

The Role of Cultural and Natural Heritage for Climate Action



A White Paper commissioned for the International Co-Sponsored Meeting on Culture, Heritage and Climate Change



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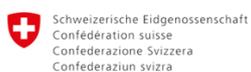
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Foreword

As co-chairs of the Scientific Steering Committee of the International Co-Sponsored Meeting on Culture, Heritage, and Climate Change (ICSM CHC) we are delighted to write this foreword for this important publication, and to congratulate the authors on their valuable exploration of the role of cultural and natural heritage for climate action. This publication is one of three commissioned by the ICSM CHC in early 2022 as a provocateur for attendees.

The proposal for the ICSM CHC was a response to growing calls for international attention to culture, heritage, and climate change including by the Intergovernmental Committee -established under the UNESCO 1972 Convention concerning the protection of the World Cultural and Natural Heritage-, which requested, already in 2016, the UNESCO World Heritage Centre and the Advisory Bodies to the World Heritage Committee to work with the Intergovernmental Panel on Climate Change (IPCC) with the objective of including a specific chapter on natural and cultural World Heritage in future IPCC assessment reports." These calls were a recognition that there exist significant gaps in understanding of the many connections between culture and the human past and the modern phenomena of climate change, as well as a need to advance the contributions of culture and heritage to climate change mitigation and adaptation.

The proposal, first proposed by the International Council on Monuments and Sites (ICOMOS), was agreed by the Co-Chairs of the Working Groups of the Intergovernmental Panel on Climate Change (IPCC), endorsed by the IPCC Executive Committee in June 2020, and co-sponsorship confirmed by the United Nations Educational, Scientific and Cultural Organization (UNESCO) in July 2020 with which a collaborative concept note for the meeting was finalized by the Co-Chairs of the Scientific Steering Committee. The ICSM CHC was held virtually over five days from 6 - 10 December 2021 bringing together approximately 100 participants from a wide range of backgrounds. The meeting participants represented 40 countries across all six continents. 40% of the participants were from the Global South and 61% of the participants were women. The participants included Climate Scientists, Culture and cultural and natural heritage experts and practitioners, Natural Science experts and practitioners and representatives from indigenous peoples and local communities.

During the ICSM CHC, participants discussed a wide range of topics including the systemic connections of culture, heritage, and climate change, the roles of culture and heritage in transformative change and alternative sustainable futures and, aided by this paper the role of cultural and natural heritage for climate action. Themes within this topic included climate justice, impacts and capacity building, and the power of heritage in critical thinking.

A draft of this paper was prepared by a diverse group of scholars and heritage practitioners from around the world. This draft was shared with the ICSM CHC meeting participants and then revised by the group following inputs from the meeting. As a provocation piece written to promote conversation and debate, its contents intentionally reflect the views and opinions of the authors and do not necessarily represent the view of the co-sponsors of the meeting. Attention to culture is an indispensable enabling condition to transformative climate action and climate resilient sustainable development. It is increasingly recognized that the lack of attention to culture can lead to poor adaptation and inadequate mitigation outcomes. As the urgent need for effective, equitable climate

action becomes ever clearer, we hope this paper gains a wide audience and it makes an important contribution to a topic that requires greater attention.

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Executive Summary

Arguing that ‘the moment of the now’ calls for fresh, creative thinking in the search for solutions, this White Paper both explores the state of research at the intersection between culture, heritage and climate change, and makes a case for a set of approaches, perspectives and conversations that we need to have—or that we need to have in new ways. Taking a broad view of heritage as ‘the archive of accumulated human wisdom’, it explores both small-s solutions (immediate, techno-infrastructure fixes) and big-S Solutions (changes in values, behaviours and worldviews). First, it defines a ‘heritage perspective’ on climate change via four attributes: an orientation towards deep time; an orientation towards the future; an orientation towards local and Indigenous knowledge; and an orientation towards both practice and critical thinking. Then it presents a review of the relevant scientific and scholarly literatures, according to the scoping questions. Next, it presents eight heritage-focused case studies, each of which orients us towards solutions to the challenges of anthropogenic climate change.

We need to consider an encompassing view of heritage, that draws from both the fields of heritage studies and heritage management. The archive of local and Indigenous knowledge and practice offers many potential solutions, but raises key questions around ethics, intellectual property and terms of engagement. Climate change itself needs to be understood as an historically situated phenomenon, that has involved and implicated populations and territories differently, especially across the Global North/ Global South divide. Recognizing this, it becomes imperative to foreground a climate justice perspective in the search for solutions. Experience suggests that science-based solutions are likely to be socially, economically, politically and culturally entangled. Social science and humanities-based approaches play a key role in allowing us to anticipate and understand such entanglements. Rather than being static and backward-looking, heritage is mobile, forward-looking and always in-the-making. Mobilising the affective power of heritage becomes a potentially powerful tool in organising for climate action—although this involves emphasising a different version of heritage, less concerned with national pasts and more with collective human endeavour. The creative arts play a key role in imagining viable futures, and in producing resonance, ‘believe-ability’ and hope. The political struggle around the climate emergency is the struggle for multilateralism, dialogue and cooperation, in the face of populist attempts to use a moment of historical anxiety for narrowly sectarian ends. From a heritage perspective, the question of relevance is: How do we mobilise the affective power of heritage in support of open, creative, and inclusive futures?



The Role of Cultural and Natural Heritage for Climate Action

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1. Introduction

1.1 Points of departure: 'the moment of the now'

For many of us, the events of the last two-and-a-half years have felt like an historical hinge, a period in time that marks a clear 'before' and 'after'. The novel coronavirus pandemic and the global public health response, have called into question many previously taken-for-granted ideas and practices and redefined our sense of the possible (Aschwanden, 2021; Saaliq, 2021; Vinter, 2021). Mid-2020 saw widespread demonstrations against racism, police brutality and authoritarianism, organised under a variety of banners including #BlackLivesMatter. Not least there is the climate emergency itself, with 2021—especially the northern hemisphere summer—described by some commentators as the moment when climate change burst onto the public and political agenda (Clayton, 2020; Hickman, 2021; Wu, Snell, & Samji, 2020). Important here is the acknowledgement that climate change and its devastating impacts have mediated lived realities of people and ecosystems in the southern hemisphere for a decade if not more. This understanding of 'the moment of the now' becomes a first point of departure for this white paper. The scale and urgency of the challenges that we face mean that 'business as usual' approaches are no longer enough. There is a time for cautious thinking, but there is also a time when bold and creative approaches are called for. Accordingly, this WP does more than merely describe the state of research at the intersection between culture, heritage, and climate change as per the scoping questions. It also makes a case for fresh approaches and perspectives, and for the conversations that we need to be having—or that we need to be having in new ways. These are presented as a series of ten 'talking points'.

A second point of departure likewise derives from the contemporary moment. Seldom have science and technology been more prominent in the public sphere, than in the last two years. We have all become armchair virologists as we have tracked the progress and mutation of the virus, and the race to develop a vaccine. The achievement of a number of effective vaccines in record time is an extraordinary achievement, and a vindication for advocates of STEM subjects and science-based policy (Ball, 2020; Zimmer, Corum, & Wee, 2021). However, this observation is doubled by a second observation: the manner in which, at almost every turn, science-based understandings and policies have been entangled with, and mediated by, complex social, cultural, political and economic forces and dynamics. This has been true at a national level—in culture wars, denialism, and politicking around the pandemic—and it has been true at a transnational level, in uneven access to vaccines, a breakdown in trust, and the entrenchment of deeply-rooted animosities and inequalities (Callaway, 2020; Cornwall, 2020; Crist, 2021; McKee, Gugushvili, Koltai, & Stuckler, 2020; Osama, Razai, & Majeed, 2021; Padma, 2021; Philips, Augustin, & Collyns, 2021; Ricard & Medeiros, 2020; Sturm & Albrecht, 2021). Understanding that solutions to the climate emergency are likely to be similarly entangled, this WP makes a strong case for the need to understand and anticipate such entanglements. In the first place, this involves drawing on conceptual vocabularies and understandings from the social sciences and humanities. In the second place, it involves developing the kinds of conversations that give equal weight to scientific discoveries and to the public, political and historical contexts in which such discoveries are made and applied.

1.2 A Heritage Perspective

Heritage is a notoriously 'slippery' concept (slippery in the sense that it evades precise definition). It joins other concepts—like culture, tradition and identity—that appear straightforward at first glance, but that gather layers of complexity the closer one looks. For present purposes, we should note two aspects of heritage as a concept. The first is that it is used in three overlapping senses or 'modalities'. The first of these is a popular usage of heritage, in which it codes for ideas like identity, tradition, belonging and descendance. The second is an official, legal and institutional usage, focused around definitions and distinctions—like the conventional distinctions between cultural and natural heritage, and between tangible and intangible heritage. This is a modality of heritage that is probably most familiar to many of us, and it characterises the work of organisations like UNESCO and ICOMOS. A third modality of heritage is a concept of heritage as it appears in research spaces, in the interdisciplinary field of heritage studies (as opposed to the second modality, which is often referred to as heritage management). A full discussion of these different modalities of heritage is given in the Appendix. For present purposes, we need to note that the second and third modalities of heritage differ on key points of definition, and the understanding of core terms like value and authenticity. However, rather than getting snagged on such differences, it becomes equally important to note that these modalities of heritage have different ends: for the second modality of heritage, this is about creating a community of practice and constructing stable legal objects for the purposes of management; for the third, it is about understanding the full complexity of our relationship to the past in the present.

A second aspect of heritage that requires brief comment, concerns its scope and meaning. Conventional definitions of heritage break down into a narrower and a broader understanding of its remit. Narrower definitions of heritage might be summarised by the phrase 'a duty of care towards old (valued) things, sites and practices'. This understanding of heritage directs us to think about practices of stewardship, custodianship, and care. The questions that it generates in relation to climate change are, in the first instance, questions about risk and mitigation in carrying out this duty of care. However, a second, broader definition of heritage exists, which can be summarised by the phrase 'accumulated human wisdom'. Here, heritage appears as something more: the sum total of ideas and innovations accumulated through time and across space, across the immense variety of human experience. In this understanding, heritage becomes a kind of archive of our species and civilisational experience, and the questions generated in relation to anthropogenic climate change are more far-reaching: How can we draw on this archive in a moment of peril, to solve some of the problems associated with anthropogenic climate change? This is an archive not just of technological innovation, but also of worldviews, values, forms of relatedness, and ways of being. As well as being an historical archive, it is also a living archive, in the sense that it forms part of a set of living traditions held and practiced by people throughout the world as part of local, traditional and Indigenous Knowledge Systems (IKS) (Carmen, this report; Sithole and Chundu, this report). Because the question of finding solutions to the challenges of anthropogenic climate change require us to think holistically, using the full range of tools available to us, all three modalities of heritage will be considered here—and a number of arguments will be framed explicitly from the space of heritage studies.

In summary, there are a number of features of a heritage perspective on anthropogenic climate change which make it distinctive, and different from other perspectives. These include the following:

- *An orientation towards deep time:* Heritage gives us a perspective on the 'longue durée' of the human career, understanding human history not just as a civilisational history—as in conventional accounts—but as a species (and multispecies) history. Thinking at the scale of epochs, it invites us to think about the Pleistocene in relation to key biological, social and cultural developments in our species being, and the Holocene in relation to the development of our civilisational complex. This deep time perspective becomes key as we look for historical analogues for the epochal change currently underway (Riede et al., this report).
- *An orientation towards the future:* Arguably, one of the features that makes anthropogenic climate change a 'wicked' problem is our limited ability to think forward, in terms of our accountability towards future generations, centuries and millennia (Scranton, 2015). A heritage perspective offers us an orientation towards the future via its core duty of care. Heritage might be described as a conversation (or transaction) between past, present and future, defined by an ethics of care.
- *An orientation towards Indigenous and local knowledge (ILK):* A powerful aspect of heritage is its ability to take us outside of modern, Western ontologies and epistemologies (however defined), towards the archive of Indigenous and local knowledge. This archive exists both as a living archive of practices, understandings, technologies, and ways of being, and as an historical archive of non-modern knowledges and social arrangements (Carmen, this report; Ernsten, this report; Sithole and Chundu, this report)
- *An orientation towards both practice and critical thinking:* The fact that heritage divides between institutionally based management practices and scholarly research practices means that taking a heritage perspective orients us towards both practice and critical thinking. Arguably, this under-appreciated aspect of heritage is one of its most important features as we address the challenges of anthropogenic climate change, delivering both institutional power and capacity, and reflexive thinking and the ability to frame questions.

2. Overview of Questions Addressed

This WP addresses the following overarching questions:

- In what ways can a heritage perspective help us to address the multiple challenges associated with anthropogenic climate change?
- Taking a broad view of heritage as a cultural archive of accumulated human wisdom, what solutions can be found to current and future problems associated with anthropogenic climate change?

Solutions in this context are understood to exist at different scales: both 'small-s' solutions, understood as immediate technical fixes to defined problems, and 'big-S' Solutions, for example, changes in values, behaviors, and social meanings. More broadly, it asks:

- What does it mean to address the climate emergency from the perspective of the social sciences and humanities, and from the set of concepts that constellation around the notion of heritage? These concepts include notions of culture, identity, tradition, and the trajectory of the human career through time.

These overarching questions break down into a series of sub-questions:

- How have culture and heritage as resources for climate resilience and adaptation been incorporated into recent IPCC reports?
- What is the state of knowledge regarding the capacity for culture and heritage to serve as enablers of climate resilience and adaptation in published scientific literature external to IPCC reports?
- What is the state of knowledge regarding the capacity for cultural and natural heritage to act as resources for physical and psychological resilience during and after disasters or conflicts?
- What is the state of knowledge regarding how tangible and intangible heritage, cultural institutions and cultural actors have inspired individual and collective climate action?
- What is the state of knowledge regarding the roles of culture and heritage in decarbonisation and mitigation? This includes but is not limited to: alternative ways of living and non-material measures of well-being; green creative economies; and the adaptive reuse of the historic built environment.

Being solutions-focused, this WP will place special emphasis on the following three cross-cutting questions, drawn from the scoping brief:

- Where have major definitions of heritage been made and how do these intersect with attention to, or lack of attention to, climate impacts and responses?
- What is the balance of current and needed methods for translating insights from centuries or millennia of human-environment experience into meaningful approaches to contemporary climate science and response?
- Learning from the past requires asking questions of it: How well do questions that climate science, adaptation, and mitigation communities have for and about the human past, and the nature of human behaviour and society, align with questions that researchers who focus on the past ask about these topics?

Finally: What are the gaps in current approaches to culture, heritage, and the climate emergency? What conversations do we need to be having, which we are not currently having (or having enough of)? What new ideas and concepts do we need to put into play?

3. Methods

Given the scope, scale, and open-ended nature of many of these questions, this WP makes use of three sets of methods, to provide at least partial answers. First are bibliographic methods, aimed at reviewing the relevant literatures at the intersection between culture, heritage, and climate change. This review is intended to address the sub-questions directed at understanding the state of knowledge in specified areas, inside and outside of IPCC reports. Second, it uses a case study approach, focusing on eight heritage-related projects and bodies of work that offer solutions to the climate emergency. Case studies were selected for diversity of approach and coverage across a range of axes: Global North/ Global South perspectives, Indigenous/ non-Indigenous perspectives, and diversity of disciplinary and epistemic perspectives. Each case study is intended to shine a light into a particular corner of heritage research and practice, and to demonstrate the kinds of solutions on offer. In some cases, the authors of the case studies use different methods, employ different technical languages, and have different starting assumptions. This is in keeping with the broad range of approaches convened under the heading of natural and cultural heritage research and management. A third aspect of the methodology is the work of analysis. This looks for the points of convergence and divergence across this range of materials—the bold ideas, the gaps in coverage, the shifts in perspective—and renders these as a set of 11 talking points. Rather than a set of conclusions or recommendations, we have decided to present the results of this collective research exercise in the form of a set of talking points. These talking points constitute our understanding of the conversations that we need to be having, the issues that we need to foreground, the concepts that we need to put into play, and the practices and methodologies that we need to adopt, if we are to find solutions to the climate emergency—thinking and practicing from a heritage perspective.

The talking points are intended to function as ‘conversation starters’ for researchers, practitioners, knowledge holders and activists coming from a broad range of perspectives. It is worth saying something about what it means ‘to get into conversation’. In our understanding, we get into conversation around things with which we strongly agree, and strongly disagree—less so around safe, middle-of-the-road utterances. Thus, the talking points are rendered in a direct manner, and are intended to encourage conversation and the articulation of positions for and against.

4. Literature review

4.1. Natural and cultural heritage as resources for climate resilience and adaptation in recent IPCC reports (in particular SR1.5C, SRCCL, and SROCC).

The term heritage itself is used relatively rarely across all IPCC reports. When it is used, it most commonly refers to specific sites, reserves, areas or assets under threat from climate change, often of world heritage status. In such cases, heritage primarily constitutes a resource towards resilience and adaptation, in the sense that learning how climate change affects sites and assets—and the people, industries and ecological processes related to them—offers insight on how best to respond and adapt. More recent reports use heritage in a broader range of senses. In the *First Assessment Report* (AR1) for example, the term heritage overwhelmingly refers to specific sites and reserves (in 21 out of 23 mentions), mentioning a broader sense of ‘social and cultural heritage’ on just two occasions (Pentland, Theys, & Abrol, 1990, pp. 167, 173). Amongst all reports, the *Fifth Assessment Report* (AR5) refers to heritage most often (28 mentions), and in the most diverse ways, referring to specific heritage sites on only five occasions (Kolstad et al., 2014, p. 221; Kovats et al., 2014, p. 1292; Reisinger et al., 2014, p. 1382; Revi et al., 2014, pp. 559, 560). The term is associated with a greater range of cultural phenomena, including ‘unique rural landscapes’ (Kovats et al., 2014, p. 1293), ‘values’ (Field et al., 2014, p. 60), and ‘narratives, world views, identity, community cohesion, and sense of place’ (Adger et al., 2014)—again with an emphasis on threats from climate change. Of particular note is the fact that it points out that ‘[some] have argued ... the bio-cultural heritage of indigenous peoples is a resource that should be valued and preserved as it constitutes an irreplaceable bundle of teachings on the practices of mitigation and sustainability’ (Kolstad et al., 2014, p. 255).

Used in relation to specific sites, areas and assets, the term heritage appears in *Global Warming of 1.5°C* (SR1.5C), with three out of six mentions (Hoegh-Guldberg et al., 2018, pp. 242, 243, 253), *Climate Change and Land* (SRCCL) with two out of six mentions (Armeth et al., 2019, p. 106; Mirzabaev et al., 2019, p. 301), and *IPCC Special Report on the Ocean and Cryosphere in a Changing Climate* (SROCC) with eight out of sixteen mentions (Bindoff et al., 2019, p. 541; Hock et al., 2019, pp. 134, 171, 174; Pörtner et al., 2019, pp. 49, 69). Here too there is an emphasis on resilience and adaptation as a result of learning from climate change threats and impacts on heritage—although this is not always the case. For example, the Siwa oasis is mentioned as a repository of dry-adapted plant genetic material in CCL (Mirzabaev et al., 2019, p. 301).

However, taking heritage in a much broader sense to include culture, archaeology, the creative arts, Indigenous and local knowledges and practices, paints a different picture. As other reviewers have noted, the trajectory through AR1 to AR5 has been to pay increasing attention to heritage-related realities and academic disciplines, and to take these increasingly seriously in terms of understanding and responding to climate change. There is a clear increase in references to Indigenous knowledge between AR1 and AR5 (Hall & Ram, 2016), a trend continued in the three most recent reports, with SRCCL and SROCC in particular including detailed reference to Indigenous and local knowledge. This is in part related to these reports’ focus on land, seas, coasts, and ice, and the people who live in such places. As noted by Kohler and Rockman (2020), the *Third Assessment Report* (AR3) ‘includes the first hint that IPCC authors consider the archaeological record to potentially hold important lessons for how humans might adapt to climate change’ (p. 633). On the other hand, it is also the case

that of the three most recent reports, only SROCC ‘makes any substantial use of archaeological data’ (p. 363).

A trend continued across reports and into SR1.5C, SRCCL and SROCC has been for heritage to be viewed through an increasingly *positive* lens—that is, in terms of what it brings to the table in terms of solutions to climate change, rather than as an impediment to be overcome. In the 332-page AR1 Working Group 3 (‘Responses’) report (IPCC, 1990), for example, heritage is mentioned on a total of two pages in terms of its actively positive contributions—as people’s knowledge of living in water-adapted houses (Gilbert & Vellinga, 1990, p. 154), and as living organisms’ and society’s ‘built in’ ability to adapt to climate change (Pentland et al., 1990, p. 167). Heritage is likewise mentioned twice as an impediment to adaptation measures—‘cultural barriers’ possibly preventing ‘translocating adaptation measures from one locale to another’ (Pentland et al., 1990, p. 167), and “cultural traditions” which might be at odds with sustainable agricultural and economic development (Pentland et al., 1990, p. 173). By contrast, in the 765-page SROCC, forms of heritage are mentioned on at least 49 pages in relation to solutions—so that heritage’s role in active, positive contributions to adaptation, mitigation, and resilience, outweigh its role as a ‘barrier’ by a ratio of more than 3 to 1 (38 vs. 11 pages) (IPCC, 2019). At the same time, analyses of the kinds of barriers heritage and culture might present have arguably become more specific and sophisticated, with increasing acknowledgement of the external and internal power dynamics which operate in every local context. These include quite extensive considerations of inequalities of gender, Indigeneity, wealth, race, age, and disability (e.g. Arneth et al., 2019, pp. 80, 106; Pörtner et al., 2019, pp. 92, 373).

This parallels a trend across recent IPCC reports for the inclusion of studies which argue for—or show the higher likelihood for adaptation or resilience efforts to succeed if they pay attention to—context-specific realities, with an identified gap in knowledge regarding coastal communities (Pörtner et al., 2019, p. 534). Studies emphasise the importance of working co-operatively with affected communities as knowledgeable and equal partners (e.g. Oppenheimer et al., 2019, p. 406). The cited material suggests that culture and heritage—most commonly taken as various forms of local and Indigenous knowledge and practice—should be drawn upon and combined with scientific knowledge and practice. It is argued that such ways of working can play a central role in improving resilience and adaptive capacity from coasts (Pörtner et al., 2019, p. 534), to farming systems (Olsson et al., 2019, p. 381), to water management, soil fertility, grazing, and the management of forests (Smith et al., 2019, p. 638). This includes technologies (de Coninck et al., 2018, p. 371) and agroecological knowledge (Mirzabaev et al., 2019, p. 252), as well as forms of political and social organisation (Arneth et al., 2019, p. 106). Loss of cultural heritage, including Indigenous knowledge—‘threatened by acculturation, dispossession of land rights and land grabbing, rapid environmental changes, colonization and social change’ (de Coninck et al., 2018, p. 337)—is taken as being synonymous with a diminution of communities’ ability to respond effectively to climate change related changes (Pörtner et al., 2019, p. 662).

4.1.1 Knowledge gaps

SR1.5, SRCCL, and SROCC each identify several heritage and culture-related knowledge gaps: including lack of evidence on the socio-cultural acceptability of energy adaptations (de Coninck et al., 2018, p. 388), and a paucity of effective predictive models on the community- and household-level impacts of 1.5 and 2°C worlds (Pörtner et al., 2019, p.475). There are two notable knowledge gaps

not addressed in this WP because of lack of space: 1) the paucity of archaeological data in IPCC reports; and 2) the general lack of consideration of the visual and performing arts—with exceptions having to do with landscapes’ propensity to evoke artistic inspiration in SROCC (Bindoff et al., 2019, p. 514), and discussion of *The Decision Theater North* at the University of Alaska in relation to arts-based methods (Meredith et al., 2019). Critical reflection might focus on the challenge raised in SR1.5C, that while the ‘importance of indigenous and local knowledge is recognised, the ability to scale up beyond the local remains challenging and little examined’ (de Coninck et al., 2018, p. 390). The SROCC also depicts Indigenous knowledge as applicable to local contexts, as opposed to the depiction of the global relevance of science (Pörtner et al., 2019, p. 47).

4.2 The capacity for natural and cultural heritage to serve as enablers of climate resilience and adaptation, in published scientific literature external to IPCC reports

Recognizing that this is not intended to be a comprehensive review, we take guidance from the WP scoping document, our own reading of the relevant literatures, and ICOMOS’s recently published *The Future of Our Pasts: Engaging Cultural Heritage in Climate Action* - in order to identify and outline five areas of heritage-linked climate change research and publication.

- 1) Indigenous and local knowledge;
- 2) communication of climate change science and experience;
- 3) resilience during and after disasters and conflict;
- 4) archaeological and previous and current climate change; and
- 5) decarbonisation and mitigation efforts.

We also point briefly to other emerging literatures that lie outside of these areas. Ten core concepts recur across these different thematic areas and help to anchor the discussion. These are:

- 1) natural and cultural heritage;
- 2) tangible and intangible heritage;
- 3) loss;
- 4) care;
- 5) inheritance;
- 6) preservation;
- 7) resilience;
- 8) adaptation;,,
- 9) understandings of science; and
- 10) mitigation.

Painting with broad brushstrokes, it is possible to identify two distinguishable, but not entirely separate, currents in this literature, which correspond to heritage ‘modalities’ two and three—a heritage management approach, versus a heritage studies approach (see Appendix). In the first of these currents, it is not uncommon to come across scholars whose other published works have been cited in previous IPCC reports (e.g. Albrecht et al., 2007; Tschakert et al., 2017). Research is typically goal-oriented, often seeking to establish best practice principles toward both better management of heritage in the context of climate change, and towards discovering and demonstrating ways in which

heritage might be a resource for practically responding to climate change and meeting SDGs. Scholars whose work is more allied to heritage modality three are more rarely cited in IPCC reports, although there are exceptions (e.g. Samuels, 2016). Reflecting its roots in critical, social constructivist theory, heritage studies has asked how, why, and in relation to what kinds of social processes and power relations certain things and practices come to be regarded as heritage, and to be worthy of protection and transmission to future generations (e.g. Brett, 1996; S. Hall, 1999; Lowenthal, 1998). Bringing this legacy into climate change-related work, heritage studies scholars work with a critical eye on the assumptive goals and frameworks that motivate much heritage management scholarship and practices.

4.2.1 *Indigenous and local knowledge and practice (ILK)*

Since this important topic is the subject of White Paper 1, and in the interests of avoiding repetition, here we limit commentary to the challenge raised in 1.5C (de Coninck et al., 2018, p. 390): the problem of scaling Indigenous knowledge (IK) beyond the local. We suggest that reflecting on an instance where IK has *already* scaled beyond the local might be useful. Many ecologically minded scholars across anthropology (Ingold, 2011; Tsing, 2015), philosophy (Morton, 2016), science and technology studies (Latour, 2005; Stengers, 2018), and heritage studies (Harrison, 2015; Harrison & Sterling, 2020; Harvey & Perry, 2015), work with concepts and theory that either draw on, or closely resemble, Indigenous ideas and ontologies (i.e. theories of being) (cf. Sterling, 2020). While there are many internal differences in this body of work, concepts such as Morton's (2016) hyperobjects (and related notion of entanglement), Haraway's (2016b) 'tentacular thinking', and Latour's (2017) retooling of the Gaia concept—amongst many other examples—help to compose worldviews which echo Indigenous ontologies in many respects (Hallowell, 1964; Kopenawa & Albert, 2013; Salmón, 2000). These include worldviews in which 'nature' and 'culture' do not exist as separate domains of existence; in which humans and non-humans are fundamentally constituted through their relationships with other humans and non-humans; and in which the non-human world is aware and/or agential. The popularity and utility of such concepts makes sense at an historical moment when humanity is facing the increasingly dangerous forces of a planet transformed by humanity's own actions—where there is no 'outside' of climate change (cf. Morel & Ammerfeld, 2021).

One upshot of working with concepts such as these, is that the solutions to climate change and other environmental crises that such scholars propose are also often quite reminiscent of Indigenous notions of what constitutes the good life—that is, learning to cultivate mutually beneficial relationships with human and non-human kin (Haraway, 2016a; Salmón, 2000; Watts, 2013), or what Tsing et al. (2017) refer to as 'the arts of living on a damaged planet.'

Indigenous/ decolonial scholars and thinkers have pointed out that equating the concepts of Latour, Haraway, Morton et al. with ideas developed by Indigenous peoples (Watts, 2013), and not recognising Indigenous thinkers who have advancing similar topics, are acts of epistemic colonialism (Todd, 2016). With this caveat in mind, it nevertheless remains the case that concepts and practices taken by many to be at the forefront of efforts to analyse and find solutions to the climate emergency, owe a great deal to supposedly locally bound Indigenous intellectual heritages.

4.2.2 UNESCO World Heritage and climate change

UNESCO has been active in exploring and managing the impacts of climate change on world heritage. In 2006, under the guidance of the World Heritage Committee, it prepared a report on predicting and managing the impacts of climate change on world heritage and strategy to assist states parties to implement appropriate management responses through stakeholder engagement, followed by a compilation of case studies on climate change and world heritage, and a policy document on the impacts of climate change on world heritage properties in 2008.

In November 2015, the General Assembly of States Parties to the World Heritage Convention adopted a new policy on sustainable development which integrated the principle of strengthening resilience to natural hazards and climate change. The policy states that in the face of increasing disaster risks and the impact of climate change, states parties should recognise that world heritage represents both an asset to be protected and a resource to strengthen the ability of communities and their properties to resist, absorb, and recover from the effects of such a hazards.

UNESCO's stated policy is to build capacities of states parties and other stakeholders to manage climate change impacts on world heritage effectively and sustainably. The aim of these efforts is to increase the capacity of these properties to continue to convey their Outstanding Universal Value (OUV) and to support sustainable development. In May 2014, the UNESCO World Heritage Centre published a practical guide to Climate Change Adaptation for Natural World Heritage Sites.

4.2.3 Communication of climate change science and experience

Many forms of culture and heritage are currently being used to facilitate the transmission of climate science to wider audiences, often with the aim of stimulating climate action. This includes heritage sites, museums, art, climate fiction, and film. A significant and expanding literature describes the current state of knowledge and practice, analyses methodologies, and puts forward ideas and data explaining successes and failures.

4.2.3.1 Heritage sites

Both 1.5C (Hoegh-Guldberg et al., 2018) and SROCC (Hock et al., 2019; Meredith et al., 2019) discuss 'last chance tourism' where people visit glaciers and other sites before climate change transforms them forever, while SROCC (Meredith et al., 2019) includes studies showing that arctic tourism offers opportunities for education (see also Powell, Ramshaw, Ogletree, & Krafte, 2016), and that the degradation of the Great Barrier Reef can be emotionally affecting for people (Bindoff et al., 2019, p. 514). External to these reports, researchers found positive connections between visits to iconic heritage sites and climate action (Goldberg et al., 2016; Goldberg et al., 2018; Lemieux et al., 2018). Samuels and Platts (2020) 'develop a climate communication recognition scheme for ... [UNESCO] World Heritage Sites ... to explore the communicative power of heritage to mobilise stakeholders around climate change'.

4.2.3.2 Museums

In the last decade, museums have paid increasing attention to climate change (McGhie, 2020). Dedicated, building-based climate museums are being established, including in Bremerhaven, Hong Kong, Rio, New York and Oslo, while entirely online climate museums are also emerging (Newell, 2020). These play key roles in knowledge production and dissemination, community engagement, stimulating climate action, and mitigation and example setting (e.g. by reducing their institutional carbon footprints) (McGhie, 2020). Recent studies have shown how museums can help empower children to communicate science to wider publics (Boaventura et al., 2021); act as decolonial agents of social change (Chipangura & Mataga, 2021); build lasting relationships with underrepresented communities (Eid & Forstrom, 2021); stimulate group experiences and shared understanding as an important variable in turning climate knowledge into action (Sutton & Robinson, 2020); and present a model for how museums might engage publics around climate change science and collective action (Hamilton & Ronning, 2020).

4.2.3.3 Visual and performing arts

Art and artists of all kinds are engaged in climate change research, debate, action, and activism, with organisations such as *Arts Catalyst* actively supporting 'artist projects, research and public programmes at the intersections of art, health, ecology and economics' (Arts-Catalyst, 2021; Harrison & Sterling, 2020). Disconnects between the impersonal grand scale of 'the globe' and climate data, versus the places in which human and non-humans actually live is a core subject of the recent exhibition and book *Critical Zones: the Science and Politics of Landing on Earth* involving scientists, artists, philosophers, and others (Latour & Weibel, 2020). In a comparable way, visual and other art forms have been used to communicate about climate change in modes other than numbers and written words (Roosen, Klöckner, & Swim, 2018), for example, among youth and children (Hendrickson Lohmeier, Thompson, Chen, & Mishol, 2021), in art galleries (Hudson Hill, 2020), in debates around the arctic (Lehtimäki, Rosenholm, & Strukov, 2021; Michałowska, 2020), in the 115 climate-change based video-games Gerber et al (2021) found in their review of the genre, and in digital algorithms that hold a mirror to humanity's collective concerns with climate change (Petrić & Jalobeanu, 2021). This also includes art associated with UNFCCC Conference of the Parties (COP) such as Olafur Eliasson's (2018) *Ice Watch* (COP24), Hawe's (2021) *Clarion the Bear* (COP26), and Binitie's (2021) science-art collaboration *Polar Zero* (COP26). In a study of such artworks associated with COP21, Sommer & Klöckner (2021) found that works characterised as offering 'awesome solutions' caused the highest emotional and cognitive activation in audiences. Arts-based research methods have generated insights into the sensory, social and cultural dimensions of climate change invisible to more traditional methods (Bastian, Jones, Moore, & Roe, 2016; Roberts & Phillips, 2018), while projects involving combinations of artists, designers, engineers and scientists have stimulated conversations and collaborations across social and natural science disciplines and social positionalities (Clinch, 2021; Heerema, 2021; Steelman et al., 2019; Tosca et al., 2021).

Forms of performance and theatre underpin how museums, galleries and other institutions seek to interest and engage publics (Picken, 2016). They are also key in the planning, undertaking, and analysis of the efficacy and spectacle of climate protests, including the Greta Thunberg-inspired School Strike for Climate Movement (Alexandrowicz & Fancy, 2021), the self-immolation of David Buckel (Scrimmer, 2021), and Extinction Rebellion (Alexandrowicz, 2021). Theatre and performance

have recently been used in various ways: to give voice to marginalised stories of climate change (Jordan, 2020); as a channel for Indigenous arts practices (Woynarski et al., 2020); to challenge stereotypes of passive Indigenous victims of climate change (Mangioni, 2021); 'to lampoon the absurdity of political inaction in relation to climate change' (Carleton & Hay, 2020, p. 79); and 'to provoke productive discussion and empowerment' (Davidson, 2021, p. 115). Theatrical productions have attempted to connect audiences in visceral ways with climate change, and to imagine alternative futures, with Latour's 2014 *Gaïa Global Circus* prominent among these (Coppola, 2020).

4.2.3.4 Climate fiction

The genre of climate fiction—since 2007 also known as 'cli-fi' (Goodbody & Johns-Putra, 2018, p. 1)—has had much to say about the dangers of a business-as-usual world. Drought (Bacigalupi, 2015; Watkins, 2015), rising seas (Turner, 1989), storms (Herbert, 1992), floods (Ballard, 1973; Tuomainen, 2010), melting glaciers (Romu, 2021), extreme climatic shifts (Gee, 1998; Herzog, 1977; Le Guin, 1971; Spinrad, 1999), destruction of the living world (Atwood, 2003; Boyle, 2001; Butler, 2020) and attendant social-cultural ramifications (Crichton, 2004; Okorafor, 2010) often play central roles as authors grapple with how humanity lives and *might live* with the more-than-human world. Often the intimate spaces of everyday life are used to render tangible the enormous spatial-temporal scales of climate change. Cautionary tales of death and despair, and of coping in the worst of circumstances, abound. Yet there are also imaginaries of care, collaboration, and utopian joy (Kabo, 2021), turning fear into action (Offill, 2020), hope (Ghosh, 2019), and of Indigenous heritages offering ways of living other than capitalism (Wright, 2013). There is some evidence that reading climate fiction can impact beliefs and attitudes (Schneider-Mayerson et al., 2020). Beyond this, however, fiction offers 'a powerful medium to explore hopes and fears about climate change and imagine potential solutions, it also provides a means to broaden the range of voices road-mapping a way forward' (Malpas, 2021). A burgeoning field, cli-fi authors, and those analyzing their work, are increasingly addressing Ghosh's influential call for more tools to think climate change as a cultural phenomenon (Ghosh, 2017).

4.2.3.5 Film

With many films produced in Hollywood, Bollywood, and elsewhere based on climate fiction and non-fiction storylines (e.g. Emmerich, 2004; Fan, 2015; Nolan, 2014; Reynolds, 1995; Sharma & Chaubey, 2021), film has been a key medium for conveying the threats of climate change in informative and affecting ways. An uptick in the publication of climate fiction literature was linked to the 2001 release of *An Inconvenient Truth* (Goodbody & Johns-Putra, 2018). Artists and researchers are employing film in various ways: to understand and advocate for youth climate action (Cherry, 2021; Leckey et al., 2021; Tayne, Littrell, Okochi, Gold, & Leckey, 2021); to research different psychological mindsets in relation to climate action (Beattie & McGuire, 2021); to provoke affective awareness of the more-than-human world (Chang, 2019); to bring local knowledge and experience into dialogue with climate policy (F. Clement & Sugden, 2021); and to draw attention to 'Afrofuturistic ecosystems' (Macdonald & Petty, 2020).

4.2.4 Resilience during and after disasters and conflict

Key debates in this thematic area center on the double-edged nature of heritage. On the one hand, heritage in the form of buildings and sites can mean that people develop stronger attachments to place, and are therefore more likely to stay and rebuild, and in this way to be (or to appear to be) more resilient (Cassar & Pender, 2005; Guo, Zhang, Zhang, & Zheng, 2018; Jigyasu et al., 2013). On the other hand, having strong place attachment also means there is a greater sense of loss when change occurs—whether through environmental change (C. Phillips & Murphy, 2021; Warsini, Mills, & Usher, 2014), relocation (Dugan, 2007; B. Phillips, Stukes, & Jenkins, 2012; Simms, Waller, Brunet, & Jenkins, 2021), or other transformative adaptation (Clarke, Murphy, & Lorenzoni, 2018). Heritage and place attachment make places and ecosystems and buildings non-substitutable and irreplaceable, meaning that their loss is truly a loss (Randall, 2009; Simms et al., 2021). This is a point that is well made in works cited in previous IPCC reports (e.g. Tschakert et al., 2017, IPCC 2019), as are the points that connection to place and personal and community values shape what people think is fair in terms of climate mitigation and adaptation (Adger, 2016; Adger, Quinn, Lorenzoni, & Murphy, 2016; Lau et al., 2021; Paavola & Adger, 2006), and can increase our ability to deal with adaptation (Kuruppu & Liverman, 2011). A key term here, also referenced in previous reports is ‘solastalgia’ (e.g. Albrecht et al., 2007, IPCC 2019, pp. 103)—‘as opposed to nostalgia, the melancholia or homesickness experienced by individuals when separated from a loved home. Solastalgia is the distress that is produced by environmental change impacting on people while they are directly connected to their home environment’ (Albrecht et al., 2007, p. S95).

Not found in IPCC reports, are discussions of various forms of disaster memorial. In this perspective, the changes brought about by anthropogenic climate change are themselves heritage events, shaping our understanding of places and altering them, such that documenting those changes can be part of heritage (Egberts & Riesto, 2021; Rockman & Maase, 2017). Examples include memorials to extinct plants and animals on the Dorset coast (Randall, 2009, p. 128), and to the death of nature in general (Bauman, 2015). Disaster memorials can be a way of creating a shared memory of events, and can help people process loss (Bauman, 2015; Eyre, 2007; Randall, 2009), and motivate future action (Randall, 2009). Similarly, constructing collective post-disaster narratives can ‘create a recollection which is less likely to produce the same anxiety and allows individuals to incorporate disaster events into personal and community history’ (Moulton, 2015, p. 319). Collections of photographs have been used to similar effect after the 2009 L’Aquila earthquake (Manzoli, 2021).

Also not found in IPCC reports are ways of differently conceiving of loss itself. With its long-established conception of the contingency of all heritage, a heritage studies approach offers food for thought and action. A central contention of Harvey and Perry’s (2015) edited volume *The Future of Heritage as Climates Change*, is that we need to revise our understanding of the role that heritage plays: ‘[the] traditional view that heritage conservation carries a treasured past into a well-understood future [needs to] be rejected. A new view of heritage, serving society in times of rapid climate change, embraces loss, alternative forms of knowledge and uncertain futures ... Such uncertainty provides a space for creativity ... [This] is not a fatalist sense of acceptance or a call to ‘do nothing’. Indeed, the threat we perceive is an approach that seeks to ‘mitigate’ without challenging the essentialist notions of stability that lie behind so many dreams of sustaining the status quo’ (pp. 4, 14, 271). Comparable conceptions of creatively embracing loss and change are put forward by other scholars (e.g. Desilvey, 2012; DeSilvey, 2017; DeSilvey & Harrison, 2020; Rico, 2020; Venture, DeSilvey, Onciul, & Fluck,

2021). Holtorf (2018) argues that 'cultural resilience, risk preparedness, post-disaster recovery and mutual understanding between people will be best enhanced by an increased ability to accept loss and transformation' (p. 639). Similar notions are also found in more heritage management-focused literature, where, for example, Seekamp and Jo argue for 'the World Heritage Convention to develop a new grouping of sites, World Heritage Sites in Climatic Transformation' (2020, p. 41). In a perhaps compatible move, Aktürk and Lerski (2021, p. 310) have advocated for the resiliency benefits for displaced persons of their 'intangible heritage'—songs, ritual, and forms of sociality that would previously have been practiced in lost place-based 'tangible heritage' of homes, neighborhoods, and landscapes. The 'ephemerality' and 'flexibility' of this intangible heritage, they argue, means that it can help forge new meanings and community, in and with new host communities.

4.2.5 Archaeology and previous and current climate changes

There is broad consensus among archaeologists that the discipline's debates about, and understanding of, human-environment relationships have become more nuanced, complex, and open than the social and environmental determinisms that characterized earlier periods of the discipline (Britton & Hillerdal, 2019; Kohler & Rockman, 2020; Rosen, 2007). Archaeological methods combining natural science-based methods with complex statistical and modelling methodologies, alongside social science, humanities and local and Indigenous knowledge are increasingly multi- and transdisciplinary (Petraglia, Groucutt, Guagnin, Breeze, & Boivin, 2020; Rockman & Hritz, 2020; Daniel H. Sandweiss et al., 2020; Torben & Sandweiss, 2020), strengthening its evidentiary base. Hussain and Riede have proposed the term 'Paleoenvironmental Humanities', which occupies a space between 'ecological reductionism and the adoption of full-scale environmental relativism, opening up new interpretive and comparative terrain for the examination of human-climate relations' (Hussain & Riede, 2020). Ongoing debates concern the relative weight that should be given to external environmental influence (such as changing climates) versus internal societal dynamics in observed ancient human behaviour (Arponen et al., 2019). Culture, sometimes understood by way of documenting contemporary Indigenous life-worlds, is considered as a key variable in the complex climate responses of prehistoric populations (Britton & Hillerdal, 2019; Fuglestedt, 2012). This poses questions of 'epistemic colonialism' (Schneider & Hayes, 2020), and the relevance and translatability of evidence in both temporal directions (Hodder, 2012).

Some argue that the discipline will be able to demonstrate increasingly reliable cause and effect relationships between climate change and ancient human responses, with more precise measurement and powerful statistical methods (Kohler & Rockman, 2020, p. 641). At the same time, there is increasing recognition that archaeological sites already offer data for testing models of future climate change (Daniel H Sandweiss & Kelley, 2012), including in vital ecosystems such as the Amazon (C. R. Clement et al., 2015; Piperno, McMichael, & Bush, 2015; 2019). Torben and Sandweiss (2020) argue that archaeological evidence offers insight into ancient human climate-induced migrations relevant to the present day, while St. Amand et al (2020) advocate for the importance of legacy archaeological collections for climate and environmental research. Other recent studies have shown the suitability of prehistoric Caribbean building techniques to hurricane-prone environments (Douglass & Cooper, 2020); the value of combining precolonial archaeological material, ethnography, traditional knowledge, and modelling techniques for understanding and enhancing climate resilience in the Caribbean (Hofman et al., 2021); and the manner in which mid-Holocene

coastline data can offer insight into past human responses to sea level rise, and current vulnerabilities (Kahlert et al., 2021).

4.2.6 Decarbonisation and mitigation

Buildings account for at least one-third of global GHGs, and historic buildings—many with heritage values—release a disproportionate portion of these gases, with uninsulated walls a primary site of heat loss (Jahed, Aktaş, Rickaby, & Bilgin Altınöz, 2020; Marincioni et al., 2021; Redden & Crawford, 2021). Rather than replace such buildings with new, ‘greener’ stock, various studies have shown that when the whole life cycle of materials, waste and energy is factored in, adaptive reuse—often involving turning old buildings with very long lifespans to new uses and retrofitting them with energy-saving technologies—results in lower carbon and ecological footprints (Flyen, Flyen, & Fufa, 2020; Redden & Crawford, 2021). This is regularly referred to as a solution related to the ‘circular economy’—where reuse outweighs disposal of productive materials as much as possible (Foster & Saleh, 2021). Such adaptive reuse of abandoned or under-used buildings can also stimulate local development processes (Bosone, De Toro, Girard, Gravagnuolo, & Iodice, 2021). While appropriate technologies are available (Posani, Veiga, & de Freitas, 2021), including super insulating aerogels (Ganobjak, Brunner, & Wernery, 2020), challenges and barriers to implementation remain. These include lack of resources for what are often expensive interventions (Bosone et al., 2021), the need to balance heritage values, cost effectiveness, durability, and environmental concerns (Garzulino, 2020), the question of who decides such values (Lidelöw, Örn, Luciani, & Rizzo, 2019), and restrictive policy frameworks (Jahed et al., 2020).

Some authors argue, however, that technology-based retrofitting models are neither necessarily low carbon nor sustainable, favouring a return to vernacular building techniques and materials (Olukoya Obafemi, 2018; Pender & Lemieux, 2020). Studies of the low carbon and sustainable potentials of vernacular architecture and materials such as cob, rammed earth and reeds are plentiful (Bilewicz & Jaworska, 2013; Malheiro et al., 2021; Zawistowski, Zawistowski, & Joffroy, 2020). Authors point to the ways in which hesitancy in switching to such materials and techniques are embedded in recently-developed notions about what makes a building ‘comfortable’ to be in (Winter, 2016), and may in fact lead to other problems. For example, hermetically sealed, climate-controlled building spaces, essential for retrofitting technologies, can encourage high humidity, mold, and the trapping of internal pollutants (Pender & Lemieux, 2020).

5. Case Studies



5.1 Case Study

Climate Change and California Indians: Oaks, Fire and Drought

Author: William Carmen, Indigenous Knowledge Holder/ Pasqua Yaqui)

I grew up in the San Francisco Bay Area and received a PhD in Ecology from UC Berkeley. My Grandmother was born in Potom, Rio Yaqui, Mexico and my family has close blood ties with the Pasqua Yaqui tribe in Arizona. I work closely with the International Indian Treaty Council to understand how climate change affects culturally important and traditional foods for indigenous peoples. European invasion of California brought new diseases, forced displacement, and violence that reduced the population from well over 250,000 to as low as 15,000 in the early 1900s (Cook, 1976; Lindsay, 2012). We were effectively barred from access to food sources and traditions across the California landscape. Now, with hundreds of thousands of self-identified native peoples, and 110 federally recognised tribes, California Indians have fought for tribal recognition, food sovereignty, and the use of traditional knowledge and practices. Understanding the limits and opportunities of traditional knowledge is critical given the anthropogenic climatic changes we now face.

Drought, acorns, and fire

Droughts are the most important climatic influence in the Southwest US. Tree ring studies in California indicate that the past century was among the wettest of the last 7,000 years—and, naturally, our current cities, farming, infrastructure, and water-use are based upon these most recent ‘wet’ conditions. Recently, we have experienced short periodic droughts, but severe megadroughts in the 9th, 12th, 13th and 16th centuries lasted decades. Megadroughts disrupted Native American cultures—some less than others—and provide insight on how we may adapt (or not) to future hotter and drier conditions.

Oaks are a keystone of tribal culture and traditions in California and cover approximately 13 million acres. Indigenous peoples evolved highly specialised traditions for grove stewardship, acorn harvest and storage, and the labour-intensive, multi-step processing required to make them edible. Historically, 75% or more of California Indian communities ate acorns as a primary food source and acorns comprised an estimated 50% of our diets. It has been suggested that California Indians did not develop agricultural practices such as maize crops because acorns were so abundant.

My colleagues and I have studied oaks and acorn production in California for 42 years (Carmen et al., 1987; Koenig et al., 1994; Koenig et al., 2015). Oaks produce synchronous but intermittent acorn crops over broad areas (masting). Most species produce a good crop every two to five years, so Indians living in areas with several species of oaks had a more reliable food source. Native peoples also coped with variable acorn crops by moving locally to areas with higher acorn abundance and by

using methods for storing acorns over several years. Our data suggest that climate change (warmer temperatures, less water availability, extended extreme droughts) will reduce but not eliminate acorn production, but will negatively impact oak distribution, recruitment, and health (Carmen *et al.*, 1987). There will be an overall loss in oak habitat extent with some species displacing others.

Already threatened by habitat fragmentation, disease, and lack of regeneration, traditional fire practices may play a role in oak conservation (Long *et al.*, 2016). Oak forests are one of California's fire prone or fire adapted ecosystems. Indians learned to live in fire prone environments and to shape these ecosystems with cultural fire for their benefit, with sophisticated practices, to ensure availability of food and game, medicinal plants, and myriad wildland products such as for basket weaving (Lake 2021). California black oaks in the Sierra Nevada are declining in quality and dominance, as fire exclusion has caused old-growth Ponderosa Pine to increase. Frequent, low intensity fires create openings that give shade-intolerant black oaks the space and resources needed to thrive within conifer-dominated forests. Local Wintu and Pit River people used cultural low intensity fire to improve acorn production and to enhance deer and elk populations, and recent studies found that burning stands in January increased the acorn crop compared to unburned areas.

The Jemez Pueblo people used 27 fire practices relative to the domestic, village, agricultural, and larger forest landscape (Roos *et al.*, 2021). When Indigenous lands and practices were eliminated, fire suppression became the governments' stated goal, to the detriment of native culture and the environment. This has led to large-scale destructive fires due to the buildup of fuels. The largest five fires in California history occurred within the last three years, with single fires burning up to one million acres and destroying up to 8,000 structures (Rays, 2021). These high intensity fires kill mature trees, destroy soil structure, increase sediment in streams and lakes, and decrease rainfall absorption. Low intensity cultural fires create mosaics of habitats and successional stages and provide habitat diversity and ecosystem resilience, and at the same time protect communities from large destructive fires (Blackburn, and Anderson 1993).

Government interest in traditional burning has focused most on controlled burns to prevent large, destructive high intensity fires, especially in the wildland urban interface—an increasingly large area given the 40 million people who now live in California. Recent, but small-scale, agreements between the US Forest Service and tribal communities are the first steps in the use of traditional fire knowledge and practice to improve and protect forest ecosystems and infrastructure. However, this is still a difficult process, as people fear fire escaping, do not like the hazardous air quality impacts from smoke, and have the idea that burning wildlands only increases carbon emissions. However, we must realise that California ecosystems are fire adapted, and so must we be—again.

A mutualist relationship

Evidence from the megadroughts indicate that people who were unwilling to change practices and who relied on infrastructure that did not work under drought conditions, did not survive. This appears to be the case with modern industrial societies that are the drivers of climate change. Adaptation will involve reorienting our approach to the environment from one of utilitarian exploitation. Even 'sustainability' misses the mark: sustainability for who? And what? A mutualist rather than exploitative relationship with nature is the key.

5.2 Case Study

River love, river heritage and river repair

Author: Christian Ernsten (Maastricht University)

Summer flood

In the summer of 2021, devastating floods ravaged Limburg's Maas (Meuse) River valley in the Netherlands. In the German region of Eifel and the Belgian Ardennes, river communities were caught off guard. In Limburg, further downstream, there were no casualties, but houses were flooded, and hospitals, towns, and villages (including my family's) had to be evacuated. In the face of accelerating climate change, life in the densely populated Dutch river delta suddenly felt precarious, for a few days at least. I am writing this paper with Maastricht, the Dutch university town on the Meuse, as my point of reference. Here, three months later, the summer flood is merely a fading memory.

As a scholar in heritage studies at Maastricht University, I am based in the Faculty of Arts and Social Sciences, which has research programmes in science, technology and society studies and in arts, media, and culture, among other disciplines—as well as a strong track record in engaged humanities research (Swinnen et al., forthcoming). I take a particular interest in issues of cultural landscapes and climate change within a Global South/Global North comparative perspective. I am trained at the University of Cape Town, South Africa, and part of my research concerns the colonial heritage of the Cape of Good Hope (Ernsten, 2014; 2015; 2017a; 2017b; 2018). My more recent work has a focus on walking as a way of engaging with Anthropocene landscapes (Ernsten and Shepherd, 2020; Ernsten et al., 2020; Shepherd and Ernsten, 2021). For the purpose of this contribution, the key point of reference is a recent collaborative research project on revitalising river heritage as a climate change mitigation strategy.¹

Anthropocene rivers

As far back as 2012, political ecologist Barbara Rose Johnston and her colleagues argued that there was a crisis surrounding river heritage. Our footprint—that is, our historical and contemporary use and misuse of rivers—has as its consequence the fact that about 80% of the world population now live in riverscapes that are under threat (Johnston et al., 2012). Many contemporary rivers in the 19th and 20th centuries became the frontiers of engineers and economists, who colonised them using scientific theories, and tools such as maps, diagrams, and inventories. According to landmark published studies, the modern river has become as a consequence a kind of 'organic machine', a 'techno-river', or an Anthropocene river (White, 1995; Cioc, 2002; Pritchard, 2011; Lagendijk, 2016; Strang, 2009).

¹ "The Reanimated River (RE-VER): Preserving river landscape heritage through co-creation" project involves a consortium of researchers from Maastricht, Leiden, Utrecht, and Wageningen Universities as well as from Design Academy Eindhoven and the Architecture Academy in Amsterdam.

I argue that the crisis of river heritage is not only a crisis in terms of preservation but also a crisis of knowledge: which questions, approaches, and practices do we need to put in play, in order to face the challenges of the contemporary river? (Chakrabarty, 2009; Shepherd et al., 2018; Kolen, 2019). If we understand the Anthropocene river as being above all a *human* artefact, then what does it mean to care for the riverscape? As a response, I want to point to *Mississippi: An Anthropocene River* (2019), a project recently exhibited at the *Haus der Welt Kulturen* in Berlin (HDW, 2019), which gives clues on how to think through questions surrounding river epistemologies. In examining the relationships between humans and the contemporary river, its curators attempt to understand where we as humans are placed in the cycles, systems, and stories that make up the river. They explore how these relationships contain ‘multiple forms of culpability, responsibility, agency and association’, of a broken nature (HDW, 2019). Moreover, the curators argue that binaries of thought—such as those between nature/culture, inside/outside, cause/effect, but also mind/body and rationality/emotion—are faltering. Moving beyond these modern dichotomies, I propose thinking about river heritage as part of various entanglements of ecologies, histories, and technologies. In order to understand the processes that create these entanglements—and the making of meaning and values, worlds and worldviews, by the human and non-human actors involved—we need new heuristic devices.

River walk

The question becomes, first, how can we ‘delink’ (Mignolo, 2007) from the ways in which we currently understand rivers? And then, how can we arrive at new ways of sensing, imagining, seeing, and producing knowledge about rivers? Theorist Chela Sandoval’s concept of decolonial love is of help here. Sandoval speaks of decolonial love as ‘a “rupturing” in one’s everyday world’ (Sandoval, 2000: 139). The experience of love creates a seizure that permits crossing over to another, allowing for a break from business of usual. Love and research may not seem like logical partners, but as anthropologist Anna Tsing has shown, most early modern nature scientists had a great love for their research objects (Tsing, 2015). I argue that we have to rediscover such rapture and embrace a kind of river love in our work. I think here of a recent project by Dutch activist Li An Phoa, who walked 1,061 km along the river Meuse as part of her plea for a drinkable river.

On her website, Phoa writes:

‘A few generations ago, all rivers were drinkable. Now almost none [are]. This is a sign of how we live. The current pollution and destruction, is a reflection of how we live and our health’ (Phoa, 2019).

More concretely, I argue that we move away from modern, expert-driven, and technoscientific forms of landscape and river care, and turn our attention to the dedication and the solutions that are already embedded in the historical landscape. I propose allowing river communities to regain a sense of ownership over the local impact of the climate change crisis. Allowing river communities to repair and restore their intimate relationships with their riverscape might contribute to new forms of landscape stewardship. It might also make the idea of drinking water from the river less outlandish and more attainable. As a researcher, my interest lies in uncovering methods that can address our current climate change challenges: in particular, uncovering heritage skills and ways of reasoning from these river communities. Borrowing from the field of science, technology and society (STS), I suggest examining the historical and ongoing efforts of maintenance and repair through which river communities contribute to the rich and robust character of the river landscape (Russel & Vinsell, 2016;

Jackson, 2014; Mesman, 2011). Borrowing from conservation studies, I take inspiration from the principle of reversibility, or minimal intervention, which maintains that projecting the behaviour of a complex system—such as a river landscape—far into the future is extremely difficult, and that caution is therefore required (Appelbaum, 1987; Van Saaze, 2013). River repair on a community scale might be just the scale that the landscape can deal with.

5.3 Case Study

Learning by doing: bringing climate change action into Colombia's natural heritage sites management

Author: Oscar Guevara (World Wildlife Fund)



For the last decade, we in World Wildlife Fund Colombia, together with an interdisciplinary team from Colombia's National Parks Agency and other stakeholders, worked together on co-designing, implementing, and re-assessing the effectiveness of various approaches to address a wide range of questions associated with the climate action agenda at Natural Heritage Sites (NHS). Ultimately we achieved an outstanding milestone in the climate action agenda. We exceeded Colombia's 2015-2020 NDC target of expanding the National Protected Areas system by at least 2,5 million hectares (UNFCCC, 2018), with a final number of 4,7 million hectares declared as protected areas. This sent a message to the world about the importance of Colombia's natural heritage in the climate action agenda. Within this context, this article is written as a learning story that summarises the key factors that allowed Colombia to reach this milestone.

The birth of climate smart conservation in Colombia's natural heritage sites (2008-2010)

Back in 2008, our thinking about climate change adaptation practice was based on a vulnerability based conceptual framework that was favoured by the IPCC (IPCC, 2007). Here our theory of change, or learning question, was based on 'solving a puzzle' or 'following the rules'. The IPCC's vulnerability assessment framework was the puzzle and 'following the rules' required us to assess the vulnerability of our targeted landscapes to climate change through an analytical approach using the 'pieces of the puzzle' approach (WWF, 2009). We did this using an assessment procedure which was similar to a 'contextual analysis' which had been articulated in the IPCC 2007 report, based on our best available information and resources.

At this point there are several fundamental points to highlight. The first is related to the difficulty involved in most of the biodiversity and climate change analyses in the NHS. The second is that the prevalent practice at that time, using the IPCC conceptual model (AR4), faced serious limitations when identifying and addressing the priorities of the climate agenda in the NHS.

Second generation of climate action in Colombia's natural heritage sites (2010-2015)

This second stage of the learning process started around 2011-2012. Both the WWF and the National Parks Agency became more reflexive, by asking the following questions: Instead of asking if a landscape is vulnerable to climate change—and by how much—can we think instead about how much climate adaptation is needed? What are the guiding principles in adapting to a changing climate? What do those patterns suggest about future pathways of influence? This learning process in climate and natural heritage management brought forth an approach that was fundamentally different from the previous stage: How can we plan a proactive climate adaptation agenda in the NHS? This

question replaces the previous question where we asked, based on the IPCC approach: Are the NHS vulnerable to climate change?

With this subtle shift in focus, we developed projects that aim to strengthen NHS management by including climate change as a major driver of landscape and ecosystem transformation at project and strategic level (WWF, 2016). Building on the skills developed from previous and ongoing projects, we further developed an approach based on two types of processes: climate risk assessment and adaptation capacity assessment. These two types of analysis are complementary to each other, and integration resulted in a more robust and comprehensive approach that is intended to identify actual or potential impacts of a changing climate on NHS outstanding universal values, and the adaptation capacity needed to address those risks (WWF, 2015).

Third generation: upscaling and mainstreaming (2016-2020)

In 2014-2015 a third stage of the NHS climate agenda began. Taking the lessons learned from previous years, and the ongoing negotiation dynamics of the Paris Agreement, it was possible to scale the results obtained in some protected areas, and advance in an ambitious process of political influence. The advocacy work pointed to two processes: a) the construction of national commitments (NDC) to the Paris Agreement; and b) the formulation of a new policy for the national system of protected areas, including its management planning systems, and the management effectiveness assessment tools.

In the construction of its NDC, Colombia was one of the first countries in the world to explicitly include its National System of Protected Areas as one of the main alternatives to achieve the country's mitigation and adaptation goals. This position was also supported by a goal: to expand the system by 2.5 million hectares by 2020. During its first implementation period, the NDC's goal of declaring new protected areas was met, including the expediting of one of the most significant Natural World Heritage Sites (due to its size and biodiversity) in the Amazon. In doing so, Colombia has recognised the role played by the NHS both in mitigation (through carbon capture and sequestration), and adaptation (for example, through prioritising ecosystems for water regulation that are part of the System of Protected Areas).

From a domestic (national agenda) perspective, Colombia continued its 'learning by doing approach', and in 2019 began a process of formulating a new national policy for the National Parks System. This policy captures the three main lessons of the learning history highlighted in this paper: a) the incorporation of the contributions of the NHS into the climate agenda, as part of its conservation and management objectives (in other words, among the reasons why these natural ecosystems are of priority interest are their contributions in mitigation and adaptation); b) a clear identification and evaluation of the climatic risks; and c) the formulation of management strategies that allow both the conservation of the climatic contributions of the NHS, and the reduction of climatic risks.

Conclusions

Colombia's initial theory of change was based on the IPCC's vulnerability conceptual framework which was applied without modification in its first projects in Natural Heritage Sites management. However, the use of critical thinking to reflect on the theory-in-use, and the learning process that

ensued, enabled the WWF and the National Parks Agency to 'let go of' and not be ruled by the vulnerability conceptual framework set out by the IPCC, and to develop an approach that was good for a proactive and site-based practice. Consequently, identifying new understandings, allowing new meanings to emerge, shifting our focus to climate solutions, not settling on the first and obvious solution to the adaptation problem (i.e. assessing climate vulnerability), and continuing to look for alternative ways of seeing the situation, led to new and more effective action and policies (WWF, 2014). Different questions have arisen for us, such as: Can we deliver, add value, and be accountable for the climate mitigation and/or adaptation benefits envisioned in our projects? Will our present biodiversity conservation targets persist in a changing climate? Despite the challenges, the WWF and the National Parks Agency are continuously evaluating their work on climate smart conservation.

Perhaps the main characteristic to highlight in Colombia's journey is the continuous evolution of principles within an environment that has facilitated learning. This has resulted in global leadership in two essential aspects of the World Heritage Convention: the recognition of the importance of the conservation and effective management of Natural Heritage Sites for the achievement of the national goals and commitments of the country to the Paris Agreement; and the need to adjust both the planning instruments and the measurement of management effectiveness of Natural Heritage Sites.

5.4 Case Study

Jointly modelling past climate and social systems reveals the dynamics and costs of socio-ecological transformations

Authors: Felix Riede (Aarhus University) Shumon T. Hussain (Aarhus University) and the CLIOARCH team

Funded by the European Research Council, we are an interdisciplinary team of archaeologists, ecologists, and climate scientists (Riede *et al.*, 2020). Our concern is to understand how past human societies thrived under, or succumbed to, climate change. Our focus is on the periods of time where direct parallels between past and projected future climatic changes allow us to build joint models: natural experiments of history that generate evidence-based insights about human responses to climate change.

Conducting joint climate/society models in the laboratory of the past

Models of past climates have become precise and inform prognoses of future climate change (IPCC, 2021). Global temperature will soon dramatically exceed those experienced by the human societies of the last 12,000 years: the period corresponding to the geological epoch of the Holocene and the time in which human civilisations developed. During this time, most people have occupied a limited environmental niche space (Xu *et al.*, 2020). While agricultural advances may expand this liveability envelope, future climates will shift it in space and size. These changes will likely result in (a) threatening declines in agricultural output (Ramankutty *et al.*, 2002), (b) rising needs for costly technological and governance adaptations (Lyon *et al.*, 2021) and (c) large-scale migration (Black *et al.*, 2011).

With these alarming insights in hand, the warm Pliocene (5.3-2.6 million years ago) or even Eocene (56-33.9 million years ago) epochs serve as suitable climatic parallels (Burke *et al.*, 2018). Yet, humans—key agents of environmental and climate change at multiple scales (Ruddiman, 2003; Meneganzin, Pievani and Caserini, 2020; Ellis *et al.*, 2021)—had not yet evolved at these times, making it impossible to jointly model climate and social systems and their interactions. In contrast, the Pleistocene (2.6 million to 11,700 years ago) and some parts of the Holocene (11,700 to the present) offer rich paleoclimatic and archaeological data with which to construct extended Earth System models that include humans, and where episodes of rapid climate change, the repeated emergence of novel ecosystems² and systemic tipping points (Brovkin *et al.*, 2021) are available for comparative study (Figure 1).

² The novelty of ecosystems is here assessed in relation to historical baselines.

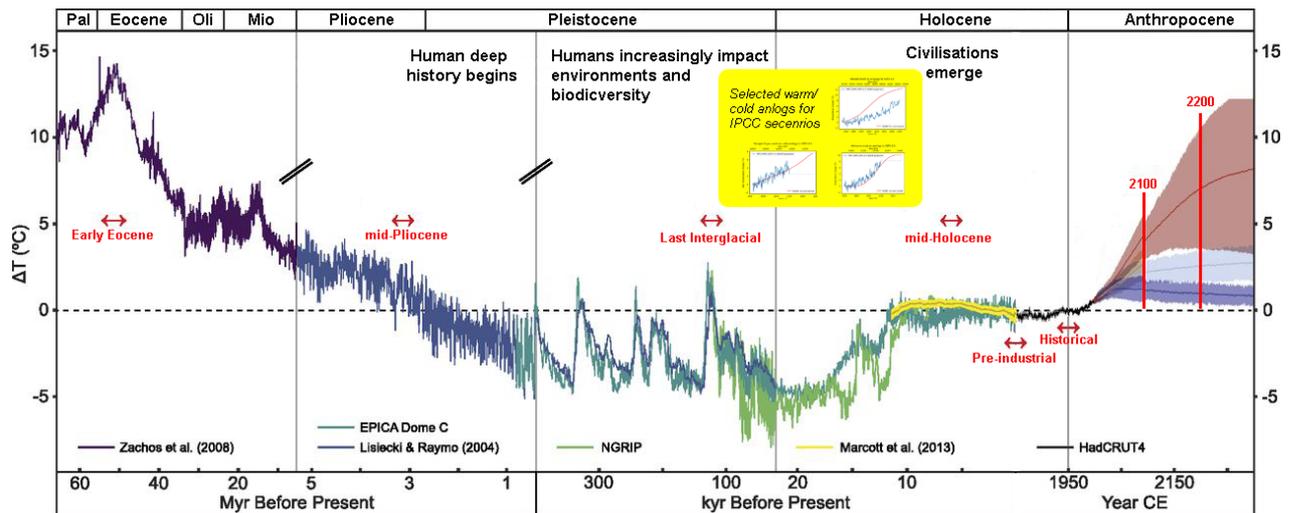


Figure 1: Temperature proxy records from the Eocene to beyond 2200. The Pleistocene and parts of the Holocene allow direct investigations of the effects of rapid climate change on different human societies. Redrawn from Burke et al. (2018); the inset graphics show particular sections of the NGRIP temperature proxy data aligned with different IPCC scenarios: the onset of warming at around 14 kyr BP, the rapid cooling at 12.7 kyr BP and the warming at 11.7 kyr BP. Each of these episodes had major impacts on ecosystems and societies.

Numerous modelling techniques have already been applied to understand climate-human relations (see d’Alpoim Guedes et al., 2016). These studies show that archaeological heritage facilitates an understanding of how climate change and extremes affected past societies. Underwritten by a detailed understanding of how human decision-making relates to ecological and social cues as well as to inherited traditions (Richerson and Boyd, 2005; Henrich, 2018), these analyses highlight that human communities can be highly resilient to rapid climate change, but also that the pace of change and the inertia inherent in many cultural systems may constrain adaptability to such a degree that major societal stress can result. Critically, many past societal transformations entailed demographic and social consequences (migration, loss of life-quality, mortality, political coercion, and religious extremism) that are undesirable or outright unacceptable. For instance, there are uncanny parallels between many well-documented episodes of extreme and prolonged drought that negatively affected human societies (Kennett et al., 2012; Schwindt et al., 2016; Weiss, 2017) and the recent compound effects of drought on forest fires, air pollution, human health, economy, and socio-political instability (Reichstein, Riede and Frank, 2021).

The past as solution archive

Archaeological heritage in the form of diachronically resolved spatial data and socio-ecological proxies complement traditional ecological knowledge and practices as a form of intangible heritage pertinent to climate change adaptation (Berkes, Colding and Folke, 2000; Gómez-Baggethun, Corbera and Reyes-García, 2013). These deep past ‘archives of society’ provide warnings about the risks associated with rapid climate change as well as pointers as to how we may be able to adapt to them (Van de Noort, 2013; Gowdy, 2020; Burke et al., 2021; Kaaronen et al., 2021)—especially beyond decadal timescales and vis-à-vis climatic regimes not captured by instrumental data (Hussain and Riede, 2020; Crabtree, Dunne and Wood, 2021). Importantly, archaeological data are also

available in regions lacking a long historical record, they are not filtered through the lenses of literate elites, and they often afford opportunities of detailed biological and geological analysis.

Catalysing generational change through joint modelling and climate/ society literacy

We see policy and education as productive avenues for turning deep-time insights into positive climate action. Via the IPCC, paleoclimatic data play a vital role in policymaking (Rödger, Heymann, and Stevens, 2020), yet climate action is not a scientific problem. Modelling efforts should therefore be extended to joined climate/society modelling using archaeological data (Kohler and Rockman, 2020). This would provide evocative examples of compound risks (cf. Quiggin et al., 2021), stress the importance of socio-ecological transformations over generational timescales as well as the necessity for long-range thinking beyond the limits of current climate scenarios (Fox, Pope, and Ellis, 2017; Lyon et al., 2021).

Focusing on societal change across generations highlights the importance of education. Values and worldviews are in part constructed with stories of our pasts in mind. Bringing the 'archives of nature' and the 'archives of society' together, we can tell empirically grounded stories of past resilience and impact and, on this basis, tell similar stories of the future (Figure 2). Such evidence-based story-lining will boost the societal relevance of climate change science across different publics (e.g. Bloomfield and Manktelow, 2021), while also cultivating forms of 'deep-time climate literacy' that would, in turn, impact personal and political decision-making. Here, formal and informal education in classrooms (Riede et al., 2016; Leichenko and O'Brien, 2020) and museums act as interfaces between the scientific community and the public at large, with the potential to catalyse climate action and support sustainable development (Cameron, Hodge and Salazar, 2013; Rees, 2017).

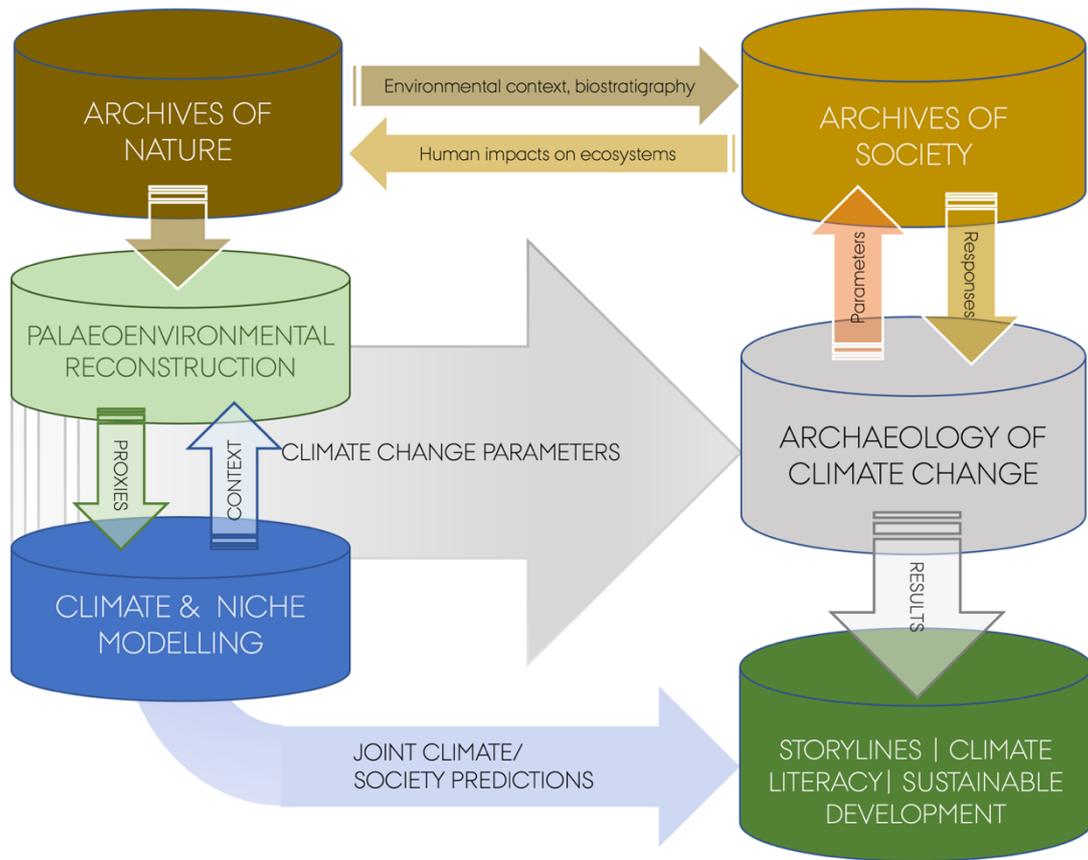


Figure 2: Aligning the ‘archives of nature’ such as temperature proxy data derived from ice cores or other records and the ‘archives of society’ in the form of archaeological heritage for jointly modelling the two-way interactions between climate change and human societies. Modified from Burke et al. (2021).

5.5 Case Study

Stewarding change with values, voices, and art

Author: A.R. Siders (University of Delaware)

I am a climate adaptation scholar at the University of Delaware, USA. My research seeks to understand how people make decisions about where, when, and how to adapt to climate change and to evaluate the effects of those decisions (e.g., Siders, 2018, 2019; Mach and Siders, 2021; Siders and Pierce, 2021). Heritage—both tangible heritage such as buildings and landscapes and intangible heritage such as traditional practices and language—is an important component of this research because heritage shapes whether and how adaptation occurs (see, e.g., Graham et al., 2014; Adger, 2016; Clarke, Murphy and Lorenzoni, 2018; Marino, 2018; Mcnamara et al., 2018; Thaler et al., 2019; Lau et al., 2021; Mallette et al., 2021) and because climate change and adaptation actions threaten, destroy, protect, alter, (re)interpret, and create heritage (see, e.g., Mattsson and Haugen, 2011; Brown, 2012; Berenfeld, 2015; Rockman and Maase, 2017; Dawson et al., 2020; DeSilvey et al., 2021). The constellation of connections between heritage and adaptation offers new concepts, lenses, literatures, methods, and practices to leverage in finding solutions for the challenges facing both fields.

Prioritising, not preventing, change

As a climate adaptation scholar, interacting with heritage scholarship and practitioners has changed the way I think about the purpose of climate adaptation. Rather than limit or leverage the effects of climate change to protect existing systems and structures, the purpose of climate adaptation—like heritage stewardship—is to choose, within constraints, which elements of the system are maintained, which are allowed to change, and which are purposefully altered. The heritage field recognises that not everything can or will be preserved, nor would complete preservation necessarily be desirable as it could stagnate the ability of places, societies, and systems to grow in ways that give heritage its meaning (see, e.g., Siders and Rockman, in press; Berenfeld, 2015; Dawson et al., 2020; DeSilvey et al., 2021). The purpose of heritage management is not to lock landscapes, practices, or buildings in stasis but to steward the rate and type of change they experience. This view, that the role of adaptation is to prioritise rather than prevent change, has emerged in natural resources management (Schuurman et al., 2020) and in conversations about transformative adaptation that focus on the degree, nature, and distribution of change that is necessary or desirable within a system and the processes by which ‘necessary’ and ‘desirable’ are determined (e.g., Kates et al., 2012; Blythe et al., 2018; Ajulo, von Meding and Tang, 2019; Thaler et al., 2019; Siders, Ajibade and Casagrande, 2021). Nevertheless, according to a recent global stocktake of academically documented adaptation, the vast majority of adaptation in practice is so incremental as to be difficult to distinguish from business-as-usual (e.g., irrigating fields in water-scarce regions or drinking water during heatwaves) (Berrang-Ford et al., 2021). This may suggest that adaptation is currently used largely to limit the extent to which climate change causes social change.

Prioritising change requires an understanding of the things people value: what they are willing to change and what they are not. Values are often implicit or unstated, and explicitly identifying values

can improve adaptation. For example, in the context of managed retreat, flipping the conversation from 'why move' to 'why stay' focuses attention on why it is important to people to remain in a particular place (why a site is not substitutable) (Siders and Rockman, in press; Costas, Ferreira and Martinez, 2015; Mach and Siders, 2021). When those reasons are explicit, adaptation efforts can be more appropriately targeted, whether people stay or go. A person who is unwilling to abandon a historic family home might be willing to relocate the building to protect it from rising tides or harsher floods, and relocation programmes can be tailored to support this option (see, e.g., CMSWS, 2015; Siders and Gerber-Chavez, 2021). A community who values coastal access and ecosystems might choose strategic relocation over modes of shoreline armoring that could disrupt attachment to place (see, e.g., Clarke, Murphy and Lorenzoni, 2018). Even when it is not possible to preserve the things or places people value, identifying those values signals a need to recognise the loss and support grief (e.g., Mcnamara et al., 2018; Tschakert et al., 2019; Mach and Siders, 2021). Disaster memorials, for example, may help people process loss by acknowledging and validating what has been lost and by creating a shared community memory (e.g., Eyre, 2006; Randall, 2009; Bauman, 2015; Moulton, 2015; Zavar, 2019).

A common challenge: choosing equitably

The challenge—one common to heritage and adaptation—is to make decisions about what is preserved, what is allowed to change, and what is purposefully altered in ways that do not privilege groups or perpetuate inequities. Heritage as a field has not solved this problem (indeed, the very act of identifying heritage has privileged certain groups and histories), but the field has experience grappling with concerns such as how to preserve a diverse range of natural wonders and cultures, not just those of colonial powers (see Knudsen et al., 2021), or whether the divide between natural and cultural heritage undervalues Indigenous perspectives and histories (see Harmsworth and Awatere, 2013). Climate adaptation scholarship has acknowledged that adaptation actions may privilege the wealthy or powerful (e.g., Adger et al., 2006; Graham et al., 2014; Clement, Rey-Valette and Rulleau, 2015; Adger, 2016; Anguelovski et al., 2016; Thaler et al., 2018), as when adaptation decisions based on property values perpetuate historical injustices that have devalued the properties of certain groups (e.g., Muñoz and Tate, 2016; Tate et al., 2016; Siders, 2018; Ajibade, 2019). Adaptation has begun to confront these challenges, and its conversations could leverage the lessons already learned in heritage studies, while heritage studies could benefit from the broad stakeholders and perspectives of adaptation studies.

Decisions about what to change and what to preserve are not scientific ones. The decisions may be informed by science, but ultimately, they are social, ethical, value-based decisions about who individuals, peoples, decision-makers, and societies want to be. They are shaped by power dynamics, history, and heritage. Any effort, for example, to determine where relocation 'should' occur as an adaptation strategy inherently involves decisions about which cultures 'should' be preserved, which injustices should be addressed or exacerbated, who has power and access to realise their preferences, and how just society seeks to be (among other things) (Mach and Siders, 2021). Adaptation science recognises that individual and community values and perceptions of fairness drive adaptation decisions, but work is still needed to integrate these insights into practice (Adger, 2016; Orlove et al., 2020; Lau et al., 2021). Addressing the power dynamics, history, and norms that shape adaptation decisions may first require the field to acknowledge and address calls to decolonise adaptation and climate science (e.g., Bronen and Cochran, 2021; Nwaka, 2021), to integrate

traditional, Indigenous, and other modes of knowledge (e.g., Ford et al., 2016; Whyte, 2017), and to increase the identities, lived experiences, and disciplines represented and respected in climate science (e.g., Pearson and Schuldt, 2014).

Leveraging art

Art and heritage offer a variety of ways to support climate science and adaptation. Reading climate fiction can change the way people think about climate justice and climate migrants (Schneider-Mayerson, 2020). Disaster and climate films raise risk awareness and spark debates about how people and places are portrayed and valued, both on the screen and in practice (see, e.g., Welk von Mossner, 2012; Maclear, 2018). Computer, video, and board games about climate change can be powerful education and communication tools (Wu and Lee, 2015; Kwok, 2019), and video game engines can be used to visualise future climate conditions (Kolb et al., 2018; Huang et al., 2021). Fiction and non-fiction narratives shape climate scenarios—such as the Shared Socioeconomic Pathways (Nikoleris, Stripple and Tenngart, 2017)—and greater integration of artistic creativity into climate scenarios may help adaptation planning address a wider range of strategies (Siders, 2019; Mach and Siders, 2021). The French military hired science fiction writers for this same reason: to imagine a wider range of plausible threats and thereby improve their innovation and strategic planning. Positive visions, in particular, can serve as ‘thought experiments’ to explore the potential implications of adaptation pathways: adaptation scholars are well-versed in the potential for maladaptation, and fiction and scenario planning may provide tools to avoid or limit surprise downsides (Robinson, 2021). Positive visions can also serve as motivating goals for which to strive.

Art and heritage can help remind people of their shared values and inspire future action. Consider, for example, the Talanoa Dialogue initiated by Fiji at UNFCCC COP23 that began conversations about climate action with heritage to establish a sense of shared history (UNFCCC, 2018). The Netherlands’ Watersnood Museum memorialises the 1953 storm that inspired a revitalisation of the nation’s water management system—now one of the world’s foremost exemplars—and educates new generations about the importance of flood management (on how I interpreted this site, see, Siders, 2017). Over time, the act of adapting (or not) itself becomes a part of peoples’ evolving identity and heritage. Heritage may help people process the emotions associated with adapting in place—e.g., to deal with solastalgia, the pain of watching one’s environment alter (Albrecht et al., 2007; Warsini, Mills and Usher, 2014)—or with relocation. As someone who studies climate relocation, I am particularly intrigued by the potential for heritage to help people to maintain identity and place attachment after relocation (e.g., through continued practice of cultural traditions), to alter the nature of place attachment (e.g., through use of risk-prone lands for hunting or recreation rather than residence), to create attachments to new places, or to un-make place attachment and grieve for places and heritage that are lost.

In short, climate adaptation and heritage are both involved in the stewardship of social change. How people choose to change social systems (who, how, when, where, and how much) will be informed by and affect heritage, and the common challenge for adaptation and heritage is to make these decisions equitably. Heritage and art offer tools and insights to communicate the science and identify the shared values that will underpin these choices. Exploring the connections between heritage and adaptation offers opportunities to improve our ability to process the losses we will experience as a result of climate change and to help us through the transformations still to come.

5.6 Case Study

Rethinking vulnerability and adaptation to climate change as if peoples' histories and aspirations mattered

Author: Chandi Singh (Indian Institute for Human Settlements)

I am a senior researcher at the Indian Institute for Human Settlements, Bangalore, working on issues at the intersection of climate change adaptation and development in rural and urban areas. As a trained botanist with a master's degree in natural resource management, and PhD in the social dimensions of climate change adaptation, I am continuously straddling my natural science training with a social scientist leaning.

I began my career working with Indigenous communities in Himalayan villages, examining change in those climate-sensitive socio-ecological systems. I implemented infrastructural, institutional, and ecosystem-based solutions, which demonstrated how different knowledge systems privilege certain solutions (Adger et al., 2013; Conway et al., 2019; Singh et al., 2021) and how every sustainability pathway involves trade-offs for certain people and places over time.

Climate change vulnerability and adaptation pathways are place-based and historically informed

In subsequent doctoral and postdoctoral research, I continued to examine adaptation pathways, focusing on how risk perceptions around water scarcity and climate variability interact with pre-existing differential vulnerability to shape how and why some people choose to adapt or not. Building upon climate change vulnerability and adaptation research (Tschakert, 2007; Ribot, 2010; Taylor, 2014; Turner, 2016) and gender studies (Agarwal, 1992; Denton, 2002; MacGregor, 2010; Arora-Jonsson, 2011; Tschakert and Machado, 2012; Alston, 2014; Carr and Thompson, 2014; Moosa and Tuana, 2014; Sultana, 2014; Ravera et al., 2016; Rao and Hans, 2018), my work emphasises that vulnerabilities based on gender, caste, income, and ethnicity, shape current and future livelihood and adaptation choices (Gajjar, Singh and Deshpande, 2019; Rao et al., 2019; Singh, 2019, 2021; Singh and Basu, 2020; Singh, Solomon and Rao, 2021; Solomon, Singh and Islam, 2021).

Inclusive adaptation pathways: values of equity and justice

Every adaptation pathway contains path dependencies and inherent trade-offs, which can ameliorate or entrench inequities (Burnham et al., 2013; Forsyth, 2014; Gajjar, Singh and Deshpande, 2019). The climate justice literature argues that poor attention to distributional, procedural, and recognitional justice, and inadequate mechanisms to address knowledge and funding asymmetries, can lead to potentially maladaptive solutions (Magnan, Schipper and Duvat, 2020; Malloy and Ashcraft, 2020; Schipper, 2020; Byskov et al., 2021). Thus, adaptation planners must acknowledge how certain development trajectories and climate solutions acquire dominance, and then empower normative alternatives that are more inclusive. In practice, this means that when reading and encountering different solutions and visions of our cities and neighbourhoods, homes, and research institutions, we need to ask: Whose vision is this? Who is getting excluded? And how can we pluralise this dialogue?

One of the emerging ways to pluralise is to recognise how individual and collective adaptation choices are embedded in socio-culturally informed values, norms, and aspirations (Grothmann and Patt, 2005; Singh, Dorward and Osbahr, 2016). The uptake and effectiveness of different behavioural approaches for adaptation (e.g., climate literacy, behavioural nudges, legal instruments) are significantly mediated by how well they 'fit' contextual and psycho-social factors influencing adaptation choices. Overall, adaptation that accounts for risk perceptions and aligns with public values are more likely to be socio-culturally acceptable and facilitate behavioural change (van Valkengoed and Steg, 2019).

Second, the adaptation literature is increasingly acknowledging the need for deep, systemic change, i.e., transformative action (Fedele et al., 2019; Scoones et al., 2020; O'Brien, 2021) that leverages a range of adaptation, mitigation, and development solutions simultaneously. Here, nature-based solutions have emerged as key interventions that move beyond technocratic, top-down visions of climate-resilient development futures to forefront solutions that support livelihoods and ecosystems (Kabisch et al., 2016; Woroniecki et al., 2020; Palomo et al., 2021). One example is my work on urban agriculture. Deeply personal choices to grow one's own food, recycle greywater, and compost waste, though small and fragmented across the city, have multiple benefits for urban sustainability (e.g., regulating indoor temperatures, improving biodiversity) and wellbeing (e.g., food and nutritional security, increased environmental awareness) (Zasada et al., 2020). Such citizen-led actions are reimagining urban food systems, signalling bottom-up transformations that can accrue to meet urban sustainability goals in personally meaningful and emancipatory ways (Singh and Gajjar-Pahwa, 2021).

A manifesto to pluralise climate vulnerability and adaptation research:

1. The need for unprecedented, transformative action: The IPCC's Special Report on 1.5°C argues that we can no longer think in binaries of adaptation versus mitigation; individual versus systemic action. This acknowledgement of the scale and speed of the climate challenge highlights the need to prioritise solutions that meet multiple, long-term goals for most people and species, and minimise the chance of maladaptation. The report concludes that feasible adaptation and mitigation solutions exist (de Coninck et al., 2018) but their implementation needs to be enabled, through more equitable financing, behavioural change, technological innovation, and inclusive institutions. Thus, the challenge of transformative action is not so much a lack of information about what to do but more an issue of inadequate enabling environments to do it effectively and inclusively.
2. 'Scaling up' is not the only route to transformation: While the challenge is grand and often overwhelming, transformative action can and must be at multiple scales, where individual action is nested within broader and deeper institutional and normative shifts. While scaling solutions vertically and horizontally is crucial, scaling 'deep' (Moore, Riddell and Vocisano, 2015)—through a change in norms, beliefs, and values—is as important. O'Brien (2017, p. 97), envisions transformation as change that 'attends equally to the inner life of human beings, human behaviour, and the social systems and structures in which they exist', visualised as three spheres: the personal (individual and shared assumptions, beliefs, values, worldviews and paradigms, which have a strong influence on the objectives of systems and on ideas about who can and should benefit); the practical (technical and behavioural interventions, e.g. climate solutions such as renewable energy or early warning systems); and the political

(i.e. the institutional architecture of decisions, rules, regulations, norms, agreements that mediate the personal and practical spheres). Collectively, these spheres articulate an action-oriented way of enabling societal change and identifying the conditions that support or constrain transformations and provide a practical way of reconciling debates between individual action versus systemic changes (O'Brien, 2017).

3. Pluralise methodologies, challenge knowledge hierarchies: One of the key issues around understanding socially differentiated vulnerability to climatic risks is that the methodologies used to assess vulnerability (and adaptive capacity) remain static and recall-based rather than temporal and relational (Ford et al., 2010; Turner, 2016; Singh, Deshpande and Basu, 2017; Singh et al., 2019). This is antithetical to what we see and experience: people, nature, culture, and aspirations are 'neither static nor unidirectional' (Tebboth et al., 2018; Few et al., 2021). Recognising and correcting this is critical because the methods we choose to assess vulnerability and adaptation outcomes hold power and inform adaptation funding and prioritisation, making and unmaking peoples' agency in the process (Singh et al., 2019, 2021).

Linked to this is the inequity in knowledge production for climate action. Climate change research replicates existing unequal and often extractive knowledge hierarchies based on geography, gender, race and ethnicity, language, and funding (Nagendra et al., 2018; Bronen and Cochran, 2021; Overland et al., 2021; Trisos, Auerbach and Katti, 2021). Addressing these asymmetries is a foundational step towards restoration (for those marginalised by histories of exclusion and extraction); inclusion (of multiple knowledge systems beyond the technocratic/Western/Anglophone); and transformational change (that is forward-looking and fit to meet the challenge of climate change).

5.7 Case Study

The heritage of meteorological IKS and its impact on climate change

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The authors are with the Africa Leadership and Management Academy (ALMA), an affiliate college of the National University of Science and Technology (NUST), Zimbabwe. Pindai Sithole is the Programs Director and Social Researcher, whilst Moses Chundu is the ALMA Executive Director and a development economist. As sustainable development practitioners, we both have a passion for exploring Indigenous Knowledge Systems (IKS), and to date we have jointly published in this area looking at the role of meteorological IKS in weather prediction, disaster preparedness, community livelihoods, and mitigation of adverse effects of climate change. Through ALMA's IKS Unit, we are part of a regional consortium of over 20 universities in Africa called the African Institute for Indigenous Knowledge Systems (AIKS), a category 2 UNESCO organisation, collaborating in spearheading IKS research, scholarship and practice.

The role of meteorological IKS in the preservation of heritage and in adaptation

Our research on meteorological IKS, a critical heritage for communities in southern Africa, focused on the districts of Chimanimani in Zimbabwe and Salima in Malawi. Meteorological IKS studies were conducted in both districts in 2019. The studies sought to establish the extent of use and efficacy of meteorological IKS for the prediction of rainfall in these unique socio-cultural contexts, and to explore the potential contribution of meteorological IKS in local community disaster preparedness within the context of the adverse effects of climatic change. Both regions had experienced a trail of unprecedented human and environmental destruction following the devastating Cyclone Idai in April of 2019, among other natural disasters. Despite the existence of IKS and modern weather forecasting tools, these climate-induced disasters seem to have caught both communities and governments unprepared, prompting our enquiry from an IKS perspective.

Historically, and still today, farmers in Africa and India have use Indigenous knowledge (IK) to understand weather and climate patterns, in order to make informed decisions about crop production and irrigation cycles (Rengalakshmi, 2007). This knowledge is adapted to local conditions and needs, and has been accumulated through decades of experience (Garay-Barayazarra and Puri, 2011; Pareek and Trivedi, 2011). Notwithstanding the dominance over centuries of conventional methods in predicting weather patterns, there is abundant agrometeorological evidence in Africa and Asia that farmers have developed and relied on their own IKS to adapt their livelihoods to variable rainfall patterns (Garay-Barayazarra and Puri, 2011; Risiro et al., 2012; Okonya and Croschel, 2013; Zuma-Netshiukhwi, Stigter and Walker, 2013; Rautela and Karki, 2015). The scholarship on this subject matter shows that IK systems, including those related to rainfall and disaster prediction, worked for centuries in these communities. There is consensus among scholars (Risiro et al., 2012; Kaya and Seleti, 2013; Soropa et al., 2015) that key success factors for IKS are that they relate to local lifestyles, institutional patterns, socio-cultural cosmology, ecology, and the historical rootedness of communities.

The communities studied in this body of work have their own IKS for predicting weather which, in itself, is a dimension of knowledge plurality/democracy—in the sense of understanding intangible heritage beyond conventional knowledge systems. However, our studies revealed the tragedy of increasing loss of this IK and its decline in application through generations. This is because IKS in most communities in the Global South are diluted or overshadowed by Western epistemologies preached and enforced during colonial and postcolonial eras (Logan, 2008; Mapara, 2009; Sithole, 2020). In some instances, this dehumanisation of the colonies' own IKS became part of mainstream colonial practices, as evidenced by the deliberate exclusion of the local communities' IKS from the education systems (Muchena, 1990; Shizha, 2013). This situation was born out of the Western dominant/superiority attitude, which accounted for the imposition of their own knowledge systems on the local citizens (Logan, 2008).

We employed Exploratory Concurrent Mixed Methods (ECMM) to collect data from a diversity of respondents, comprising community traditional leaders, elders, and the youth, using in-depth interviews, focus group discussions, and storytelling. The descriptions of the predictors used to predict rainfall or disasters formed the qualitative data for our study, whilst the estimated weather prediction probabilities based on these predictors constituted the quantitative component of the study—hence the ECMM methodology. Thematic analysis looked at local interpretive and ontological paradigms. The meteorological IKS found in these two communities were classified into five interpretive categories: flora, fauna, clouds, wind, and the planetary system. Most of the predictors show high predictive power, averaging 70% accuracy—hence the communities' reliance on them over the centuries. However, our research concluded that meteorological IKS are no longer widely used due to a number of factors, including inferioritisation and limited documentation. We also noted that the IKS have potential for incorporation disaster preparedness frameworks into the community, especially given the changing climatic conditions (Sithole and Chundu, 2020; Sithole, Chundu and Moyo, 2021). We consider meteorological IKS to be an intangible cultural heritage involving diverse knowledge systems and climate change. Such intangible cultural heritage includes practices, representations, expressions, knowledge, and skills inherited from our ancestors and passed on to our descendants. This is directly linked to natural heritage, which encompasses geological and other natural features—and in turn supports biodiversity, and human systems, as they are closely linked and mutually reinforcing.

We believe local IK plays an important role in sustaining, conserving, and managing the environment, because its features are largely geophysical. This explains one of the conclusions from our study: that meteorological IKS are intricately dependent on the preservation of the natural environment. We found that, to the extent the predictors of rainfall and disaster are specific to certain species, this invariably means that issues of environmental conservation are dealt with simultaneously in the communities (Sithole and Chundu, 2020; Sithole, Chundu and Moyo, 2021). In fact, in African cultural practices, the preservation of this traditional Indigenous heritage is in itself an embedded mechanism to preserve plant and animal species in the communities (Kaya and Koitsiwe, 2016). Notably, most of the indicators used in the IKS carry a sacred status in the communities of reference, which guarantees preservation of the flora and fauna without the need for modern/colonial laws or policies to enforce environmental conservation.

Given that climatic changes are largely destructive, this locates meteorological IKS as a valuable intangible heritage that alerts communities to prepare for the impending disaster, including ensuring that community tangible heritage is not destroyed. In other words, on the one hand, the conservation of the natural physical environment (tangible heritage) gives life to the indicators of IKS (intangible heritage) in the community. On the other hand, since fauna and flora are the predominant categories of weather predictors, entrenching meteorological IKS and giving it prominence, means indirectly encouraging local communities to preserve most of the species used as predictors. The preservation of biodiversity plays a critical role in carbon sequestration towards easing the extent of global warming and its dire consequences. Thus, the intangible heritage of meteorological IKS plays a critical role in decarbonisation and in mitigating the adverse effects of climate change. There is also an added advantage via the preservation of medicinal plants as a community health heritage (Ghorbanpour and Varma, 2017). In this way, IKS demonstrates the capacity for culture and heritage to serve as enablers of climate resilience and adaptation (Harvey and Perry, 2015).

Recommendations

We concluded that modern weather prediction information, if not communicated in a timely fashion, is of little help in respect of rural and remote communities' state of preparedness for climate disasters. For most of Africa, connectivity remains a challenge—hence the need for governments, especially in Africa, to integrate Indigenous weather forecasting systems into the mainstream, recognising it as complementary to modern scientific systems. When IKS are considered, this will promote knowledge democracy and justice for the heritage sustenance of our planet earth. Meteorological IKS could also be mainstreamed into the education curricula as a way of preserving, modernising and utilising this knowledge which is fast going extinct. Since meteorological IKS depends on the behaviour of the local biosphere, we recommend that there be global efforts to preserve Indigenous environments. Systematic documentation of meteorological IKS across regions in the world—especially in the Global South—could be another way of ensuring that meteorological IKS is not relegated to the periphery of modern knowledge discourse. The diverse vaccines developed in response to the COVID-19 pandemic are a clear testimony to the fact that knowledge plurality is the way to go—today and in the future.

Inspiring good practices: A database to trigger the energy-efficient renovation of historic buildings

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We both work at the intersection between engineering, architecture and building conservation. Alexandra Troi has a background in engineering and early in her career started to work at the interface between engineering and conservation—for example, in her PhD on *Church Heating: a balancing act between comfort, cost and conservation*. She currently leads the research group on ‘Energy Retrofit in Historic Buildings’ at Eurac Research and holds a professorship in simulation building physics at Coburg University. Franziska Haas trained as an architect and has worked as a professional in archaeology and conservation, and as a researcher at Dresden University. Since 2015 she has collaborated with Alexandra’s research group at Eurac Research. In 2020 she was elected as president of the ICOMOS’s Scientific Committee on Energy, Sustainability and Climate Change.

Within the research group on ‘Energy Retrofit of Historic Buildings’, architects, engineers, physicists, and conservators work together to let our built heritage contribute to a sustainable future. For the purposes of this white paper, we will focus on an ongoing project, the *Historic Building Energy Retrofit Atlas* (HiBERAtlas; available at <https://www.hiberatlas.com/en/welcome-1.html>). It compiles cases of building renovation that are exemplary both in terms of heritage conservation and energy efficiency to inspire and foster energy retrofits. The HiBERAtlas addresses climate change first in terms of mitigation. It provides technical solutions, but goes beyond that by ‘making deep renovation of historic buildings happen’ (Haas, et al., 2021). We consider this a best practice case study for five reasons.

1. There is enormous potential for saving energy in the historic stock. If we consider not only those historic buildings that are formally listed, but also the wider range of buildings with elements and characteristics worthy of preservation—an approach postulated by EN 16883 (2017)—there are 55 million dwellings in Europe alone. This corresponds to 25% of the overall stock and an output of 250 Mt CO₂ per year, of which 75% could be avoided without losing the buildings’ heritage value (Troi, 2011). Solutions have to be found for each building, adapted to its specific characteristics—and here is where the HiBERAtlas can contribute, with good examples that can inspire, showing possibilities and offering technical solutions related to a specific context (Haas, et al., 2021).
2. The New European Bauhaus initiative has recognised the importance of the cultural dimension in driving a wave of renovation. This cultural dimension has always been important in the care of the historic building stock: renovations of historic buildings can thus become a model for any energy efficiency measure. As pointed out in the European Cultural Heritage Green Paper (Potts, 2021), ‘sensitively retrofitting Europe’s historic buildings while preserving Europe’s unique selling point—its cultural heritage—provides extraordinary opportunity to

promote a post-COVID19 economic recovery. It can and should be a lighthouse project in the Next Generation EU initiative, advancing simultaneously climate action, just transition and social cohesion'. This is not only the case for Europe, but could be a guiding principle for the rest of the world.

3. The discipline of heritage preservation has developed methods and technologies for the long-term preservation of historic structures. Understanding that maintaining the existing fabric is always better than demolition and new construction (for reasons of embodied carbon, resource efficiency, and air pollution), such methods can be widely applied. The HiBERAtlas shows the active role culture and heritage can take in transformative change, and the capacity of heritage approaches to feed into sustainable climate action.
4. Traditional buildings were constructed with local materials and adapted to local conditions. In the HiBERAtlas, we can see a trend towards the use of ecological materials based on local conditions. These culture-based solutions may be of interest for application far beyond the historic building stock. The approach feeds well into the life cycle and circular economy discussions on an international level, proposing well-established and long-term proven solutions, and a mindset which is intrinsically conserving and not wasting.
5. The energy-efficient renovation of historic buildings has always been a deeply interdisciplinary task: preservationists, technicians, engineers, architects, and building owners must work together to develop solutions that are socially, ecologically, economically, and culturally sustainable. Many examples for interdisciplinary planning processes and the related effects are described in the HiBERAtlas.

By giving people living in historic buildings a stage to show and describe what they appreciate in their buildings, and how they preserved these existential values (Coeterier, 2002), the HiBERAtlas promotes a bottom-up approach to heritage value perception, and a peer-to-peer learning process. As Herrera-Avellanosa et al. (2019) conclude, we will only be able to speed up the transformation process and increase the quality of renovations if, in future research, we 'not only focus on technical and economic aspects, but also pay attention to how decision makers can be motivated, guided and ultimately helped to implement energy-efficient measures in historic buildings'. The HiBERAtlas not only shows the potential which lies in the historic building stock to contribute to climate change mitigation and a sustainable future, but also triggers climate action led by cultural heritage.

6. Talking points

6.1 Learning from Indigenous and local knowledge systems: Skills, technologies, land management practices

Historically, modernity has tended to ride roughshod over local livelihoods, bodies of knowledge, and ways of being, replacing this rich and various archive with, frequently, homogenous commodities, centralised production processes, and unsustainable extractive technologies and supply-chains (Escobar, 2008; Mignolo, 2011). Indigenous and local knowledge systems offer many examples of skills, technologies, materials usages, land management practices, and the like, that are of utility in finding solutions to aspects of anthropogenic climate change (Carmen, this report; Ersten, this report; Sithole and Chundu, this report; Troi and Haas, this report). In many cases, these are based on particularly local, historically based observations and understandings, accumulated across generations. Turning to, and opening, this historically neglected and under-valued archive is an inherently exciting line of investigation that offers great potential in the search for solutions (Pindai and Chundu, this report; Troi and Haas, this report). At the same time, key questions apply around intellectual property and terms of engagement. What does it mean to selectively adopt elements of Indigenous and local knowledges, without adopting their contextualising world views and value systems (Carmen, this report)? Historically, local and Indigenous knowledge have been subalternised as knowledge systems through processes of colonialism and imperialism (in the Global South), and through the advance of a form of modernisation that systematically displaced local knowledges and production processes (in both the Global North and the Global South). How can we ensure that these historical relationships of exploitation are not recapitulated in the contemporary engagement with local and Indigenous knowledge around solutions to anthropogenic climate change?

6.2 Learning from Indigenous and local knowledge systems: Values, forms of relatedness, ways of knowing

The critique of extractivism and unsustainable development, and of the values and worldviews that sustain such practices, is by now well established. Both historical and contemporary Indigenous and local knowledge systems offer a rich archive of alternative values, approaches, understandings, and forms of relatedness. Many of these challenge foundational modern understandings that humans stand apart from other beings, and from the natural worlds that sustain us (Carmen, this report). A strong argument can be made for the case that finding and sustaining solutions to the negative effects of anthropogenic climate change at the required scale, involves changing foundational values and behaviors (Singh, this report). We can draw inspiration from the archive of local and IKS, finding analogues for sustainable lifestyles and alternative value systems, however the same caveats apply. How do we create the conditions for such an engagement, based on mutual respect and non-exploitative relations?

6.3 Transforming pedagogies: A curriculum for the Anthropocene

In his influential and widely cited essay, 'The Climate of History', postcolonial historian Dipesh Chakrabarty makes a startling admission. He writes: 'As the crisis gathered momentum in the last few years, I realized that all of my readings in theories of globalization, Marxist analysis of capital, subaltern studies, and postcolonial criticism over the last twenty-five years, while enormously useful in studying globalisation, had not prepared me for the making sense of this planetary conjunction within which humanity finds itself today' (Chakrabarty, 2009 p.199). As we exit the Holocene and enter the Anthropocene, we need to revisit curricula, and consider the kind of education that will be useful and relevant to future generations (Riede, this report; Singh, this report; Sithole and Chundu, this report). In an immediate way, there is a need for 'Anthropocene literacies', an understanding of core concepts and basic scientific processes connected to researching the climate emergency (like tipping points, planetary boundaries, and the notion of the Anthropocene itself). Such literacies become important for active, informed citizenship, and for bringing to bear the kinds of public, political pressures that translate into policy changes (Riede, this report). In a more general way, there is a pressing need to revise and rethink some of the grand narratives through which histories of modernity are taught. Narratives around industrialisation, modernisation, progress and development need to be revised to take account of the social and environmental costs of such developments over the last 500-years and more.

Many commentators have argued that discussions of climate change should not be left to climate scientists alone. The ramifying effects of climate change will affect every aspect of human endeavour (Siders, this report). Curricula in the arts, literature, and philosophy need to be rethought, as much as those in engineering and the sciences. Attention might turn not only to *what* we teach, but *how* we teach. Arguably, distanced and dispassionate approaches to knowledge, premised on an essential distance between subject and object, are part of the core problem of climate change—a problem in which we become passive bystanders to a catastrophe. Arguably too, the 'white cube' of the seminar room is not the best environment through which to evolve more personally and materially implicated understandings of the world. Conversations might be had around 'ways of knowing': around those moments when a distance and objective approach to knowledge serves us well, and the moments when we need a more intimate, subjective, and 'feeling' approach (Guevara, this report). Equally, conversations might focus on the relationship between science, knowledge, and wisdom. Are there forms of knowledge and wisdom that do not grow out of empirically-based scientific methods, but out of other sources—for example, experience (Carmen, this report; Ernsten, this report; Sithole and Chundu, this report; Troi and Haas, this report)? And does this help us to rethink the conventional distinction between science, local knowledge and IKS?

6.4 Mobilising the affective power of heritage

In all of its different forms—sites, memorials, material cultures, practices of everyday life—heritage is typically characterised by deep affective involvements (Siders, this report). There is a sense that heritage *matters* to people, at both an individual and collective level. This makes heritage a potent site of claim-making, as groups mobilise around heritage in the course of struggles around rights, resources and representation. Interestingly, this operates on both the political right and left: for example, in populist mobilisations of heritage in the pursuit of identitarian claims, and in Indigenous mobilisations of heritage in pursuit of sovereignty and territory. This affective power of heritage

becomes a potentially powerful resource in mobilising for climate action. The notion of world heritage provides us with a ready-made concept through which to think about shared destinies and responsibilities. Heritage's core duty of care might be extended to the planet as a whole, and its life-forms and bio-physical processes. At the same time, some important questions apply. What does it mean to invoke a concept of world heritage in the face of manifest global social and economic inequality? What does it mean to share a heritage, when other things—wealth and vaccines—are not shared, or only grudgingly shared?

In moments of peril, such as the climate emergency, typically we have two choices. Either we close ranks, falling back on the solidarity of the clan, the nation, and the region. Or we open out, building alliances, pooling resources, and seeking dialogue. The nature and scale of the climate emergency make the second option by far the preferred option, in the sense of the option that holds the greater chance of success for the majority of humanity. In this sense, the *political* struggle around the climate emergency is the struggle for multilateralism, dialogue, and cooperation, in the face of populist attempts to use a moment of historical anxiety for narrowly sectarian ends. From a heritage perspective, the question of relevance is how do we mobilise the affective power of heritage in support of open, creative, and inclusive futures. Arguably, this involves focusing on a different kind of heritage, less concerned with national sites and symbols. For example, this might include the heritage of human rights, the heritage of anti-racism, the heritage of the extraordinary vaccination campaigns of the twentieth and twenty-first centuries, the heritage of labour rights and workplace reforms, the heritage of the struggle to protect biodiversity and threatened habitats, and the heritage of science itself and the extraordinary advances in knowledge that it has enabled, understood as shared human achievement.

6.5 Producing socially and historically contextualised accounts of anthropogenic climate change

One of the most important contributions that a heritage perspective can make, lies in producing socially and historically contextualised accounts of anthropogenic climate change. Anthropogenic climate change itself has a history, that has involved and impacted populations and territories across the globe in different ways, depending on their position in relation to some of the defining historical forces of our times: modernity, colonialism, imperialism, nationalism, racial slavery, industrialisation, urbanisation, postcolonialism, deindustrialisation, and many others. While a case can be made for looking at the mounting scale of human impacts through the Holocene, understanding anthropogenic climate change as an historically situated phenomenon involves looking, in the first instance, at the 'long-500 years' post-1492: the period characterised by the expansion of Europe, the subsumption of myriad local systems of production within an increasingly global system of production and consumption, and the progressive acceleration of human impacts on social and natural worlds, and on the earth's biophysical processes. It also involves understanding anthropogenic climate change as a process that, historically, has differently involved and impacted populations and territories in the Global North and the Global South, such that there are those who have emerged as beneficiaries of the 'long-500 years', and those who have borne a disproportionate burden of the cost in the form of human tragedy, environmental degradation, and economic underdevelopment (Singh, this report). In this perspective, anthropogenic climate change can itself be understood as a form of 'dark heritage', visited by overdeveloped nations, local elites, and others

who have benefitted from the carbon-fueled civilisation of the long-500 years, on the rest of humanity, as well as on other beings, future unborn generations, and the earth itself.

With some important exceptions, the lack of socially and historically contextualised accounts of anthropogenic climate change is one of the biggest gaps in the current debate. This is signaled in the very concept of ‘the Anthropocene’, which effects a radical flattening of human history, by subsuming humanity within the undifferentiated mass of the ‘anthropos’. A heritage perspective allows us to think anthropogenic climate change *through* histories of modernity, colonialism, patriarchy, and much else—which in turn allows us to understand how we are differently situated, implicated and accountable for the climate emergency (Singh, this report).

6.6 Foregrounding a climate justice perspective

One of the cruelest aspects of anthropogenic climate change is that, in many cases, populations and territories who bore a disproportionate burden of the costs of the long-500 years, now find themselves most at risk from global heating. In this perspective, the historical injustices of racism, sexism, coloniality, heteronormativity and speciesism are woven into the fabric of anthropogenic climate change as a phenomenon. Understanding this, it becomes important that any solutions should foreground a climate justice perspective (Siders, this report; Singh, this report). The debate around climate justice is well advanced. For current purposes, it is understood to mean at least two things. First, that proposed solutions should be based on human rights and social justice for the mass of humanity. Second, that anthropogenic climate change needs to be understood as a phenomenon that has differentially implicated populations and territories, such that we hold different accountabilities and responsibilities when it comes to both finding, and bearing the cost of, solutions. It is not that now is the moment when we should wipe the slate clean, and stand shoulder-to-shoulder to face the new challenge. Rather, it is the case that our only chance of standing shoulder-to-shoulder, is to work through the histories that have brought us to this point (Singh, this report).

Naming and entering a new epoch like the Anthropocene, there is the danger that this comes to be regarded as a break in the timeline of history, such that we enter a new world characterised by new rules. In fact, just the opposite appears to be the case. Arguably, the last few decades have witnessed not a break, but an acceleration and intensification of many of the forces and dynamics that created the modern/colonial world—including the forces that have created global social and economic inequality.

6.7 Imagining viable futures

In order to work towards viable futures, we need, first, to imagine them into being. Arguably, we stand at a precarious point in human history where, for many, the grand narratives of the twentieth century—nationalism, modernisation, communism, capitalism—have been called into question, but have yet to be replaced by compelling alternatives. For commentators like Amitav Ghosh (2016), the climate crisis presents itself, among other things, as a crisis of culture. Nothing in our culture prepares us for the sudden disruption of timelines and expectations. ‘High’ cultural forms like the novel are premised on the expectation of continuity and progress. As a plot device, catastrophism is reserved for devalued genres: science fiction, horror, and tales of apocalypse.

This suggests a potent role for the arts and for creative practitioners. We need to evolve narratives, frameworks and images that enable us to imagine viable futures in the context of anthropogenic climate change (Riede et al., this report; Siders, this report). The power of arts-based approaches lies in producing work that appeals on an intellectual, emotional and affective level, and that produces resonance, believability and hope (Siders, this report). Future generations will look to our generation to ask not only, 'What did you do about climate change?', but also, 'Where is the cultural transcript on climate change?', 'How were you processing, and making sense of, this imminent civilisational threat?'. Hope is an unusual word to find in an academic setting, as is love (Ernsten, this report). Arguably, in seeking solutions we need to set in play a new vocabulary of dreams, aspirations, hopes, and fears. Far from being abstract or empty concepts, these are drivers of human behaviour, and will determine our ability to adapt and change (Siders, this report).

6.8 Heritage as a resource for resilience and adaptation

The broader climate debate has been characterised by a tendency to fall back on culturalist understandings and frameworks (that is, the understanding that people identify and respond on the basis of cultural differences). It has also been characterised by a general understanding of heritage as a fixed and inherently conservative category. This has resulted in two sets of arguments in relation to heritage. The first is that heritage acts as a potential barrier to change and adaptation, manifesting as a kind of cultural drag. The second, more positive, argument is that heritage might act as a source of resilience—as in, a fixed point that people can hold onto in times of rapid social change.

Arguably, both of these understandings are misleading. A near consensus view within the field of heritage studies is that rather than being a fixed and backward-looking phenomenon, heritage is mobile as a category and always in-the-making (Siders, this report). In this, it resembles categories like culture and tradition, themselves understood to be mobile and subject to constant renewal and revision. Equally, there are strong arguments to suggest that people identify and respond on the basis of a complex combination of factors—including gender, race, class, caste, religion, level of education, and many other factors—rather than simply on the basis of cultural differences (Singh, this report). Revising our understanding of culture and heritage accordingly has a number of implications. First, it suggests that the debate on heritage and climate change might pivot, from heritage as a source of resilience, to heritage as a source of adaptation (Siders, this report; Troi and Haas, this report). We might ask what new forms of heritage are currently in emergence, and what forms of heritage do we need to evolve *of* and *for* the Anthropocene. Second, we need to evolve methodologies able to account for the complexity of motivations and responses to climate change in particular, local settings (Ernsten, this report; Singh, this report).

6.9 Decolonising heritage and climate change research

One of the interesting features of the last ten years has been the re-emergence of 'the colonial' as a critical term in both public/political and scholarly circles—fifty years and more after formal, political decolonisation in many parts of the world. In the academy, this has been evidenced in the many workshops, conferences and new publications, aimed at decolonising disciplines and institutions. Decolonising heritage and climate change research arguably has two dimensions, a structural

dimension and an epistemic dimension. In many disciplines, flows of resources, centers of authority, and forms of organisation tend to recapitulate the structures of the colonial worlds in which those disciplines came into being. Simpson et al. (in press) and Singh (this report) report prevailing disparities in research across a Global North/South axis in heritage and climate change research. Singh writes: 'Climate change research replicates existing unequal and often extractive knowledge hierarchies based on geography, gender, race and ethnicity, language, and funding'. Addressing such disparities addresses the structural dimension of decolonisation.

Addressing the epistemic dimension of coloniality requires that we ask questions about knowledge itself: what counts as knowledge, who gets to speak under the heading of knowledge, and how has this situation come into being historically. In recent decades, a number of academic and scientific organizations have recognised the importance of including local and Indigenous knowledge perspectives. However, this inclusion typically comes with a catch. While disciplinary scientists are understood to speak from a position of knowledge, their local and Indigenous interlocutors are typically understood to speak from a more provisional position: knowledge as it exists in local settings, or knowledge tempered by culture and tradition. The conventional distinction between science on the one hand, and local and Indigenous knowledge on the other, has a number of effects. First it implies that local and Indigenous knowledges are not scientific. Second, it implies that science is none of these things, but is global, modern, and not linked to culture and identity—against the weight of decades of research in science and technology studies. In a further aspect of the subalternisation of knowledge and practice, researchers in the Global South report having to apply models and concepts developed in the Global North, with little regard for local conditions (Guevara, this report). This involves having to adapt such models and concepts, and to engage in a process of reflexive learning (Guevara, this report). In this epistemic dimension, decolonising heritage and climate change research involves creating the conditions for open, non-hierarchical, and mutually respectful engagements between scholars and practitioners across these different axes of difference: Global North versus Global South, as well as science versus local and Indigenous knowledges (Carmen, this report; Singh, this report; Sithole and Chundu, this report).

6.10 Working across the different modalities of heritage

It is both a strength—and a challenge—that heritage operates across different, and at times incompatible, modalities: a popular understanding of heritage; legal and institutional understandings of heritage; and scholarly understandings of heritage. The strength of this situation lies in the fact that each modality brings a set of capacities in addressing the challenges of anthropogenic climate change. Popular usages of heritage create the potential for broad public buy-in around solutions. Legal and institutional usages bring substantial already-existing logistical and infrastructural capacities. Scholarly usages open the way to nuanced, empirically based understandings based on current research. The challenge of this situation lies in the fact that these different modalities—especially the second and third modalities—are characterised by somewhat different understandings and ways of working. The process of academic peer-review is very different to the process of negotiating agreement between state parties. Equally, institutional technical languages and definitions aimed at creating stable legal objects as a basis for management are very different to scholarly definitions, which typically have the status of hypotheses—or current best guesses—and which are subject to constant revision (see Appendix).

This WP has taken some pains with questions of definition, and with explicating the different modalities of heritage. This is for the following reason: in the experience of the authors, discussions between heritage scholars, managers, policy-makers and practitioners too often bog down in disagreements around matters of definition, or in attempts by a single entity to insist on the primacy of their definitions and technical language. In the search for solutions to anthropogenic climate change, we cannot afford to go down this road. Rather, we need to recognise the inherent strength of combining these different modalities of heritage. Doing so requires compromise and flexibility. More especially, it involves a deep understanding that different modalities of heritage are at play, and that each operates according to a different set of rules and understandings. Meeting on the basis of mutual respect and compromise might allow for a formidable combination of criticality, logistical capacity, and popular buy-in.

A good example of the value of global logistical reach is provided by our UNESCO correspondent, who writes as follows about the management of World Heritage Sites:

Spread across different regions, climates and ecosystems, World Heritage sites serve as global field observatories for climate change, where information on the impacts of climate change can be gathered and disseminated. Furthermore, as the state of conservation of World Heritage sites is regularly monitored and assessed, any adverse impact is systematically reported to the World Heritage Committee which recommends appropriate corrective action. World Heritage sites are, crucial places for gathering and disseminating information regarding the impacts of climate change on our cultural and natural heritage.

The iconic character of World Heritage sites is an important asset for raising public concern and enthusiasm and, therefore, building up support to take preventive and precautionary measures for adapting to climate change and advocating on action more broadly.

Heritage and knowledge embedded in cultural diversity as well as local and Indigenous knowledge are among the critical assets for a holistic, effective and sustainable climate change response that promotes sustainable development, inspires societal transformation and builds resilience.

6.11 Narrowing the gap between science and society

One of the most interesting discussions on the climate emergency coming out of the social sciences and humanities concerns the lack of commensurate response. While many people are now persuaded by the scientific evidence on anthropogenic climate change, for many of these same people it continues to be a case of business-as-usual. Arguably, both individually and collectively, there has been a lack of commensurate response to this imminent civilisational threat. It is as though we simply cannot encompass the scale of the emergency, what it means for our own lives, and its implications for the future. Part of the discussion has centered on the 'unthinkability' of climate change, and commentators have advanced a variety of arguments (Ghosh, 2016; Scranton, 2015). One of the best lines comes from Slavoj Žižek (2011), who writes (in paraphrase): 'we know it... but we don't believe it'—implying that something more than abstract knowledge is needed if we are to translate knowledge into action. Arguably, part of the problem is the manner in which climate science

itself unfolds—as a matter of expert knowledge, the subject of reports by formidably erudite panels, aimed at policy makers at the highest levels of government. Ordinary people see few opportunities for involvement in either knowledge production or climate action, beyond the usual matters of sorting the household trash.

Heritage can address this problem in two quite specific ways. Part of the ‘work’ that heritage does as a concept is to suture individual lives and experiences into larger collective wholes, and to do so in intimately personal ways. On the one hand, our individual experiences are sutured into the life of the clan, the nation, or the cluster of nations, in ways that make us feel Namibian and African, or Danish and European. On the other hand, the span of our individual life is sutured into the timeline of history, such that we think of ourselves as forming part of a tradition. As a collective action problem, anthropogenic climate change requires this sense of identification which is both understood abstractly and felt personally. It asks that we join ourselves—our individual lives and decisions—to larger collective wholes: the collective of those taking climate action, and the collective of past and future generations. In this sense, Anthropocene heritage-in-the-making is about taking responsibility for the future, as part of an ethical responsibility of care, in which we act—and feel—individually and collectively.

The second way in which heritage can help, is in addressing the arms-length nature of knowledge production. Heritage is concerned with both ‘fine’ productions (the pyramids) and everyday artefacts (your grandparent’s teapot). It begins with the personal and extends into the collective. The effects of anthropogenic climate change are, by now, easily observable within the span of a single lifetime. In this way, anthropogenic climate change is generating its own heritage, in forms that are observable and reportable by each one of us, however differently situated we might be. Heritage studies excels at the kind of intergenerational memory-work that is able to document the nature, scale and severity of climate change, rendered from the perspective of an individual life. Ordinary questions elicit startling answers: Where have all the insects gone? Did it always rain this little (or this much)? Were there always such big storms? In this way, anthropogenic climate change is translated from an abstract, planetary process into something that is immediately observable—and knowledge is joined to belief. Telling climate change stories is already used as an important tool for climate action (by organisations like Oxfam), but there is surely scope for wider application.

7. Conclusion

Part of the idea behind heritage is that it invites a moment of pause, and holds open a space for contemplation about the deepest and most fundamental aspects of the human, outside of the preoccupations of our disciplinary concerns. Encompassing both 'fine' productions and everyday practices and artefacts, and with a perspective that stretches back over tens of thousands of years, it offers an unusually broad commentary on some basic questions: What does it mean to be human? What do we value most about our accumulated experience on earth? What do we wish to carry forward for future generations to see, hear, touch and taste? In fact, outside of religion (arguably inherently divisive) and philosophy (arguably incorrigibly highbrow), the language of heritage offers one of the few registers through which we can have a conversation about such existential questions and ideas. Heritage presents us with a vernacular, secular language through which to address questions and concerns which, for previous generations, might have been addressed through the register of the sacred.

The climate emergency presents us with the kind of existential challenge for which, in quite specific ways—culturally, temperamentally, institutionally—we seem to be unprepared. It becomes vital that we find a language through which we can talk about ultimate things, not in an abstract way, but in relation to our individual lives, and the changes small and large that we will choose to make, and that will be compelled upon us. Our world is changing quickly, in ways that many of us are just beginning to understand. As we exile ourselves from the Holocene—the garden in which our civilisation flowered—and embark on an ambiguous new epoch, we will need to be resilient, adaptable, creative and kind. Within the limits of its methodology, this WP has attempted to show what a heritage perspective might contribute to the conversations to come.

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Appendix

Defining heritage

Heritage, literally ‘that which we inherit from the past’ and ‘that which we pass on to the future’, is used in at least three different and only partially compatible senses (cf. OED.com, 2021). As a result, there is sometimes confusion over the precise meaning of heritage at play in any given context. A first usage or ‘modality’ of heritage is a popular or everyday usage, where it codes (or substitutes) for notions like culture, identity, tradition, descendancy, background—and even ethnicity and race. This is the sense in which someone might ask ‘What is your heritage?’, or say ‘This is part of my heritage’. This modality of heritage includes an ensemble of traits, including language, dress, foodways, festivals—but also, values, beliefs, and ways of being. Used in this way, heritage becomes a powerful site for the mobilisation of identities in the pursuit of claim-making—including claims to territory, citizenship, rights, and restitution. Interestingly, this mobilisation of heritage in the pursuit of claims operates both on what are usually thought of as the political left and right—for example, in Indigenous claims to rights and restitution (e.g. Lane, 2006; Silverman & Ruggles, 2007; Wilson & Inkster, 2018), and in populist claims to nationhood and identity (Kaya, 2019; Kaya, Robert, & Tecmen, 2020; Obermaier, 2021; Reynié, 2016).

A second usage or ‘modality’ of heritage is an official, legal, and institutional usage. This is heritage as it is codified in conventions, laws, protocols, accords, codes of ethics, and the like. Heritage in this second sense is managed and operationalised through institutions like UNESCO, national heritage agencies, professional associations, museums, and many other bodies. It exists at different scales or levels—local, national, and global—and is focused on definitions and measurable values. In this second usage of heritage, conventional distinctions are made between cultural and natural heritage, and between tangible and intangible heritage. For example, intangible heritage is defined by UNESCO’s 2003 *Convention for the Safeguarding of the Intangible Cultural Heritage* as:

... the practices, representations, expressions, knowledge, skills—as well as the instruments, objects, artefacts and cultural spaces associated therewith—that communities, groups and, in some cases, individuals recognise as part of their cultural heritage. This intangible cultural heritage, transmitted from generation to generation, is constantly recreated by communities and groups in response to their environment, their interaction with nature and their history, and provides them with a sense of identity and continuity, thus promoting respect for cultural diversity and human creativity (UNESCO, 2020, 5)

This second modality of heritage tends to be expert-led and normative, in the sense of advocating and working towards best practices, global standards, and desired outcomes. If the first usage of heritage is unruly and inexact, this second usage is regular and codified—both out of the need to construct stable legal objects, and out of the need to build consensus based on agreed-upon definitions. This broad arena of heritage thinking and practice is also sometimes called ‘heritage management’, and it has a recognizable technical apparatus of expert meetings, white papers, technical committees, and heritage organisations.

All of this is as might be expected, in terms of the distinction between popular (inexact) and technical (exact, defined) usages of heritage. However, there is a third modality of heritage, which serves to complicate this picture: namely, academic and scholarly usages of heritage, where heritage appears as an object of research. This third modality of heritage is typically sited in academic departments and research institutes, as an interdisciplinary field involving a number of disciplines: archaeology, anthropology, architecture, art history, human geography, history, and the like. Also called 'heritage studies' (Sørensen & Carman, 2009), and even 'critical heritage studies' (Harrison, 2012; Winter, 2013), it differs from the second modality of heritage in a number of important respects. It tends to be non-normative, critical and analytic in approach—for example, in seeking to destabilise definitions, unsettle dichotomies (like the distinction between natural and cultural heritage) (Harrison, 2015; Shepherd, 2019), and call into question apparently fixed objects, like notions of community (Harvey, 2001). Typically, it focuses on heritage practices and processes—like processes of 'heritagization' (e.g. Flesler & Pérez Melgosa, 2010; Milošević, 2018)—and on a notion of heritage as 'discourse' (Smith, 2006). In this third modality of heritage, heritage is not, as it were, a 'given' category, but a 'constructed' one—pointing to another important point of difference between the second and third modalities of heritage, the difference between positivist and non-positivist approaches. In this third modality, heritage is typically understood as a site of contestation and claim-making, summarised in the phrase 'the politics of the past'. This is in contrast to the second modality of heritage, where heritage is often framed as a site of nation-building, consensus-making, and healing. For example, the preamble to South Africa's National Heritage Resources Act (Act 25 of 1999), written in the aftermath of apartheid, states that heritage 'helps us to define our cultural identity and therefore lies at the heart of our spiritual well-being and has the power to build our nation' (South Africa, 1999, 3). In this third modality of heritage there is often a focus on community heritage and 'heritage-from-below', and on local heritage practices and logics, sometimes understood to be in tension with global practices and protocols. In this modality, heritage studies overlaps with a number of other interdisciplinary fields, including memory studies, gender studies, postcolonial studies, tourism studies, and the like.

Three observations need to be made in relation to this short account. First, these different modalities of heritage have been presented here in a rather schematic way. In fact, in practice, most practitioners, researchers and students navigate these different worlds of heritage intuitively. There is also considerable overlap between the different modalities, especially between the second and third modalities of heritage. For example, there are many important initiatives in the second modality of heritage that question and complicate conventional definitions of heritage, that recognise the entanglement between natural and cultural heritage and between tangible and intangible heritage, and that seek to valorise local heritage perspectives. However, anyone who has been involved in discussions in these overlapping worlds of heritage practice and usage will attest to the very real potential for frustration and miscommunication, based on the points of disjuncture between these different modalities. For example, either heritage exists as a set of 'natural' (pre-existing) objects in the world, or it is brought into being as the result of complex social, cultural, political, economic, and institutional processes. It is generally not possible to hold that both propositions are valid—and each proposition gives rise to a cascading set of assumptions.

A second observation: given the slight indeterminacy that attaches to the notion of heritage, and the fact that it is used in different and sometimes disjunctive senses, one of two things might be supposed. Either that the concept of heritage is not 'fit for purpose' and should be abandoned, or that it should be 'cleaned up', regularised, held to strict definitions and universally accepted norms.

In fact, just the opposite can be argued. Part of the resilience and adaptability of heritage as a concept relies—precisely—on its indeterminacy, on its sense of spaciousness as a concept, its ability to mean different things to different people. This is, in part, because the ‘work’ that heritage does as a concept is quite extraordinary in a number of respects. On the one hand, it sutures individual experience into larger, collective experiences—interpolating, or recruiting, our individual lives and memories into larger wholes (the group, the culture, the nation). On the other hand, it sutures the span of an individual life into the continuity of time, so that we understand ourselves not as atomised existences, but as part of a larger unfolding whole (the tradition). This complex set of processes implies both a diminution of the self (as we submerge ourselves in collective identities and endeavors), and an enlargement of the self (as we recontextualise out individual lives as part of ever-larger wholes). Rather than seeing the different modalities of heritage as being in conflict, we might rather understand that they are directed towards different ends. Managing and legislating the sites, material cultures, and bodies of knowledge and practice that support and are associated with this complex set of social and cultural processes requires the clear boundaries, precise definitions and stable legal objects of the second modality of heritage. Understanding the full complexity of individual and cultural relationships to time, history, memory, and tradition requires the flexibility, nuance and criticality of the third modality of heritage. For its part, to accomplish the many roles that we assign to it, the concept of heritage needs to retain its slight indeterminacy, to be able to shift between modalities and navigate dichotomies between the individual and the collective, the past and the present, and the human and the non-human (or more-than-human).

A third observation: in common to all three modalities of heritage is the recognition that heritage functions as a site of deep affective investments. At both an individual and collective level, we care deeply about heritage—or as we might say, heritage *matters*—which is why it functions so powerfully as a site of mobilisation of culture and identity. This ability to appeal to people at a deep level, and to mobilise people as part of collective, aspirational projects, becomes important as we consider solutions to the challenges of anthropogenic climate change.