originally recognized for, while also adapting to the impacts of climate change, involving communities in site management, and moving toward energy security.³⁰ Examples include the use of biofuel to heat historic district sites such as the Hanseatic Town of Visby or a simpler switch to limit unnecessary lighting to both save energy and reduce light pollution as part of the Starlight Initiative on the Amalfi Coast.³¹ ICOMOS, together with Google Arts and Culture and the technology non-profit CyArk, has profiled five sites threatened by climate change and responding with innovative approaches: Historic Mosque City of Bagerhat in Bangladesh, Chan Chan Archaeological Zone in Peru, Rapa Nui National Park in Polynesia, Old and New Towns of Edinburgh in Scotland, and the Ruins of Kilwa Kisiwani and Ruins of Songo Mnara in Tanzania.³² These sites have each been recorded through photogrammetry and terrestrial laser scanning in collaboration with site partners as a

²⁷ Casey and Becker 2019; Fatorić and Biesbroek 2020; Sesana et al. 2018.

²⁸ Sesana et al. 2020; Orr, Richards, and Fatorić 2021.

²⁹ Guzman, Fatorić, and Ishizawa 2020.

³⁰ UNESCO 2012; Benchikh and Marin 2013.

³¹ Benchikh and Marin 2013.

³² Megarry and Hadick 2021.

safeguard against loss. Other emerging strategies and tools for addressing climate change at WHS include the Climate Vulnerability Index, which assesses the climate vulnerability of both OUV and local communities, and also a recent joint meeting by UNESCO, the IPCC, and ICOMOS to better integrate culture and heritage into climate science and climate responses and explore the role of heritage in creating sustainable futures.³³

Sites such as the Wet Tropics of Queensland World Heritage Area (WTWHA) have received best practice recognition from UNESCO that emphasizes the integration of local communities into research processes at the WHS.³⁴ Managers of this site recognize, and are working to mitigate, the impact of climate change on the OUV of the site as well as its broader biodiversity and cultural significance. The WTWHA was listed in 1988 under all four natural World Heritage criteria and is currently facing climatic challenges related to decline in suitable habitat for flora and fauna, invasive species, changing weather phenomena, and increased exposure to catastrophic events such as fire. In response, both the managers of the WTWHA and a Forum of Rainforest Aboriginal Peoples from across the region formed advocacy efforts and created a climate adaptation plan. This form of long-term community engagement is seen as essential to the future of the area.³⁵

These efforts, however, have encouraged site managers to think differently about OUV and the future of WHS. The exposure to the hazards, risks, and impacts of climate change faced by all heritage sites requires a focus on resilience based on mitigation, adaptation, and risk assessment.³⁶ Resilience in the context of heritage requires new ways of approaching value that do not prioritize conserving material heritage above all else.³⁷ Beyond recording loss, these new approaches must move beyond a “risk”-centered framework focused on what existed before and embrace the emergence of new heritage through processes of climate impacts.³⁸ For example, at heritage sites centered upon glaciers in northern Canada, projects have explored how visitors to the site respond to the possible ways in which the site may look in the future.³⁹ Using photorealistic environmental visualization, researchers examined the response of visitors to possible “futurescapes,” reflecting different levels of environmental change, to improve the ability of site managers to plan ahead and prepare for the impacts of climate change not only to the site but also to visitors.

Resilience requires creative transformation that is focused on local knowledge and community-based decision making.⁴⁰ Indeed, some scholars even call for moving away from the traditional assessment of authenticity at WHS toward a recognition of heritage as a process that can better help meet the challenges of climate change.⁴¹ Understanding heritage as a process at WHS necessitates the prioritization of local knowledge and the role of communities, aligning with building climate resilience at these sites. While recognition of local communities within World Heritage is often perceived as primarily lip service, acknowledgment of their importance has grown at UNESCO over time, indicated by changes in the *Operational Guidelines*.⁴² This recognition, especially of Indigenous communities, is

³³ Climate Vulnerability Index, <https://cvi-heritage.org/about>. Information on the UNESCO, Intergovernmental Panel on Climate Change (IPCC), and ICOMOS meeting is available at <https://www.cultureclimatemeeting.org/about/>.

³⁴ UNESCO 2012.

³⁵ Weber et al. 2021.

³⁶ Morel and Ammerfeld 2021.

³⁷ Cassar 2005; Harvey and Perry 2015; Carmichael et al. 2018; Sesana et al. 2018; Casey and Becker 2019.

³⁸ For a critique of the risk-centered framework in heritage management more broadly, see Rico 2014.

³⁹ Groulx et al. 2017

⁴⁰ García 2019.

⁴¹ Khalaf 2021.

⁴² For the critique of lip service paid to communities, see Brumann 2015; for the growing role of communities in the *Operational Guidelines*, see Jang and Mennis 2021.

critical to climate change responses. For example, Bethune Carmichael and colleagues argue that adaptation and mitigation efforts will likely fail if they are not connected to cultural values and that community experiences and values are important sources of information.⁴³ As an example, the cultural values embedded in the Aboriginal Australian concept of country provide management tools for adapting to climate change.⁴⁴ In this way, traditional Indigenous practices and knowledge can and should be incorporated into sustainability work at WHS. Returning to the WTWHA discussed above, managers at that site include Aboriginal advisors, who have undertaken a process of co-research with scientists to develop a set of cultural and biophysical indicators of the ecosystem condition for sustainable management.⁴⁵ While this project has created a joint platform for Indigenous advisors and scientists to work together, many climate studies are more extractive in approach, in which outside researchers make use of traditional Indigenous knowledge with minimal participation, authority, or approval from communities.⁴⁶ Disconnects between the perceived benefits of a World Heritage listing between Indigenous and non-Indigenous communities can further muddy the waters of climate resilience in these areas, requiring deep-seated reflection, engagement, and inclusion.⁴⁷

Cultural landscapes

Within the context of international conservation instruments, the World Heritage Convention was an innovative instrument for combining the conservation of natural and cultural properties under a single international conservation instrument. This was an important advancement for better recognizing the shared cultural and natural character of properties and the conservation process itself. Despite this innovation, cultural sites (and the new term “cultural heritage”) were still kept separate from natural sites (“natural heritage”) under the operating mechanisms of the World Heritage Convention, except in the uncommon instances of “mixed” sites, which were nominated under both cultural and natural criteria. The introduction of the category of “cultural landscapes” in the 1990s sought to heal this categorical rift in the World Heritage Convention, offering the opportunity to recognize and protect sites representing the “combined works of nature and man [sic]” as stated in Article 1 of the convention. According to Mechtild Rössler, one of the principal architects of the new category, cultural landscapes convey “the outstanding value of the interaction between people and the environment” and “are at the interface between nature and culture, tangible and intangible heritage, biological and cultural diversity.”⁴⁸ Cultural landscapes have been a particularly valuable instrument for recognizing and conserving Indigenous heritage within the World Heritage system.

In 1992, this interaction between people and the environment as the “combined works of nature and man” was further refined by the World Heritage Committee by recognizing three categories of cultural landscapes: (1) clearly defined landscapes designed and created intentionally by humans; (2) organically evolved landscapes; and (3) associative cultural landscapes. Every cultural landscape is therefore listed under one of these three subcategories. The 2021 *Operational Guidelines* define cultural landscapes as “illustrative of the evolution of human society and settlement over time, under the influence of the physical

⁴³ Carmichael et al. 2018.

⁴⁴ Cullen-Unsworth and Maclean 2015.

⁴⁵ Cullen-Unsworth et al. 2012.

⁴⁶ David-Chavez and Gavin 2018.

⁴⁷ Pocock and Lilley 2017.

⁴⁸ Rössler 2006, 334.

constraints and/or opportunities presented by their natural environment and of successive social, economic and cultural forces, both external and internal.”⁴⁹

Currently, cultural landscapes compose 119 sites inscribed to the World Heritage List as of 2021. Since its introduction as a possible category for inscription in 1992, cultural landscapes have seen an ever-increasing interest for inclusion on the World Heritage List. Over the past 10 years of inscription (2011–21, with zero WHS inscribed in 2020 due to the COVID-19 pandemic), there have been 49 cultural landscape properties inscribed to the list, accounting for 21 percent of new inscriptions. This trend offers an important step forward for fitting the World Heritage Convention to the urgent needs of the twenty-first century, and especially for climate change, as one of this century’s greatest challenges. This is the case not only for the spatial reimagining of cultural “sites” that cultural landscapes allows but also in the better integration of natural and cultural relationships under a single heritage management instrument.

Spatially, cultural landscapes embed heritage sites within their broader environmental milieu, reinforcing that the site-specific climate vulnerabilities and impacts are part of a larger picture that includes local and regional changes to the environment, alongside global drivers. This not only has ramifications for effectively managing WHS for adaptation but also holds conceptual implications for legal arguments around the applicability of the World Heritage Convention for climate accountability and action, which we discuss further below. Further, the cultural landscape site type presents an ideal case for underscoring anthropogenic climate change as a “combined work of nature and man” and a joint natural and cultural product. While inscribing cultural landscape sites to the World Heritage List for their expression of anthropogenic climate change has yet to transpire, these site types do communicate more broadly the depth and cultural intricacy of human and natural co-creation. Therefore, they offer the best platforms within the World Heritage framework for monitoring and communicating climate change as anthropogenic.⁵⁰ Also, although WHS have not been inscribed for climate change, climate change will inevitably take a back door into the World Heritage system, forcing a reconsideration of authenticity and integrity as immutable pillars for OUV. The “organically evolved landscapes” subcategory, which is by far the most common of cultural landscape sites, makes perhaps the most compelling case for injecting new understandings of authenticity and integrity into World Heritage, ones that can account for and respond to the changing conditions of landscapes continuing to “evolve” so that the authenticity and integrity of the site is allowed to evolve as well. The palimpsest nature of such landscapes means that climate change will shape yet another layer of meaning and value at the site.

Carbon management

WHS can also tap into key developments in the heritage tourism sector more broadly. In particular, the management of carbon emissions provides another avenue to adapt to and mitigate climate change. Carbon management, or a strategic understanding of how and where a location, activity, or organization generates GHG emissions and ways to decrease those emissions, is well documented within the tourism sector.⁵¹ Rapidly increasing carbon emissions attributed to global tourism, and a significant contribution by heritage tourism, in particular, necessitates a stronger carbon management strategy for heritage tourism that goes further to reduce emissions and exhibit climate action as part of a decarbonized global

⁴⁹ UNESCO 2021b, 22.

⁵⁰ Lafrenz Samuels 2017.

⁵¹ For example, see Gössling 2010.

economy.⁵² It is challenging to overstate the seriousness of this issue for climate change, and WHS are deeply implicated, dependent as so many are on tourism development and revenue. At the local level, heritage site managers can act through improving the energy efficiency of historical buildings and through the reuse of heritage buildings over new construction, when possible, in recognition of the embodied carbon footprint of a site's material fabric.⁵³

At the international level, the situation is more dire, especially for mitigating the carbon output of international air travel, in particular, which is projected to double in the next 15–20 years.⁵⁴ Air travel is one of the few sectors that cannot be electrified, or currently presents no obvious pathway for doing so, meaning that it will continue to be dependent on fossil fuels. So while WHS managers can incorporate carbon management strategies into their local efforts at the site, the carbon emissions for tourists traveling internationally by air is an issue that directly confronts the unsustainable development models of many WHS, when dependent on international tourism revenue, largely from international air travel. There is also the troubling phenomenon of “last chance tourism,” as tourists rush to see sites before they vanish or are irrevocably changed by climate change.⁵⁵ Paradoxically, last chance tourism often hastens the effect of climate change impacts on the site.

A radical revisioning for heritage tourism is needed. At the same time that a changing climate influences visitation patterns and tourist activity, scholars in tourism studies argue that global climate change necessitates challenging the current non-sustainable, carbon-intensive tourism paradigm.⁵⁶ Carbon management projects such as carbon footprint calculators and ecolabels may contribute to this revisioning, though it is unclear the extent to which tourists understand and trust these projects.⁵⁷ More direct communication with visitors may help, positioning them as protectors of biodiversity, culture, nature, and heritage.⁵⁸ The COVID-19 pandemic has been presented as an opportunity to transform tourism.⁵⁹ This is an opportunity not only to refocus efforts on climate change adaptation and mitigation but also to connect the need for community integration discussed above – in particular, the needs and desires of Indigenous peoples who are in a position of vulnerability due to the COVID-19 pandemic and whom have been the subject of tourism and the stewards of heritage sites for years, should be central to this transformation.⁶⁰

Pathways forward for climate communication and activism

While actions to adapt to and mitigate climate change are critical, communication around climate change and advancing climate activism will play an important role in forging a path ahead. Climate activism and action uses various means to enact change. Activists pursue legal mechanisms to protect heritage and bring nations to account for their contribution to the climate crisis, and the World Heritage Convention has served as a particular focal point for drawing on international law and deploying the classic strategy of “name and shame.” Climate action can also prioritize sophisticated methods of communication, drawing on the persuasive power of narratives.

⁵² For increasing carbon emissions attributed to global tourism, see United Nations World Tourism Organization, United Nations Environment Programme, and World Meteorological Organization 2008; Scott, Hall, and Gössling 2016; Lenzen et al. 2018. For carbon emissions due to heritage tourism, see Hall 2016.

⁵³ Guo et al. 2019; Sesana et al. 2019.

⁵⁴ International Air Transport Association 2018.

⁵⁵ Dawson et al. 2011; Frew 2012; Lemelin, Dawson, and Stewart 2012.

⁵⁶ Burns and Bibbings 2009; Hall, Scott, and Gössling 2013.

⁵⁷ Eijgelaar et al. 2013; Juvan and Dolnicar 2014; Gössling and Buckley 2016.

⁵⁸ Lafrenz Samuels 2017; Lemieux et al. 2018; Nichol 2018.

⁵⁹ United Nations Sustainable Development Group 2020

⁶⁰ Carr 2020; Hutchison, Movono, and Scheyvens 2021.

Drawing on international law for climate action

Climate and environmental advocacy groups have wielded the World Heritage Convention as leverage in international law for mobilizing action on global climate change. On the face of it, climate change in the World Heritage Convention makes only a proxy appearance, through reference to threats to heritage by extreme weather, such as fires, earthquakes, landslides, and changes in water level, as being points of concern.⁶¹ However, the World Heritage Convention is being tested for the extent to which it sets up obligations for national governments to act on climate change and provides the means to do so, by reducing GHG emissions. A corollary challenge is the relationship between the World Heritage Convention and international legal instruments that specifically target climate change, including the 1992 UNFCCC, the 1997 Kyoto Protocol, adopted to meet the goals of the UNFCCC, and the 2015 Paris Agreement to extend this work beyond 2020.⁶² Together, these two critical issues – national obligations and the Convention’s authority vis-à-vis dedicated legal instruments for climate – serve as wedges in efforts and debates surrounding the World Heritage Convention’s utility within international law for pushing forward on climate mitigation.

In principle, both the World Heritage Convention and the 2003 Convention for the Safeguarding of Intangible Cultural Heritage set obligations to states to take necessary measures to protect or safeguard the heritage in question, and this would include mitigating the drivers and risks of climate change.⁶³ However, in practice this is not the case.⁶⁴ The primacy on state sovereignty in World Heritage means that states maximize the potential of WHS to contribute to national interests, rather than prioritize addressing the threats that jeopardize integrity and preservation.

Within the text of the World Heritage Convention, Articles 4, 5, and 6 are pointed to as setting the basis for climate action. Ottavio Quirico explains that the World Heritage Convention “seems to easily encompass adaptation and site-level mitigation measures, i.e. *ad hoc* remedies aimed at the ‘protection’ and ‘conservation’ of World Heritage (Article 5 (d) of the World Heritage Convention), since they may be adopted by States under the principle of territoriality (Articles 4 and 5 of the World Heritage Convention) within the context of a generally cooperative framework (Article 6 of the World Heritage Convention).”⁶⁵ However, he notes that efforts beyond the site level, such as general mitigation measures to protect WHS globally over the long haul, is more difficult to establish based on the convention’s text. This is particularly detrimental because site-level mitigation and adaptation measures will have only a limited effect on climate change, being a global process. Therefore, legal scholars have dug into several criteria in Articles 4, 5, and 6 to make the case for general mitigation (beyond the site level) as compulsory. These criteria include the obligations to “integrate the protection of... heritage into comprehensive planning programmes” (Article 5.d); to do “all [they] can” for “ensuring the identification, protection and transmission to future generations of the cultural and natural heritage” (Article 4); and “not to deliberately cause harm” to other states’ sites (Article 6.3).⁶⁶

A few cases are illustrative for the legal pressure being applied to national governments and the World Heritage Center by climate advocacy groups and individuals. Between 2004 and 2006, a series of petitions were brought by 37 NGOs and individuals to the World Heritage Committee, requesting sites to be placed on the List of World Heritage in Danger.⁶⁷

⁶¹ Carducci 2014.

⁶² UNFCCC; Kyoto Protocol, 11 December 1997, 2303 UNTS 162; Paris Agreement.

⁶³ Convention for the Safeguarding of Intangible Cultural Heritage, 17 October 2003, 2368 UNTS 1.

⁶⁴ Lenzerini 2014; Morrison et al. 2020.

⁶⁵ Quirico 2012, 400–1.

⁶⁶ Huggins 2007, 125; Thorson 2008, 160–9; Burns 2009, 161; Quirico 2012, 401.

⁶⁷ Quirico 2012, 394–5.

The WHS in question included Sagarmatha National Park in Nepal, Huascarán National Park in Peru, the Great Barrier Reef in Australia, the Belize Barrier Reef Reserve System, and Waterton Glacier International Peace Park in the United States and Canada. The petitions cited climate change as the primary threat to these sites and to their outstanding universal value and integrity, and called on national governments to radically reduce GHG emissions. Usually in such petitions, to place sites on the List in Danger, it is the relevant national government that is held responsible for addressing the threats to its site. However, in three of the five petitions a transnational case was made that all state parties signatory to the World Heritage Convention – and especially the major greenhouse gas emitters – should reduce their emissions in order to protect and conserve the sites endangered by climate change. The specific impacts of climate change to the sites in question included coral bleaching at the two reef sites and glacial melting for the other three sites. Further, additional petitions were filed: in 2007 for the Greater Blue Mountains Area in Australia, citing rising temperatures as increasing bushfires and endangering biodiversity, and, in 2009, for the threats posed to a number of WHS by black carbon (soot), a short-lived but potent substance that speeds up global warming and therefore exacerbates rising sea levels and glacial melt.⁶⁸

Petitions to include individual sites threatened by climate change on the List in Danger are something of a distraction for climate advocacy around national legal obligations since the obligations set out in Articles 4, 5, and 6 apply to all WHS and not just sites on the List in Danger.⁶⁹ At any rate, the US government has argued in response that failing to take action to reduce GHG was not a deliberate action (recall Article 6.3).⁷⁰ The charge of deliberate harm would be especially hard to demonstrate for those national governments already pursuing or meeting their emissions targets set out under the Kyoto Protocol and following agreements, as would the assertion that harm was deliberately aimed at WHS.⁷¹ UNESCO's response to the petition submitted for the Waterton Glacier International Peace Park was then reluctant to engage with mitigation, instead setting up reporting suggestions only for adaptation measures.

In response to the first set of petitions, the World Heritage Committee did not place the sites on the List in Danger but, instead, created the climate change working group (discussed previously) to study the threats posed by climate change to WHS, which resulted in the *Report on Predicting and Managing the Impacts of Climate Change on World Heritage* and the *Strategy to Assist State Parties to Implement Appropriate Management Responses*.⁷² However, UNESCO's response offered in these documents confines the role of mitigation to the site level, or sometimes the regional level in the case of landscapes, in the form of site-specific strategies for reducing GHG emissions. It leaves general mitigation efforts to the UNFCCC and its implementation agreements.⁷³ Whether UNESCO's position here on mitigation makes sense –that the UNFCCC should serve as the only international tool for general climate mitigation –remains a key point of debate among legal scholars, as does the specific relationships between the various international legal instruments.⁷⁴ Quirico argues that the relationship of the World Heritage Convention to the UNFCCC should be seen as mutually supportive, but with specific GHG emissions targets being set forth in the UNFCCC and its agreements and, moreover, that these agreements should include the threats to World

⁶⁸ Burt et al. 2009; Quirico 2012, 395–6.

⁶⁹ Quirico 2012, 400.

⁷⁰ United States 2006.

⁷¹ Quirico 2012, 403.

⁷² UNESCO 2007b.

⁷³ Quirico 2012, 396–7.

⁷⁴ Thorson 2008, 2009; Burns 2009; Quirico 2012, 2020; Chechi 2014; Maus 2014.

Heritage in their consideration of where to set emissions targets.⁷⁵ Of course, whether cultural heritage is even on the radar of the UNFCCC framework is questionable, considering that heritage is rarely mentioned in the IPCC's reports.⁷⁶

In bringing awareness to the impacts of climate change on WHS and the obligations of states under the World Heritage Convention, climate advocacy groups likely are not solely pursuing legal solutions. They are simultaneously using the platform to deploy a classic international governance strategy of "naming and shaming." After all, as discussed above, inscribing sites to the List in Danger is not legally necessary, as Articles 4, 5, and 6 of the World Heritage Convention apply to all WHS. Even though, ostensibly, the List in Danger is for organizing major operations and assistance to address endangered sites, functionally, the List in Danger has served also as an instrument for naming and shaming governments into acting on conservation issues at specific WHS. Public perceptions become very important in naming-and-shaming contexts.

Climate activism in this respect has been particularly active around the case of the Great Barrier Reef, to call the Australian government to account for its weak commitment to climate change mitigation. The 2007 petition for the Greater Blue Mountains Area in Australia had been brought by Climate Action Network Australia, Greenpeace, the New South Wales Nature Conservation Council, and Friends of the Earth, whereas the 2009 black carbon petition was filed by EarthJustice and the Australian Climate Justice Programme.⁷⁷ Over the past 27 years – about as long as the Great Barrier Reef has been a WHS – the reef has lost half of its coral cover due to bleaching and increased cyclone activity from warming waters.⁷⁸ Since 2011, the World Heritage Committee has issued annual appeals to the government of Australia, expressing its concern over the state of conservation of the Great Barrier Reef. The SOC reports, as well as a reactive monitoring mission report, cite climate change and development pressures as the major threats to the Great Barrier Reef. Through these reports and monitoring activities, the World Heritage Committee has threatened to inscribe the Great Barrier Reef to the List in Danger.

Thus far, Australia has campaigned hard to avoid this from happening, submitting detailed reports and plans for conservation and lobbying fellow member countries to support their bid to keep the Great Barrier Reef off the List in Danger.⁷⁹ Australian politicians claim that placing the Great Barrier Reef on the list would detrimentally impact the \$6 billion tourism industry built up around the reef. It is perhaps in light of the heightened sensitivity in the relationship between the World Heritage Committee and the state government of Australia over the Great Barrier Reef that controversy erupted over a 2016 report, to which the author Kathryn Lafrenz Samuels contributed, that addressed climate impacts to WHS.⁸⁰ Organized by the Union of Concerned Scientists and vetted and published by UNESCO and the United Nations Environment Programme (UNEP), the Australian government demanded that UNESCO and UNEP strike the Australian WHS from the report. The text in question had included a lengthy case study on the Great Barrier Reef and two shorter descriptions of the climate change impacts to the Tasmanian Wilderness and Kakadu National Park. The Australian government was roundly criticized in the press

⁷⁵ Quirico 2012.

⁷⁶ See Hall and Ram 2016 (though recent collaboration between UNESCO, ICOMOS, and the IPCC may change this). Further, there are developments within the European Union to better integrate the World Heritage Convention with international climate law and action into a more cohesive climate strategy for the European region. See Chechi 2016; Kenig-Witkowska 2019.

⁷⁷ Burt et al. 2009.

⁷⁸ De'ath et al. 2012.

⁷⁹ Morrison 2021.

⁸⁰ Markham et al. 2016.

for censoring the report, as was UNESCO for bowing to the Australian government's demands. In part, the Australian government had objected to the case studies' inclusion on the grounds of the report's original title – *Destinations at Risk: World Heritage and Tourism in a Changing Climate* – because it was seen as potentially confusing to the public and prospective tourists, who might mistake the publication with the List of World Heritage in Danger. The news coverage and NGO outrage at the Australian government's actions were the most effective response in continuing the strategy of naming and shaming. The Australian government's reasoning that the report would be confused with the List in Danger shows that they understand the frontlines of the battle to be public perception, including consumer (tourist) beliefs. Meanwhile, recent surveys of Australians themselves show that over 70 percent of them think that inclusion of the site on the List in Danger would spur action to protect the reef.⁸¹

Heritage within the UNFCCC and IPCC, when mentioned, tends to be drafted as traditional knowledge and Indigenous rights. As Hee-Eun Kim explains, “the climate change regime under the UNFCCC primarily recognizes the *usefulness* of traditional knowledge in the context of climate change adaptation.”⁸² This utility is largely extractive, emphasizing the importance of local knowledge in understanding and adapting to climate change, but it fails to place appropriate emphasis on protecting this knowledge and the knowledge keepers in ways that they deem appropriate or on providing effective decision-making power to Indigenous communities. Thinking about effective and appropriate prioritization of Indigenous communities in protecting their own cultural heritage reveals the limitations of the World Heritage framework. Insistence upon the right to self-determination enshrined in the United Nations Declaration on the Rights of Indigenous Peoples (UNDRIP) by many Indigenous communities has led to statements against the World Heritage Centre that deplore an insufficient respect for the human rights of Indigenous peoples.⁸³ Returning once more to the Wet Tropics of Queensland World Heritage Area (WTWHA) in northeastern Australia shows that, while site managers have received awards for best practices and co-research activities are taking place with Indigenous communities, some of the desires of the Indigenous caretakers of this land go unrecognized. The WTWHA was inscribed on the list in 1988 as a natural, not a cultural, site, despite significant reference to Aboriginal rainforest culture and despite statements from these communities they “wish to have the property recognized as a living cultural landscape.”⁸⁴ Other WHS that have taken a co-management approach continue to face ambiguity in negotiating the interests of all parties. For example, the Indigenous Sami community at the Laponia WHS in northern Sweden continues to face challenges in their call for power in land management at this site, despite the site management plan stimulating a substantial shift in the national land management system.⁸⁵

Climate change intensifies all of these concerns, not only in what happens on the ground, but also in how these issues are framed and communicated. In popular and news media, Indigenous peoples are framed as victims of climate change, whose knowledge is used to corroborate Western scientific approaches.⁸⁶ Indigenous communities, however, are

⁸¹ Morrison 2021.

⁸² Kim 2011, 260 (emphasis in original).

⁸³ Brumann 2015; Vrdoljak 2018; United Nations Declaration on the Rights of Indigenous Peoples, GA Res 61/295, UNGAOR, 61st Sess, Supp No 49, UN Doc A/61/49, 13 September 2007.

⁸⁴ Australian National Periodic Report, Section II: Report on the State of Conservation of the Wet Tropics of Queensland, 2002, 8–9, <http://whc.unesco.org/archive/periodicreporting/APA/cycle01/section2/486.pdf>, quoted in Vrdoljak 2018.

⁸⁵ Stjernström, Pashkevich, and Avango 2020.

⁸⁶ Belfer, Ford, and Maillet 2017.

rewriting the narrative about sustainability and climate change, through indigenizing the United Nations Sustainable Development Goals and developing their own indicators to take control of development in their own communities.⁸⁷ While climate change is driven by those who often face the least impact, responsibility for adapting to and mitigating climate change, and communicating climate concerns, is being taken seriously by impacted communities. This kind of reframing the narrative is an opportunity to think more deeply about how heritage sites can contribute to climate communication.

Climate communication, narratives, and persuasion

While some pursue climate action through international legal instruments, others seek change through communication efforts that persuade individuals and communities directly, recognizing that the grindingly slow machinery of national and international governance has thus far proven inadequate to address climate change. For many years, climate communication had largely focused on communicating the science of climate change to the general public, including how science shows that contemporary climate change is human caused, and how climate models can make projections about our collective futures.

Increasingly, climate communication is being employed to mobilize citizens for climate action, and cultural heritage has become an important arena for making persuasive arguments about intergenerational obligations, the loss of cultural endowments, and the anthropogenic and long-term character of global climate change. In the face of political dysfunction around climate change, citizens and investors are also being persuaded to vote with their wallet. Indeed, some of the most vociferous debates within climate change circles is whether the market (and capitalism) will be the force that saves us, or whether it was the problem to begin with and, instead, that we should be pursuing degrowth strategies. The market logics and economic value of WHS implicates them within these debates, especially in terms of their connection to the carbon economy such as from long-distance tourism. More recently, there is a turn toward narratives about how to live in a time of ever-increasing change, uncertainty, and loss. These narratives are directed less toward a persuasive outcome and more toward feeding a human need for making sense of one's world and dealing with strong emotional responses such as despair and anxiety. WHS will assist here as well, acting as a mirror on the dynamics of social change and drawing on the rich and complex histories represented within sites.

Motivated by these approaches to climate communication, we have developed a public-facing “climate communication recognition scheme” (CCRS) focused on WHS. The CCRS is available online as an ArcGIS StoryMap, and we discuss it here as an example of leveraging WHS for communicating climate change.⁸⁸ One significant development over the past 50 years of the World Heritage Convention is its evolution into a brand. Indeed, the World Heritage List has exploded to over 1,100 properties and counting, overwhelming the list's original conservation mandate as national governments seek to attract foreign tourism revenue and foster economic growth through the World Heritage brand. The branding function of World Heritage is powerful and increasingly central to motivations for inscription.⁸⁹

We find value in the branding function of World Heritage, as a brand signifying global conservation, and applied to this brand an “ecolabel” for communicating climate change.⁹⁰ These two facets of World Heritage – conservation and branding – provide an excellent

⁸⁷ Yap and Watene 2019; Degai and Petrov 2021.

⁸⁸ ArcGIS StoryMap “Climate Footprints of Heritage Tourism,” <http://www.heritageofclimate.com>.

⁸⁹ King and Halpenny 2014; Ryan and Silvano 2014; Bailey 2017; Wuepper and Patry 2017.

⁹⁰ Lafrenz Samuels and Platts 2020.

vehicle for drawing public awareness and action to the problem of global climate change. Ecolabels assign labels to consumer goods (for example, organic and fair-trade certification of foods) for the purpose of communicating the sustainability of a product.⁹¹ Ecolabels extend to the tourism sector too – for example, 30 percent (128 of 430) of the ecolabels listed in the 2014 Ecolabel Index apply to the tourism industry.⁹² In the context of the tourism industry, these schemes often carry a strong quantifiable and ecological focus. However, efforts to incorporate cultural, social, and economic aspects of a tourist destination into these schemes are underway and are often reflected in a more holistic approach to a certification process known as an “environmental product information scheme” (EPIS), which aims to provide more holistic ecological information on products and services.⁹³ Ecolabels and EPIS are employed to communicate information to consumers, such as quality and sustainability, and reward and promote goods and services that are environmentally superior in some respects. They provide individuals and groups with the opportunity to vote with their wallet as a consumer driven form of environmental policymaking.

Our CCRS followed from the aim to develop an environmental product information scheme for communicating climate change through WHS. This elaboration from an ecolabel to a more holistic capturing of the various facets of climate change knowledge and responses immanent in heritage sites is reflected in our choices in designing the CCRS. In addition to the quantitative measures that typically characterize ecolabels, given in this case by carbon footprint analysis, we have also chosen to portray other facets of climate change at heritage sites, such as their narrative potential for communicating the histories of anthropogenic climate change, the sustainability practices being undertaken at heritage sites, and the impacts of climate change to heritage resources. We consider this approach a more accurate means for capturing the climate communication potential of heritage sites and for pursuing carbon management tools like carbon footprint analysis, but also triangulated with social justice and sustainability issues attendant with heritage sites and global climate change (for example, exacerbating existing social and economic inequalities, the fundamental and paradoxical inequalities of climate justice between who contributes and who suffers, and the impacts of climate change for increasing migration, displacement, conflict, and food insecurity).

We employed the ArcGIS StoryMaps platform for the CCRS to combine the text, images of sites, and interactive maps to create a publicly accessible platform. The StoryMap interface allows for the creation of interactive web-based platforms built around the presentation of spatial information through maps. By linking narrative text with photographs and maps of spatial relationships, StoryMaps are a rich, visually compelling way to present information that engages the reader and facilitates dissemination. We organized the CCRS around two overarching themes: “Understanding Your Impact” and “Telling the Story.” The Understanding Your Impact theme provides an opportunity to learn about the effects of travel to WHS through the carbon footprint analysis, which includes a description of what carbon footprint analysis is and the methodology for this part of the project. It then provides the results of the carbon footprint analysis in narrative form for each of 10 WHS. Each site description concludes with an interactive map that shows the carbon cost of international flights to the WHS from one of at least 20 countries that represent the 20 countries with the most carbon emissions in 2015, and the countries which send the most tourists to the WHS country. The Telling the Story theme, meanwhile, provides a hub of information about the ways in which climate change and World Heritage are related through climate narratives, sustainability actions, and climate change impacts. This section of the platform highlights

⁹¹ Rubik and Frankl 2005; Bolwig and Gibbon 2009; Gössling and Buckley 2016.

⁹² Gössling and Buckley 2016.

⁹³ Scheer and Rubik 2005; Tepelus and Córdoba 2005; Boström and Klinton 2008; Das and Chatterjee 2015.

the WHS on a world map, including the site's spatial location, photographs, narrative text, and links to more information. Attention to narrative is recognized as an increasingly vital tool for responding to the challenges of climate change.⁹⁴ Narratives provide conceptual scaffolding not only for adapting to climate change and mitigating its drivers but also for mobilizing broader conversations about the moral and ethical foundations of a changing climate, and for processing how we individually face climate change in dignity, grief, sorrow, and hope. We identified sites with the narrative potential to tell stories about climate change. For example, sites associated with the use of fossil fuels (for example, Cornwall and West Devon Mining Landscape in the United Kingdom) help illustrate the anthropogenic contributions of carbon-based energies to climate change, and sites endangered by conflict influenced by climate change (for example, Palmyra in Syria) highlight that impacts on heritage resources are not only natural or environmental (for example, sea level rise, increased pest and mold activity) but social too.

Conclusion

Looking back on the legacy of the World Heritage Convention over the past 50 years, climate change poses a complex and seemingly intractable challenge to the World Heritage apparatus. Over time, World Heritage has slowly been coming to terms with the realities of climate change, but significant hurdles remain in matching the World Heritage framework to its twenty-first-century existential threats.

Acts of commemoration speak to beginnings and ends, and new beginnings too. The origin story of the World Heritage Convention began in floods of biblical proportions – in the international safeguarding campaigns of Nubia and Venice.⁹⁵ Now sea-level rise and increased flooding from storms threatens to swallow up WHS en masse, emblematic of the many climate change impacts projected for heritage sites. It is fitting with such an origin story that we conclude by pointing to new narratives that WHS may express. The persuasive capacity of heritage to tap into emotional states and instill trust renders WHS a valuable template for individuals and communities to mobilize social and environmental change for the better. At the same time, these sites can help visitors make sense of change, including how to live with grief and loss. Narratives around WHS must dwell on the moral values of climate action even if or when success is unlikely – for example, because of the climate justice imperatives of taking responsibility in the face of such unequally distributed risk. We can only imagine what future stories WHS will tell. As authors of our collective stories now, let us be good ancestors.

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⁹⁴ Fløttum and Gjerstad 2017; Coulter, Serrao-Neumann, and Coiacetto 2019.

⁹⁵ Hafstein 2018, 27.

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