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World Heritage and the challenge of climate change: a reform agenda

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ABSTRACT

The General Assembly of States Parties to the World Heritage Convention adopted a policy and strategy on climate change in 2007. Many of its actions remain to be delivered. Climate change has highlighted the limits of a system under stress to respond to an immense challenge. The General Assembly is again considering the issue, and a second World Heritage climate change policy is being developed to provide high-level guidance on response measures. The draft second policy emphasises the role of individual States Parties in addressing climate impacts on their World Heritage sites but says less about the responsibilities of the World Heritage Committee, World Heritage Centre or Advisory Bodies to the Convention in meeting the goals of climate action and achieving an equitable, international and shared response. Nor does it tackle issues related to Outstanding Universal Value, the core of any response to climate change. We develop a conceptual framework for substantive reform and propose actions to enable the World Heritage system to effectively respond to climate change and support the resolution of long-standing, systemic issues. Meaningful response to climate change needs to involve strategic as well as operational elements in a staged response with measurable outcomes and outputs.

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Introduction

Climate change poses an existential threat to the protection and conservation of the world's outstanding cultural and natural heritage. Collective effort by the 194 States Parties to the World Heritage (WH) Convention is needed to meet this challenge. The Convention should support international efforts, national governments and communities in mitigating and adapting to the effects of climate change, especially in adapting their heritage places in the face of increasing and increasingly complex climate-driven impacts.

On the occasion of its fiftieth anniversary, it is worth recalling the collective international action that gave rise to the WH Convention following the devastation of the Second World War. The decision to raise the Aswan Dam in Egypt and submerge the Nubian temples of Abu Simbel and Philae catalysed international concern about the need to protect this heritage of global significance. In 1959, after an appeal from the governments of Egypt and Sudan, the United Nations Educational Scientific and Cultural Organisation (UNESCO) launched an international campaign to save the temples – dismantling them and reassembling them on higher ground (Brumann 2021).

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A prominent and enduring result of this international movement was the Convention Concerning the Protection of the World Cultural and Natural Heritage, adopted by UNESCO in 1972 (Batisse and Bolla 2005). The Convention established the WH List, which was originally envisaged as comprising some 100–200 sites (Batisse and Bolla 2005; Cameron and Rössler 2013) that could meet the demanding threshold of having Outstanding Universal Value (OUV). The WH List now includes 1154 sites from 167 countries (UNESCO WH Convention 2022a list, statistics). This apparent success of the Convention, under which far more sites that originally envisaged have been listed, can be beguiling. As the over-stretched and politically fraught WH system struggles to respond to the challenges that climate poses, the need for substantive systemic reform is increasingly apparent.

Fifteen years ago, the Director of the WH Centre wrote in his foreword to the Convention's first climate change policy that 'Climate change has now emerged as one of the most serious threats impacting on the conservation of this heritage' (UNESCO WH Centre 2007). Since that time, the global community has witnessed an increasing severity and frequency of climate-driven impacts to lives and livelihoods, the environment and cultural heritage. Despite significant work by governments and non-government organisations to identify, evaluate and develop site-based adaptation strategies for climate impacts on heritage, the WH Committee's response to this global heritage crisis has left many core issues unresolved (Daly 2022).

A second WH climate change policy is currently being developed under the mandate of the 23rd General Assembly of States Parties to the WH Convention (henceforth General Assembly), which, in 2021, tasked an open-ended working group to finalise this draft 'Policy Document on Climate Action for World Heritage' (UNESCO WH Committee 2021, henceforth draft climate change policy) as well as proposals for its effective implementation (UNESCO WH Convention 2021a). This draft policy outlines high level directives but currently says little about the operational reforms within the WH system that are required to address the scale and complexity of the challenges. In this article, we offer ideas about the additional strategic and operational responses needed for the WH community to respond to the challenge of climate change in a way that maximises the retention of the OUV of the world's most precious heritage sites.

Climate change impacts on World Heritage

The exposure of the WH system to climate change is increasing as the number of sites grows and as the severity of impacts increases (Figure 1).

The potential impact on a WH site from any single climate-related event may not be greater than impacts from localised, non-climate events. Nonetheless, climate-related impacts are distinct from localised events due to: (1) the wide range of climate factors, many interrelated; (2) the broad spatial and temporal scales over which these factors have affected and will continue to affect WH properties; and (3) the increasing frequency of impacts related to climate change as climate impacts are exacerbated; (4) the synergistic way in which climate change can multiply the effects of other threats, exacerbating cumulative impacts (Dodson et al. 2020).

In 2020, IUCN concluded that one in three of the 257 WH sites listed for natural values (218 natural only and 39 mixed) are currently threatened by climate change (Osipova et al. 2020). Climate change impacts are already evident and well understood for many of these sites, especially coral reefs (Heron et al. 2017, 2018) and glaciers (Bosson, Huss, and Osipova 2019; UNESCO and IUCN 2022).

The situation for the 936 sites listed for cultural values (897 cultural only and 39 mixed) is more complex. Climate change can affect not only their physical fabric but also their cultural and social attributes (ICOMOS 2019; UNESCO WH Committee 2021, para.6; Climate Knowledge Portal 2022), which are currently seen as static even though cultural landscapes, for example, are the product of change. Climate impacts on some cultural sites have been documented in official publications since 2007 (UNESCO WH Convention 2007) and on 4 November 2022 in a news release, UNESCO estimated that one in six cultural heritage sites are already threatened by climate

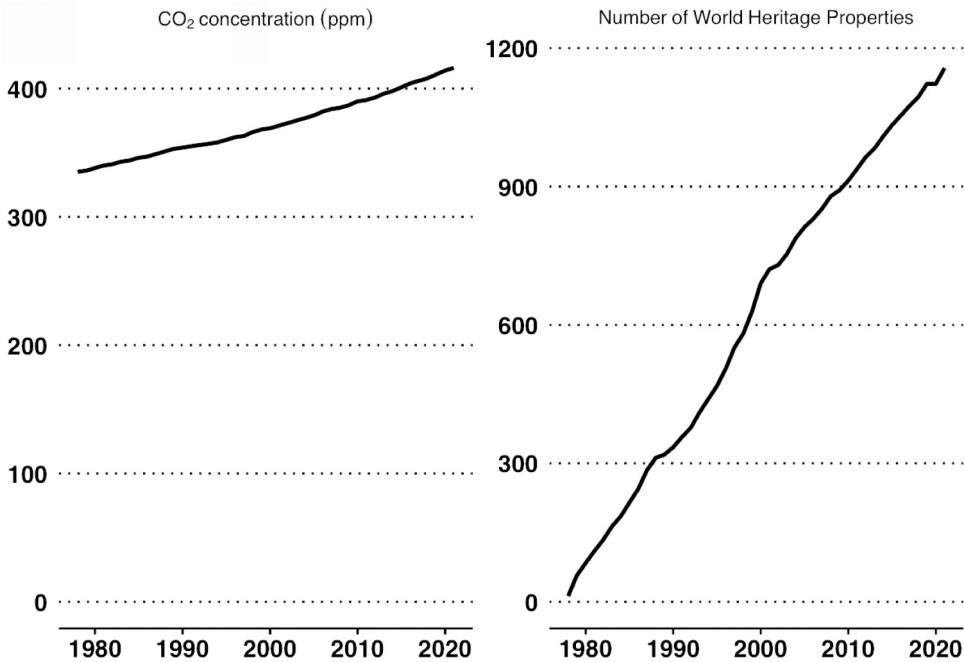


Figure 1. The increasing number of WH properties (right) and their increasing exposure to greenhouse gases causing climate change (left). The consistent measurement of atmospheric CO₂ concentrations, a key driver of climate change started in 1958, about when the governments of Egypt and Sudan appealed to UNESCO. The number of WH properties listed is from 1978, the year the first properties were inscribed.

change. For example, flooding has long been a threat to ‘Venice and its Lagoon’. A projected median sea-level rise of anywhere from 47 cm to 80+cm by 2100 linked to climate change (Climate Knowledge Portal 2022) and exacerbated by the peculiarities of Venice’s lagoon and development pressures, will cause higher water levels to be more frequent, longer lasting and potentially permanent, placing the OUV of this site in danger. Under the Convention’s operational guidelines, the ‘Champagne Hillside, Houses and Cellars’ cultural landscape in France (UNESCO WH Convention 2022b) may lose OUV if – when – it becomes too hot to sustain a wine industry or if the industry becomes dependent upon heat tolerant grapes imported from another location.

Some WH sites may be capable of adaptation to these changing conditions, naturally or through intervention strategies to preserve the OUV of the property. For others, there will be limits to the ability of both cultural and natural properties to adapt while retaining OUV. Some species in sites listed for their natural values, for example, have preferred temperature ranges, which cannot be exceeded (White et al. 2021); elsewhere, rainfall regimes required for agriculture/cultural landscapes may alter in ways that irreparably damage values (Hatfield et al. 2020). In some cases, climate adaptation strategies may impact OUV, posing dilemmas over competing values e.g. the proposed raising of a dam as a flood mitigation measure is predicted to have an impact on the OUV of the Greater Blue Mountains Area WH property in Australia (Australia ICOMOS 2021).

The nature and extent of climate impacts on the OUV of a WH property will depend on many factors including the current state of conservation of that property, the strength of the protection and management systems in place and available human and financial resources. Measuring and responding to the complexity of climate impacts will be difficult for properties that do not have an established and rigorous system of assessing and monitoring current impacts on their OUV. The cumulative impacts of climate change and other threats are likely to be profound, especially in the countries of the ‘global south’, which are already over-represented on the List of WH in Danger. For example, of the 52 sites currently listed as In Danger, 29% are in Africa, which has only 8.5% of the

sites on the WH List (UNESCO WH Convention 2022a, statistics). UNESCO acknowledged this inequality in their 2017 “Declaration of Ethical Principles in relation to Climate Change”, which stressed the need for global solidarity and action (Megarry 2022).

Non-climate issues in the operation of the WH system

Systemic issues that adversely affect the implementation of the WH Convention are well known (Brumann 2021) and are summarised in Figure 2. We elaborate on some of these challenges in the text below.

The increase in WH List inscriptions has not been accompanied by an equivalent increase in resources to support the Convention; rather, the reverse is – astonishingly – true. Article 15 of the Convention (UNESCO WH Centre 2021a) establishes a WH Fund (UNESCO WH Convention 2022c) that consists of compulsory and voluntary contributions made by States Parties as well as private donations (an aspiration more than a reality, at least in recent years) to support activities requested by States Parties in need of international assistance as well as to service the work of the expert Advisory Bodies – the International Centre for the Study of the Preservation and Restoration of Cultural Property (ICCROM), the International Council on Monuments and Sites (ICOMOS) and the International Union for Conservation of Nature (IUCN), all of which have prescribed roles in the implementation of the Convention (UNESCO WH Centre 2021a, Article 8.3). Funding for the Advisory Bodies is in long-term decline.

Contributions to the WH Fund in 2011 totalled US\$3,601,657, while in 2021 contributions totalled US\$1,856,226 (UNESCO World Heritage Convention 2022a, WH Fund, Archives, Statement of assessed compulsory and voluntary contributions) – a halving in nominal value and a much greater decline in actual value. Forty of the 52 sites currently listed as In Danger have received assistance, ranging from US\$3500 (Hatra, Iraq) to US\$540,649 for Mount Nimba Strict Nature Reserve on the borders of Guinea, Liberia and Côte d’Ivoire. The mean assistance is in the order of US\$120,000; the median US\$100,000. Most sites on the WH List have not received any assistance from the WH Fund (UNESCO WH Convention 2022a, list).

Nor has the increase in WH List inscriptions been accompanied by an equivalent increase in the sophistication of the Convention’s processes. The imbalances in the representation of geographic regions on the WH List (UNESCO WH Convention 2022a, statistics) are longstanding, and

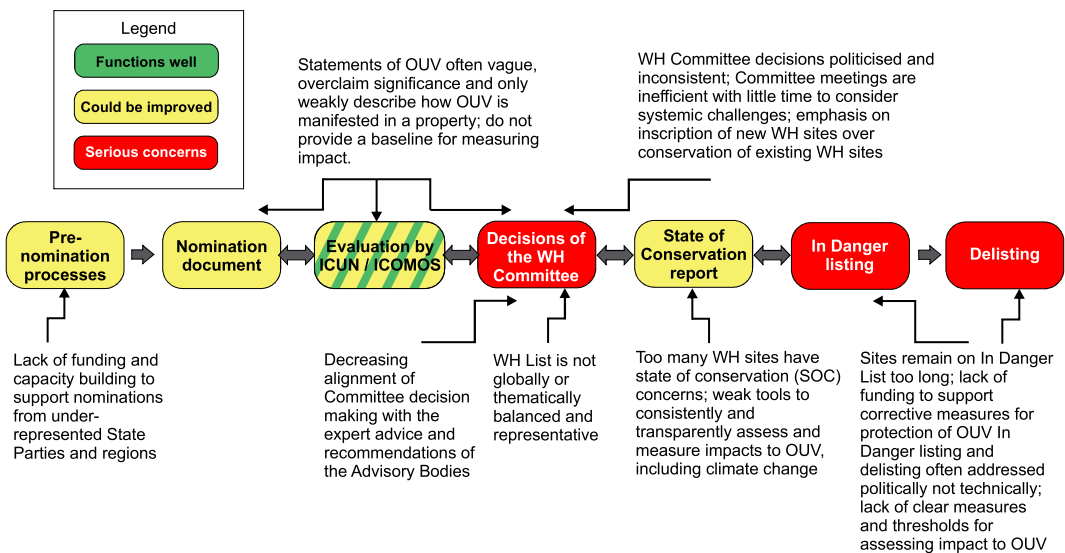


Figure 2. An overview of the systemic issues in the operations of the WH system. The box ‘Evaluation by IUCN/ICOMOS’ is striped to reflect its intermediate status.

recognition of Indigenous or First Nations in the Convention, while improving, remains low despite the establishment of the International Indigenous Peoples' Forum on WH in July 2017 and the consequential changes to the operational guidelines (UNESCO WH Centre 2021b). The increasingly overt politicisation of decision-making by the WH Committee has been widely documented (Bertacchini et al. 2016; Morrison et al. 2020; Brumann 2021). At the same time, the bearing of expert opinion in Committee decision-making has diminished. In 2021, only 21 of the 36 decisions of the WH Committee on nominations of properties to the WH List aligned with the expert recommendations of the Advisory Bodies (UNESCO WH Convention 2021a).

Less comment has been devoted to the lack of evolution in the Convention's processes to adapt to the growth in the size of the WH List. The increase in the number of inscribed properties (Figure 1) has not been paralleled by funding, personnel or organisational capacities available to the WH system. Although the protection and management of properties are the responsibility of States Parties, the increasing number of WH properties and decreasing capacity of the WH Centre have a direct impact on the ability of the WH Committee to monitor and make recommendations about the state of conservation of WH properties. Modest procedural innovations have been introduced, for example limiting discussion of the state of conservation reports to sites of particular concern, with the result that ever more cursory glances are cast over the state of conservation of most properties. In 2021, the extended forty-fourth session of the Committee discussed only four of the 52 properties on the List of WH in Danger (UNESCO WH Convention 2021a).

These operational challenges are magnified by conceptual challenges. The system struggles to adequately describe what it wants to protect. The fundamental concept within the WH system is OUV, which is formally agreed for a property at the time of inscription. Demonstrating that a site has OUV requires it to meet one or more of the 10 WH criteria; to have integrity (and authenticity for cultural and mixed properties); and to be in a good state of conservation with satisfactory protection and management. These three elements are presented in the Statement of OUV for each site. This statement provides the key reference point or baseline against which the WH Committee will make decisions about the nature and extent of any impacts on OUV, including climate change and the actions required to ensure the protection and management of the OUV of each site. Nonetheless, the Statements of OUV are brief – commonly limited to a single page – and provide, at best, a short summary description of the values of the site and key features in the property against one or more of the 10 WH criteria; a statement of integrity (all sites) and authenticity (for sites inscribed under one or more cultural criteria); and a statement about the protection and management of the site, necessary to maintain its OUV (UNESCO WH Centre 2021b, paras. IId-f).

Despite years of effort, particularly by the Advisory Bodies, statements of OUV are often vague, overclaim significance and at best weakly describe how OUV is manifested in particular attributes or features – tangible or intangible – that hold or express the OUV. Crucially, it is change in these attributes against which an impact to OUV may be identified and measured. For many if not most sites, the specificity and level of detail in the Statement of OUV is not sufficient to provide the baseline required for: (1) States Parties to make robust arguments as to whether an impact on OUV has or has not occurred, or (2) the WH Committee to make evidence-based decisions as to whether OUV has been impacted, partially lost, or whether the loss is significant and permanent. As a consequence, the Committee's discussion of the state of conservation of individual WH sites rarely directly engages with the extent to which the attributes that hold the OUV have been impacted. This practice increases the potential for poor outcomes in the protection of OUV and Committee decisions that are political rather than evidence based. A recent example is the WH Committee's 2021 discussion of the Advisory Body's recommendation for the Kathmandu Valley to be included on the List of WH in Danger, summarised in Text Box 1.

Text Box 1. 2021 WH Committee decision on Kathmandu Valley (UNESCO WH Convention 2021a)**Text Box 1: 2021 WH Committee decision on Kathmandu Valley** (UNESCO WH Convention 2021a, decision 44 COM 7B.33)

In 2021, the WH Committee considered a recommendation from the Advisory Bodies to include the Kathmandu Valley on the List of WH in Danger due to the ongoing impacts of the 2015 earthquakes, which caused extensive damage to the site's historic monuments and buildings. The recommendation was supported by detailed reporting of the outstanding conservation issues, ongoing concerns with management of the site and recent constructions and developments in the site. This was the fifth consecutive meeting of the WH Committee in which the site had been recommended for inclusion in the In Danger List. In 2021, as for each of the previous years, the Committee decided against In Danger Listing.

The one-page Statement of OUV for the very large and complex Kathmandu Valley lists seven monument zones, several individual monuments and briefly describes the architecture and construction techniques of the many tiered temples and stupas in the site and the Nepalese cultural traditions of Buddhism and Hinduism they express. The site is said to include 'exceptional architectural typologies, ensembles and urban fabric illustrating the highly developed culture of the Valley' although these are not detailed.

A majority of the Committee members argued that In Danger listing was premature for reasons unrelated to threats or impacts to OUV, the most common being that the actions of the State Party of Nepal demonstrated its commitment to conservation and restoration of the site, but further time and finances were needed to continue this effort before consideration of In Danger listing. In evidence, members cited the large number of monuments that have been restored to date although the significance of these monuments was not discussed. The Statement of OUV does not mention the number of monuments in the site. A small minority of the Committee argued for In Danger listing due to ongoing damage to or collapse of monuments; the use of inappropriate construction techniques; and new developments in the site. Such impacts on the physical fabric of the site do not automatically or directly correlate with an impact on OUV. In the absence of a detailed description in the Statement of OUV of the attributes that hold the OUV of the Kathmandu Valley, the nature and extent of these impacts on the OUV of the site remains unclear.

A major decision for the WH Committee will be to determine whether it is appropriate to allow the attributes of OUV of WH properties under the criteria for which they were listed, to change within objectively defined limits. If so, Limits of Acceptable Change to integrity, the major characteristic likely be under threat from climate change for all types of WH, could be developed for all properties and to authenticity for properties listed under cultural criteria. The concept of Limits of Acceptable Change is not new to the Convention, but its use has been limited (see Australian Academy of Science 2022 for ideas about how the concept might be used). These weaknesses in existing processes leave the Committee poorly placed to address the challenges posed by climate change.

Response to climate change

Climate change is an additional challenge to a system already under stress. For individual properties, it exacerbates other threats to OUV, impacting sites in increasingly complex ways and requiring further resources for management and adaptation in the face of competing needs caused by changing demography, food insecurity, social stresses and the displacement of peoples as a consequence of climate change.

The WH Committee has twice considered how to respond to climate change.

2007 policy and strategy

The main international climate change convention, the United Nations Framework Convention on Climate Change (United Nations 1992) entered into force in 1994. Eleven years later the WH Committee commenced development of its own response. The resultant 'Policy Document on the Impacts of Climate Change on WH Properties' was adopted by the General Assembly in 2007 (UNESCO WH Centre 2007). This document notes that climate change poses crucial questions for the Convention's legal framework regarding inscription, In Danger listing, delisting, and the responsibilities of States Parties. A 'strategy to assist states parties to implement appropriate management responses' was included in the document but is silent on how the more generic issues of concern should be addressed.

Since 2007, States Parties, the WH Committee and the Advisory Bodies have implemented adaptation measures, practiced disaster risk management, undertaken site level climate change mitigation and sustainable development at some sites. In addition, UNESCO is currently supporting specific WH sites to undertake climate change adaptation activities under its World Heritage Canopy Program (UNESCO WH Centre 2022).

Nonetheless, even though the barriers that inhibited the implementation of the 2007 policy have been identified (Daly 2022), the crucial legal issues identified in the 2007 policy have not been addressed and an operational reform pathway has not been developed.

Current efforts

The current draft climate change policy updates the 2007 policy in recognition of the now greatly increased understanding of the magnitude and nature of the threats posed by climate change. The draft aims to *provide high-level guidance on enhancing the protection and conservation of heritage of Outstanding Universal Value through comprehensive adoption of climate action measures . . . including climate adaptation, mitigation, resilience building, innovation and research* (UNESCO WH Committee 2021).

The draft climate change policy document takes a different path from its 2007 predecessor in moving beyond site-based adaptation as the focus for WH, to importing into the WH Convention process many of the issues – and their accompanying political fault lines – of the Framework Convention on Climate Change. Little is said in the draft policy about the contribution of the WH Committee, the WH Centre, UNESCO or the Advisory Bodies in meeting the goals of climate action and therefore in achieving the success of a collective, international and shared response to the impacts of climate change. The call for collective action is weakened by the emphasis on the responsibilities and actions of States Parties to achieve the goals set out in the policy.

The capacity of States Parties to fulfil their responsibilities to protect and manage the OUV of properties within their territories is not equal, although the nature and extent of this disparity is difficult to understand through current reporting processes. Nonetheless, the trend is clear. For example, as noted in an article in *Alarabiya News* on 22 September 2021, donors had contributed US\$865 million to reconstruct Notre-Dame Cathedral in Paris after it was ravaged by a massive fire in April 2019. This amount is some 1600 times the largest investment in a single site from the WH Fund. Many States Parties will need international support to enable their WH sites to adapt to climate change in response to decisions of the WH Committee and informed by expert advice from the Advisory Bodies.

The WH Committee requested the WH Centre and Advisory Bodies to: (1) prepare a guidance document to facilitate effective implementation of this draft policy, suggesting that this document include indicators and benchmarking tools for measuring and reporting progress towards achieving the goals of the policy; and (2) develop, subject to available resources, education and capacity-building initiatives (UNESCO WH Convention 2021a, Decision 44 COM 7C). In addition, the open-ended working group established by the General Assembly in 2021 to finalise the draft climate change policy has been charged with developing proposals to implement the policy (UNESCO WH Convention 2021b). Any distinction between the objectives of these two initiatives has yet to be clarified.

A reform agenda

The Convention cannot adequately respond to climate change without comprehensively responding to the longstanding issues including those highlighted in the 2007 policy document and discussed above.

We consider that meaningful response to climate change needs to involve strategic as well as operational elements in a staged response articulated through the development and implementation of a series of 5 or 10-year plans that have measurable outcomes and outputs. Along with specific action on climate change at site, national and regional levels, these plans need to action the many

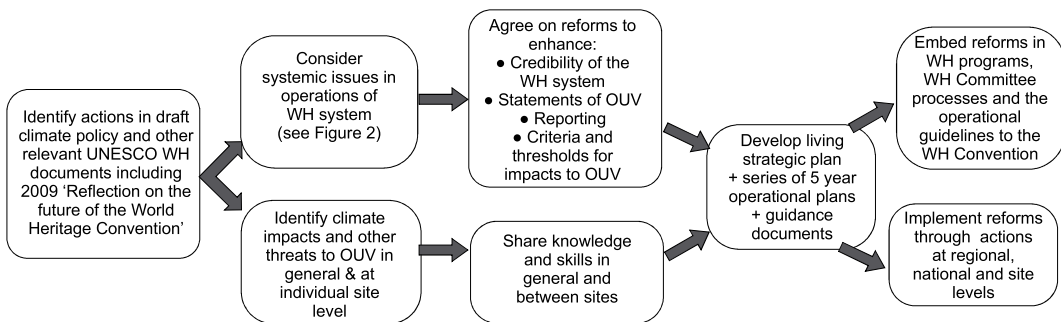


Figure 3. A suggested conceptual framework for a process to reform the WH system to address climate change in the context of the systemic issues.

ideas in the draft policy that focus on reforms in the implementation of the Convention to address the systemic issues that currently limit the effectiveness of Committee decision-making and hence the capacity of the WH system to respond to climate change. This approach should emphasise the imperative of international community participation to ensure that the OUV of the World's most precious heritage places is conserved to the greatest extent possible in the face of the inevitable impacts of climate change, by providing meaningful collective assistance that complements actions by the States Parties.

Figure 3 provides a conceptual framework for such reforms. The Supplemental Online Material identifies our ideas for actions to support the resolution of longstanding issues and initiatives to effectively respond to climate change in the WH system. These ideas are based upon the required actions identified in 2009 (UNESCO WH Convention 2009), which we have updated to address issues that have become clearer in the past 14 years, many of which are raised in the draft policy for climate action.

Concluding remarks

The international response to the threat to the temples of Abu Simbel and Philae demonstrated pragmatism – moving a future WH site, and innovation – adopting a new Convention to reduce the risks to the shared heritage of humanity. This spirit is needed again. All WH sites will be impacted over the coming century, and the ability to adapt will often be limited (Megarry 2022).

Every state party is confronting complex, competing priorities in its response to climate change because of extreme weather events, changing demography, food insecurity, social stresses and the displacement of populations. If sites of OUV are to be conserved, the global response must be both innovative and pragmatic. The General Assembly has charged the open-ended working group with the significant responsibility of developing a proposal to implement the policy document on climate action for WH (UNESCO WH Convention 2021b). The open-ended working group is fortunate in being able to draw upon previous proposed improvements to the implementation of the Convention, information that will equip the group to develop an effective response to climate change.

We hope this article will contribute to thinking about these matters, which are existential to the future of the Convention and its capacity to protect the world's most precious heritage places in the face of climate change. The future of the World Heritage Convention can only be assured if such challenges are confronted and resolved (Albert et al. 2022).

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Disclosure statement

No potential conflict of interest was reported by the author(s).

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Greg Terrill is an independent consultant and heritage expert based in Canberra, Australia. Greg worked for the UNFCCC from 1995 to 98, led the Australian delegation to the World Heritage Committee from 2008 to 2011 and played a key role in the development of the 2007 Policy Document on the Impacts of Climate Change on World Heritage Properties.

References

- Albert, M.-T.A., R. Bernecker, C. Cave, A. C. Prodan, and M. Ripp. 2022. "Outlook." In *Chapter 38 in 50 Years World Heritage Convention: Shared Responsibility – Conflict & Reconciliation*, edited by M.-T.-A. Albert, R. Bernecker, C. Cave, A. C. Prodan, and M. Ripp, 238. Heritage Studies, Chan: Springer. doi:10.1007/978-3-031-05660-4_18.
- Australia ICOMOS. 2021. "Submission Warragamba Dam Raising Project –SSI-8441: Submission Regarding the Environmental Impact Statement". Accessed 13 December 2022. <https://majorprojects.planningportal.nsw.gov.au/prweb/PRRestService/mp/01/getContent?AttachRef=SSI-8441%2120220127T001515.619%20GMT>
- Australian Academy of Science 2022. *The Existential Threat: Climate Change as a Catalyst for Reform in World Heritage. Report of World Heritage Convention and Climate Change Roundtable*, 6 December 2021. <https://www.science.org.au/supporting-science/science-policy-and-analysis/reports-and-publications/addressing-existential-threat-climate-change-catalyst-reform-world-heritage>
- Batisse, M., and G. Bolla. 2005. *The Invention of "World Heritage"*. Paris: Association des Anciens Fonctionnaires de l'UNESCO (AAFU). Club Histoire.
- Bertacchini, E., C. Liuzza, L. Meskell, and D. Saccone. 2016. "The Politicization of UNESCO World Heritage Decision Making." *Public Choice* 167: 95–129. doi:10.1007/s11127-016-0332-9.
- Bosson, J.-T., M. Huss, and E. Osipova. 2019. "Disappearing World Heritage Glaciers as a Keystone of Nature Conservation in a Changing Climate." *Earth's Future* 7: 469–479. doi:10.1029/2018EF001139.
- Brumann, C. 2021. *The Best We Share: Nation, Culture and World-Making in the UNESCO World Heritage Arena*. New York: Berghahn.
- Cameron, C., and M. Rössler. 2013. *Many Voices, One Vision: The Early Years of the World Heritage Convention*. Abingdon: Routledge.
- Climate Knowledge Portal. 2022. "Italy. Impacts > sea level rise". Accessed November 19 2022. <https://climateknowledgeportal.worldbank.org/country/italy/impacts-sea-level-rise>
- Daly, C. 2022. "Climate Action and World Heritage: Conflict or Confluence?" In *Chapter 19 in 50 Years World Heritage Convention: Shared Responsibility – Conflict & Reconciliation*, edited by M.-T. Albert, R. Bernecker, C. Cave, A. C. Prodan, and M. Ripp, 238. Heritage Studies, Chan: Springer. doi:10.1007/978-3-031-05660-4_18.
- Dodson, J. C., P. Dérer, P. Cafaro, and F. Götmark. 2020. "Population Growth and Climate Change: Addressing the Overlooked Threat Multiplier." *The Science of the Total Environment* 748: 141346. doi:10.1016/j.scitotenv.2020.141346.
- Hatfield, J. L., J. Antle, K. A. Garrett, R. C. Izaurralde, T. Mader, E. Marshall, M. Nearing, G. P. Robertson, and L. Ziska. 2020. "Indicators of Climate Change in Agricultural Systems." *Climatic Change* 163 (4): 1719–1732. doi:10.1007/s10584-018-2222-2.

- Heron, S. F., R. van Hooidonk, J. Maynard, K. Anderson, J. C. Day, E. Geiger, O. Hoegh-Guldberg, T. Hughes, P. Marshall, and D. Obura. 2017. *Impacts of Climate Change on World Heritage Coral Reefs: A First Global Scientific Assessment*. Paris: UNESCO World Heritage Centre.
- Heron, S. F., R. van Hooidonk, J. Maynard, K. Anderson, J. C. Day, E. Geiger, O. Hoegh-Guldberg, T. Hughes, P. Marshall, and D. Obura. 2018. *Impacts of Climate Change on World Heritage Coral Reefs: Update to the First Global Assessment*. Paris: UNESCO World Heritage Centre.
- ICOMOS Climate Change and Cultural Heritage Working Group. 2019. *The Future of Our Pasts: Engaging Cultural Heritage in Climate Action*. Paris: ICOMOS.
- Megarry, W. P. 2022. "The Climate Crisis, Outstanding Universal Value and Change in World Heritage." In *Chapter 18 in 50 Years World Heritage Convention: Shared Responsibility – Conflict & Reconciliation*, edited by M.-T. Albert, R. Bernecker, C. Cave, A. C. Prodan, and M. Ripp, 238. Heritage Studies, Chan: Springer. doi:10.1007/978-3-031-05660-4_18.
- Morrison, T. H., W. N. Adger, K. Brown, M. Hettiarachchi, C. Huchery, M. C. Lemos, and T. P. Hughes. 2020. "Political Dynamics and Governance of World Heritage Ecosystems." *Nature Sustainability* 3: 947–955. doi:10.1038/s41893-020-0568-8.
- Osipova, E., M. Emslie-Smith, M. Osti, M. Murai, U. Åberg, and P. Shadie. 2020. *IUCN World Heritage Outlook 3: A Conservation Assessment of All Natural World Heritage Sites*. Gland: IUCN.
- UNESCO and IUCN. 2022. *World Heritage Glaciers: Sentinels of Climate Change*. Paris: UNESCO.
- UNESCO World Heritage Centre. 2007. "Climate Change and World Heritage. Report on Predicting and Managing the Impacts of Climate Change on World Heritage and Strategy to Assist States Parties to Implement Appropriate Management Responses". World Heritage Reports 22. Paris: UNESCO.
- UNESCO World Heritage Centre. 2021a. "Convention Concerning the Protection of the World Cultural and Natural Heritage (Adopted In1972)". In *Basic texts of the 1972 World Heritage Convention*, December 2021 edition. 1–16. Paris: UNESCO
- UNESCO World Heritage Centre. 2021b. "Operational Guidelines for the Implementation of the World Heritage Convention". In *Basic texts of the 1972 World Heritage Convention*. December 2021 edition. 244 pp. Paris: UNESCO
- UNESCO World Heritage Centre. 2022. "Canopy Programme". Accessed 19 November 2022. https://whc.unesco.org/en/activities/search_theme=23&canopy=1&action=list&&order=dmd
- UNESCO World Heritage Committee. 2021. "Policy Document on Climate Action for World Heritage" (November 2021).
- UNESCO World Heritage Convention. 2007. "Case studies on climate change and World Heritage". Paris, UNESCO. <https://whc.unesco.org/en/activities/473/>
- UNESCO World Heritage Convention. 2009. "33rd Session of the World Heritage Committee Item 14A of the Provisional Agenda: Reflection on the Future of the World Heritage Convention". <https://unesdoc.unesco.org/search/N-EXPLORE-a8c9366e-aaac-4b8a-ac6e-685f4d62ef91>
- UNESCO World Heritage Convention. 2021a. "Extended Forty-Fourth Session of the World Heritage Committee". <https://whc.unesco.org/en/sessions/44COM/documents/>
- UNESCO World Heritage Convention. 2021b. "Resolutions/Decisions 23 GA 11". <https://whc.unesco.org/en/decisions/8026/>
- UNESCO World Heritage Convention. 2022a. "World Heritage List". Accessed December 13 2022. <https://whc.unesco.org/en/list/>
- UNESCO World Heritage Convention. 2022b. "Champagne Hillsides, Houses and Cellars". Accessed November 19 2022. <https://whc.unesco.org/en/list/1465/>
- UNESCO World Heritage Convention. 2022c. "World Heritage Fund". Accessed November 19 2022. <https://whc.unesco.org/en/world-heritage-fund/>
- United Nations. 1992. *United Nations Framework Convention on Climate Change*. <https://unfccc.int/resource/docs/convkp/conveng.pdf>
- White, C. R., D. J. Marshall, S. L. Chown, S. Clusella-Trullas, S. J. Portugal, C. E. Franklin, and F. Seebacher. 2021. "Geographical Bias in Physiological Data Limits Predictions of Global Change Impacts." *Functional Ecology* 35: 1572–1578. doi:10.1111/1365-2435.13807.