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The Wealth Gap in World Heritage—Economic Disparity and State Fragility as Factors of World Heritage Preservation

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Abstract

The importance of heritage in global development is a well-established fact, and according to UNESCO the preservation and protection of the cultural and natural heritage of the world should be among the priorities of the global community. This is necessitated by the fact that heritage has been continuously destroyed over time by war and terrorism, modernisation, urbanisation, and climate change. World Heritage sites are global treasures of unique value, and their protection requires efforts on the international scale. Countries may raise resources for maintaining and preserving their endangered World Heritage sites, and for those inscribed on the List of World Heritage in Danger they may apply for international assistance from UNESCO as well. Case studies and examples show that economic affluence and state stability considerably influence the conservation of World Heritage sites. This research investigates the correlation between national economic development and the conservation status of UNESCO World Heritage sites. By analysing data from 31 countries as homes of sites inscribed on the List of World Heritage in Danger, this study examines the relationship between GDP per capita, the volume of international assistance, and the "In Danger" status of sites, adding control factors such as the fragile state index, encompassing threats of war and internal conflicts, and extreme climate events. To the author's best knowledge, no such comparative assessment between development level and international assistance to sites inscribed on the list has been attempted before, so this quantitative analysis is a novel approach of the outlined problem area. The findings aim to demonstrate whether the current global heritage framework effectively supports lower-income nations or if financial disparity remains the primary driver of heritage loss in the face of global climate change and political factors. The main research question is whether the socio-economic status of a nation will remain a stronger predictor of heritage survival than the actual severity of environmental threats, maintaining a "heritage divide" between the Global North and the Global South. This research concludes with recommendations for a more equitable financial model to safeguard universal values in an age of increasing uncertainty.

Keywords: World Heritage sites; List of World Heritage in Danger; economic development; fragile state index; international assistance

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Academic Editors: Matthias Ripp, Christer Gustafsson and Rohit Jigyasu

Received: 12 March 2026
Revised: 12 April 2026
Accepted: 13 April 2026
Published: 16 April 2026

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1. Introduction

1.1. Problem Statement

The importance of heritage in global development is a well-established fact [1,2]. As UNESCO declared, the cultural and natural heritage of the world are irreplaceable sources of life and inspiration. Their importance is acknowledged by the 1972 Convention

Concerning the Protection of the World Cultural and Natural Heritage adopted by the General Conference of UNESCO, which deals with the preservation of cultural sites and the conservation of nature [3]. Heritage crucially impacts the welfare and economic development of societies and creates the foundations of national and personal identity [1,3–5]. The focus on the protection of heritage and maintenance of its values is necessitated by the fact that heritage has been continuously threatened over time by war and terrorism, technological change and modernisation, urban transformation, and climate change [3]. World Heritage sites are a unique treasure of the global community, and their protection requires efforts not only from the host nations but from the international community. This is precisely why the World Heritage Convention came into being: it is an instrument of international cooperation. Simultaneously, a recommendation was adopted dealing not with international cooperation but with national heritage [6]. Countries may raise resources for maintaining and preserving their sites inscribed on the List of World Heritage in Danger, and they may apply for assistance from UNESCO as well [7]. Case studies and examples show that economic affluence and state stability considerably influence the conservation of World Heritage sites [8–15], while, as Lanzoni [16] demonstrates through the example of Delhi in India, Kashgar in China, or Lake Chad in Chad, sometimes the requirements of the World Heritage status may be in conflict with construction projects necessary for industrial development. This research investigates the relationship between sites inscribed on the List of World Heritage in Danger, the major natural and anthropogenic threats, and the international assistance provided for maintenance, conservation or emergency relief. By analysing data from 31 countries as homes of sites inscribed on this list, this study examines the relationship between GDP per capita, the volume of international assistance, and the "In Danger" status of sites, adding control factors such as the fragile state index and extreme climate trends. The findings aim to demonstrate whether the current global heritage framework effectively supports lower-income nations or if financial disparity remains the primary driver of heritage loss in the face of global climate change and political factors, including conflicts, war and terrorism. The main research question is whether the socio-economic status of a nation will remain a stronger predictor of heritage survival than the actual severity of external threats, maintaining a "heritage divide" between the Global North and the Global South. This research concludes with recommendations for a more equitable approach to safeguard universal values in an age of increasing uncertainties.

To the author's best knowledge, no such comparative assessment between development level and international assistance to countries having sites inscribed on the List of World Heritage in Danger has been attempted before on a multi-country level, so this quantitative analysis is a novel approach of the outlined problem area.

The List of World Heritage in Danger is an important instrument in the protection of World Heritage, and many important research issues may emerge in relation to it. However, the present research is limited to only a small slice of the wide range of possible topics. This research has in no way analysed the mechanisms of the List of World Heritage in Danger; that is in itself a very complex issue including nation-state interests, diplomatic lobbying and political bargaining. The World Heritage Committee's decisions inscribing the sites on the List of World Heritage in Danger and the way of allocating international assistance to them are also beyond the present research, though these are challenging topics in themselves that would deserve an in-depth analysis, especially in contrast to our findings, and this issue could be the focus of further research.

This study is limited to those countries that had sites on the List of World Heritage in Danger in 2024. It would be important to check the situation of countries with sites that were proposed for inscription on the List of World Heritage in Danger but for which the inscription was postponed or rejected by World Heritage Committee, as well as the

situations of countries which had sites inscribed on the List of World Heritage in Danger in the past. This could be the scope for further research, and it is a question of whether the conclusions of the current study remain valid compared to these countries. There are many reasons why the World Heritage Committee may have decided to postpone an inscription on the List of World Heritage in Danger or decided not to proceed with the inscription on this list. Such considerations are outside of the scope of the present research.

1.2. Literature Review

1.2.1. Major Causes of Heritage Endangerment

The conflict between development pressures and heritage preservation is a recurring theme in the literature. The main components of socio-economic development, such as urbanisation, industrialisation, infrastructure development and tourism promotion, frequently threaten the conservation of heritage, natural or cultural alike [1,17–20]. Preserving endangered sites is often in conflict with development ambitions, and although international law defines clear limits on damaging heritage for economic gain, state practice is not always fully in line with these [16,21–23].

Economic development (mainly tourism) contributes to both risk and protection of heritage. Tourism is both a driver of economic development and a cause of heritage endangerment [24]. Tourism and cultural industries, while being drivers of economic growth by creating jobs and generating investments and revenues, also lead to overcrowding, environmental degradation, overtourism, congestion, and resource pressures that lead to deteriorating site conditions and to the endangerment of heritage sites. The challenge is to reconcile the needs of development with those of conservation by better targeted communication, visitor management, and experience design to align visitor behaviour with sustainability goals [24–28].

Safeguarding cultural heritage can coexist with economic development, if development is understood broadly to include cultural and social wellbeing and flourishing cultural values, not only growth metrics [22]; however, attention should be paid to trade and investment regimes that may privilege economic claims over heritage protection [22,29,30]. Problems may arise from governance and conflicts related to lack of prior local consultation and participation and disrespect for human rights [16,20]. Local communities and their wellbeing have crucial importance in conservation policy, reflecting a shift toward participatory governance as a way to mitigate development–conservation conflicts and the acknowledgment of a more holistic view of heritage benefits and burdens [20,31].

Additionally, damage can be caused by terrorism and war, often induced by political, ethnic or religious causes [32–34]. Climate-driven risks, like sea-level rise, or extreme events [27,35] further intensify these pressures, compounding site vulnerability and complicating benefit–risk calculations associated with development-led interventions at heritage sites [10,16,22,30]. To mitigate the effects of these threats requires active prioritisation of cultural and ecological values and allocation of managerial, financial and legal resources to the long-term safeguarding of outstanding universal value (OUV) as acknowledged by UNESCO [20,21,36].

1.2.2. Classification of Risk Factors According to the World Heritage Committee

According to the World Heritage Committee, the five most common groups of anthropogenic threats to World Heritage are the following, as each of these affected between 77 and 30% of the World Heritage sites between 1979 and 2013 [36]:

- Management and institutional factors (management plan for historical sites, legal framework, governance, financial resources);

- Buildings and development (related to housing and associated infrastructure, visitor facilities, and industrial development);
- Social/cultural uses of heritage (e.g., the impacts of tourism and impacts on local identities);
- Transportation infrastructures;
- Other human activities (i.e., civil unrest, illegal activities, deliberate destruction of heritage).

In addition, climate change and severe weather events were found to threaten 14% of the heritage sites in the 1979–2013 period directly [36]. Climate change can also contribute to the changes in local conditions (12% of sites affected, mainly due to water, radiation, humidity, temperature, and wind) and indirectly to the occurrence of ecological changes, pollution and the spreading of invasive species (representing threats at 16%, 16% and 7%, respectively) [36].

A similar but slightly different categorization was set up by Seila et al. [37], who identified six major areas that may hinder effective management of heritage sites:

- Administrative institutions (inadequate structures, skill deficiency, lack of coordination between relevant institutions, obstacles in implementing plans, outdated information);
- Stakeholders (inadequate coordination among them, neglecting the involvement of local communities);
- Financial resources (insufficient funding, poor financial practices, centralisation, dependency on external support);
- Legislation and policies (lack or ambiguity of legal framework, ineffective implementation);
- Natural and human risks (urbanisation, vandalism, pressures by economic development, neglecting disaster preparedness, pressures of the natural environment such as weather and climate); and
- Political issues (fluctuations of political power, lack of political support).

The various threat categories were found to differ in their impacts across regions, as summarised by Veillon [36].

- Regarding the management and institutional factors, Africa was significantly more affected by threats related to financial resources and human resources, while the problems of the legal framework impacted Arab countries, Latin America and Caribbean regions the most.
- In the category of buildings and development, housing affected Asia and Pacific regions the most, while Africa was not impacted in this regard and Arab countries only slightly. Africa was, however, the most affected region by industrial developments, and Asia and Pacific regions were affected by developments related to the development of visitor facilities.
- Regarding social/cultural uses of heritage, local identity threats were mostly felt in Africa, Latin America and the Caribbean, and Arab regions, while the impacts of tourism affected Asia and Pacific regions the most.
- Transportation infrastructures showed different regional impacts; the establishment of ground transport infrastructure represented high threats in the Asia and Pacific region, Latin America and the Caribbean, while the use of transport infrastructure created the most risk in Arab countries and in Latin America and the Caribbean.
- The factors within the other human activities category also impacted regions differently; the deliberate destruction of heritage was most damaging in the Arab countries, illegal activities affected mostly Africa and the Asia and Pacific region, civil unrest and war were threats mainly in Africa, military training was noted in Latin America and the Caribbean, and terrorism was mainly in Europe and North America.
- Within the category of climate-induced risks, the change in oceanic waters and desertification were most threatening in Africa and Arab countries, with drought in Africa,

flooding in Arab countries and in Latin America and the Caribbean, storms in Latin America and the Caribbean, and temperature in Arab countries, Europe and North America, and Latin America and the Caribbean, while relative humidity posed a threat mainly in Europe and North America and water (rain or water table levels) posed a threat in Africa, Arab countries, and Latin America and the Caribbean.

The existence of strong regional differences was also established by Brown et al. [38], who also underline that inscription to the list is heavily related to the setup of the decision-making committees of UNESCO.

1.2.3. The Effects of Climate Change on the Conservation of World Heritage Sites

Climate change is the most prevalent threat to World Heritage sites, and especially to natural sites, as an empirical study established by assessing 245 natural and mixed WH sites in 2014, 2017 and 2020, applying multivariate regression models controlling for size, type of threat, climate zone, continent, and type of site [39].

The main aspects of climate change that can affect natural heritage sites are the following [40]: Natural heritage is affected in polar and mountain regions by the melting ice caps, glaciers, permafrost, sea ice, ice and snow cover. The coral reefs are also severely affected by sea level rise, storm frequency and intensity, changing oceanic circulation, and ocean acidity, and especially sea temperature increase leading to coral bleaching. The rising temperatures and atmospheric CO_2 concentrations directly or indirectly impact plant and animal species and their ecosystems. The changing length of the growing season, due mainly to warmer temperatures, pushes plant and animal territories towards the poles and to higher elevations, while increased temperatures and atmospheric CO_2 concentrations change the impacts of invasive alien species upon indigenous species. All these changes lead to shifts in species ranges, and sometimes to the extinction of species, resulting in changed composition and configuration of biotic communities.

Similarly, severe impacts are forecasted for cultural heritage as a consequence of rising temperature and changing precipitation patterns, accompanied by changes in the surrounding flora and fauna [40,41]. The changing hydrological, chemical and biological processes of the soil may endanger the preservation of archaeological remains. The structures and materials in historic buildings are rather porous and draw water from the ground into their structure, losing it to the environment by surface evaporation. Therefore, increases in soil moisture might lead to greater salt mobilisation and to damaging crystallisation on decorated surfaces through drying [42]. Wooden and other organic constructs and building materials may suffer from biological infestation of pests in altitudes and latitudes that were previously free of such threats. Flooding may damage building materials not designed for wet environments, and drying after such floods can lead to the growth of moulds and other damaging micro-organisms. Rapid flowing water may also erode buildings. Increased storm and wind intensity and frequency can lead to structural damage, while higher levels of humidity, higher temperatures and increased levels can also harm buildings and other constructs. Desertification, salt weathering and erosion is threatening cultural heritage in desert areas.

A questionnaire survey conducted in 2005 by the World Heritage Centre about the impacts of climate change on World Heritage properties showed that of the 83 participating states, 72% acknowledged that climate change had an impact on their natural and cultural heritage, with a total of 124 World Heritage sites (79 natural or mixed, and 46 cultural) mentioned specifically to be threatened [40]. Current case studies and analyses reflect the same threats as listed in the 2005 survey. The Abu Mena site in Egypt suffers from rising groundwater levels and increased salinity in the walls, arising not only from climate change but from the land reclamation and agricultural development in the area [18].

Historic environments suffer more from climate instability than modern buildings, as changes in rainfall patterns and temperatures that do not affect modern structures may cause serious damage to buried or exposed archaeological sites; historic buildings and museum collections are usually more affected by relative humidity, and old drainage systems may be incapable of coping with increasing rainfall [23]. For example, rising sea levels and coastal erosion have affected the archaeological Roman site of Tróia, Portugal, located at the shoreline of the River Sado estuary in the vicinity of the Atlantic Ocean, and communities from Chesapeake Bay, United States, such as Hooper's and Tangier Island, have literally been washed away [23]. Another example of the threats by coastal erosion and sea level rise induced by climate change is the Castle of Paphos on the island of Cyprus, for which the proactive creation of barriers and water management systems may be the way to protect heritage sites from water infiltration and other water-related threats [43]. Not only tangible heritage is in danger, but intangible cultural heritage is also under pressure from climate change. Rising temperatures towards the poles threaten the Inuit heritage in Canada, while rising temperatures, decreasing precipitation, and the resulting extreme droughts and forest fires critically endanger the native American Indian communities in California [44].

Precipitation has been identified as the major factor of climate-induced damage [40,42,45] by damaging porous surfaces, leading to microbial growth on wooden and stone structures, corrosion on metal structures, and scouring and erosion in general. More direct damage is caused by the precipitation level itself than the variation in precipitation, the effect of which is more indirect. The impacts of precipitation-induced risk on the cultural heritage in China show that the impacts of precipitation-induced risk vary widely with heritage type, but also with geography and latitude, with northern regions being less at risk than southern ones on average [46]. Veillon [36] also gives a detailed analysis by heritage types and regions about the possible threats of climate change, including precipitation, temperature, humidity, radiation, extreme weather events, desertification, and rising ocean levels. The Kruger National Park in South Africa is an example of threat caused by changed precipitation patterns. Coral bleaching is also experienced by the shores of South Africa, while warming water temperatures endanger exotic species of the aquatic ecosystems in the rivers of the country [19].

Drought frequency and severity are also points of concern. Drought is the result of insufficient precipitation, often accompanied by high temperatures. The example of the Konso cultural landscape in Ethiopia shows that drought reduces farm productivity with serious negative consequences on the livelihood of the community, and this may result in the abandonment of rituals which are essential for the continuity of the cultural landscape. In addition, drought makes local people engage in non-farm activities, giving up their traditional lifestyle that is essential in preserving the cultural landscape. Another negative consequence is seen in the changes in the architectural design and structure of houses, as Konso traditional houses covered with grass are replaced by modern houses made from corrugated iron sheets, which can accelerate soil erosion and land degradation [47].

1.2.4. Threats to Heritage by Anthropogenic Reasons and Armed Conflicts

Threats to heritage are often the result of state practice in the name of "development" [17], of which Lanzoni [16] lists several examples: In the late 1960s, the dictator of Romania initiated a policy of land reform that led to the destruction of important cultural districts in many cities and towns, including neoclassical and art nouveau groups of buildings, as well as historical churches. A similar example is the former Soviet Union, where at political order the iconic Königsberg Castle, a thirteenth-century fortress, was destroyed in 1968; another example includes the Red Guards' barbaric actions against traditional

temples and shrines in China and Tibet during the Cultural Revolution in the mid-1960s, or the destruction of the Buddhist heritage of Cambodia by Khmer Rouge between 1975 and 1979. Another striking example is the plan by Saudi authorities in 2022 to demolish the Ajyad Fortress, an eighteenth-century Ottoman citadel in Mecca, to clear the place for a five-star residential complex; the destruction continued in 2014, with the demolition of more historical buildings and sites dating back to the eighth century, for a new real estate project in the area. More recent examples are Iran and the Middle East and the border conflict between Cambodia and Thailand in 2025.

Petra in Jordan, a World Heritage site since 1985, is currently threatened by risks of many different kinds, both natural and anthropogenic [48]. Natural causes are weathering, flash floods and biological damage, which particularly affect the monuments in Petra because of the specific and vulnerable characteristics of the rock from which they are carved and built. Anthropogenic impacts include vandalism, theft, and incorrect restoration interventions on the rock-cut facades. Tourism development, and especially overtourism, are other major factors threatening the integrity of the property.

Armed conflicts constitute a major threat to cultural and natural heritage in the twentieth and twenty-first centuries. Cultural sites have frequently become deliberate targets, motivated by military strategies, ideological agendas, or political objectives, as evidenced in recent conflicts in Syria and Iraq, the targeted destruction of heritage sites in Mali, and recent attacks on historic cities in Ukraine [49].

1.2.5. Inequalities in Receiving the World Heritage Status and Related Financial Aspects

Since the establishment of the concept of World Heritage sites, severe debates have related to the unequal regional distribution of sites placed in the World Heritage List [6,8]. Europe and North America are severely over-represented, having at least twice as many sites on the list as the next highest region, Asia and Pacific.

The preparation of nominations has become very costly, and besides considerable financial resources it also requires expertise in heritage conservation [50], so financial capacity and expertise affect the number of sites inscribed on the list. The world's twenty-one richest countries have on average thirteen World Heritage sites. The other 146 countries that ratified the convention have on average a little more than three World Heritage sites on average [8,51].

Heritage is often considered as a cost to society and a financial burden to be tolerated, as museums, ancient monuments, historic buildings, parks, gardens and cultural landscapes have to be maintained at public cost [52]. Today, due to economic problems and social change, raising the necessary funds for these tasks becomes increasingly difficult without the proper context and nuances. Many historic assets are converted to alternative uses, although the costs of such conversions may be economically unprofitable, requiring new models for financing such projects, such as public money or public–private partnerships, social enterprises and investment funds, or grants from national or international organisations [52]. The World Heritage Fund also provides international assistance for heritage conservation to sites enlisted as World Heritage sites [7]. The major types of international assistance available are the following: emergency assistance, which is a rapid aid for urgent repairs to sites damaged by human-made or natural disasters; conservation and management assistance which is funding for preserving, monitoring, and managing sites; and preparatory assistance, which is an aid for preparing nomination files for the World Heritage List or tentative lists. The major source of international assistance is the World Heritage Fund, with roughly $7.3 million for 2026–2027, and sites on the List of World Heritage in Danger are prioritised when applying for such assistance [6]. It should

not be forgotten, however, that not all funding for World Heritage sites of for sites inscribed on the List of World Heritage in Danger is channelled through the World Heritage Fund.

1.2.6. Models Applied for Analysing the Impacts of Hazards on Heritage

Econometric models are popular tools to assess relationships between heritage management and threat factors. The most favoured tools are correlation analysis, regression analysis, analysis of variance, and the application of vulnerability indices [32,36,39,46,53,54].

Mekonnen et al. [53] applied correlation analysis, analysis of variance and regression analysis to assess the main factors that influence cultural heritage conservation in the Amhara region, Ethiopia, based on a survey conducted in 2021. Though the R-square value of explanatory power of their model was very low (0.08 only), the model findings showed significant positive impacts of lack of stakeholder involvement and population settlement and significant negative impacts of lack of community concern and illicit trafficking, as well as of natural catastrophes and agricultural practices, as main factors hindering heritage conservation.

Hosseini et al. [54] analysed the relationship of the tourism industry to the number of World Heritage sites for 21 developing nations for 2000 to 2016, with the purpose of determining whether possessing WH sites significantly impact the tourism industry in developing countries. In the analysis, based on previous studies, they included the country GDP, the area, and the number of WH sites as input variables, while the outputs were international tourist arrivals and international tourism receipts. Their findings show that countries with larger economies, and more devoted governments, are more successful in nominating and promoting their heritage sites to the WHS list. This is also demonstrated by Wang et al. [46] about China, a very successful country in this respect, in contrast to Egypt and Iraq who, despite their magnificent historical heritage, are far less successful from this perspective. This reflects the fact that the process of designation is easier for wealthier countries, such as China, Italy, and France, than for less affluent ones.

Wang et al. [46] analysed the precipitation-induced risk on the cultural heritage in China using the weighted average of the amount of forecasted maximum annual precipitation of 2021–2099 compared to the average of 1973–2019 and the forecasted variation in annual precipitation of 2021–2099 to that of the 1973–2019 period.

Falk and Hagsten [39] applied multivariate models to evaluate the impacts of climate change, assessing 245 natural and mixed WH sites, in 2014, 2017 and 2020 and controlling for size, type of threat, climate zone, continent, and type of site.

Chen et al. [55] used maximum temperature, warm spell duration, maximum precipitation and the SPEI indicator (Standardised Precipitation and Evaporation Index) as measures of extreme heat, rain, and drought to assess their impacts on 247 natural heritage sites. Thresholds were specified, and exposure of heritage sites to above-threshold weather events were measured; then, correlation analysis was performed between biodiversity indicators and the occurrence of extreme weather events, resulting in mainly negative values.

Canesi et al. [56] carried out a vulnerability assessment of the Wachau region in Austria in response to climate-related hazards, measuring vulnerability as the weighted sum of susceptibility, exposure and resilience index values, using weather time series from 2000 to 2018 to create the mentioned indices, and then creating forecasts up to 2100 based on climate simulations. Their findings indicate that the region is particularly vulnerable to precipitation-related extremes, such as heavy rain and flooding.

Brimblecombe et al. [27] applied minimum and maximum temperatures together with precipitation data to evaluate how climate influences the pilgrimages to Lalibela, Ethiopia, and then, using weather projections up to 2065, estimated the impacts on future pilgrimages. Their findings suggest that most difficulties are expected from increased rainfall in the area, making travel more difficult. They found that warming will make travel generally easier

because of less frost and cold, but the higher numbers of hot days above 30 °C may make travel less pleasant and more demanding.

Assen et al. [47] used a wide range of climate indices including highest daily rainfall amount, annual rainfall above 10 mm, total annual rainfall, daily maximum and minimum temperatures, average temperatures, warm spell and cold spell duration index, from 1984 to 2020, to assess the impacts of drought on Konso, Ethiopia. Based on the trends of the measured variables, the vulnerability of the Konso cultural landscape was forecasted. Similar analysis was applied by Antoniou et al. [57] about the Dion monument in Pieria, Greece, a cultural heritage site historically affected by severe rainfall. They identified critical climate risks, such as rising temperatures and an increased frequency of intense rainfall events that contribute to flooding, which may be most harmful in the future.

In spite of numerous analyses and case studies on impacts of various risk factors, most notably, of climate, there are still areas with insufficient analyses related to conservation of World Heritage sites and their connection to development. There is limited causal evidence quantifying how specific development interventions (e.g., new transport corridors, cruise terminals) alter endangerment risk and heritage condition over time; future work should combine panel data with conservation status indicators to isolate effects [19]. More research is needed on who gains and who bears costs when WH status is leveraged for development to design equitable benefit sharing and anti-displacement safeguards [18,58]. Further research is needed to examine how international assistance and national financing streams can be structured (e.g., performance-based grants, resilience bonds) to internalise conservation externalities within development projects, as well as designing tools that align climate adaptation with economic strategies and heritage conservation [22,58].

The present study addresses some of these areas by identifying major causes of endangerment on a multi-country level generated by the natural environment or by human activities, revealing distributional inequalities in international financial assistance for sites inscribed on the List of World Heritage in Danger and for heritage conservation.

2. Materials and Methods

2.1. Data

This study employs a multi-source quantitative method to analyse the relationship of economic development and heritage vulnerability. Data are collected from the statistics presented on the website of the List of World Heritage in Danger [6], the International Assistance Website [59], Fund for Peace [60], the World Bank Climate Knowledge Portal [61], and the World Bank World Development Indicators [62].

Data were collected for 31 countries that have sites inscribed on the List of World Heritage in Danger in 2024 (see Figure 1). Indicators were computed for these countries, such as endangerment rate (percentage of their World Heritage sites inscribed on this list) and International Assistance Dependency Ratio (total international assistance paid for conservation or emergency purposes per total annual GDP). The analysis utilises bivariate correlation, ANOVA and OLS regression analysis to identify relationships, using control variables such as income level and regional location, and the impacts of climate- related risks (computed from temperature and precipitation information), and socio-economic and political risk (represented by the fragile state index) are accounted for in these relationships.

It is worth noting that inscription on the List of World Heritage in Danger is viewed differently by different countries. Some of them apply to be inscribed on the list to attract international attention to their problems and to obtain assistance in solving them. Other countries avoid an inscription, as they view it as a dishonour, even if sites in the World Heritage in Danger are not looked upon as being under some sanction but as acknowledged for their specific conservation needs [59].

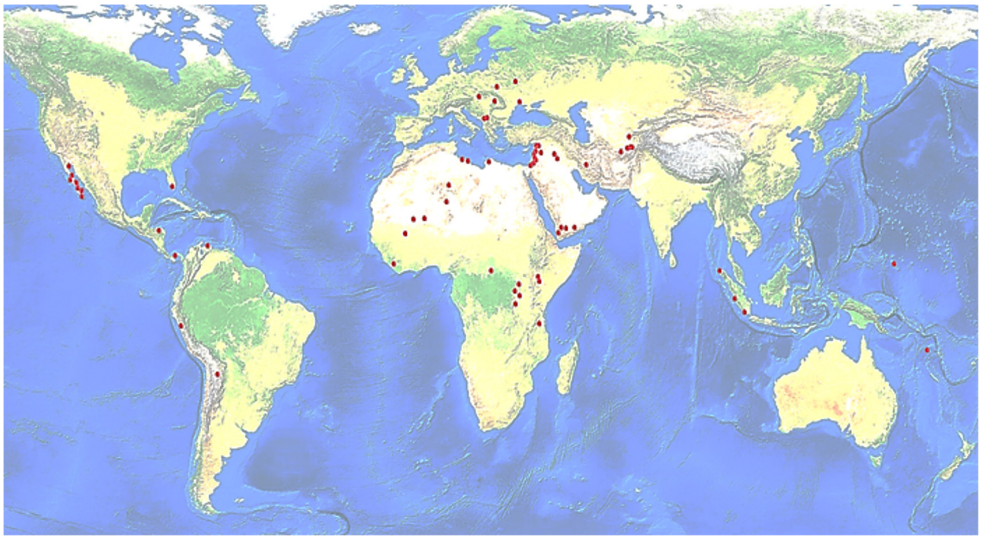


Figure 1. Sites inscribed on the List of World Heritage in Danger in 2024. (source: author's own construction based on data from [6] and the map downloaded from https://commons.wikimedia.org/wiki/File:World_map_geographical.jpg, accessed on 8 April 2026).

Table 1 lists the variables used in the present analysis, indicating the exact source of the publicly available data. All the data reflect the situation in 2024, either by downloading the relevant values for that year, or by computing a cumulative value up to that year. The justification for choosing the listed risk indicators and control variables is explained in Sections 2.2 and 2.3 and the handling of the output variables is described in Section 2.4 in detail.

Table 1. List of variables in the analysis.

Name of Variable	Meaning or Variable	Range or Unit	Data Source
WHS	The number of World Heritage sites per country in 2024	number of sites	[6]
IA	The international assistance paid to a country from 1978 to 2024, for conservation or emergency purposes	USD	[59]
WHDS	The number of sites inscribed on the List of World Heritage in Danger in 2024 (inscribed up to 2024 and not removed)	number of sites	[6]
ER	Endangerment rate, WHDS/WHS	%	computed (Section 2.4)
IADR	International Assistance Dependency Ratio, IA/GDP	ratio	computed (Section 2.4)
IApWHS	International assistance per WHS = IA/WHS	USD	computed (Section 2.4)
IApWHDS	International assistance per World Heritage in Danger site = IA/WHDS	USD	computed (Section 2.4)
FSI2024	The fragile state index in 2024, representing state vulnerability from social, economic, technological or political reasons	score between 20 and 120	[60]
TempCI	Temperature change index, the mean of the last 10 years (2015–2024) divided by that of the first 10 years (1978–1987)	ratio, higher values mean more warming	computed (Section 2.3) from temperature time series [61]
PrecCI	Precipitation change index, standard deviations of the de-trended time series, the value of the last 10 years divided by that of the first 10 years	ratio, higher values mean more uncertain precipitation	computed (Section 2.3) from precipitation time series [61]
GDP, lnGDP	Total current GDP of the country in 2024 and its ln-transformed version	USD	[62]
GDPpc, lnGDPpc	The per capita current GDP of the country in 2024 and its ln-transformed version	USD	[62]
Region	Dummy for UNESCO regional groups of countries: Europe and North America (ENA); Africa (AFR); Asia and Pacific (APA); Arab states (ARB); Latin America and Caribbean (LAC)	-	[59]
InCat	Dummy for country groupings by income level (per capita GNI); low-income countries (LIC: up to $1145), lower-middle-income countries (LMIC: $1146–$4515); higher-middle-income countries (HMIC: $4516–$14,005); high-income countries (HIC: above $14,005)	-	[62]

As was mentioned before, hazards that can threaten heritage sites include terrorism and war, ethnoreligious conflicts, development-related land use plans, tourism and overtourism, and climate; therefore, the chosen variables include weather-related variables and indicators that can capture anthropogenic hazards, too. These indicators will be explained in Sections 2.2 and 2.3.

2.2. Hazards from Anthropogenic Reasons (Political, Economic, Socio-Demographic)

Anthropogenic hazards are measured by the fragile state index (FSI) and its components in the present analysis. The concept of state fragility was established to evaluate the exposure of countries to risks arising from economic, social, political and international conditions and the capacities of nations to cope with these risks. Fragility is understood as the combination of high exposure and insufficient coping capacity [63,64]. The main drivers of state fragility are reflected by economic, environmental, political, security, societal, and human dimensions. Although various aspects of the stability of nations can be measured by several other indicators—such as the Global Terrorism Index [65] and the Global Peace Index [66], focusing on the political and security-related aspects of state fragility; the Economic Vulnerability Index [63] which is used for identifying the least developed countries by the United Nations; or the Index of Economic Freedom [67], which can assess fragility from an economic viewpoint—the fragile state index [68,69] has a multi-purpose character, incorporating economic, social, political and security, environmental, and human aspects of state fragility. This complexity makes it useful for our analysis.

The FSI value is constructed by 12 sub-index values:

- C1: Security Apparatus; C2: Factionalized Elites; C3: Group Grievance;
- E1: Economy; E2: Economic Inequality; E3: Human Flight and Brain Drain;
- P1: State Legitimacy; P2: Public Services; P3: Human Rights;
- S1: Demographic Pressures; S2: Refugees and IDPs;
- X1: External Intervention.

Comparing these sub-index values, it can be seen that most of the anthropogenic hazards threatening heritage are covered by one or more sub-indices. War and terrorism can be reflected in C1, subnational conflicts can also be captured by C2 and C3, while and P1 may reflect unrest related to state legitimacy and P3 to issues about human rights. The indicator S2 reflects the situation about external and internal refugees, and X1 measures the fragility related to external intervention. The indicator P2 can capture problems associated with overtourism that are related to insufficient public services and partly to extreme climate events that would necessitate larger capacities of public services. S1 also contain aspects of human hazards through fragility due to demographic pressures.

The United Nations member and observer states are ranked annually by the fragile state index. The index is computed by relying on quantitative and qualitative primary data collection and expert validation. The FSI scores range from 0 to 120, with higher scores indicating more fragility. The fragility status categories are the following: sustainable (0.0–29.9), stable (30.0–59.9), warning (60.0–89.9), and alert (90.0–120.0) [68,69]. The FSI is widely used in assessing the violence and conflict situation in the world and is used by the OECD annual reports together with indicators of economic performance [64]. It is also used in climate change resilience assessment [70], in analyses of economic and defence conflicts [71], and in evaluating economic vulnerability [63] or city conflicts [72], among others.

2.3. Hazards of Damage from Climate Change, Computed from Precipitation and Temperature Time Series, 1978–2024

Hazard-index values were computed, based on the logic of Wang et al. [46], Pendergrass et al. [73] and Sesana et al. [41].

The first option to compute such an index is the following. The chosen weather time series is de-trended, removing a linear trend from the original data. Then, the standard deviations are computed for 10-year periods. The first 10-year period is chosen as baseline, and the value of the last 10-year period is divided by the value of the baseline period. The resulting value can be used as an index of climate change, reflecting the increasing or decreasing variability of the chosen weather time series. This procedure is best used for full datasets without missing data. This method is preferred for weather variables, where visual analysis shows an insignificant increasing or decreasing trend, compared to the fluctuations present in the data, as is the case for precipitation in the analysed countries. This is the method we applied to compute PrecCI from the annual precipitation time series for each of the 31 countries in the analysis.

An alternative solution is to use the original time series and compute the 10-year mean values. Then, the mean for the last 10-year period is divided by the mean of the baseline period. The result reflects the increase or decrease in the mean value of the time series. This approach is best used when there is a definite trend in the data series, which is more significant than the variations in the annual values around the trend. For our weather series, this method is most suitable for the temperature data. This was the method we used to compute the TempCI values from the original annual maximum temperature time series for the analysed 31 countries. The same approach could be used for annual mean temperatures and for annual minimum temperatures, and the computations would lead to similar results, as the present author tested it. With global warming being the issue of rising temperatures, it seemed reasonable to work with the annual maximum temperatures as climate indicators here.

2.4. Indicators for Heritage Vulnerability and International Assistance

Endangerment rate (percent): This indicator is computed for country i as

$$ER_i = 100 \times WHDS_i / WHS_i$$

International Assistance Dependency Ratio: It is computed from the total international assistance received by country i for emergency or conservation purposes from 1978 to 2024, divided by the annual GDP of the country in 2024. This indicator reflects the amount of international assistance compared to the economic strength of the country.

$$IADR_i = (\sum_{j\ =\ 1978\ldots2024} IA_{ij}) / GDP_i$$

The assistance amount is also presented in proportion to the total number of World Heritage sites (*IApWHS*, international assistance per WHS) and to the number of inscribed sites (*IApWHDS*, international assistance per World Heritage in Danger Site) for country i:

$$IApWHS_i = (\sum_{j\ =\ 1978\ldots2024} IA_{ij}) / WHS_i$$

$$IApWHDS_i = (\sum_{j\ =\ 1978\ldots2024} IA_{ij}) / WHDS_i$$

These indicators reflect how much international assistance is paid, on average, to support one heritage site and one inscribed site, respectively. The purpose of computing *IADR*, *IApWHS*, *IApWHDS* and *ER*, and to compare them to per capita GDP, is to see whether there is income-related inequality in allocating international assistance to countries in need and whether more affluent countries have better capacity (operational or diplomatic) to keep their WHSs from inscription on the List of World Heritage in Danger.

2.5. Statistical Methodology

Methods of the statistical analysis are the following [74]:

- Descriptive statistics of the variables chosen for the analysis, including testing for the normality of distributions, both for the downloaded data and for the indicators computed for the purposes of the analysis.
- Bivariate correlation relationships between variables to identify interdependencies that may influence the further statistical tests.
- Comparisons of the characteristics of the derived indicators across regions and across income groups by means of the Kruskal–Wallis test to account for the non-normal distributions of variables.
- OLS regression estimations to identify the main natural and anthropogenic risks contributing to heritage sites being inscribed on the List of World Heritage in Danger and to identify relationships of the international assistance to income levels and economic power. The OLS regression estimations used the following model:

$$Y_i = \sum_{(j = \ldots J)} A_j D_j + \sum_{(k = 1 \ldots K)} B_k X_{ik} + \sum_{(s = 1 \ldots S)} C_s Z_{is} + e_i$$

where Y_i: the chosen dependent variable (*ER*, *IADR*, *IApWHS*, *IApWHDS*) for country i,

D_j: regional dummy (1 if country i belongs to region j, 0 otherwise),
X_{ik}: the k-th risk indicator (*FSI2024*, *TempCI*, *PrecCI*) for country i,
Z_{is}: the s-th control variable (*GDP*, *GDPpc*) for country i, and
$A_j.B_k$, C_s: the coefficients estimated for the model.

In order to deal with the strong skewness in GDP values, instead of the original figures, the ln-transformed versions were used, as is usual in econometric analyses. Similar OLS estimations are used in the studies mentioned in Section 1.2.6.

3. Results

3.1. Descriptive Analysis of Variables

The descriptive statistics for the variables of the analysis are presented in Table 2. The last two columns of the table show the results of the Kruskal–Wallis test for differences between regions and income categories for the main variables of the analysis.

Table 2. Descriptive statistics and Kruskal–Wallis test by region and income groups.

(31 Countries)	Min	Max	Mean	St Dev	Kr-W Stat (Regions)	Kr-W Stat (Income Groups)
WHS	1	35	7.84	7.77	7.325	13.350 **
IA	30,000	1,308,738	372,532.1	314,957.7		
WHDS	1	6	1.74	1.32	10.096 *	11.312 *
GDP	471.43	28,750,956	1,122,935	5,143,419		
GDPpc	413.76	84,534.04	9218.91	17,710.86		
FSI2024	23.1	108.1	80.4	20.7	14.511 **	20.395 ***
TempCI	0.993	1.257	1.056	0.065	3.509	2.743
PrecCI	0.030	1.712	0.891	0.368	6.026	0.912
ER	2.86	100.00	39.67	33.53		
IADR	0.01	81.95	14.51	19.88		
IApWHS	5000	262,835.5	78,739.81	74,192.31		
IApWHDS	12,625	1,308,738	286,509	288,829.9		

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$. See variable names in Table 1.

As Table 2 shows, neither the regions nor the income categories of the 31 countries show any significant difference in the precipitation index and the temperature index. The temperature index shows that the maximum temperature is 1.056 times higher in the

last decade (2015–2024) than in the first decade (1978–1987), i.e., a 5.6% rise was experienced in the analysed countries. According to the precipitation index, the mean value of 0.89 shows that the variation around the trend in the last decade is 89% of that of the first decade, i.e., precipitation becomes less variable in the analysed countries.

However, FSI2024 values differ significantly both across regions and income categories. As Figure 2 shows and Kruskal–Wallis tests verify, the Europe and North America, Asia and Pacific, and Latin America and Caribbean regions have significantly lower mean values than Africa and the Arab States, and high-income countries have significantly lower values than all other income categories, while low-income countries show significantly higher values than all the other income categories. Looking at the number of World Heritage sites, they do not differ significantly by region but rather by income categories (low-income countries have significantly lower values than high-income and higher-middle-income countries, while high-income countries have significantly higher values than low- and lower-middle-income countries). The number of sites inscribed on the List of World Heritage in Danger, however, differ both by regions (with Arab States having significantly higher values than all the other regions) and by income categories (low-income countries having significantly higher values than high- and higher-middle-income ones).

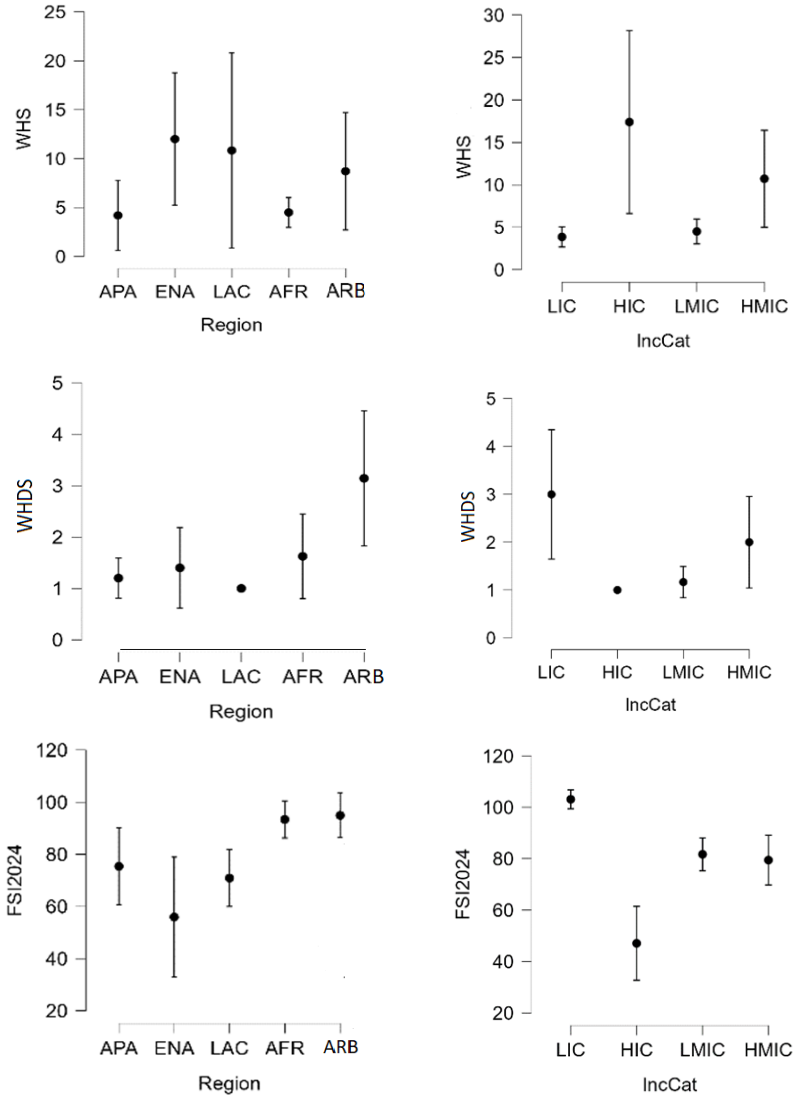


Figure 2. Mean values of WHS, WHDS, and FSI by region and by income category (see Table 1 for acronyms).

Table 3 presents the bivariate correlations for the ln-transformed values of GDP and GDP per capita, the number of sites inscribed on the list, endangerment ratio, *FSI2024*, and the temperature and precipitation climate index values.

Table 3. Bivariate correlations for selected variables.

	lnGDP		lnGDPpc		ER		WHDS		FSI2024	TempCI	
lnGDPpc	0.5398	***	—								
ER	−0.6617	***	−0.5162	***	—						
WHDS	−0.1886		−0.2628		0.4566	**	—				
FSI2024	−0.4306	***	−0.5856	***	0.5543	***	0.5819	***	—		
TempCI	0.1883		0.1017		−0.2020		−0.0654		−0.2340	—	
PrecCI	−0.0043		0.1421		−0.0464		0.1455		0.0022	0.2687	*

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$, Kendall–Tau coefficients for small samples. For variable names see Table 1.

It is noticeable that the climate indicators did not show reasonable correlations with the fragile state index (*FSI2024*), nor with the logarithm of GDP (*lnGDP*) or with logarithm of the per capita GDP (*lnGPDpc*), either, i.e., there are no multicollinearity issues among them. The FSI2024 variable is correlated to both *lnGDP* and *lnGDPpc*, but the absolute values of the correlation coefficients are below 0.6, so their correlations do not mean unacceptable levels of multicollinearity [74]. The endangerment rate (*ER*) is correlated to *lnGDP* and *lnGDPpc* negatively and to *FSI2024* positively, suggesting that high income or economic power of a country means lower endangerment rate, while high state fragility leads to increased endangerment rate. The temperature and precipitation climate index values do not show significant correlations to *ER*, so their impact on heritage endangerment rate is more subtle, if any.

The top panel of Figure 3 compares countries by GDP per capita and by the assistance they received from UNESCO for heritage conservation or for emergency relief. According to the figure, the increasing GDP per capita indicates decreasing *IApWHS* (international assistance per WHS), though with fluctuations. However, the values of *IApWHDS* (assistance per WH in Danger Site) show a different pattern. Some of the most affluent countries received as high assistance per inscribed site as the poorer ones, so the assistance allocated to countries does not take into account the resources of countries to care for their World Heritage sites in danger.

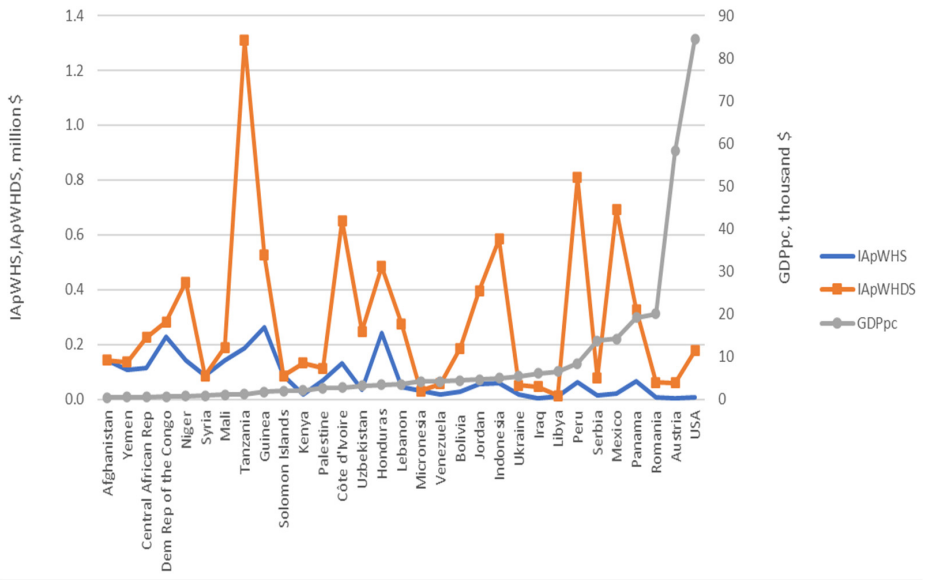


Figure 3. *Cont.*

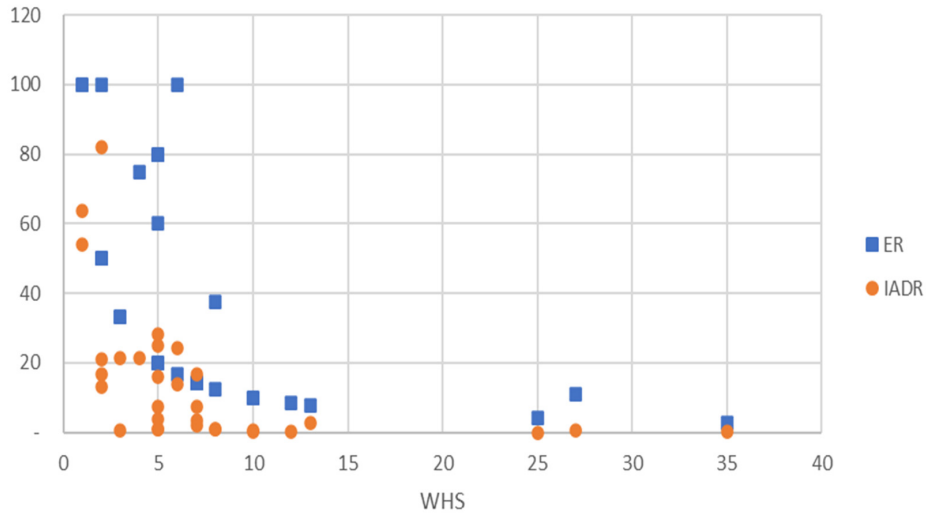


Figure 3. International assistance per WHS (*IApWHS*), international assistance per WH in Danger Site (*IApWHDS*) and *GDPpc* (**top panel**), and endangerment rate (*ER*) and International Assistance Dependency Ratio (*IADR*) by WHS (**bottom panel**).

The bottom panel of Figure 3 shows ER (endangerment rate, as percent of WHS) and *IADR* (assistance per GDP) by the number of World Heritage sites. As the figure shows, both *ER* and *IADR* decrease with increasing WHS, that is, the less WHS a country possesses, the higher proportion of these sites is in danger. Furthermore, the less WHS a country possesses, the higher international assistance is paid for it compared to its total GDP.

3.2. Kruskal–Wallis Tests for Differences by Regions and by Income Categories

ER (endangerment rate): Significant differences are revealed between regions and income categories (Table 4), though the regional differences are significant mostly at the 10% level. The ENA region has a significantly lower endangerment rate than APA, AFR and ARB, and the LAC region is also significantly lower than APA. Looking at income categories, low-income countries have a significantly higher proportion of WHS inscribed on the List of World Heritage in Danger than those having higher incomes, with LIC having higher values than HIC, HMIC and LMIC, and LMIC having higher values than HIC.

ADR (Assistance dependency ratio): As the non-parametric Kruskal–Wallis test shows, the assistance dependency ratio significantly differs both by region and by income category (Table 4). The ENA region has significantly lower values than APA, AFR, and ARB, and the value for LAC is significantly lower than AFR. The *ADR* value is significantly lower in LIC and LMIC than in HIC and HMIC; two low-income categories receive significantly lower assistance per GDP than the two high-income categories.

IApWHS (international assistance per WHS): *IApWHS* also reflects significant differences across regions and income categories (Table 4). The ENA region received significantly less assistance per WHS than APA, LAC, AFR, ARB (though this latter is significant only at 10% level), and both LAC and ARB values are lower than that of AFR. Regarding the income categories, the two lower-income categories are significantly above the two higher-income categories, though the difference between LMIC and HMIC is significant only at 10%.

IApWHDS (international assistance per WH in Danger Site): For *IApWHDS* the differences by regions are significant; both ENA and ARB are significantly lower than LAC and AFR, while the differences by income categories are not significant (Table 4).

This suggests that although *ADR* and *IApWHS* seem to favour lower-income countries, providing more assistance to them compared to their GDP or WH numbers, the *IApWHDS* reflects an entirely different pattern. While low-income countries have significantly higher

endangerment rates, they do not receive more assistance per site inscribed on the List of World Heritage in Danger, even if their own resources are obviously much less than that of higher-income countries.

Table 4. Mean values and Kruskal–Wallis test results for ER, IADR, IApWHS and IApWHDS.

Region (N)	ER	IADR	IApWHS	IApWHDS	IncCat (N)	ER	IADR	IApWHS	IApWHDS
	Mean					Mean			
APA (5)	64.858	27.40	70,393.66	218,012.0	LIC (7)	74.05	29.97	137,311.02	212,924.8
ENA (5)	15.966	0.39	10,537.13	85,141.0	LMIC (12)	40.45	18.47	95,774.29	341,497.0
LAC (6)	21.362	3.98	72,479.01	425,855.5	HMIC (7)	25.80	1.97714	32,427.37	282,257.8
AFR (8)	41.890	23.36	152,615.46	468,065.7	HIC (5)	9.038	0.89	20,694.78	263,507.2
ARB (7)	51.724	14.30	54,354.64	152,336.4					
Kruskal-W *z*	7.21636	13.724 **	14.9125 **	11.2957 *	Kruskal-W *z*	14.76524 **	18.91 ***	14.7926 **	0.6332
	Dunn's Post Hoc z					Dunn's Post Hoc z			
APA—ENA	2.0591 *	2.5914 **	2.2260 *	1.07820	LIC—HIC	3.6350 **	3.7705 ***	3.2898 ***	0.1717
APA—LAC	1.7436 +	1.4230	0.3148	−1.2654	LIC—LMIC	1.7100 +	1.4146	1.5335	−0.0661
APA—AFR	0.5856	−0.3980	−1.3216	−1.5289	LIC—HMIC	2.5809 **	3.1603 **	3.0277 **	0.6173
APA—ARB	0.3043	0.0939	0.6386	0.4937	HIC—LMIC	−2.4708 *	−2.8845 **	−2.2488 *	−0.2480
ENA—LAC	−0.4071	−1.2837	−2.0101 *	−2.3915 *	HIC—HMIC	−1.2790	−0.8856	−0.5259	0.3918
ENA—AFR	−1.6988 +	−3.2729 **	−3.7910 ***	−2.7251 **	LMIC—HMIC	1.1907	2.1380 *	1.8693 +	0.7599
ENA—ARB	−1.9198 +	−2.7051 **	−1.7657 +	−0.6708					
LAC—AFR	−1.3368	−2.0155 *	−1.7480 +	−0.1952					
LAC—ARB	−1.5775	−1.4500	0.3295	1.8969 +					
AFR—ARB	−0.3008	0.5446	2.1783 *	2.2428 *					

+ $p < 0.1$, * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$. For region and income acronyms see Table 1.

3.3. Regression Analysis

In regression analysis the *ER*, *IADR*, *IApWHS*, and *IApWHDS* were analysed as dependent variables, and the independent variables, i.e., influencing factors, were the hazards *FSI2024* and climate index variables, as well as income levels and overall economic power. The GDP values were used in their ln-transformed form to mitigate their strongly skewed distribution. The following relationships were revealed.

3.3.1. Factors Influencing the Endangerment Rate

Table 5 shows that both natural and anthropogenic effects have an influence on the endangerment rate. The effect of the *TempCI* climate index was significantly positive, i.e., countries with higher levels of warming, as reflected by maximum temperatures, have higher proportions of sites inscribed on the List of World Heritage in Danger. The precipitation index, however, did not show any significant impact: the changing variation in precipitation did not impact the endangerment rate. The anthropogenic hazards are reflected in the effects of *FSI2024*, which is positive: the more fragile a country, the higher proportion of its World Heritage sites is inscribed on the list. The effect of *lnGDP* turned out to be negative: higher values led to lower *ER* values, i.e., economically more powerful nations had lower ratios of sites inscribed on the list. This is in agreement with the findings of the Kruskal–Wallis test, which showed significant differences across income categories, with higher income categories having lower ER values. The high R-square value (0.8367) indicates the strong explanatory power of the model.

As the model coefficients show, with 10% higher maximum temperatures (i.e., TempCI increasing by 0.1), the endangerment rate increases by 7.67 percentage points. With a 10%—increase in GDP (i.e., a 1.1 times increase in *lnGDP*) the endangerment rate decreases by 0.834 (=ln(1.1) × 8.753) percentage points, and when the *FSI2024* score increases by 1 point, the endangerment rate increases by 0.625 percentage points. The standardised coefficients show that the *lnGDP* has the largest (negative) impact for a change in a unit standard deviation, followed by the positive impact of FSI2024, while the impact of temperature change is the smallest. It must be noted that the GDP per capita value did not

show this relationship with endangerment rate, suggesting that it is not so much the living standards but the overall economic power of a country that matters here.

Table 5. Regression result for endangerment rate (*ER*).

Coefficients	R-Square = 0.8367 B	Beta	*p*
TempCI	76.723 *	0.149	0.0170
PrecCI	6.372	0.070	0.5794
lnGDP	−8.753 ***	−0.548	0.0002
FSI2024	0.625 **	0.386	0.0017

***: $p < 0.001$; **: $p < 0.01$; *: $p < 0.05$, B: unstandardized, Beta: standardised.

3.3.2. Factors Influencing the Assistance Dependency Ratio, the Assistance Level per WHS and the Assistance Level per Site Inscribed on the List of World Heritage in Danger

The purpose of these OLS regressions was to see whether income-related bias is present in the allocation of international assistance. Regression analysis for *IADR*, *IApWHS* and *IApWHDS* resulted in models with a reasonable fit, with R-square values 0.7991, 0.7038 and 0.6273, respectively. The independent variables were *TempCI*, *WHS*, *lnGDP*, *lnGDPpc*, *ER*, and the interaction of WHS with *lnGDP* and with *ER* (Table 6).

Table 6. Regression result for *IADR*, *IApWHS* and *IApWHDS*.

Dependent	IADR			IApWHS			IApWHDS		
Coefficients	R-Square = 0.7991 B	Beta	*p*	R-Square = 0.7038 B	Beta	*p*	R-Square = 0.6273 B	Beta	*p*
TempCI	105.774	0.346	***						
lnGDP	−9.122	−0.963	***	25,110.0	0.710	**	106,993.00	0.7775	**
WHS	−4.260	−1.664	*	−4739.7	−0.496	*	−3255.93	−0.0876	
ER	0.094	0.158		824.4	0.373	*	1506.60	0.1749	
lnGDPpc				−24,182.6	−0.434	*	−94,081.10	−0.4337	+
lnGDP × WHS	0.339	2.008	*						
ER × WHS							−1013.94	−0.4619	+

***: $p < 0.001$; **: $p < 0.01$; *: $p < 0.05$; +: $p < 0.1$; B: unstandardised, Beta: standardised, '×' denotes interaction.

The assistance dependency ratio (*IADR*) shows that the number of WH sites has negative significant impact on *IADR*, but the endangerment rate does not have any significant impact. The *lnGDP* negatively influences *IADR*, i.e., higher total GDP means less international assistance per GDP. However, the interaction of *lnGDP* and WHS shows significant positive impact, i.e., countries with the same WHS get more assistance if their GDP is higher. *IADR* is also higher in countries where the impact of warming is more strongly felt, i.e., assistance takes into consideration the climatic hazard, too.

The coefficients suggest that by a 10% increase in GDP (i.e., a 1.1 times increase in *lnGDP*), the *IADR* value increases by \$0.869 (=ln(1.1) × 9.122), but it is slightly offset by a \$0.033 (=ln(1.1) × 0.339) increase for the same WH numbers.

The regression analysis for international assistance per WHS shows that *IApWHS* is negatively related to WHS numbers and to *lnGDPpc*, while it is positively related to *lnGDPpc* and to *ER*. With one percentage point increase in *ER* the international assistance per WH increases by \$824.4, but with one more WHS the assistance decreases by \$4739.7. A 10% increase in GDP (i.e., a 1.1 times increase in *lnGDP*) increases the *IApWHS* value by \$2393.2 (=ln(1.1) × 25,110), while a 10% increase in *GDPpc* (i.e., a 1.1 times increase in *lnGDPpc*) decreases the *IADR* value by \$2304.8 (=ln(1.1) × 24,182.6). The opposite effects of per capita GDP and total GDP reflect that they measure different economic concepts: total GDP represents the absolute economic power or size of a nation, which has a positive

impact on the *IApWHS* value, while per capita GDP represents the average standard of living or productivity per person, and it has a negative impact. Looking at the standardised beta coefficients, the largest effect is that of *lnGDP*, followed by WHS, *lnGDPpc*, and finally ER, reflecting the impact of a change of one standard deviation in the respective variables. It is worth remembering that in less developed countries, total GDP growth often goes together with population growth, which may keep *GDPpc* growth at a much lower rate, so the negative impacts of the latter on *IApWHS* are easily offset by the former.

The most interesting results are seen for the *IApWHDS* model. In this model, the *lnGDPpc* has significant positive impact on the assistance paid per inscribed site, i.e., more economic power means more support. However, this is mitigated by the negative impact of *lnGDPpc*, i.e., countries with higher living standards receive less *IApWHDS*. A 10% increase in GDP (i.e., a 1.1 times increase in *lnGDP*) increases the *IApWHDS* value by $10,197.5 (=ln(1.1) $\times$ 106,993), while a 10% increase in *GDPpc* (i.e., a 1.1 times increase in *lnGDPpc*) decreases the *ADR* value by $8967 (=ln(1.1) $\times$ 94,081.1). But again, as a 10% growth in GDP usually means much lower *GDPpc* growth in low-income countries, the positive impact will dominate the relationship.

The impacts of WHS and *ER* are not significant in themselves, but their interaction has a significant negative impact. This means, that countries with the same WHS numbers receive $1013.94 less support per inscribed site with a 1-percentage-point-higher endangerment rate, and countries with the same endangerment rate receive $1013.94 less support per inscribed site with one more WHS.

These relationships reflect some income-related bias: although countries with more economic power receive less assistance per GDP, the same WHS number means more support for countries with higher GDP. Countries with higher GPD also receive more support per WHS, even if the decreasing support for countries with higher per capita GDP somewhat mitigates it. The same holds true for assistance per inscribed site. Although the more affluent countries receive less support, more economic power reflected by total GDP counteracts this, maintaining the perverse allocation of assistance towards countries with more financial resources. Countries with higher endangerment rates get less assistance per inscribed site, but the most affluent groups of countries get significantly higher assistance per inscribed site than poorer ones; even if for countries being within the same income group, the higher per capita income induces lower levels of support. It must be noted, however, that international assistance requests are assessed based on a detailed description of the project and a budget; therefore, the reality is certainly more subtle than what these figures show.

4. Discussion

Our analysis was focused on the following main research question: Does the socio-economic status of a nation remain a stronger predictor of heritage survival than the actual severity of environmental threats, maintaining a "heritage divide" between the Global North and the Global South? Through identifying major causes of endangerment by the natural environment or by human activities, distributional inequalities were evaluated regarding financial assistance for sites inscribed on the List of World Heritage in Danger and for heritage conservation.

The first thing to reflect on is whether hazards affect World Heritage sites differently depending on their income levels. The two major types of hazards show a different pattern in this regard. The occurrence of climate-related stress was found to affect the 31 listed countries similarly. Neither the geographic regions nor the income categories of the 31 countries with sites inscribed on the List of World Heritage in Danger show any significant difference in their precipitation index or temperature index, and this is similar to the threat maps

in [39], although with some variations. According to the results of the regression analysis, the climate index, measuring the increase in maximum temperature, consistently showed positive influence on endangerment rate, suggesting that a 10% increase in the maximum temperature in the last decade compared to the baseline decade increases the endangerment rate by 7.67 percentage points. The change in precipitation variability does not influence endangerment rate at all. The climate-related hazards endangering heritage sites have been affirmed by previous research and case studies [16,27,30,35]. Contrary to our findings, some previous studies [40,42,45] underlined the negative impacts of changing precipitation on heritage. However, Wang et al. [46] stated that the impacts of precipitation change on heritage vary with regions, and this is demonstrated by our findings, too, regarding the countries with sites inscribed on the List of World Heritage in Danger. The detrimental effects of rising temperatures were also confirmed by several previous studies [23,36,40,44].

The identified negative effect of *lnGDP* means that more affluent nations have the means of keeping their World Heritage sites away from the List of World Heritage in Danger, having more financial resources and managerial skills to protect and preserve their conditions, as previous research suggests [51,75].

However, both regions and income categories differ in their fragile state index level, so anthropogenic risk factors affect them differently; therefore, state fragility may be one of the reasons that lead to their different endangerment rates. The fragile state index is the highest in African and Arab countries, while Europe and North America show significantly lower values, and the high-income countries have a much lower fragility level than the rest of the countries, which is also supported by OECD [64]. State fragility was found to be definitely related to the inscription of heritage sites to the List of World Heritage in Danger.

The results of correlation and regression analysis showed, similar to previous studies, that the proportion of sites inscribed on the list is strongly and positively correlated to the vulnerability of the state, which includes a vulnerable economy [20,31], internal social and ethnic conflicts, and external intervention [35,49,76]. Economic weakness may constrain national funds to protect and conserve heritage sites, while armed conflicts, or conflicts arising from the fragmentation of state institutions along ethnic, class, or religious lines, may directly damage them.

The geographic regions have similar WHS numbers across the countries with sites on List of World Heritage in Danger, but those falling into the high-income category have significantly more World Heritage sites than those in the low-income or the lower-middle-income category, which is confirmed by previous case studies [11,75]. This is probably related to the political influence and power that these countries play in the decision-making processes of international organisations [8,9,37,50]. In spite of this, the number of sites inscribed on the list is significantly higher in low-income countries than elsewhere, and this is also reflected in the endangerment rates: 74% in low-income countries, 40% in lower-middle-income countries, 26% in higher-middle-income countries, and only 9% in high-income ones. The more affluent countries are obviously more successful in keeping their World Heritage away from inscription on the List of World Heritage in Danger. Another interesting fact is that countries with less WHS have a higher endangerment rate, as the difficulties of registering sites to the World Heritage List would also make it difficult to protect and preserve the already registered sites. The most vulnerable regions regarding World Heritage are in the Asia and Pacific region, followed by the Arab countries, with these having the highest endangerment rates (64.8% and 54.1%, respectively).

The assistance dependency ratio, which measures the international assistance paid to each dollar of GDP in the analysed countries, was assessed to reveal disparities in the allocation of conservation and emergency relief assistance paid by the World Heritage Fund. As countries with higher GDP are in a better position to finance their own conservation

and emergency problems than poor countries, they should be less dependent on UNESCO support, so IADR was expected to increase with lower GDP. Our results seem to support this expectation: low-income and lower-medium-income countries received significantly more assistance per GDP than high- or higher-medium-income ones, although the IADR value decreases with higher WHS numbers. The regression analysis, with its more refined approach, also identified a negative impact of lnGDP on IADR, that is, countries with higher economic power receive less international assistance to each dollar of their GDP. However, as the interaction of lnGDP and WHS numbers revealed, countries with the same WHS number receive higher assistance if their GDP is higher, and the effect of this interaction can mitigate the negative effect of GDP in itself.

The disparity concept seems to be refuted by the analysis of the international assistance per WHS (IApWHS), which shows that Europe and North America receive significantly the least assistance per World Heritage site, and this region has the lowest endangerment rate by far, though this is true only for 2024 which isthe scope of the present analysis. But the regression results again give a more controversial picture. Although the assistance provided per WH site was negatively related to GDP per capita (i.e., countries with higher per capita income seem to receive less assistance per WHS that poor ones), the strong positive influence of total GDP offsets this and guarantees higher support to countries with more economic power. This disparity is underlined by the assistance per inscribed site. Although Europe and North America receive less assistance per inscribed site than Latin America and the Caribbean or Africa, its difference from the Asia and Pacific or Arab regions is not significant. On top of that, IApWHDS values do not differ significantly between high-income and low-income countries. This suggests that countries more in need of assistance do not receive more UNESCO funding, and according to our findings, the countries with the highest proportions of heritage inscribed on the List of World Heritage in Danger (LIC, 70%) receive the least support per inscribed site ($213 thousand). The regression analysis reflects the same relationship: though higher per capita GDP should mean less support per inscribed site, higher total GDP values direct higher assistance per inscribed site to more powerful countries. This inequality is mentioned in previous studies, although without thorough statistical analysis [22,50].

These findings support the assumptions of the present study: the economically more powerful countries seem to be at an advantage regarding UNESCO, although they could raise more funding from their own resources to protect and preserve their World Heritage sites. The situation is further aggravated by the fact that countries with less stable economies and those more prone to external violence and conflict find higher proportions of their World Heritage sites inscribed on the List of World Heritage in Danger.

Finally, it is worth mentioning that although general tendencies were compared on the level of the broader regions, it is worth investigating differences within regions, though this is beyond the scope of the present research. However, it is interesting to point out, that regions—and countries with sites on the List of World Heritage in Danger—widely differ in their economic situations, and this influences their ability to keep their sites out of the List of World Heritage in Danger. In Africa and in the Arab states (AFR and ARB), the most frequent reason for sites to be inscribed was war and civil unrest, while in the other regions (APA, ENA and LAC) it was development projects in the area [77]. Research suggests that the List of World Heritage in Danger serves a dual purpose in regulation: firstly, to alert the international community of imminent dangers at World Heritage sites, and secondly, as a non-compliance procedure used for states that breach the rules; the requests for inclusion on the list are initiated by the World Heritage bodies and not the states themselves [77,78]. The more affluent and economically powerful countries, therefore, make great efforts to keep their sites away from inscription on the list, as the examples of the Great Barrier Reef

(Australia), the Historic District of Panama City (Panama), and Venice (Italy) show [77,78]. As our data shows, the per capita GDP of countries with sites inscribed on the List of World Heritage in Danger was $9219 in 2024, only 67.4% of the overall world average of $13,673, and the same imbalance is true for the respective regions, too.

5. Conclusions

Our research was aimed at revealing whether the conservation and preservation of World Heritage sites is efficiently supported by the international assistance provided by the World Heritage Fund and whether the countries most in need of this financial support receive preferential handling by the mechanisms of allocation. The analysis dealt with the 31 countries with sites currently inscribed on the List of World Heritage in Danger. The results revealed that the proportion of World Heritage sites inscribed on this list was influenced by warming temperatures and higher fragility of their states, both factors contributing to the increase in endangerment, while higher GDP levels could mitigate the impacts of both factors, contributing to lower endangerment rates. This already indicates that the heritage in economically weaker countries is more threatened by both climatic and anthropogenic hazards, suggesting the presence of economic disparities in heritage conservation. As a consequence of this fact, it would be reasonable to provide more funding for heritage preservation to these states from international resources, as their economies do not allow the sufficient allocation of their own resources to this globally important task.

However, as results show, the current practice of international assistance for conservation and emergency relief for heritage does not seem to be efficient enough in this respect. Although countries with higher total GDP get less international assistance compared to their GDP, when the WHS numbers are taken into consideration, the support increases with higher GDP for the same WHS numbers. This suggests that economically weaker countries receive less support for each of their World Heritage sites. Even if the allocation of such funding seems to favour countries with lower per capita GDP, this is offset by the fact that countries with larger economies (larger total GDP) get most assistance per World Heritage site and also per site inscribed on the List of World Heritage in Danger. This reflects that larger economies seem to be at advantage, even if it is the smaller, less developed states who need more support to protect their heritage inscribed on this list.

This study suggests that there seems to be a bias that decision-makers may not be aware of, while the complexities of the decision-making process may generate inefficiencies in heritage protection. Hopefully, our findings and further analysis of the topic may help to reveal such inefficiencies and contribute to the improvements of the decision-making process.

The results of this study, which is just an initial step in a series of important analyses in the area, are limited in several aspects. The analysis used only the data of the 31 countries with sites inscribed on the List of World Heritage in Danger in 2024. Instead of analysing the evolution of the international assistance provided for sites inscribed on the List of World Heritage in Danger by time, the analysis was focused only on the 2024 situation. A more detailed analysis of the sites themselves, including their type, geographic location, and specific risk factors, could reveal a more refined picture, as well as an analysis covering a longer time span instead of the present snapshot. The research focus could also be extended in the future in spatial terms, so that besides assessing the countries with sites inscribed in the List of World Heritage in Danger in 2024, countries with sites proposed for inscription, but for which the inscription was postponed or rejected by the World Heritage Committee, or countries which had sites inscribed on the list in the past, could also be included. These analyses could give more insight, lead to more refined conclusions, and could be important issues for future research.

Funding: This research received no external funding.

Data Availability Statement: Data were downloaded from publicly available databases, as is indicated in Table 1 of the current research. Actual websites are listed in the References section.

Conflicts of Interest: The author declares no conflicts of interest.

References

1. Panzera, E. Cultural heritage, tourism and economic development in the existing literature and beyond. In *Cultural Heritage and Territorial Identity*; Springer: Berlin/Heidelberg, Germany, 2022; pp. 45–63. Available online: https://link.springer.com/chapter/10.1007/978-3-030-94468-1_2 (accessed on 10 December 2025).
2. Courtney, P.; Hill, G.; Roberts, D. The role of natural heritage in rural development: An analysis of economic linkages in Scotland. *J. Rural Stud.* **2006**, *22*, 469–484. [CrossRef]
3. Albert, M.T.; Bernecker, R.; Cave, C.; Prodan, A.C.; Ripp, M. (Eds.) *50 Years World Heritage Convention: Shared Responsibility—Conflict & Reconciliation*; Springer: Berlin/Heidelberg, Germany, 2022. Available online: https://unesdoc.unesco.org/ark:/48223/pf0000383152 (accessed on 10 December 2025).
4. Ashworth, G.J. Heritage and local development: A reluctant relationship. In *Handbook on the Economics of Cultural Heritage*; Rizzo, I., Mignola, A., Eds.; Edward Elgar: Cheltenham, UK, 2013; pp. 824–855. [CrossRef]
5. UNESCO. *Convention Concerning the Protection of the World Cultural and Natural Heritage UNESCO World Convention*; UNESCO World Heritage Centre: Paris, France, 1972. Available online: https://whc.unesco.org/en/conventiontext/ (accessed on 10 December 2025).
6. UNESCO WHS. List of World Heritage in Danger. UNESCO World Heritage Convention Website. 2025. Available online: https://whc.unesco.org/en/list/stat/#s7 (accessed on 10 December 2025).
7. UNESCO WHC. *International Assistance—Funding Windows, Eligibility, and Project Examples*; World Heritage Centre, UNESCO: Paris, France, 2021. Available online: https://whc.unesco.org/en/intassistance (accessed on 12 December 2025).
8. Meskell, L.; Liuzza, C.; Brown, N. World Heritage Regionalism: UNESCO from Europe to Asia. *Int. J. Cult. Prop.* **2015**, *22*, 437–470. [CrossRef]
9. Meskell, L.; Liuzza, C. The world is not enough: New diplomacy and dilemmas for the World Heritage Convention at 50. *Int. J. Cult. Prop.* **2022**, *29*, 391–407. [CrossRef]
10. Bulut, N. Economic impact of cultural heritage: A case study approach. *Bus. Econ. J.* **2023**, *14*, 453.
11. Elbahy, A.A.; Sheta, S.A.; Fouda, M.A. World heritage sites management as approach to improving quality of life: Memphis and its Necropolis as a case study. *Alex. Eng. J.* **2024**, *95*, 333–351. [CrossRef]
12. Deegan, N. The local-global nexus in the politics of World Heritage: Space for community development? *World Herit. Pap.* **2012**, *31*, 77–84.
13. Bacsi, Z.; Tóth, É. Word Heritage Sites as soft tourism destinations—Their impacts on international arrivals and tourism receipts. *Bull. Geogr. Socio-Econ. Ser.* **2019**, *45*, 25–44. [CrossRef]
14. Ghodya, M.K.; Azzam, Y.A.-E.; Maarouf, I.E. Strategy of integrating Egyptian sites into world heritage property: Rashid city as a case study. *Ain Shams Eng. J.* **2021**, *12*, 3381–3387. [CrossRef]
15. Starr, F. Poverty alleviation through World Heritage conservation: Encouraging corporate partnerships at Temple of Preah Khan, Angkor. *World Herit. Pap.* **2012**, *31*, 100–106.
16. Lanzoni, N. Cultural heritage protection versus social and economic development: Where does customary international law stand? *Int. J. Cult. Prop.* **2024**, *31*, 299–315. [CrossRef]
17. UNESCO. *Recommendation Concerning the Safeguarding of Beauty and Character of Landscapes and Sites*; UNESCO: Paris, France, 1962. Available online: https://www.unesco.org/en/legal-affairs/recommendation-concerning-safeguarding-beauty-and-character-landscapes-and-sites (accessed on 7 April 2025).
18. Ghodya, M.K.; Elbahy, A.A. Management of the endangered World Heritage in Egypt: A case study of the Abu Mena site. *Delta Univ. Sci. J.* **2024**, *7*, 142–153. [CrossRef]
19. Odeku, K.O. Sustainable Protection and Preservation of Heritage Sites Attractions from Climate Change in South Africa. *Afr. J. Hosp. Tour. Leis.* **2018**, *7*, 38.
20. Jang, H.; Mennis, J. The role of local communities and well-being in UNESCO World Heritage Site conservation: An analysis of the Operational Guidelines, 1994–2019. *Sustainability* **2021**, *13*, 7144. [CrossRef]
21. Kubik, M. Cultural Heritage Protection in the Age of Climate Change: Adapting International Legal Frameworks to Environmental Threats. *Harvard International Law Journal*, 1 April 2025. Available online: https://journals.law.harvard.edu/ilj/2025/04/cultural-heritage-protection-in-the-age-of-climate-change-adapting-international-legal-frameworks-to-environmental-threats (accessed on 5 February 2026).

22. Cárdenas, E.B. Economic progress versus cultural preservation: Insights from "cultural heritage in international economic law". *J. Int. Econ. Law* **2024**, *27*, 386–391. [CrossRef]
23. García, B.M. Resilient cultural heritage for a future of climate change. *J. Int. Aff.* **2020**, *73*, 101–120.
24. Zhang, Z.; Xiong, K.; Huang, D. Natural world heritage conservation and tourism: A review. *Herit. Sci.* **2023**, *11*, 96. [CrossRef]
25. Trovato, M.G.; Ali, D.; Nicolas, J.; El Halabi, A.; Meouche, S. Landscape Risk Assessment Model and Decision Support System for the Protection of the Natural and Cultural Heritage in the Eastern Mediterranean Area. *Land* **2017**, *6*, 76. [CrossRef]
26. Ardiwidjaja, R. Preservation of World Heritage Sites viewed from the Perspective of sustainable tourism development. *Kapata Arkeol.* **2019**, *15*, 25–34. [CrossRef]
27. Brimblecombe, P.; Tola, H.G.; Richards, J. Climate Change and Pilgrimage to Shrines in Ethiopia. *Heritage* **2024**, *7*, 95–106. [CrossRef]
28. Nowacki, M. Heritage Interpretation and Sustainable Development: A Systematic Literature Review. *Sustainability* **2021**, *13*, 4383. [CrossRef]
29. Albert, M.T.; Richon, M.; Viñals, M.J.; Witcomb, A. (Eds.) *Community Development through World Heritage*; World Heritage Papers 31; World Heritage Centre, UNESCO: Paris, France, 2012.
30. Vadi, V. *Cultural Heritage in International Economic Law*; Brill Nijhoff: Leiden, The Netherlands; Boston, MA, USA, 2023. [CrossRef]
31. Bhati, H.V. Implementing cultural heritage conservation and energy sustainability in the UNESCO World Heritage site of Jaipur city, India. *Front. Sustain. Cities* **2025**, *7*, 1548279. [CrossRef]
32. Cantatore, E.; Quagliarini, E.; Fatiguso, F. European Cities Prone to Terrorist Threats: Phenomenological Analysis of Historical Events towards Risk Matrices and an Early Parameterization of Urban Built Environment Outdoor Areas. *Sustainability* **2022**, *14*, 12301. [CrossRef]
33. UNESCO. *Second Protocol to the Hague Convention of 1954 for the Protection of Cultural Property in the Event of Armed Conflict*; UNESCO: Paris, France, 1999. Available online: https://www.unesco.org/en/legal-affairs/second-protocol-hague-convention-1954-protection-cultural-property-event-armed-conflict (accessed on 7 April 2025).
34. UNESCO. *UNESCO Declaration Concerning the Intentional Destruction of Cultural Heritage*; UNESCO: Paris, France, 2003. Available online: https://www.unesco.org/en/legal-affairs/unesco-declaration-concerning-intentional-destruction-cultural-heritage (accessed on 7 April 2025).
35. Sesana, E.; Gagnon, A.S.; Bertolin, C.; Hughes, J. Adapting Cultural Heritage to Climate Change Risks: Perspectives of Cultural Heritage Experts in Europe. *Geosciences* **2018**, *8*, 305. [CrossRef]
36. Veillon, R. *State of Conservation of World Heritage Properties—A Statistical Analysis (1979–2013)*; UNESCO World Heritage Centre: Paris, France, 2014.
37. Seila, F.; Selim, G.; Newisar, M. A Systematic Review of Factors Contributing to Ineffective Cultural Heritage Management. *Sustainability* **2025**, *17*, 366. [CrossRef]
38. Brown, N.E.; Liuzza, C.; Meskell, L. The politics of peril: UNESCO's list of world heritage in danger. *J. Field Archaeol.* **2019**, *44*, 287–303. [CrossRef]
39. Falk, M.T.; Hagsten, E. Probability and severity of climate change threats to natural world heritage sites vary across site specifics and over time. *Sci. Total Environ.* **2024**, *946*, 174291. [CrossRef]
40. Colette, A. *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*; UNESCO: Paris, France, 2007. Available online: https://unesdoc.unesco.org/ark:/48223/pf0000160019 (accessed on 5 February 2026).
41. Sesana, E.; Gagnon, A.S.; Ciantelli, C.; Cassar, J.; Hughes, J. Climate change impacts on cultural heritage: A literature review. *WIREs Clim. Chang.* **2021**, *12*, e710. [CrossRef]
42. Merello, P.; García-Diego, F.J.; Zarzo, M. Evaluation of corrective measures implemented for the preventive conservation of fresco paintings in Ariadne's house (Pompeii, Italy). *Chem. Cent. J.* **2013**, *7*, 87. [CrossRef]
43. Psoma, A.; Pyla, P. Safeguarding heritage sites from climate change: UNESCO's 'buffer zones' as a tool for managing sea level rise in Cyprus. *J. Archit. Conserv.* **2025**, *31*, 64–81. [CrossRef]
44. Morel, H.; Megarry, W.; Potts, A.; Hosagrahar, J.; Roberts, D.C.; Arikan, Y.; Brondizio, E.; Cassar, M.; Flato, G.; Forgesson, S.; et al. *Global Research and Action Agenda on Culture, Heritage and Climate Change*; ICOMOS & ICSM CHC: Charenton-le-Pont, France; Paris, France, 2022.
45. Silva, H.E.; Henriques, F. Preventive conservation of historic buildings in temperate climates. The importance of a risk-based analysis on the decision-making process. *Energy Build.* **2015**, *107*, 26–36. [CrossRef]
46. Wang, X.; Li, H.; Wang, Y.; Zhao, X. Assessing climate risk related to precipitation on cultural heritage at the provincial level in China. *Sci. Total Environ.* **2022**, *835*, 155489. [CrossRef]
47. Assen, Y.M.; Kura, A.L.; Degefu, M.A.; Gella, A.; Yesuph, A.Y. Detection and characterization of meteorological drought and its impacts in the UNESCO designated world heritage site of Konso Cultural Landscape, southern Ethiopia. *Discov. Environ.* **2025**, *3*, 286. [CrossRef]

48. Paolini, A.; Vafadari, A.; Cesaro, G.; Fakhoury, L. *Risk Management at Heritage Sites: A Case Study of the Petra World Heritage Site*; UNESCO: Paris, France; KU Leuven: Paris, France, 2012. Available online: https://www.researchgate.net/publication/269688994_Risk_Management_at_Heritage_Sites_a_case_study_of_the_Petra_World_Heritage_Site (accessed on 5 February 2026).
49. Aronson, J.; Cil, D.; Huth, P.K.; Daniels, B.I. Attacks on History: The Causes of Cultural Heritage Damage during Armed Conflict. *Natl. Ethn. Politics* **2025**, *31*, 189–208. [CrossRef]
50. Bertacchini, E.E.; Saccone, D. Toward a political economy of World Heritage. *J. Cult. Econ.* **2012**, *36*, 327–352. [CrossRef]
51. Liuzza, C.; Meskell, L. Power, persuasion and preservation: Exacting times in the World Heritage Committee. *Territ. Politics Gov.* **2021**, *11*, 1265–1280. [CrossRef]
52. Thurley, S.; Busquin, P.; Spek, T.; Brandt-Grau, A.; Clausse, G.; Gustafsson, C.; Kolar, J.; Lazarro, E.; Smith, B.; Mallouchou-Tufano, F. *Getting Cultural Heritage to Work for Europe*; Report of the Horizon 2020 Expert Group on Cultural Heritage; European Commission: Brussels, Belgium, 2015. [CrossRef]
53. Mekonnen, H.; Bires, Z.; Berhanu, K. Practices and challenges of cultural heritage conservation in historical and religious heritage sites: Evidence from North Shoa Zone, Amhara Region, Ethiopia. *Herit. Sci.* **2022**, *10*, 172. [CrossRef]
54. Hosseini, K.; Stefaniec, A.; Hosseini, S.P. World Heritage Sites in developing countries: Assessing impacts and handling complexities toward sustainable tourism. *J. Destin. Mark. Manag.* **2021**, *20*, 100616. [CrossRef]
55. Chen, G.; Fu, B.; Jiang, Y.; Suo, X.; Lai, Y.; Chen, Z.; Li, J.; Li, L.; Lu, M.; Tang, Y.; et al. Natural world heritage sites are at risk from climate change globally. *Commun. Earth Environ.* **2024**, *5*, 760. [CrossRef]
56. Canesi, L.; Sardella, A.; Vogler, R.; Kaiser, A.; Vaccaro, C.; Bonazza, A. Hazard Analysis and Vulnerability Assessment of Cultural Landscapes Exposed to Climate Change-Related Extreme Events: A Case Study of Wachau (Austria). *Heritage* **2024**, *7*, 1917–1934. [CrossRef]
57. Antoniou, A.; Tsegas, G.; Moussiopoulos, N.; Theodossiou, N. Assessment of the impacts of climate change on a world heritage site in Greece. *J. Cult. Herit.* **2025**, *73*, 498–509. [CrossRef]
58. UNESCO-ICOMOS-IUNC. *Guidance and Toolkit for Impact Assessments in a World Heritage Context*; UNESCO: Paris, France, 2022. Available online: https://whc.unesco.org/en/guidance-toolkit-impact-assessments/ (accessed on 9 April 2026).
59. UNESCO WHC. International Assistance Statistics Website. 2025. Available online: https://whc.unesco.org/en/intassistance/#statistics (accessed on 10 December 2025).
60. Fund for Peace. *Fragile States Index—Global Data for 2007–2024*; Fund For Peace: Washington, DC, USA, 2025. Available online: https://fragilestatesindex.org/global-data/ (accessed on 5 August 2025).
61. World Bank. *World Bank Climate Knowledge Portal*; The World Bank Group: Washington, DC, USA, 2025. Available online: https://climateknowledgeportal.worldbank.org/download-data (accessed on 10 August 2025).
62. WDR. *World Development Indicators*; World Bank Group: Washington, DC, USA, 2025. Available online: https://databank.worldbank.org/source/world-development-indicators (accessed on 10 August 2025).
63. Guillaumont, P.; Jeanneney, S.G. *State Fragility and Economic Vulnerability: What Is Measured and Why?* CERDI: Clermont-Ferrand, France, 2009. Available online: https://shs.hal.science/halshs-00554284v1 (accessed on 5 August 2025).
64. OECD. *States of Fragility 2022*; OECD Publishing: Paris, France, 2022. [CrossRef]
65. IEP. *Global Terrorism Index 2025: Measuring the Impact of Terrorism*; Institute for Economics and Peace: Sydney, Australia, 2025. Available online: https://www.visionofhumanity.org/wp-content/uploads/2025/03/Global-Terrorism-Index-2025.pdf (accessed on 11 July 2025).
66. IEP. *Global Peace Index 2025: Identifying and Measuring the Factors that Drive Peace*; Institute for Economics & Peace: Sydney, Australia, 2025. Available online: https://www.visionofhumanity.org/wp-content/uploads/2025/06/Global-Peace-Index-2025-web.pdf (accessed on 11 July 2025).
67. Kim, A.B. *Highlights of the 2025 Index of Economic Freedom*; The Heritage Foundation: Washington, DC, USA, 2025. Available online: https://static.heritage.org/index/pdf/2025/2025_indexofeconomicfreedom_highlights.pdf (accessed on 12 February 2026).
68. Fund for Peace. *Fragile States Index Methodology and CAST Framework*; Fund For Peace: Washington, DC, USA, 2017.
69. Fund for Peace. *Fragile States Index—Annual Report 2021*; Fund For Peace: Washington, DC, USA, 2021. Available online: https://fragilestatesindex.org/wp-content/uploads/2021/05/fsi2021-report.pdf (accessed on 5 August 2025).
70. Zhou, G.; Zhu, J.; Luo, S.; Wu, Z.; Jiang, Y. An evaluation method of fragile states index based on climate shock: A case of Bangladesh. *J. Environ. Manag.* **2020**, *275*, 111142. [CrossRef] [PubMed]
71. Rahman, I.A.; Suharsih, S.; Waluyo, J. Fragile State Index Assessment of Economic, Defence and Administrative Conflicts Endangering States in Indonesia: An Econometric Study. *South Asian J. Soc. Stud. Econ.* **2024**, *21*, 1–15. [CrossRef]
72. Beall, J.; Goodfellow, T.; Rodgers, D. Cities and Conflict in Fragile States in the Developing World. *Urban Stud.* **2013**, *50*, 3065–3083. [CrossRef]
73. Pendergrass, A.G.; Knutti, R.; Lehner, F. Precipitation variability increases in a warmer climate. *Sci. Rep.* **2017**, *7*, 17966. [CrossRef]
74. Stock, H.J.; Watson, M.W. *Introduction to Econometrics*, 4th ed.; Pearson Education: Harlow, UK, 2020.

75. Thapa, B. Funding strategies for World Heritage Sites in least developed countries. In *Cultural Heritage Management: A Global Perspective*; Smith, G., Ed.; University Press of Florida: Gainesville, FL, USA, 2010; pp. 278–294.
76. Tsugorka, O.; Byrkovych, T.; Denysiyuk, Z.; Kravchenko, A.; Boyko, V.; Kotviakovsky, Y. The role of international organizations in the protection and restoration of the cultural heritage of Ukraine in the conditions of armed aggression: Financial, economic and legal aspects. *Edelweiss Appl. Sci. Technol.* **2024**, *8*, 1430–1444. [CrossRef]
77. Hølleland, H.; Hamman, E.; Phelps, J. Naming, Shaming and Fire Alarms: The compilation, development and use of the List of World Heritage in Danger. *Transnatl. Environ. Law* **2019**, *8*, 35–58. [CrossRef]
78. James, L.; Hamman, E.; Hølleland, H. The fear of losing national and institutional face: Exploring Australia's resistance to World Heritage In Danger listing. *Int. J. Herit. Stud.* **2025**, *31*, 918–934. [CrossRef]

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