Decolonizing climate change–heritage research

Climate change poses a threat to heritage globally. Decolonial approaches to climate change–heritage research and practice can begin to address systemic inequities, recognize the breadth of heritage and strengthen adaptation action globally.

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Climate change is an increasing focus of heritage research across Europe and North America, including identification of site-specific adaptation options for heritage perservation[1,2]. In contrast, climate change research in low- and middle-income countries (LMICs) is limited due to systemic gaps in access to funding and its associated knowledge generation and thought leadership[3,4], and rarely concentrates on heritage[5,6] (Fig. 1a). As heritage includes all the inherited traditions, monuments, objects, places and culture, as well as contemporary activities, knowledge, meanings and behaviours that are drawn from them[7], its preservation is crucial for all societies. Heritage can be tangible, in the case of objects or monuments, or intangible, including cultural practices and traditions, cultural identity and sense of place. Across LMICs, tangible and intangible heritage coexist, commonly without clear delineations between them.

Climate change exacerbates existing risks to heritage[5,6]. This is particularly acute in LMICs where vulnerability to climate change is generally high and adaptation capacity low[8], increasing the risk to heritage from climate hazards such as sea-level rise, flooding and wildfires[9,10]. These physical risks are compounded by land-use change leading to socio-ecological tipping points and loss of livelihoods[10]. In particular, local and Indigenous knowledge (a form of intangible heritage) is impacted by climate

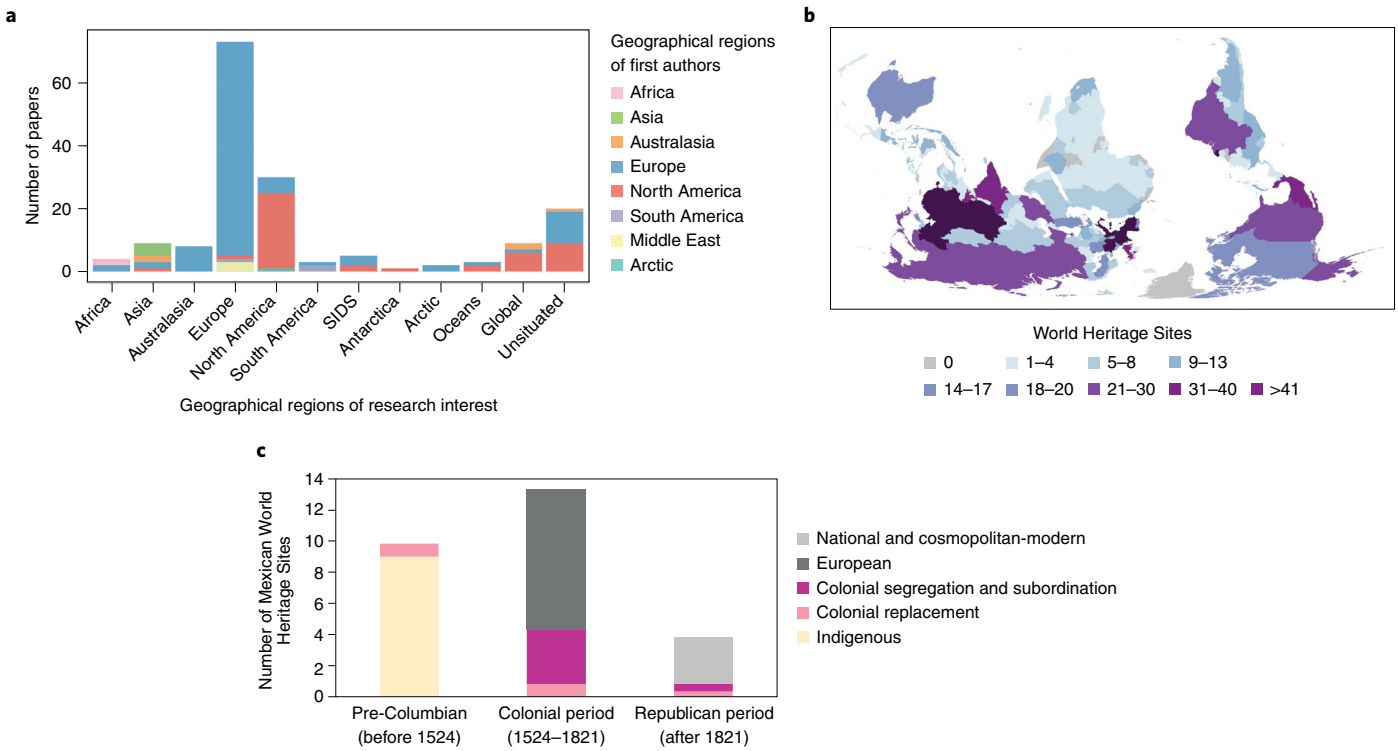

Fig. 1 | Colonial legacies affecting inequities in climate change–heritage research and practice. a, Number of English language papers on cultural heritage for different geographical regions and regions of first authors of climate change–heritage research. Concentrations of research focus on Europe and North America, while these regions also contain the highest number of first-author scholars producing this research. **b**, Global distribution of UNESCO World Heritage Sites per country shows concentrations of inscribed heritage in HICs, while former colonies have fewer UNESCO World Heritage Sites. **c**, Categorization of 27 World Heritage Sites in Mexico, showing the progressive marginalization of Indigenous cultures. Taken as a set, these World Heritage Sites form a narrative in which the Spanish conquest destroyed many Indigenous cultures and left the others as marginal and subordinated to European and cosmopolitan cultures, with little or no contribution to heritage. Visualization in **a** compiled from the supplemental information of ref. [5]; map in **b** created from the UNESCO World Heritage List 2021[32]; graph in **c** created from Mexican sites listed on the UNESCO World Heritage List 2021[32].

Box 1 | Climate change and research on intangible cultural heritage

Djenné is a mud-built town situated on the Bani River within the Inland Niger Delta, Mali. Inhabited since the thirteenth century, its deep history and iconic earthen architecture form part of its 'Outstanding Universal Value', and its mud architecture is maintained by local men who belong to generations of masons. The re-plastering masonic traditions are necessary to ensure 'authenticity' — a requirement for Djenné's inscription on the World Heritage List[14]. Yet these intangible cultural practices have been increasingly difficult to maintain and were not adequately considered at the time of inscription. As a result, Djenné's continued inscription on the UNESCO World Heritage List is precarious, because climate change is exacerbating cultural vulnerabilities that threaten both the integrity of the earthen structures and the cultural practices that protect it[14]. Calcified fish bones are needed for good-quality mud, but lower rainfall has reduced mud quality for re-plastering by lowering river levels and reducing fish stocks[14]. Young masons have tried to find cheaper building materials instead of buying the required but unaffordable high-quality mud for annual resurfacings. Reduced ability to effectively re-mud traditional buildings increases their exposure, but also interrupts traditional knowledge and practices tied to re-mudding performances. Continued loss of intangible cultural heritage will lead inevitably to the loss of the earthen structures that are its material expression. While colonial policies and their legacies have typically ignored intangible cultural heritage of host communities[33,34], such as Indigenous building practices, this case highlights the importance of understanding climate impacts holistically, those on both tangible and intangible heritage. Climate change–heritage research needs to recognize the need for contextually appropriate adaptation and protection of sites from a broad range of potential impacts, including their need for a just transition when heritage-dependent livelihoods are disrupted by climate change and heritage policies.

change through loss of livelihoods and migration[11,12], yet this knowledge is crucial for safeguarding other forms of heritage, such as traditional buildings and building methods[13,14] (Box 1).

Research, data and knowledge barriers that undermine the potential for more informed responses to climate change also pose a risk to heritage[3,15]. Development of robust climate change adaptation strategies for heritage is impaired by lack of up-to-date, adequately downscaled climate data and heritage-focused climate information services, particularly for LMICs, some of which are too small for current resolutions of global climate models, such as small island developing states[16]. Without usable data, it is highly challenging for LMICs to generate robust risk assessments and policy on how to best adapt and preserve vulnerable heritage, which leads to under-representation of climate risk to heritage in large climate assessments.

The prevailing conceptions and research foci in LMICs are dominated by the perspective of higher-income countries (HICs)[17,18], perpetuating a narrow, Eurocentric view, and mirroring colonial legacies that continue to shape priorities for climate research questions, funding and outputs globally[3,19,20] (Fig. 1a,b). For example, climate adaptation funding for many vulnerable LMICs is heavily dependent on international aid organizations that are commonly located in HICs[3]. This inevitably leads to an unequal balance in the types of heritage earmarked for research or development, with a bias towards heritage that is implicitly (if not explicitly) valued by those living in HICs while commonly side-lining pre-colonial heritage (as in the case of Mexico; Fig. 1c). The narrow concept of 'Outstanding Universal Value' as defined by the United Nations Educational, Scientific and Cultural Organization (UNESCO) for World Heritage Sites has been criticized in this regard[21], because in LMICs, heritage with little or no global appeal frequently holds considerable local or Indigenous significance. Moreover, the continuing dichotomy between tangible and intangible heritage, employed by organizations such as UNESCO, is incompatible with non-Western heritage because it forces an unnatural dichotomy between belief systems and traditions, which often create value, or make sacred, places and things. By distinguishing between tangible and intangible heritage, these intricate social, ideological and cosmological relationships inherent in non-Western heritage are undermined[6] (Fig. 1c and Box 2). Decolonizing climate change–heritage research is therefore important for heritage preservation because locally led research and a more equitable research environment are needed to address the true potential loss and damage to heritage from climate change across LMICs[10,11].

Decolonize climate–heritage research

Despite recent interest in decolonizing heritage research[19,22], decolonial approaches are not yet widely established in climate change–heritage scholarship and practice. Recognizing that colonization led to Euro-American centricity, dispossession, racism and ongoing power imbalances in how climate change–heritage research is produced and used is an important first step[20,23,24]. The next step is committing to actively undoing those systems and ways of thinking through transformations to agenda setting, funding, training, access to data and governance.

First, scholars and heritage practitioners across LMICs need the epistemic freedom to set their agendas for climate change–heritage research to address inequities in research leadership[25,26] (Fig. 1). For this to happen, research agendas and funding, along with the policy agendas to which they are linked, need to be decentred from the HICs. Priorities for research and practice should be informed by Indigenous and local communities and should integrate their values, preferences and judgements with climate change risk and vulnerability assessments[27]. For example, climate risk assessments need to integrate heritage values at local scales with scientific information on climate change.

Second, specific efforts will be required to train scholars in transdisciplinary research methodologies that accommodate multiple knowledges and world views in the formulation of research questions and the co-creation of solutions, including collaboration with Indigenous and local communities in equitable ways. Mentoring scholars from LMICs in writing for international peer-reviewed journals will help bring up a new generation of climate change–heritage scholars[28]. Further, safeguards are needed to avoid exclusive and extractive research relationships and ensure research outcomes benefit local heritage communities and custodians, particularly where this knowledge can support adaptation responses to climate change.

Third, research findings and data need to be made accessible to heritage managers and practitioners in the regions that were the target of the research. At present, many online data repositories and journals are not freely available, and subscriptions are too expensive for many research institutions in LMICs. A tiered system of subscription costs based on ability to pay, or preferably open

Box 2 | Climate change–heritage research and Indigenous communities

In the Amazon, climate change impacts are experienced by Indigenous communities in dramatic and yet poorly understood ways. Impacts from heatwaves, precipitation variation, and more frequent and intense extreme weather events are material, including disruptions to food systems and local diets[35]. Non-material impacts include losses of livelihoods, knowledge, place attachment, governance institutions, culture and identity, which compound material impacts to reduce resilience of Indigenous communities[36]. The marginalization of Amazonian Indigenous communities is determined by these climate impacts, coupled with maladaptive responses and structural imbalances in power and resources[36,37]. Yet, climate change–heritage research on the Amazon faces severe funding crises and ongoing political opposition[38]. This instability in research funding is likely to exacerbate existing knowledge gaps such as climate impacts on Indigenous communities' health[36]. Lack of research funding also affects the visibility of Indigenous communities and the potential for mobilizing protective interventions[36]. Resulting damages may enhance existing inequalities in the types of heritage recognized for protection. The Amazonian experience highlights the need for climate change–heritage scholars to propose new strategies for transdisciplinary research that adopts broad conceptions of heritage, includes protection of ecosystems and empowers Indigenous communities[36,39,40].

access, could make access to research more equitable.

Fourth, research on governance is also critically important for identifying enabling conditions for the transformation of colonial heritage governance arrangements that dislocated and disempowered local and Indigenous heritage governance structures[7,29]. Multiple research disciplines, including social and political sciences, anthropology and climate research, need to provide critical research on what climate-resilient governance for heritage might look like when decolonized. Further, these disciplines need to collaborate to produce the kinds of actionable knowledge local governance would require, for example, downscaled and heritage-focused climate information available in local user languages to support multi-level decision-making[30].

Finally, nationally determined contributions are a mechanism by which every country can present its climate adaptation and mitigation plans to the United Nations Framework Convention on Climate Change. As such, these are bottom-up action plans for individual countries to tackle climate change. Although these documents are formatted with national priorities in mind, heritage should be included within suggested formats to catalyse climate change–heritage research globally.

International bodies concerned with heritage research and practice, including UNESCO, the International Council on Monuments and Sites (ICOMOS), the International Centre for the Study of the Preservation and Restoration of Cultural Property (ICCROM), and the IPCC, have increasingly recognized the importance of climate change–heritage research to inform climate action within heritage practice globally[31]. Knowledge generated is essential to inform heritage-specific understanding of the impacts, vulnerability and risks from climate change, including loss and damage, and how such knowledge can inform adaptation and mitigation responses to climate change. It is therefore critical that transformations to climate change–heritage research agenda setting and funding, training, access to data, and governance overcome geographic, intersectional and distributional blind spots associated with colonial research legacies. In failing to actively transform in these ways, the climate change–heritage research community stands to further entrench these long-standing inequities, as well as exacerbate inequalities in heritage-relevant responses to climate change.

Data availability

The underlying dataset for Fig. 1a is available open access from the supplemental material in ref. [5], and datasets for Fig. 1b,c from the UNESCO World Heritage List 2021 in ref. [32]. ❐

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The authors declare no competing interests.

Effective climate change adaptation means supporting community autonomy

Communities want to determine their own climate change adaptation strategies, and scientists and decision-makers should listen to them — both the equity and efficacy of climate change adaptation depend on it. We outline key lessons researchers and development actors can take to support communities and learn from them.

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At COP26, high-income nations pledged hundreds of billions of dollars for adaptation projects in low-income countries. Even if these pledges are realized, however, this money represents a tiny fraction of the amount needed to reach global targets, leaving open the question as to what projects will actually be funded. While scientists have yet to agree on what kinds of adaptation are the most effective at reducing risk[1], much less what climate change adaptation actually means[2], communities on the frontlines of climate change want to take the lead in choosing their own adaptive strategies[3]. Supporting their autonomy is important not just for equity: the very effectiveness of climate change adaptation depends on it.

When people refer to climate change adaptation, they are loosely referring to change — for example, behavioural, social or economic — meant to reduce risk in response to, or in anticipation of, climate change[4]. Under this broad definition, adaptation can be a process, an outcome or both. It can take place at the individual, community, regional or national levels[1]. Funding can thus be allocated at any scale, and funders may emphasize top-down initiatives, in which outside entities help communities identify vulnerabilities and then offer prescriptive solutions; bottom-up initiatives sometimes called community-based[5] or autonomous adaptation[6]; or initiatives that blend both.

'Development actors' — for example, governmental and non-governmental organizations, businesses and consultants — often prefer to fund initiatives that are more top down than bottom up because of perceived advantages in speed, control and efficiency[7]. Indeed, elements of top-down design can be important when local and national governments need to coordinate[1], for example, or when a climate event devastates several neighbouring communities[2]. However, the effectiveness of climate change adaptation depends on community participation. Communities on the frontlines — who are often rural, Indigenous and/or poor — have existing adaptations to climate and ideas for new ones[2,7,8]. These innovations increase diversity, the driving force of adaptation, widening the state space of potential solutions to learn from and that other communities may wish to adopt[2]. Adaptation also means enabling communities to experiment with these candidate solutions, modify them as needed and transmit those that work[2]. The solutions that emerge are more likely to reduce risk[2,7,9] because they better match local conditions, needs, values and norms[5,10].

Researchers and development actors can do things differently, to better support communities and learn from them. The first step is to recognize that communities have been responding to climate change for a