

Policy Misalignment in a Warming World: Reforming China's Cultural Heritage Governance for Climate Adaptation

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Abstract

Climate change poses accelerating and intensifying threats to cultural heritage worldwide, necessitating urgent and coordinated state-level responses. This study critically examines China's governance framework for climate adaptation of cultural heritage, identifying a critical policy misalignment: although relevant legal and governance instruments—spanning cultural heritage protection, environmental governance, disaster risk reduction, territorial spatial planning, and climate action systems—are nominally in place, they remain profoundly fragmented in practice, resulting in operational inefficiency that severely constrains effective adaptation. To address this, the paper argues for a fundamental paradigm shift from static preservation to dynamic adaptation. It proposes a reform pathway centered on three pillars: reconceptualizing heritage from static preservation to dynamic adaptation, institutionalizing cross-departmental cooperation, and integrating systemic adaptation tools into planning and decision-making. The ultimate objective is to establish an adaptive governance system capable of responding flexibly to climate impacts through interdisciplinary coordination. This transformation is framed as a critical strategic imperative, essential for ensuring the long-term resilience of cultural heritage and civilizational continuity in a warming world.

Keywords: climate change; cultural heritage; fragmented governance; China

1. Introduction

Climate change is no longer a distant scientific forecast but an immediate and pressing global crisis [1]. Its effects extend beyond natural ecosystems and socioeconomic development, both directly through extreme weather events and indirectly through gradual environmental shifts, increasingly threatening the material foundations of human civilization, including cultural heritage [2]. China possesses a vast, diverse, and widely distributed array of cultural heritage sites, which are deeply interconnected with natural geography, ecosystems, human-made environments, and community activities¹. However, this profound interdependence also reveals a striking vulnerability in the face of climate change. Recent catastrophic floods affecting ancient cities, recurrent Yangtze River basin flooding that threatens historic riverside quarters, and the erosion of coastal archaeological sites due to salinization and storm surges all serve as urgent warnings [4]. These are not merely isolated incidents, but rather symptoms of a systemic vulnerability arising from the deep interconnection between heritage and its rapidly changing environment under climate change.

These escalating threats have propelled climate adaptation to the forefront of international heritage conservation discourse [2]. This paradigm necessitates a fundamental



Received: 26 March 2026

Revised: 11 May 2026

Accepted: 15 May 2026

Published: 24 May 2026

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shift from passive disaster response to proactive risk management, aiming to enhance a heritage system's capacity to anticipate, absorb, adapt to, and recover from climatic disturbances, thereby ensuring its long-term continuity [5]. The attainment of this objective is fundamentally contingent upon effective legal and policy instruments. While China has undertaken substantial efforts across multiple domains—cultural heritage, climate action, spatial planning, and environmental governance—a critical review reveals a significant gap between intent and implementation. Despite this multi-sectoral engagement and high-level commitment, the corresponding policies and legal instruments remain profoundly fragmented in practice.

This fragmentation—where measures are dispersed across disparate administrative systems rather than functionally integrated—constitutes the core governance challenge. The core issue is not merely the absence of specific rules for climate impacts on heritage, but a systemic misalignment: heritage is treated as a static object for preservation rather than a dynamic socio-ecological system, and persistent deficits in sustainable funding, interdisciplinary expertise, and institutionalized learning prevent adaptive objectives from translating into effective practice. This fundamental misalignment causes the current framework to undermine its own goals, resulting in delayed, fragmented, or contradictory adaptive actions that ultimately heighten climate vulnerability. Thus, moving beyond fragmentation to build an integrated, coherent, and responsive legal–institutional system emerges as a critical imperative for both research and practice. China is selected for its vast and diverse heritage, its complex multi-level governance, and its important role in global climate policy. While focusing on China, its fragmentation challenges identified here resonate with many other countries, offering broadly relevant lessons.

This research aims to address this critical issue by moving beyond a mere inventory of existing tools to critically examine the foundational causes and real-world effects of fragmentation, and ultimately to propose pathways for comprehensive reform. Section 2 defines the threat of climate change and outlines the global response framework. Section 3 analyzes China's current legal instruments across multiple policy domains, revealing how fragmentation manifests in practice. Section 4 diagnoses the underlying causes—conceptual, institutional, and operational—that sustain this fragmented condition. Section 5 proposes integrated reform pathways and specific recommendations. Section 6 presents the conclusion.

2. Overview

2.1. *The Growing Threat: Climate Change and Cultural Heritage*

Climate change impacts cultural heritage through multiple direct and indirect pathways [6]. Rising temperatures trigger thermal expansion and contraction in traditional materials like wood and stone, leading to structural deformation while simultaneously accelerating chemical degradation that causes pigment fading in murals and paintings. These physical and chemical stresses are particularly consequential for China: over 70% of ancient Chinese structures are constructed from wood or rammed earth, and research indicates that global temperature increases can significantly reduce wood strength, thereby exacerbating material vulnerability [7]. At the same time, the growing frequency and intensity of extreme weather events—including heavy rainfall, floods, and hurricanes—directly threaten historic buildings and sites. A case in point is the Ancient City of Pingyao in Shanxi Province, a UNESCO World Heritage site renowned as China's best-preserved historic walled city, which sustained severe damage during torrential rains in 2021, resulting in the collapse of 61 sections of its city walls [8]. Furthermore, intense precipitation can elevate groundwater levels, amplifying dampness, salt crystallization, and mould growth, which progressively erode heritage materials [9]. Collectively, these interrelated

impacts underscore the systemic, compound, and multi-faceted nature of climate threats to cultural heritage.

The very systemic and compound nature of these threats has propelled climate change to the forefront of international heritage agendas. UNESCO, in its updated Policy Document on Climate Action for World Heritage, explicitly states that “climate change has become one of the most significant threats to World Heritage properties” [10]. It warns that climate-related pressures can undermine a site’s Outstanding Universal Value—including its integrity and authenticity—as well as its socio-economic role within local communities. These institutional observations are strongly supported by scientific research, notably the assessments of the Intergovernmental Panel on Climate Change (IPCC). The IPCC’s Sixth Assessment Report identifies cultural heritage as highly vulnerable to climate hazards, noting that certain impacts are already irreversible and that adaptation limits will be reached for many sites without timely action [1]. Critically, studies cited in the report reveal that while around 80% of World Heritage sites have been exposed to damaging heat and humidity stress, nearly 19% are already facing significant material degradation due to climate effects on stone, wood, and other traditional building materials [11]. Together, these assessments illustrate that climate pressures on heritage are not only widespread but also intensifying and spatially differentiated.

2.2. The Global Response: An Evolving Framework for Action

Faced with the escalating threats of climate change to cultural heritage, the international community has developed a concerted and multi-faceted response [12]. At the institutional forefront is the United Nations Educational, Scientific and Cultural Organization (UNESCO), which acts as the central global coordinator for safeguarding heritage against climatic impacts [13]. One of its pivotal contributions is the development and adoption of the Policy Document on Climate Action for World Heritage. Emerging from a draft in 2021 and refined through extensive global consultation, the policy was formally ratified at the UNESCO General Conference in November 2023 [14]. This document establishes a systematic framework, obligating States Parties to develop and implement specific climate adaptation strategies for their World Heritage properties by 2030. Structured around five guiding principles and four strategic objectives—risk assessment, adaptation, mitigation, and capacity building—the policy signifies a critical shift from broad advocacy to targeted, time-bound operational action. This evolving framework was reinforced by the 2021 Fuzhou Declaration, adopted at the 44th session of the World Heritage Committee. The declaration explicitly recognizes that “climate change-induced extreme weather, natural disasters, and other negative impacts are becoming increasingly frequent,” and calls for “closer international cooperation” to address these challenges [15].

Translating this policy framework into on-the-ground action, UNESCO and its partners deploy regional projects and capacity-building initiatives. Programs such as the World Heritage Capacity-Building Programme foster knowledge exchange through case studies, expert networks, and training workshops, thereby enhancing the adaptive capacity of heritage managers, particularly in vulnerable regions like the Asia-Pacific [16]. Complementing this, UNESCO’s assistance also provides targeted technical and policy support for crisis preparedness. A pertinent example is the “Climate Change & UNESCO Heritage” pilot project at the Frontiers of the Roman Empire: Hadrian’s Wall World Heritage site in the United Kingdom [17]. Led by the UK National Commission for UNESCO, this initiative deploys advanced environmental monitoring equipment to track subsurface variables critical to archaeological preservation—including soil temperature, pH, and moisture—while fostering cross-sectoral collaboration to build integrated models for climate-informed decision-making. This pilot project exemplifies a data-driven governance model that inte-

grates real-time environmental monitoring into heritage management, demonstrating how climate adaptation can be operationalized through the coupling of scientific infrastructure and institutional collaboration.

Beyond UNESCO's coordinating role, specialized bodies such as the International Council on Monuments and Sites (ICOMOS) and the International Union for Conservation of Nature (IUCN) deepen and extend protection efforts within their respective domains. ICOMOS has not only issued its own Climate Action Strategy, but also actively advocates for the integration of cultural heritage into national climate policy instruments [18]. Concurrently, IUCN focuses on developing scientific assessment tools; its Guidelines for Assessing Species' Vulnerability to Climate Change, for instance, are employed by practitioners and policymakers to evaluate the exposure and sensitivity of natural heritage to climatic hazards [19]. These organizations collaborate closely with UNESCO, forming an integrated global network that connects policy, science, and practice. Through joint publications, coordinated monitoring efforts—such as tracking climate impacts on Venice—and the dissemination of shared guidelines, they enhance the coherence, scientific rigor, and professional foundation of the international response system [20].

Additionally, community-based and cross-border models have also proven useful in enhancing climate adaptation for cultural heritage. The United Kingdom's National Trust has implemented a Climate Change Adaptation Plan that engages volunteers in monitoring coastal heritage sites [21]. Australia's Indigenous-led "Caring for Country" programs integrate traditional knowledge with climate risk assessment for rock art and archaeological sites [22]. In Europe, the "Living Danube Limes" project—covering ten Danube countries—has worked to assess and manage flood risks collectively to protect the region's shared Roman heritage [23]. These examples demonstrate that public participation and transnational collaboration can enhance adaptive capacity. However, the effectiveness of this global architecture ultimately depends on its translation into national governance systems—a process fraught with challenges of institutional fit, political will, and resource availability.

3. The Fragmented Legal-Policy Framework in China

Against the backdrop of this evolving international framework, China has formally acknowledged the critical importance of safeguarding its cultural heritage from the acute challenges posed by climate change [24]. This commitment was articulated in a landmark 2025 report by the National Climate Center, which, for the first time, features a chapter dedicated to the impacts of climate change on cultural heritage. The report explicitly states that climate change has become "one of the most severe tests" for the field of cultural heritage. Currently, the regulatory framework for addressing climate impacts on heritage is not confined to cultural heritage law alone; it also draws upon policies from climate action, territorial planning, and environmental protection [25]. However, this multi-sectoral coverage is marked by a lack of coordination and integration, resulting in a fragmented system that ultimately undermines the climate resilience of cultural heritage.

3.1. *The Heritage Protection Regime: A Focus on Physical Integrity*

China places paramount importance on the protection of its cultural heritage. This commitment is underscored by the statement articulated by China's President Xi Jinping that "We must protect cultural heritage as we protect our own lives" [26]. This commitment is concretized in the recently revised Cultural Relics Protection Law of the People's Republic of China, which came into force on 1 March 2025, forming the cornerstone of the national conservation framework. The law enshrines core mandates such as "the safety of cultural relics" and the principle of "prioritizing protection and emphasizing rescue," establishing

a robust system centered on safeguarding physical safety and the integrity [27]. Regarding the challenge of climate change, the law acknowledges in Article 11 that “cultural relics are non-renewable cultural resources.” Significantly, the revised text now also stipulates that “governments at all levels should attach importance to the protection of cultural relics, correctly handle the relationship between economic construction, social development and cultural relics protection, and ensure the safety of cultural relics” (Article 11). This new provision signifies an evolving legislative intent, recognizing that heritage conservation must adapt to contemporary challenges [28]. It establishes a foundational legal basis for adopting a more developmental and forward-looking approach to safeguarding cultural heritage, moving towards adaptive management within a changing socio-environmental context.

However, despite these legislative advances, the framework remains anchored in a paradigm ill-suited to climate risk. The existing framework is established from a traditional perspective focused on structural stability and proves inadequate for the systemic, cumulative, and non-linear risks of climate change, revealing a critical adaptation deficit [4]. This inadequacy stems from a twofold deficiency in its core design. First, the law’s core “safety” paradigm is narrowly construed against conventional and immediate threats. Its provisions mandate attention to “safety during construction projects or blasting, drilling, excavation and other operations” (Article 28), and prohibit the construction of “facilities that pollute cultural relics protection units and their environment” (Article 30). Additionally, it enforces principles of minimal intervention for immovable relics in use, charging users with protecting their safety (Article 38), while stipulating strengthened “fire safety management” (Article 39). Finally, it obligates collecting institutions to “be equipped with fire prevention. . . and take corresponding measures to ensure the safety of cultural relics collected” (Article 63). This framework establishes a comprehensive safety paradigm against conventional hazards but entirely omits “climate vulnerability” as a risk factor. Consequently, both the direct and, more significantly, the indirect chronic impacts of climate change—such as long-term threats from shifting humidity, temperature fluctuations, and salt crystallization—fall outside the scope of these narrowly defined “safety” mandates.

Second, the spatial planning instrument of Cultural Relics Conservation Zones—a cornerstone of China’s heritage protection regime—is conceptually disconnected from climate risk parameters. Enshrined in the Cultural Relics Protection Law, these zones are statutorily mandated for areas “where cultural relics are relatively concentrated. . . and in need of overall protection” (Article 40). As the primary legal tool for delineating protection scopes and construction control boundaries, they serve a vital function: creating a spatial buffer against urban development pressures and enabling landscape-level management of heritage assets [27]. Yet, its triggering rationale—relic concentration—renders it inherently unresponsive to climate change indicators. The legal imperative for special protection is not activated by risks such as sea-level rise, coastal erosion, or altered hydrological patterns that may threaten dispersed or singular sites. Thus, this instrument remains anchored in a paradigm of defending static integrity against proximate development, ill-suited to facilitate proactive adaptation to dynamic, climate-induced systemic risks operating at different scales.

These specific shortcomings give rise to three critical and interconnected governance deficits. Foremost among these is the absence of mandated, proactive risk governance instruments, which perpetuates systemic reliance on post-disaster response. The 2025 case of the Erjiangsi Arch Bridge illustrates this gap: while proactive measures—installing monitoring sensors and securing insurance—enabled successful intervention, this outcome depended on ad hoc local initiative rather than systematic legal mandate [29]. The case epitomizes the contingent, rather than institutionalized, nature of climate risk management in the current framework. In stark contrast, Article 22 of the law merely recognizes and

commends those who perform “meritorious rescue after cultural relics are faced with imminent danger,” epitomizing the law’s reactive logic and its silence on preventive monitoring or climate risk financing. Secondly, the system fails to establish mandatory linkages to external scientific data and monitoring. Although temporary inter-departmental coordination, as seen during the 2025 Inner Mongolia floods, can be effective, such collaboration remains entirely episodic [30]. The framework imposes no binding requirement to integrate climate projections, hydrological models, or real-time environmental data into protection planning, resulting in persistent cross-sectoral disconnects in risk assessment. Third, and fundamentally, the core regulatory tools are structurally misaligned with the nature of climate risks. As the cases illustrate, neither broad “safety” mandates nor static conservation zones are designed to authorize or guide the continuous, science-based monitoring and adaptive management required for slow-onset, cumulative, and uncertain climate pressures. Ultimately, these deficits are symptoms of a static and reactive legal protection paradigm. This paradigm treats climate change as an occasional emergency rather than a permanent, transformative condition requiring embedded adaptive governance [31]. The resulting systemic misalignment—across legal mandates, administrative sectors, and scientific domains—is not a marginal gap but a fundamental policy misalignment that prevents the coherent, adaptive governance necessary to safeguard heritage in a warming world.

3.2. Climate and Disaster Policies: The Omission of Heritage-Specific Measures

China has fully integrated climate change response into its national development strategy, with the core focus being the steadfast implementation of the National Strategy for Active Climate Response [32]. This strategic orientation emphasizes that addressing climate change is not only about fulfilling international responsibilities but also represents “an inherent requirement for promoting high-quality development”, as outlined in key national policy documents. The central objectives are to strive to peak carbon emissions before 2030 and achieve carbon neutrality before 2060. Guided by the dual-carbon goals, this policy framework stresses to “promote coordinated efforts to cut carbon emissions, reduce pollution, expand greening, and pursue economic growth” [33,34].

China’s policy framework for addressing climate change has established an integrated structure encompassing macro-level strategy, legal foundations, and technical standardization. This structure provides a foundational policy platform for protecting cultural heritage from climate-related risks. At the macro-strategic level, the National Climate Change Adaptation Strategy 2035, issued by agencies including the Ministry of Ecology and Environment, serves as a national guiding document. It systematically outlines the overarching requirements and core tasks for China’s climate adaptation, explicitly listing the “protection of important cultural heritage” as a key focus area [32]. This grants crucial policy legitimacy and strategic direction for the field of heritage protection [35]. At the legal support level, the newly revised Emergency Response Law of the People’s Republic of China in 2025, as the fundamental statute for emergency management, codifies the principle of prioritizing prevention. Its stipulations, such as integrating emergency preparedness into spatial planning, provide a general legal basis for incorporating heritage site considerations, like emergency access routes, into concrete planning actions. Regarding technical standardization, the National Plan for the Construction of a Standard System Addressing Climate Change in 2025 defines key developmental categories, including climate change impact assessment and adaptation actions [6]. This planning document lays the groundwork for future specialized technical standards, such as guidelines for assessing the vulnerability of cultural heritage, marking a progression from strategic planning toward specialized operational norms. Collectively, this multi-tiered policy architecture functions

as essential foundational infrastructure. It establishes the initial political and legal premises for incorporating climate adaptation into the long-term conservation of cultural heritage.

Nevertheless, this policy framework reveals significant shortcomings at the systemic, normative, and operational levels. These shortcomings not only highlight its inherent maladaptation to the dynamic, systemic nature of climate risks but also exemplify a profoundly fragmented governance landscape that obstructs the translation of policy intent into effective, coherent action. At the systemic level, the absence of a cohesive implementation mechanism creates a critical disconnect between declarative national strategy and actionable local implementation. While the National Strategy for Adaptation to Climate Change mentions heritage protection, it lacks the requisite specificity—such as dedicated funding streams, clear departmental mandates, and performance metrics—to operationalize its goals. This structural gap is illustrated by a 2025 Supreme People's Procuratorate case on cultural public interest litigation, which revealed that local heritage bureaus frequently face protracted and complex funding application processes [36]. Consequently, strategic objectives risk remaining abstract, leaving frontline actors without the concrete authority or resources to act, thereby suspending top-down policy in a state of implementation inertia—a condition where strategic intent exists but institutional mechanisms for delivery are absent.

On the normative front, a deep-seated tension exists between the static preservation paradigm embedded in law and the proactive intervention required for climate adaptation. The Cultural Relics Protection Law enshrines principles of “preservation of the original state” and “minimum intervention.” In contrast, emerging technical standards, such as the Technical Specification for Lightning Protection of Cultural Relics Buildings issued in 2013 and the ongoing national standard pre-research project initiated in July 2023, necessitate specific, sometimes intrusive, engineering measures. This misalignment creates a zone of regulatory uncertainty: how can a comprehensive national standard for lightning protection be implemented while strictly adhering to minimum intervention? The lack of legal integration for these new technical guidelines underscores a fragmented normative regime where updated scientific protocols conflict with foundational legal doctrines, paralyzing decision-making [37]².

At the operational level, fragmentation manifests as a disconnect between generalized procedural frameworks and the specialized needs of heritage conservation. Although inter-departmental cooperation mechanisms (involving emergency management, meteorology, and cultural relics administrations) have been formally established, they often fail at the point of integration. For example, the Cangzhou Grand Canal Cultural Heritage Protection Emergency Plan meticulously outlines multi-agency collaboration but lacks detailed protocols for the material-specific rescue of diverse heritage artifacts [38]. Similarly, while joint directives from the China Meteorological Administration and the National Cultural Heritage Administration mandate enhanced data sharing and early warning, a significant implementation gap persists at the grassroots. The translation of professional meteorological risk data into tailored, pre-emptive conservation actions—such as developing dynamic monitoring models or damage mechanism analyses for specific climate scenarios—remains inconsistent and ad hoc. This operational disconnect risks rendering rescue efforts generic and potentially causing secondary damage—harm inflicted by inappropriate or untargeted intervention [4].

To sum up, the current policy toolkit is characterized by a dual deficiency: it is structurally maladapted to manage the evolving, long-term pressures of climate change, and it is operationally fragmented across administrative, legal, and technical domains. This fragmentation ensures that strategic declarations, normative advances, and operational procedures remain siloed, systematically undermining the coherence and effectiveness of

climate adaptation for cultural heritage. This is not merely a technical or administrative gap; it is a manifestation of the deeper policy misalignment that this paper identifies—a misalignment that, left unaddressed, will continue to leave China's cultural heritage vulnerable in a warming world.

3.3. *Spatial Planning Instruments: The Neglect of Heritage Vulnerability*

This legal framework, centered on the Land Administration Law, the Urban and Rural Planning Law, and the unified territorial spatial planning system established after the integration of multiple plans³, aims to achieve unified and efficient management of all land use through strict regulatory measures [39]. Functionally, modern territorial spatial planning serves as the state's core spatial governance tool for optimizing national development and conservation patterns and addressing systemic risks [40]. It seeks to safeguard ecological security and sustainable urban–rural development from a macro and long-term perspective, a goal that inherently encompasses the strategic intent of spatially governing climate risks holistically. Theoretically, this system should provide a spatially resilient framework for cultural heritage, particularly for the land systems and surrounding environments critical to its survival. This governance framework shapes the safeguarding of cultural heritage primarily through a top-down approach of spatial regulation and planning coordination. While this approach has enabled certain protective achievements, its underlying logic reveals profound tensions when confronted with the dynamic challenges of climate adaptation, as the following analysis demonstrates.

Specifically, this influence operates at three distinct levels of regulatory constraint, each embodying a different logic of heritage protection. First, territorial spatial master plans establish a policy foundation for regional heritage protection while serving as a critical instrument for mainstreaming climate adaptation. As emphasized in the State Council's approval of the Yellow River Basin Spatial Plan, territorial planning must “strengthen disaster prevention, mitigation, and resilience infrastructure to address climate change and extreme weather events, comprehensively enhancing spatial resilience” [41]. Within this framework, heritage protection is no longer an isolated conservation task but an integral component of climate-resilient spatial governance. Chinese scholars have noted that “maximizing the preservation of cultural heritage can substantially reduce carbon emissions from demolition and construction,” positioning heritage conservation itself as a climate action strategy [42]. Thus, territorial master plans function as a fundamental platform that aligns heritage conservation with broader climate adaptation and mitigation goals. Second, within China's spatial planning framework, the most enforceable instruments are the Three Control Lines—Ecological Protection Red Line, Permanent Basic Farmland, and Urban Development Boundary [43]. These lines play a significant role in heritage protection. As articulated by Jilin Provincial authorities, the protection scopes of cultural heritage sites must be incorporated into the territorial spatial basic information platform and precisely delineated onto the “One Map”—a unified spatial database enabling integrated management [44]. This mechanism ensures that where conflicts arise between urban development boundaries and heritage areas, the development boundary must be adjusted to accommodate heritage preservation. Finally, building upon this foundation, a dedicated heritage protection overlay has been formalized through national policy. The 2021 Guiding Opinions, jointly issued by the Ministry of Natural Resources and the National Cultural Heritage Administration, require that “historical and cultural protection lines”—encompassing heritage protection zones and construction control boundaries—be delineated in municipal master plans and incorporated into the “One Map” as “mandatory content” [45]. These lines serve as the legal basis for land-use regulation, with provisions that plan sections involving heritage utilization must seek input from corresponding cul-

tural heritage authorities. This control line system thus embeds legally defined protection scopes into a unified spatial database to coordinate competing land-use pressures under a dynamic climate adaptation framework.

When applied to the climate adaptation of cultural heritage, these spatial planning rules reveal fundamental institutional rigidity, embedded value conflicts, and a critical lack of coordination. This rigidity manifests in two distinct but interrelated forms of institutional failure: temporal misalignment and functional incompatibility. Temporal misalignment refers to the fact that protection boundaries are fixed based on present-day value assessments, with a management logic focused on preventing immediate physical destruction [21]. Yet climate risks are dynamic, uncertain, and future-oriented. The existing framework lacks any legal or procedural mandate for dynamic adjustment based on forward-looking climate risk assessments, leaving it structurally unable to anticipate or respond to gradual environmental change.

Functional incompatibility describes the situation where, even when the need for adaptive infrastructure is recognized, the rigid permitting regime within control lines—designed to prevent harm, not enable adaptation—erects prohibitive barriers to the very facilities that would make long-term resilience possible. While national policies ostensibly permit “necessary facilities” for “scientific research” and “survey monitoring” within ecological redlines—a category that could logically include climate adaptation centers or environmental monitoring stations—the implementation pathway is fraught with procedural rigidity [39]. To build a climate monitoring station within an area bounded by the Ecological Protection Red Line, for instance, an applicant must navigate a multi-tiered review process from county to provincial levels, proving that the facility will cause “no damage to ecological functions”⁴. The permitting regime, designed to ensure that only absolutely necessary projects proceed, thus operates on a presumption of exclusion rather than a principle of enablement. This creates a paradoxical governance dilemma: the very infrastructure that would enable science-based adaptive management—monitoring stations, research facilities, interpretive centers—is subjected to a permitting regime designed for a fundamentally different purpose [40]. The result is a system that, in its well-intentioned effort to prevent harm, precludes the possibility of proactive resilience-building altogether. Projects vital for enhancing a site’s interpretive capacity, monitoring climate impacts, and ensuring long-term operational viability face prohibitive procedural barriers when proposed within zones restricted by the Red Line, effectively stifling adaptation before it can begin [39].

At its core, this is a conflict between two competing temporal logics in governance: the planner’s time, which seeks to fix and stabilize land use through legally enforceable boundaries, and the climate’s time, characterized by uncertainty, gradual change, and abrupt shocks. The current framework is equipped only for the former, leaving it structurally blind to the latter. This temporal blindness manifests as a profound operational disconnect: control lines designed to preserve ecological integrity in the abstract inadvertently stifle the very type of planned, adaptive, and minimally intrusive development necessary to make heritage sites resilient to long-term climatic pressures. This conflict exemplifies the systemic fragmentation between spatial environmental planning and the practical needs of dynamic heritage conservation—a fragmentation that lies at the heart of the policy misalignment.

3.4. Environmental Legislation: The Gap in Value-Specific Safeguards

China has placed environmental protection at the core of its national development. The formal integration of “ecological civilization” into the Five-Sphere Integrated Plan in 2012 marked a strategic shift, elevating environmental conservation from a specialized task to a fundamental development pillar. This orientation is being further institutionalized through the ongoing codification of the Ecological and Environmental Code, which was formally

submitted to the National People's Congress for deliberation in March 2026. Once enacted, this will become China's second formal statutory code after the Civil Code, systematically consolidating existing environmental laws into a more coordinated framework. Notably, the draft code establishes "green and low-carbon development" as an independent section, with a dedicated chapter on "climate change response" that mandates the development and implementation of climate adaptation strategies. This represents a significant legislative advancement, explicitly recognizing the nexus between environmental protection and climate governance. However, neither the current Environmental Protection Law nor the forthcoming Ecological and Environmental Code takes cultural heritage as a direct focus. Their mechanisms can indirectly benefit heritage sites, but this incidental protection reveals a fundamental limitation: environmental law provides the tools, but not the tailored application that cultural heritage requires.

The environmental governance system constitutes a critical mechanism for adapting cultural heritage to climate change. As mandated by the Environmental Protection Law, significant construction projects must undergo an Environmental Impact Assessment (EIA), which involves the analysis, prediction, and evaluation of potential environmental effects [46]. This procedural tool is widely applied in heritage conservation to prevent harm from development [47]. A pertinent example is the post-disaster reconstruction of Yandao Ancient City in Sichuan, where a legally compliant EIA mandated environmental protection measures and the "three simultaneities" system—requiring environmental protection facilities to be designed, constructed, and operated concurrently with the main project [48]. The "three simultaneities" requirement that facilities be designed concurrently with the main project embeds environmental considerations at the very front end of decision-making. For climate adaptation of cultural heritage, this mechanism is particularly valuable: it addresses not only routine environmental impacts but also provides an institutional entry point for responding to climate uncertainty. In the Yandao Ancient City case, EIA was conducted at the planning and design stage rather than after project completion, enabling the pre-identification of climate-related risks—such as extreme precipitation and geological hazards—that could potentially affect the site, and allowing for the design of adaptive measures in advance [48]. This logic of source control exemplifies the proactive risk management central to climate adaptation: rather than reacting after disasters occur, it incorporates forward-looking climate scenarios into project design from the outset. This case demonstrates how EIA, by forecasting impacts and enforcing mitigation from the outset, can minimize risks to heritage integrity at the source [46]. Beyond this specific procedural tool under the Environmental Protection Law, the Flood Control Law establishes spatial zoning systems—such as flood detention basins—that can reduce disaster risks for heritage in vulnerable areas. Similarly, the Forest Law and the Wetland Protection Law enable broader ecological governance that yields synergistic benefits for both ecosystem resilience and heritage conservation⁵.

Nevertheless, when scrutinized through the lens of climate adaptation for cultural heritage, the environmental framework reveals weaknesses that extend far beyond mere omission. These weaknesses manifest at three distinct levels of governance failure—operational, normative, and procedural—each exposing a deeper misfit between environmental and heritage governance logics. At the operational level, legal and planning tools focus on safeguarding current populations and economic interests, without statutory mandates to enhance standards specifically for protecting heritage sites. While spatial zoning systems like flood detention basins can offer a buffer, they also risk placing heritage sites under broader emergency protocols where they may be treated as expendable. The Gaobeidian Kaishan Temple in Hebei Province, a nationally protected site within the Langouwa Flood Detention Basin, starkly illustrates this vulnerability. During heavy rainfall from Typhoon

Doksuri in 2023, the Hebei Provincial Flood Control Headquarters activated the basin, leading to floodwaters inundating the temple grounds [50]. This case reveals a systemic blind spot: with absent heritage-specific provisions, even protected sites remain exposed to sacrifice when broader disaster priorities demand. At the normative level, a fundamental conflict arises when generic environmental standards are applied to contexts governed by specialized heritage values. The debate over vegetation removal from non-scenic sections of the Great Wall exemplifies this tension [51]. Ecologically, vegetation stabilizes slopes; from a conservation perspective, root systems fracture ancient masonry. Neither option is unequivocally correct: prioritizing vegetation risks structural deterioration; removal may disrupt micro-ecological systems that have, over centuries, become integral to the site's character. This is not a technical problem but a governance dilemma—two equally legitimate yet incompatible value systems colliding in the same physical space, underscoring how standardized environmental management lacks the flexibility to accommodate heritage's value-based judgments [52]. At the procedural level, while EIAs address general pollution and ecological impact, they are not required to consider heritage-specific factors. The Old Summer Palace eastern lake bed project EIA explicitly stated that determining “whether the lakeside stone embankments constitute cultural relics. . . falls outside the scope of this assessment” [53]. This legally permissible disclaimer reveals a profound procedural gap: the very tool designed to anticipate environmental harm is structurally blind to the heritage values most at risk. The EIA system thus marginalizes heritage concerns, treating them as external to its jurisdiction rather than integral to its mission.

In summary, while China's environmental legal system provides a broad framework for managing commonplace ecological risks, its application to cultural heritage reveals a profound systemic fragmentation. This is not merely a gap, but a structural disjunction between two governance logics: the generalized, ecosystem-based priorities of environmental protection and the precise, value-based imperatives of heritage conservation. This instrumental mismatch does not create a simple gap to be bridged; it actively entrenches a system where different sectors operate in parallel, with distinct standards and objectives. The result is a governance landscape that systematically undermines the coherent, interdisciplinary action required for true climate adaptation—a fragmentation that lies at the center of the policy misalignment.

4. Underlying Causes of Fragmented Governance

The Chinese government has shown a clear understanding of the increasing threats that climate change poses to its cultural heritage and has actively worked to address these issues through evolving policies and institutional measures. However, as the previous analysis indicates, the governance landscape that has emerged is characterized by persistent and widespread fragmentation. It is important to note that this fragmentation is not simply a technical oversight or a lack of policy clarity. Instead, it is a systemic result, deeply embedded in three interconnected yet analytically distinct challenges. Together, these three factors form the main barriers to a coherent and effective national response.

4.1. The Static-Dynamic Mismatch—Heritage Conservation Paradigms vs. Climate Change Realities

The fragmentation documented above is not merely administrative; it is, at its core, a product of conceptual dissonance. The dominant paradigm of heritage conservation remains anchored in a static worldview—one that views heritage as a fixed object with a singular, authentic state—rendering it fundamentally ill-equipped to respond to the dynamic and uncertain realities of climate change. This conceptual misfit cascades through the entire governance system, manifesting as the legal gaps, sectoral silos, and operational disconnects analyzed in previous sections.

Rooted in traditions of material conservation, this paradigm treats cultural heritage as a fixed object defined by a singular, authentic historical state. Management practices consequently emphasize identification, boundary demarcation, physical enclosure, and restoration to an idealized original condition. Legal frameworks reinforce this orientation through spatial controls—such as protection zones and construction restriction areas—and prescriptive behavioral limits [54]. Yet climate change introduces fluid and often unpredictable environmental pressures, demanding that heritage be reconceptualized as a living system in continuous dialogue with its surroundings. The objective of heritage management must therefore evolve from preserving a static ideal to fostering adaptive capacity and building long-term resilience—a shift with profound implications for legal mandates, institutional practices, and professional expertise. The current paradigm lag leaves legal instruments ill-suited to authorize flexible, context-sensitive interventions—such as reversible structural reinforcements or ecosystem-based adaptations—that are essential in a changing climate [55].

This conceptual inertia does not remain abstract; it is institutionalized through the persistent cognitive externalization of climate change within heritage governance agencies. For many sectoral bodies, climate change remains a specialized concern delegated to environmental or ecological departments, framed within global policy discourse rather than integrated as a core variable in heritage decision-making [56]. Within cultural relics, housing, or natural resource administrations, climate risks are often eclipsed by more immediate policy priorities such as economic development or urban expansion. Consequently, forward-looking climate risk assessments rarely inform heritage conservation planning, spatial regulation, or project approval processes. The case of the Dunhuang Mogao Grottoes illustrates this disconnect: decades of world-renowned conservation focused predominantly on sandstorm mitigation—a familiar, visible threat—while the emerging risk of extreme precipitation remained entirely off the institutional radar [39]. When unprecedented rainfall washed out access roads and threatened the caves, the response was necessarily reactive and urgent. The lag between climatic shifts and institutional recognition underscores a deep-seated cognitive gap: agencies plan for the hazards they know, not necessarily those that climate change is making newly dangerous [57].

The practical consequences of this static–dynamic mismatch are increasingly visible and costly. In 2021, unprecedented autumn floods in Shanxi damaged over 1700 immovable heritage sites. Two years later, floods destroyed the historic Huixiu Bridge pavilion in Anhui's Chengkan Village [58]. Both incidents laid bare the acute vulnerability of traditional timber-and-earth structures to extreme weather events. Yet the post-disaster response in both cases followed a familiar pattern: restoration efforts focused narrowly on structural repairs guided by the principle of “restoring original appearance,” with no evident integration of systemic risk assessment or adaptive design responsive to evolving climate patterns. The disasters were treated as isolated events requiring repair, not as signals of a new normal demanding strategic reconceptualization. Similarly, the restoration of the Guangji Temple Pagoda in Liaoning reflects this pattern at the level of routine practice [59]. Crack monitoring still depends on periodic manual inspections rather than sensor-based real-time data collection—a choice that reflects not technological unavailability but institutional inertia. Restoration work addresses visible structural symptoms without sustained evaluation of long-term performance under changing climatic conditions. The paradigm of reactive repair thus perpetuates itself, foreclosing the possibility of anticipatory, data-driven adaptation.

Together, these cases reveal a persistent institutional inertia: across warning signs, disaster events, and routine practice, climate adaptation remains peripheral rather than central to heritage governance. The static paradigm, reinforced by institutional habits and legal mandates, continues to shape responses even as the dynamic reality of climate change

renders it increasingly untenable. This is the conceptual root of the fragmentation this paper diagnoses—a root that must be addressed before any technical or administrative reforms can take hold.

4.2. Institutional Fragmentation—Departmental Segmentation and Misaligned Governance Structures

In addition to conceptual constraints, the structure of governance itself compounds fragmentation. The protection of cultural heritage is hindered by the absence of institutional authority and cross-sectoral mechanisms capable of reaching across isolated departments—each operating within its own vertical hierarchy, managing its own resources, setting its own standards, and holding its own data. This institutional fragmentation manifests in three interrelated forms: limited horizontal enforceability, conflicting professional standards, and fragmented knowledge systems.

A primary manifestation of this institutional fragmentation lies in the limited horizontal reach of heritage protection across administrative domains. While the Cultural Relics Protection Law formally establishes the legal status of heritage conservation, its practical influence remains largely confined within the cultural relics system itself. The financial, technical, and human resources essential for addressing climate-related risks are scattered across multiple sectoral departments—yet no core coordinating body exists with statutory authority to allocate these resources or facilitate cross-sectoral decision-making [60]. In the formulation of territorial spatial plans, for instance, climate vulnerability assessments for cultural heritage are rarely mandated as integral components of broader layout and functional zoning. As a result, heritage protection requirements fail to exert binding influence at upstream stages such as land-use designation or construction project approvals. Cross-domain collaboration thus risks devolving into procedural formality rather than achieving substantive integration [61]. In effect, heritage protection possesses legal status without the institutional instruments to translate its mandates into binding constraints on other sectors' decisions made beyond its administrative domain [36].

This disconnect is further compounded by direct implementation barriers arising from conflicts between professional standards and value-based objectives. Consider, for instance, the construction of flood control facilities within a historic district. Heritage authorities, guided by principles of “authenticity” and “minimal intervention,” prioritize the preservation of traditional aesthetics and materials. Water management departments, by contrast, advocate for efficient, durable modern engineering solutions grounded in safety standards and technical performance. What appears on the surface as a technical disagreement over materials or design is, in fact, a collision between two fundamentally different value systems—one centered on preserving material fabric and historical meaning; the other on ensuring structural safety and functional performance [39]. This tension extends beyond isolated projects to the very fabric of standard-setting itself. Although precedents for inter-departmental coordination do exist—such as the Technical Code for Lightning Protection of Heritage Buildings, jointly issued by meteorological and cultural heritage authorities—these represent partial integrations targeting single, well-defined hazards. They succeed where the problem is bounded and the trade-offs are minimal [12]. Yet for the complex, multi-dimensional challenges posed by climate change—where flood control, ecological restoration, and heritage preservation must be negotiated simultaneously—no comparable institutional mechanism exists. In the absence of an institutional forum for negotiating these trade-offs, projects either stall indefinitely or proceed with one set of values systematically prioritized over the other, leaving the deeper conflict unresolved.

Underpinning all of these challenges is the fragmentation of knowledge and data systems across sectors, which precludes integrated risk assessment. High-precision climate data held by meteorological departments and heritage structure monitoring data main-

tained by cultural heritage authorities exist in isolated silos [4]. No systemic mechanism enables the interconnection and joint interpretation of these datasets—not merely because of technical incompatibility, but because they are generated within different epistemic communities, using different metrics, different temporal scales, and different definitions of what counts as relevant information. Bridging them requires not just data sharing, but a shared analytical framework that neither sector possesses alone. Consequently, scientific warnings are seldom translated into prioritized lists of adaptive interventions [39]. Core heritage principles such as authenticity have yet to enter into sufficient dialogue with climate adaptation concepts—resilience, reversibility, and adaptive management—to form operationally guiding frameworks. Although isolated collaborative cases do exist, such as Shanxi’s joint analysis of five decades of climate data to study wind patterns affecting the Yingxian Wooden Pagoda, these remain project-based and site-specific—dependent on individual initiative rather than institutionalized mandate [62]. They prove that cross-sectoral collaboration is possible, but also that it remains exceptional. The gap between what can be done and what is routinely done is itself a measure of institutional fragmentation.

These three dimensions of institutional fragmentation—limited horizontal enforceability, conflicting professional standards, and fragmented knowledge systems—are not isolated deficiencies but mutually reinforcing manifestations of a deeper structural condition. In the absence of statutory authority to mandate cross-sectoral coordination, heritage protection remains confined to its administrative domain, unable to shape other sectors’ decisions made beyond its jurisdictional boundaries. In the absence of institutional forums for negotiating value trade-offs, conflicts between conservation principles and other sectors’ standards persist as recurring implementation barriers. And in the absence of unified platforms for data integration, scientific warnings about climate risks fail to translate into actionable priorities for heritage management. Together, these absences constitute the defining feature of the current governance landscape: a system where departments operate in parallel, each with its own mandates, standards, and information, but without the institutional architecture to align them toward a shared objective. This is the essence of institutional fragmentation—not merely the coexistence of multiple actors, but the absence of structured mechanisms to render their collective action coherent. And it is this fragmentation that systematically undermines the possibility of integrated climate adaptation for cultural heritage in China.

4.3. Mechanism Failure—Resource and Capacity Deficits Undermining Adaptive Action

Even where conceptual frameworks are appropriately oriented and institutional structures nominally in place, the system falters at the level of implementation: chronic deficits in sustainable funding, interdisciplinary expertise, and learning mechanisms prevent adaptive objectives from translating into effective, long-term action.

Foremost among these implementation barriers is the persistent confinement of financial investment to short-term, project-based, and post-disaster models. Addressing climate risks effectively requires sustained and predictable support for long-term monitoring, preventive maintenance, and adaptive interventions. Yet current funding streams remain predominantly tied to discrete disaster recovery projects, dedicated preservation programs, or time-bound research grants, characterized by cyclicity and rigid earmarking [4]. Resources allocated through separate administrative channels cannot be strategically coordinated to address cross-cutting systemic risks. As a result, a disproportionate share flows toward post-disaster emergency restoration, while proactive vulnerability reduction and long-term capacity building suffer from chronic underfunding and instability. An instructive counterexample is the “Annual Maintenance System” implemented in Zhongshan City, which provides full subsidies for minor routine maintenance (under 50,000 RMB) of

municipal and lower-level heritage sites [63]. Yet this local innovation precisely underscores a systemic gap: it demonstrates that preventive funding is technically and administratively feasible, yet for the vast number of lower-tier and ungraded heritage sites facing complex and compounding risks, such regularized mechanisms remain the exception rather than the rule. The gap is not one of possibility, but of institutionalized practice.

This implementation gap is further compounded by systemic deficiencies in interdisciplinary competence within professional capacity building. Climate adaptation for cultural heritage demands that managers and technicians possess competencies spanning heritage conservation ethics, climate science, risk management, and adaptive engineering [31]. However, the existing talent development framework within the cultural relics protection system remains anchored in traditional disciplines such as history, archaeology, and restoration techniques, creating acute skill shortages in emerging interdisciplinary domains like climate risk identification, vulnerability assessment, and adaptive design. Concurrently, technical staff in meteorological, water resources, and urban planning departments often lack a nuanced understanding of heritage values and conservation principles. This bidirectional knowledge divide engenders persistent communication barriers and diminishes the feasibility of proposed solutions, even within ostensibly cooperative frameworks. The Maijishan Grottoes, a World Heritage site requiring integrated expertise in geological engineering, bio-deterioration control, and microclimate monitoring, have consistently faced difficulties recruiting professionals with such multidisciplinary backgrounds [64]. This is not an isolated challenge in human resources; it is a structural consequence of a talent development framework that has yet to recognize climate adaptation as a core competency rather than a peripheral specialization.

Underpinning and perpetuating these deficits are the absence of robust implementation, evaluation, and feedback mechanisms within the governance framework. Many adaptive measures are implemented as pilot projects or temporary engineering solutions, with no institutionalized pathways to systematically summarize, evaluate, and translate their experiences into scalable standards or policies. There is a persistent shortage of continuous monitoring and post-intervention assessment mechanisms to evaluate effectiveness and long-term impacts, particularly regarding potential effects on heritage values [65]. This failure precludes the formation of an effective learning–feedback–improvement cycle, producing a form of institutional amnesia: successful experiences are rarely documented or replicated, and lessons from failures dissipate rather than being assimilated into future practice. Consequently, adaptive capacity remains stagnant, and each new climate event is met with responses that are no more prepared or evidence-based than the last [66]. The absence of an integrated implementation–monitoring–evaluation cycle prevents valuable practical experience from being consolidated into replicable technical standards or policy guidelines, perpetuating a cycle in which climate events are met with unprepared, case-by-case responses rather than systematic, evidence-based adaptation.

Beyond the deficits already discussed, historical, economic and political factors have contributed significantly to governance fragmentation. For decades, China's heritage protection system evolved primarily in response to immediate threats—development pressure, tourism overexploitation, natural disasters—accumulating a legacy of reactive measures. This event-driven path dependency has produced an institutional architecture oriented toward post hoc intervention, which is ill-suited to the slow-onset, uncertain nature of climate risks. Moreover, local governments' fiscal reliance on land development often creates misaligned incentives: heritage adaptation competes with revenue-generating urban expansion, and preventive investments yield no immediate visible returns, leading to chronic underfunding [28]. Closely related to these structural constraints are political economy considerations. Under the current system, separate departments—cultural relics,

environmental protection, water resources, spatial planning—each maintain their own budgets, personnel, and regulatory authority. Integration would require ceding autonomy and reallocating resources, which may be resisted by entrenched interests. Path dependency and bureaucratic resistance to coordination are well-documented phenomena in public administration [56]. Studies of China's governance have similarly identified entrenched obstacles to multi-departmental collaboration, including fragmented authority and administrative structures that perpetuate reactive, event-driven responses—a pattern that is particularly evident in the domain of cultural heritage, where climate adaptation demands proactive, cross-sectoral coordination [35].

In conclusion, the fragmented governance of climate adaptation for cultural heritage in China represents not merely a superficial flaw but a deeply entrenched systemic condition. This condition is sustained by the interaction of three primary challenges: a conceptual static–dynamic mismatch, wherein preservation paradigms grounded in ideals of permanence are inadequately equipped to address the fluid realities of climate change; significant institutional fragmentation, characterized by departmental segmentation and misaligned governance structures that hinder the integrated, cross-sectoral action required for effective climate adaptation; and persistent mechanism failure, marked by chronic deficits in sustainable funding, interdisciplinary expertise, and institutionalized learning cycles, which consistently impede the translation of adaptive objectives into effective, long-term practice. These drivers are not mutually exclusive but rather mutually reinforcing, creating a cycle of inertia that leaves heritage vulnerable. Overcoming this impasse necessitates a fundamental paradigm shift—transitioning from fragmented, reactive measures to a holistic and proactive strategy. Such a shift, however, requires more than technical fixes or administrative adjustments; it demands a reconceptualization of heritage governance itself, one capable of aligning conceptual frameworks, institutional structures, and operational mechanisms toward a shared goal: the long-term resilience of cultural heritage in a warming world.

5. Towards an Integrated Governance Framework

In response to the fragmented legal framework and its resultant systemic failures as previously analyzed, this Part argues that merely patching existing legal loopholes is insufficient; rather, a new generation of legal framework must be designed—one capable of accommodating climate uncertainty, incentivizing cross-sectoral collaboration, and empowering diverse stakeholders. This reform agenda rests on four interconnected pillars: conceptual renewal to internalize climate risk into heritage doctrine; institutional restructuring to overcome administrative fragmentation; instrumental integration to close operational gaps in resources, capacity, and feedback; and critical international learning to enrich domestic innovation through comparative engagement.

First, updating the conceptual foundation to internalize climate risks directly addresses the cognitive barriers of static preservation and the externalization of climate issues. The core of this approach lies in institutionalizing the philosophy of adaptive governance. This can be achieved by embedding the precautionary principle into legislation such as the Cultural Relics Protection Law, thereby providing legal legitimacy for proactive intervention, and by reinterpreting the principle of authenticity to create space for necessary technical measures. Collectively, these doctrinal shifts establish a new jurisprudential bedrock for the entire adaptive governance system. Significantly, China's recent legislative practice has already demonstrated a viable pathway for operationalizing this transition. The newly revised Cultural Relics Protection Law in 2025 formally introduced preventive public interest litigation, a procedural mechanism that authorizes procuratorial organs to intervene when cultural relics face a serious risk of damage—before actual harm occurs [67]. This represents a critical first step toward embedding the precautionary principle into

heritage governance, transforming it from a theoretical proposition into a justiciable legal instrument [68].

Beyond doctrinal renewal, restructuring collaborative institutions and procedures constitutes a key response to the institutional barriers of administrative fragmentation and misaligned incentives. The central task here is to transcend ad hoc, project-based cooperation toward permanent, rule-based coordination. This involves establishing a standing cross-departmental coordination platform and transforms cross-sectoral collaboration from discretionary practice into binding institutional rule. In this regard, successful prototypes for multi-stakeholder governance already exist within domestic practice. In May 2024, the Shanxi Provincial Department of Ecology and Environment, the Shanxi Provincial Cultural Heritage Administration, and the Shanxi Cultural Heritage Protection Fund jointly issued the Declaration on Cultural Heritage Protection under Climate Change [69]. This declaration articulated a six-point call to action—spanning scientific understanding, participatory conservation, green lifestyles, timely hazard reporting, public advocacy, and financial support—demonstrating an emerging cross-sectoral consensus on the climate-heritage nexus. While the declaration itself remains a non-binding policy statement, its significance lies in the institutional precedent it establishes: three distinct administrative domains—environmental regulation, heritage conservation, and dedicated funding mechanisms—converging around a shared agenda. The core institutional logic is directly transferable to the climate adaptation context: the formalization of cross-sectoral commitment through joint policy articulation. The task is not to replicate the declaration's specific provisions, but to abstract its architectural principle—the statutory empowerment of inter-agency coordination—and embed it in a binding institutional framework designed for climate-related decision-making [28].

The third pillar of reform involves integrating a systemic adaptation framework to address operational deficits in resources, capacity, and feedback mechanisms. This necessitates a closed-loop design encompassing the entire chain from risk perception to monitoring and evaluation. Its essential components include: first, formulating a national standard for climate change vulnerability assessment of cultural heritage, providing the scientific baseline for identifying priority sites; second, enacting statutory climate adaptation management plans for heritage sites, integrated as a mandatory component of territorial spatial planning to translate that baseline into legally binding management obligations; third, establishing dedicated funding mechanisms—including a national special fund complemented by resilience insurance and ecological compensation schemes—to supply the resources necessary for implementation; and fourth, instituting capacity certification and transparency reporting systems to ensure accountability and enable lessons learned to feed back into future standard-setting. These four components are not standalone tools but interconnected elements of a closed-loop adaptive governance system [7]. Together, they constitute a self-reinforcing cycle that transforms ad hoc responses into systematic, evidence-based adaptation.

The three domestic pillars outlined above—conceptual, institutional, and instrumental—do not need to be designed from scratch. A rich repertoire of international experience exists from which China can selectively draw, provided that such borrowing is mediated by critical adaptation to domestic governance contexts [70]. Such comparative engagement should be neither wholesale adoption nor wholesale rejection, but selective appropriation informed by China's distinctive governance realities. For instance, the United Kingdom's systemic approach to integrating cultural heritage into its national climate change risk assessment framework offers valuable procedural reference points [31]. The objective is not to transplant foreign models, but to enrich the domestic institutional repertoire through critical and contextualized learning.

Taken together, these four reform directions constitute a coherent agenda for moving from fragmented, reactive governance to an integrated, adaptive system. At its heart lies a fundamental reconceptualization of heritage itself—not as a static object to be preserved against change, but as a dynamic system to be sustained through change. It is this conceptual shift that animates the institutional, instrumental, and international reforms proposed above, and it is this shift that offers a feasible way for safeguarding China’s cultural heritage in a warming world.

6. Conclusions

As climate change intensifies, its impacts on cultural heritage have become increasingly severe. Within this context, this study critically examines China’s legal and policy framework for climate adaptation of cultural heritage and reveals a fundamental dilemma. On one hand, the Chinese government has demonstrated increasing attentiveness to this challenge, as evidenced by the proliferation of legal rules across heritage, climate, spatial, and environmental domains. On the other hand, in the face of climate change—a quintessentially systemic threat—this very proliferation has produced not integration but fragmentation: a governance landscape where policies accumulate but fail to coordinate, where instruments multiply but leave gaps unbridged. The system, in its current configuration, is inherently self-undermining. This fragmentation is not accidental but stems from deeply embedded structural flaws operating across three interconnected dimensions: the cognitive (a static preservation paradigm blind to dynamic climate risks), the institutional (departmental segmentation with no binding coordination mechanisms), and the operational (chronic deficits in resources, expertise, and learning). These are the root causes diagnosed in the preceding analysis, and any meaningful reform must address them simultaneously.

Addressing these root causes therefore requires a comprehensive transformation of the governance paradigm across the very same dimensions that produced the fragmentation. Piecemeal amendments cannot repair a systemic failure; only integrated restructuring can. First, at the cognitive level, the jurisprudential foundation must be renewed. This entails embedding the precautionary principle into heritage legislation and reinterpreting authenticity to accommodate science-based adaptive interventions. Second, at the institutional level, the governance architecture must be restructured. This requires establishing a statutory cross-departmental coordination platform with embedded decision-making processes—transforming collaboration from discretionary practice into binding institutional rule. Third, at the instrumental level, operational mechanisms must be integrated. This involves formulating national vulnerability standards, mandating statutory adaptation plans, and diversifying financing instruments to bridge the gap between policy intent and on-the-ground action.

Ultimately, this transformation aims to reconceptualize cultural heritage—from a static object of preservation into a living system safeguarded by an adaptive governance framework capable of continuous learning and dynamic adjustment. Such a paradigm shift is essential to fortify heritage resilience for an uncertain climatic future. This endeavor represents not merely a necessary legal reform but a strategic imperative for national cultural security and civilizational continuity in a warming world. The analytical framework developed here—centered on conceptual, institutional, and operational drivers of fragmentation—is transferable to other contexts, and China’s experience offers a cautionary lesson: policy proliferation without coordination can be as damaging as policy absence. Ultimately, the paper’s contribution lies not only in diagnosing governance failures in China, but in demonstrating a transferable approach for analyzing climate–heritage policy misalignment beyond China. The question is no longer whether China’s cultural heritage

can be preserved unchanged, but whether governance systems can adapt quickly enough to sustain it through change.

Funding: This research was funded by the 2026 Fujian Province Social Science Strong Province Construction Hundred Experts Investigation and Research Project (Grant Number: FJSK26DY009).

Data Availability Statement: All data used in this study are derived from publicly available databases.

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

Notes

- ¹ According to official definitions, China's cultural heritage falls into two broad categories—tangible (cultural relics) and intangible. Tangible heritage includes immovable cultural relics (ancient sites, tombs, architecture, cave temples, stone carvings, murals, and modern historic sites), movable cultural relics (historically significant objects, artworks, documents and manuscripts), and underwater cultural heritage explicitly recognized under the Regulations on the Protection and Management of Underwater Cultural Relics in 2022. Intangible heritage includes oral traditions, performing arts, folk customs, festivals, traditional knowledge and practices concerning nature and the universe, and traditional craftsmanship skills. Even for immovable cultural relics alone, China has surveyed over 767,000 officially registered sites, making the scale and diversity of its heritage corpus among the largest in the world [3].
- ² The China Meteorological Administration, in its May 2025 response to suggestions from National People's Congress deputies, clearly stated: "Going forward, meteorological departments will. . . promote the systematic protection and unified supervision of cultural heritage. . . and to further advance research on the impacts of climate change on cultural heritage".
- ³ The "integration of multiple plans" denotes a foundational reform in China's spatial governance that merges formerly fragmented sectoral plans—covering land use, urban–rural development, and ecological conservation—into a unified, legally binding territorial spatial plan. This reform aims to eliminate contradictions between parallel planning systems and establish a single authoritative framework for all land-use decisions.
- ⁴ Article 16 of the Interim Measures for the Territorial Spatial Control of the Core Monitoring Area of the Jiangsu Section of the Grand Canal stipulates: "Within ecological use areas, strict management of the ecological protection red line shall be implemented. Under the premise of complying with existing laws and regulations, only limited human activities that do not cause damage to ecological functions shall be permitted, with the exception of major national strategic projects."
- ⁵ The comprehensive restoration of Xixi National Wetland Park, for instance, leveraged the Wetland Protection Law to revive the wetland ecosystem while simultaneously restoring historical sites such as Qiuxue Temple [49]. The outcome—a resilient cultural landscape with enhanced flood storage and climate regulation capacity—exemplifies how environmental governance tools can simultaneously advance ecosystem-based adaptation and heritage conservation.

References

1. IPCC. *Intergovernmental Panel on Climate Change's AR6 Synthesis Report: Climate Change 2023*; IPCC: Geneva, Switzerland, 2023.
2. Fatorić, S.; Seekamp, E. Are cultural heritage and resources threatened by climate change? A systematic literature review. *Clim. Change* **2017**, *142*, 227–254. [CrossRef]
3. Rockman, M. Capacity of the U.S. federal system for cultural heritage to meet challenges of climate change. *Proc. Natl. Acad. Sci. USA* **2024**, *121*, e2317158121. [CrossRef] [PubMed]
4. Zhang, R.; Kuang, D.; Peng, Z.; Li, X. China's Cultural and Natural Heritage under Climate Change. *World Archit. Rev.* **2023**, *38*, 47–49.
5. Chinese Government. National Climate Change Adaptation Strategy 2035. 2022. Available online: https://www.gov.cn/zhengce/zhengceku/2022-06/14/content_5695555.htm (accessed on 20 April 2026).
6. Ministry of Ecology and Environment. *National Plan for the Construction of a Standard System Addressing Climate Change in 2025*; Ministry of Ecology and Environment: Beijing, China, 2025.
7. Wang, L.E.; Li, K.; Cui, J.S.; Sun, L.; Zhang, S.Y. The impact of climate change on the protection of cultural heritage in China and its response. *J. Nat. Resour.* **2023**, *38*, 2263–2282. [CrossRef]
8. Hao, S.; Qiao, Y. Trend Research on the Rainstorm Disaster Risk of Immovable Cultural Heritage in China from the Perspective of Climate Change. *China Cult. Herit.* **2023**, *1*, 81–90.
9. Gregory, D.; Dawson, T.; Elkin, D.; Van Tilburg, H.; Underwood, C.; Richards, V.; Viduka, A.; Westley, K.; Wright, J.; Hollesen, J. Research Article of time and tide: The complex impacts of climate change on coastal and underwater cultural heritage. *Antiquity* **2022**, *96*, 1396–1411. [CrossRef]

10. UNESCO. Climate Change and World Heritage. 2023. Available online: <https://whc.unesco.org/en/climatechange/> (accessed on 20 April 2026).
11. Chen, Z.; Gao, Q.; Wu, Y.; Li, J.; Li, X.; Li, X.; Wang, Z.; Cui, H. World Cultural Heritage sites are under climate stress and no emissions mitigation pathways can uniformly protect them. *Commun. Earth Environ.* **2025**, *6*, 628. [CrossRef]
12. Liu, H.; Qiu, H.; Fu, Z. Global action on cultural heritage under the impact of climate change. *China Cult. Herit.* **2024**, *2*, 106–113.
13. Aboulmaga, M.; Abouaiana, A.; Puma, P.; Elsharkawy, M.; Farid, M.; Gamal, S.; Lucchi, E. Climate Change and Cultural Heritage: A Global Mapping of the UNESCO Thematic Indicators in Conjunction with Advanced Technologies for Cultural Sustainability. *Sustainability* **2024**, *16*, 4650. [CrossRef]
14. UNESCO. Resolution 24 GA 8 Updating of the Policy Document on Climate Action for World Heritage. 2023. Available online: <https://whc.unesco.org/en/decisions/8443> (accessed on 20 April 2026).
15. National Cultural Heritage Administration. Fuzhou Declaration of the 44th World Heritage Conference. 1 August 2021. Available online: http://www.ncha.gov.cn/art/2021/8/1/art_722_170257.html (accessed on 20 April 2026).
16. UNESCO. World Heritage Capacity-Building Programme. 2021. Available online: <https://heritap.whitr-ap.org/index.php?classid=12483&id=172&t=show> (accessed on 20 April 2026).
17. UNESCO. Hadrian's Wall: Frontiers of the Roman Empire UNESCO World Heritage Site. 2024. Available online: <https://unesco.org.uk/news/climate-change-unesco-heritage-visits-frontiers-of-the-roman-empire-hadrians-wall-world-heritage-site> (accessed on 20 April 2026).
18. ICOMOS. ICOMOS Welcomes the Heritage Adapts to Climate Alliance Initiative. 2024. Available online: <https://www.icomos.org/actualite/icomos-welcomes-the-heritage-adapts-to-climate-alliance-initiative/> (accessed on 20 April 2026).
19. IUCN. IUCN Guidelines for Assessing Species' Vulnerability to Climate Change. 2024. Available online: <https://gsapskills.org/resources/iucn-guidelines-for-assessing-species-vulnerability-to-climate-change/> (accessed on 20 April 2026).
20. UNESCO. The Case of Venice and the Impact of Climate Change on Heritage. 2021. Available online: <https://www.whitr-ap.org/index.php?classid=1490&newsid=3593&t=show> (accessed on 20 April 2026).
21. Institute of Archaeology. Living Danube Limes. Available online: <https://www.iarh.hr/en/research/international-projects/living-danube-limes/> (accessed on 20 April 2026).
22. Writer, S. UK's National Trust Unveils First Climate Transition Plan. 30 June 2025. Available online: <https://esgpost.com/uks-national-trust-unveils-first-climate-transition-plan/> (accessed on 22 April 2026).
23. Australian News Wales Government. Caring for Country. Available online: <https://www.planning.nsw.gov.au/policy-and-legislation/strategic-conservation-planning/cumberland-plain-conservation-plan/caring-for-country> (accessed on 22 April 2026).
24. Zhang, B.; Zhu, Y.; Lan, C.; Chen, Z. Nature-based Solutions: Heritage Setting Cognition and Conservation Planning for Historic Cities in the Context of Climate Change. *Urban Plan. Forum* **2024**, *281*, 18–28.
25. Fu, Z. Summary Report on the Conference Held for the International Day for Monuments and Sites 2022: Heritage and Climate. *China Cult. Herit.* **2022**, *3*, 104–110.
26. Xinhua Net. Xi Jinping's three proverbs on the protection of cultural relics. *Xinhua Net*, 6 January 2015. Available online: http://www.xinhuanet.com/politics/2015-01/06/c_1113897353.htm (accessed on 20 April 2026).
27. Chinese Government. What Changes Have Been Brought About by the Implementation of the Newly Revised Cultural Relics Protection Law? 4 March 2025. Available online: https://www.gov.cn/zhengce/202503/content_7009974.htm (accessed on 20 April 2026).
28. Wang, Y.; Hu, S. *Understanding and Application of the Cultural Relics Protection Law*; China Rule of Law Publishing House: Beijing, China, 2025.
29. China Daily. "Technology + Insurance" Empowers Cultural Relics to Protect and Build Historical Guarantees. 17 July 2025. Available online: <https://cn.chinadaily.com.cn/a/202507/17/WS68789317a310028a84abe507.html> (accessed on 20 April 2026).
30. National Cultural Heritage Administration. Inner Mongolia Autonomous Region: Make Every Effort to Build a Strong Defense Line for Cultural Relics Safety During Flood Season. 5 August 2025. Available online: http://www.ncha.gov.cn/art/2025/8/5/art_722_197782.html (accessed on 20 April 2026).
31. Wang, X.; Li, H.; Wang, Y. International Policy and Action for Adaptation to Climate Change in Heritage Sector and Its Implications to China. *Environ. Prot.* **2022**, *50*, 72–78.
32. Chinese National People's Congress. Report of the State Council on Addressing Climate Change and Carbon Peaking and Carbon Neutrality. 11 September 2025. Available online: http://www.npc.gov.cn/npc/c2/c30834/202509/t20250911_447643.html (accessed on 20 April 2026).
33. Chinese Government. Xi Jinping Report to the 20th National Congress of the Communist Party of China. 2022. Available online: https://www.gov.cn/xinwen/2022-10/25/content_5721685.htm (accessed on 20 April 2026).

34. State Council Development Research Center. Maintain Strategic Focus and Coordinate Efforts to Promote Carbon Reduction, Pollution Reduction and Green Growth During the 10th Five-Year Plan. 9 February 2026. Available online: <https://www.drc.gov.cn/DocView.aspx?chnid=379&leafid=1338&docid=2909635> (accessed on 20 April 2026).
35. CNR News. 17 Departments Issued a Document Clarifying the Development of Climate-Adapted Tourism. 19 June 2022. Available online: https://travel.cnr.cn/dsywzl/20220619/t20220619_525871584.shtml (accessed on 20 April 2026).
36. Supreme People's Procuratorate. Guiding Cases: Comprehensively Performing Their Duties to Protect Cultural Relics and Cultural Heritage. 1 March 2025. Available online: https://www.spp.gov.cn/xwfbh/wsfbt/202503/t20250301_686735.shtml#1 (accessed on 20 April 2026).
37. China Meteorological Administration. Response to the "Proposal on Establishing a Meteorological Early Warning and Monitoring Mechanism for Cultural Heritage Protection". 10 May 2025. Available online: <https://www.cma.gov.cn/zfxxgk/gknr/jytabl/202505/P020250514662304668331.html> (accessed on 20 April 2026).
38. Cangzhou Government. Interpretation of the "Emergency Plan for Cultural Heritage Protection of the Grand Canal in Cangzhou". 1 August 2024. Available online: <https://www.cangzhou.gov.cn/czsrnzfbgs/c104726/202408/8c0ecf5299ce4c779e95f8b8708b9fe0.shtml> (accessed on 20 April 2026).
39. Zhang, B. Spatial Planning System Reform in China: To Enhance the Conservation and Management of Cultural Heritage. *World Archit.* **2022**, *12*, 20–24.
40. Kamjou, E.; Scott, M. The heritage-climate change nexus: Towards a values-based adaptive planning response for cultural landscapes. *J. Environ. Plan. Manag.* **2025**, 1–20. [CrossRef]
41. Resources Ministry of Natural. Reply of the State Council on the "Land and Space Planning of the Yellow River Basin (2021–2035)". 8 April 2025. Available online: https://x.m.mnr.gov.cn/gk/ghjh/202504/t20250410_2882784.html (accessed on 20 April 2026).
42. Zhang, G. Low carbon emission reduction in urban cultural heritage protection. *China Urban Planning Network*, 16 December 2025. Available online: <https://planning.org.cn/news/view?id=17999> (accessed on 20 April 2026).
43. Chinese Government. Guiding Opinions on Coordinating and Implementing Three Control Lines in Land and Space Planning. 1 November 2019. Available online: https://www.gov.cn/zhengce/2019-11/01/content_5447654.htm (accessed on 20 April 2026).
44. Jilin Province Department of Culture and Tourism. Notice on Promoting the Work of Defining the Scope of Cultural Relics Protection in the "Three Districts and Three Lines". 27 May 2022. Available online: https://whhlyt.jl.gov.cn/zwgk/tzgg/202205/t20220527_8461116.html (accessed on 20 April 2026).
45. Chinese Government. Guiding Opinions on Strengthening the Protection and Management of Historical and Cultural Heritage in the Preparation and Implementation of Land and Space Planning. 8 March 2021. Available online: https://www.gov.cn/zhengce/zhengceku/2021-03/18/content_5593637.htm (accessed on 20 April 2026).
46. He, X. In the Name of Legitimacy and Efficiency: Evaluating China's Legal Reform on EIA Get access Arrow. *J. Environ. Law* **2020**, *32*, 441–469. [CrossRef]
47. Ma, Y. Dynamics in Central–Local Division of the Authority of EIA Approval in China Get access Arrow. *J. Environ. Law* **2019**, *31*, 29–57. [CrossRef]
48. Yingjing Government. Reply to the Environmental Impact Report Form of the Post-Disaster Recovery and Reconstruction Project of Yandao Ancient City. 17 November 2016. Available online: <http://3g.yingjing.gov.cn/gongkai/show/20161117090224-042066-00-000.html> (accessed on 20 April 2026).
49. Zhejiang News. Xixi Wetland Reconstruction: A Group of Ancient Architecture Experts to Demonstrate. 3 April 2004. Available online: <https://zjnews.zjol.com.cn/05zjnews/system/2004/07/03/003001511.shtml> (accessed on 20 April 2026).
50. Zhang, N.; Wang, J.; Li, N. The support of dynamic flood risk analysis technology for flood emergency work. *China Flood Drought Manag.* **2023**, *33*, 39–44.
51. Liu, W. Challenges and Responses—Protection of the Great Wall under the Impact of Climate Change. *Study Nat. Cult. Herit.* **2022**, *7*, 24–34.
52. Ding, G. Theories and Practices of Public Participation in Public Interest Litigation relating to Cultural Heritage. *China Cult. Herit.* **2023**, *4*, 56–64.
53. Ministry of Ecology and Environment. The State Environmental Protection Administration Requires Comprehensive Rectification of Yuanmingyuan Anti-Seepage Project. 7 July 2005. Available online: https://www.mee.gov.cn/gkml/sthjbgw/qt/200910/t20091023_179931.htm (accessed on 20 April 2026).
54. Wang, Y. *Cultural Heritage Law: China and the World*; The Commercial Press: Beijing, China, 2024.
55. Zan, L.; Baraldi, S.B. Managing Cultural Heritage in China: A View from the Outside. *China Q.* **2012**, *210*, 456–481. [CrossRef]
56. Huo, Z. Legal Protection of Cultural Heritage in China: A Challenge to Keep History Alive. *Int. J. Cult. Policy* **2016**, *22*, 497–515. [CrossRef]
57. Lu, B.; Zhou, S. China's State-led Working Model on Protection of Underwater Cultural Heritage: Practice, Challenges, and Possible Solutions. *Mar. Policy* **2016**, *65*, 39–47. [CrossRef]

58. Tencent News. Huanxiu Bridge with a History of More than 700 Years Is Hit Again. 2024. Available online: <https://news.qq.com/rain/a/20240621A09OUL00> (accessed on 20 April 2026).
59. Jinzhou Government. *Suggestions on the Protection of Guangji Temple and Ancient Pagoda*; Jinzhou Government: Jinzhou, China, 2025.
60. Chen, X. Theoretical optimization and institutional improvement of procuratorial environment public interest litigation. *China Law* **2022**, *4*, 288–304.
61. Wang, D. Internationalizing heritage: UNESCO and China's Longmen Grottoes. *China Inf.* **2010**, *24*, 123–147. [CrossRef]
62. CNR News. Climate Change Triggers Natural Disasters and Technology Supports Cultural Heritage. 6 July 2024. Available online: https://m.cnr.cn/tech/20240706/t20240706_526780815.html (accessed on 20 April 2026).
63. Zhongshan Government. Notice on Issuing the "Measures for the Management of Annual Repair Funds for Immovable Cultural Relics in Zhongshan City (Trial Implementation)". 20 February 2023. Available online: https://www.zs.gov.cn/wglj/zcgw/gfxwj/content/post_2321390.html (accessed on 20 April 2026).
64. Yang, Y. *The Project to Cultivate Talents and Improve Capabilities for the Protection of Cave Temples Colorful Sculptures and Murals Was Launched*; National Cultural Heritage Administration: Beijing, China, 2025.
65. Procuratorial Daily. Protection Model Upgraded from "Passive Rescue" to "Active Early Warning". 13 June 2025. Available online: https://www.spp.gov.cn/spp/dfjcdt/202506/t20250613_698235.shtml (accessed on 20 April 2026).
66. People's Procuratorate of Iichuan City, Hubei Province. Digitally Empowered Cultural Protection Units Continue to "Look Back" Online. 13 June 2025. Available online: https://lc.es.hbjc.gov.cn/shgy/202509/t20250917_1868468.shtml (accessed on 20 April 2026).
67. Leng, L.; Han, K. Limitation and application of preventive liability in environmental civil public interest litigation. *J. China Univ. Political Sci. Law* **2024**, *5*, 20–34.
68. Li, Y.; Huang, J. On the Identification of "Major Risks" in Preventive Environmental Public Interest Litigation. *J. China Univ. Political Sci. Law* **2024**, *5*, 5–19.
69. Xinhua News. Shanxi Province Issued the Declaration on the Protection of Cultural Heritage Under Climate Change. 17 May 2024. Available online: <http://www.sx.news.cn/20240517/1452110291a2489c944c9033d119360a/c.html> (accessed on 20 April 2026).
70. CCTV News. Rich Cultural Relics Resources! Our Country has More Than 760,000 Immovable Cultural Relics. 25 September 2024. Available online: https://content-static.cctvnews.cctv.com/snow-book/index.html?item_id=12218023513233703448 (accessed on 22 April 2026).

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