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CULTURAL HERITAGE PRESERVATION IN RESOURCE-RICH TERRITORIES: CHALLENGES AND SUSTAINABLE DEVELOPMENT PATHWAYS

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Abstract: The present article provides an interdisciplinary assessment of cultural heritage preservation in resource-rich territories, focusing on Kazakhstan's Aktobe Region as an emblematic case of the tensions and synergies between natural resource exploitation and heritage conservation. Despite the fact that Kazakhstan is home to over 25,000 registered cultural heritage sites, the protection of these sites is constrained by industrial pressures, insufficient institutional capacity, limited community engagement, and fragmented regulatory mechanisms. These challenges are particularly pronounced in regions with high concentrations of mining, oil, and gas activities. In such areas, technogenic transformations, landscape degradation, and environmental stressors have a detrimental effect on the integrity of archaeological, architectural, and museological assets. The study employs a systematic qualitative review based on PRISMA 2009/2020 guidelines. A total of 85 peer-reviewed sources published between 2000 and 2025 across heritage studies, geography, sustainability science, and environmental governance have been synthesised. A comparative analysis of international contexts demonstrates that developed countries are increasingly integrating adaptive reuse, heritage impact assessments, climate-risk adaptation, and participatory governance into heritage management systems. In contrast, post-Soviet states, including Kazakhstan, continue to encounter structural impediments such as legislative inconsistency, inadequate funding, and ineffective coordination between heritage authorities and extractive industries. The findings indicate that cultural heritage can function as a strategic catalyst for sustainable territorial development when integrated within governance models that combine legal protection, ESG-aligned corporate responsibility, community-based stewardship, and spatial planning. In the context of territories with abundant natural resources, achieving a balance between economic growth and heritage conservation is not merely a preservation task; rather, it is an essential prerequisite for ensuring long-term socio-ecological resilience and the formation of regional identity.

Keywords: cultural heritage preservation, resource-rich territories, sustainable development, industrial landscape transformation, heritage governance, Aktobe region, adaptive reuse

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INTRODUCTION

In Kazakhstan, cultural heritage encompasses both tangible objects (architectural monuments, historic landscapes) and intangible forms (traditions, cultural practices). More than 25 000 historical and cultural heritage objects are registered in the country, including 265 monuments of republican significance and over 12 000 of local significance (Ministry of Culture & Information of the Republic of Kazakhstan, 2025). Insufficient development of buffer zones, inconsistent enforcement of protection standards, and limited involvement of local communities and specialists complicate the protection of this heritage. Added to this, domestic literature notes a shortage of qualified personnel, bureaucratic procedures, and inadequate funding for restoration projects (Rizakhojayeva, 2021; Abdikarimova et al., 2025). In regions with high natural-resource potential – for example, the western regions of Kazakhstan with significant oil, gas and mineral sectors – additional pressures arise from intensive resource use, industrial load, infrastructure development and tourism flows, which may degrade heritage conditions (Imankulov, 2024; Moldagaliyeva et al., 2024; Issakov et al., 2025).

In distant abroad contexts – such as the USA, Western Europe, China and Japan – cultural heritage preservation faces its own distinctive challenges even within well-resourced systems. In the USA and Western Europe, despite strong institutional capacity, issues of adaptive reuse of heritage buildings, conflicts between infrastructure expansion and heritage

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conservation, mass tourism pressure, climate change impacts, and ageing heritage stock are prominent (Min, 2025; Zhang, 2024; Kostakis, 2024; Tost, 2021; Kostakis & Lolos, 2024).

In East Asia, for instance in China, rapid urbanisation, industrialisation, heavy tourism flows and environmental impacts are placing significant strain on the historic fabric of cities and cultural landscapes; for example, studies of the "Forbidden City" highlight the combined threats of environment change, pollution and redevelopment on heritage (Zhang, 2024; Li, 2025; Saifi, 2025; Van Tricht et al., 2025; Mekonnen et al., 2022; Chen, 2023)

In the near abroad – countries such as Belarus, Russia, Kyrgyzstan and Uzbekistan – we observe a mixture of post-Soviet legacies and globally common heritage concerns. In Russia and Belarus, research points to legislative and institutional weaknesses: heritage legislation is not always systematically integrated, monitoring and public engagement mechanisms remain weak, and heritage is often under-financed (Martynenko & Trofimova, 2019). In Central Asian neighbours (Kyrgyzstan, Uzbekistan), challenges include lack of resources, weak integration of heritage into sustainable territorial development, limited assessment of natural-resource and cultural-heritage potential, and the risk of heritage compromise due to resource extraction or heavy land-use transformation (Imankulov, 2024; Nazarov, 2020; Oktyabrskaya et al., 2024; Hølleland, 2017). In all these countries of the near abroad, the central issues revolve around how to balance economic development – especially in resource-oriented territories – with preservation of cultural and natural heritage. Across these geographical contexts, common themes emerge – institutional capacity, funding, community engagement, monitoring, environmental stressors – but each context has its own local variations and priorities.

In the contemporary world, the topic of cultural heritage preservation is of growing importance for multiple reasons.
First, globalization, rapid urbanisation, industrialisation and infrastructure development impose intense pressure on historical fabrics, landscapes and cultural practices – leading to loss of authenticity, destruction or alteration of cultural spaces (Seila, 2025; Rodrigues, 2025; Andrade et al., 2024; Lucia & Pashkevich, 2023). Second, cultural heritage is increasingly recognised as a resource for sustainable development: it supports identity, social cohesion, tourism attractiveness, economic growth and resilient territorial development (Rhodes, 2024; Wang et al., 2025; Fouseki, 2022; Soeswoyo, 2025).

Third, territories that are rich in natural resources face a double-pressure scenario: on one hand they host abundant heritage and landscapes; on the other, they experience intense resource use (mining, extraction, infrastructure) which may negatively impact both cultural and natural heritage. Forestry, mining, oil and gas, heavy tourism and development can degrade landscapes, displace communities, erode cultural practices and undermine heritage integrity. Moreover, climate change and environmental stressors amplify threats – increasing frequency of extreme events, shifting landscapes, rising pollution levels – all of which demand that cultural heritage be integrated within sustainability agendas (Harfst, 2025; Somoza-Medina, 2021; Chiodi et al., 2025). Additionally, international initiatives such as programmes by UNESCO emphasise the linkages between culture, nature and sustainable development, making heritage preservation central in research, policy and practice globally (Min, 2025). Given the strategic value of heritage for territorial development, especially in regions with high natural-resource potential, the theme is not only academically timely but also practically urgent (Guo, 2024; Vandelli et al., 2024; Vadrucci, 2025; Geçikli, 2024; Aldybayev et al., 2021).

METHODOLOGY

This review was conducted using a systematic, qualitative methodology to synthesize interdisciplinary scientific knowledge on the relationship between abundant natural resources, sustainable development, and the role of cultural heritage conservation. The methodology was based on the general principles of transparency and replicability, developed in accordance with the PRISMA guidelines (2009/2020) and adapted for conceptual sociological and geographical reviews. Literature selection and analysis were conducted in four stages: identification, screening, eligibility, and inclusion (Figure 1).

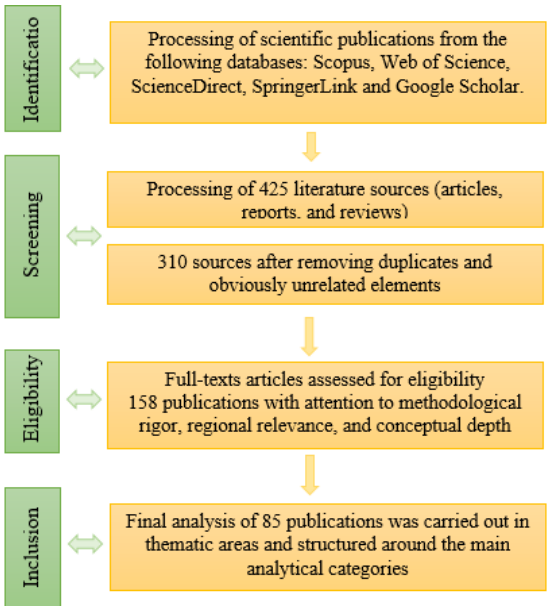

Figure 1. PRISMA 4-phase flow diagram of the literature selection process (Source: own construction)

Identification: A targeted search strategy was developed to identify peer-reviewed journal articles, conceptual papers, and systematic reviews published between 2000 and 2025. The review focused on papers examining cultural heritage, sustainable development, and natural resource potential. The following databases were used: Scopus, Web of Science, ScienceDirect, SpringerLink, and Google Scholar. Search terms included keywords such as technogenesis, sustainable development, recreation, industrial zones, steppe ecosystems, biodiversity, and green infrastructure. The initial search yielded 425 articles, reports, and reviews, of which 310 were retained after removing duplicates and obviously unrelated items.

Selection: Records were screened based on titles and abstracts to assess relevance. Inclusion criteria: (a) publications in English; (b) published in peer-reviewed journals or academic collections; (c) a substantive examination of the interactions between anthropogenic impacts and natural ecosystems; (d) an examination of recreational or protected areas in a post-industrial or technogenic context; and (e) a contribution to conceptual, theoretical, or applied ecological and spatial approaches. Exclusion criteria included publications narrowly focused on technical engineering solutions, case studies without a broader theoretical approach, and non-peer-reviewed "gray" literature. At this stage, 158 publications were selected for full-text assessment. Selection requirements: The full texts of 173 publications were reviewed based on methodological rigor, regional relevance, and conceptual depth. Each article was evaluated based on whether it addressed: (1) cultural heritage preservation; (2) sustainable regional development; and (3) natural resource potential. Particular attention was paid to articles presenting comparative case studies from different countries, in particular Kazakhstan, Germany, China, South Korea, the United States, and others. As a result, 85 works were selected, including systematic reviews, theoretical articles, and case studies relevant to policy and planning.

Inclusion and analysis: The final corpus of 85 articles was analysed thematically and structured around the main analytical categories defined in the "Literature Review" section: cultural heritage preservation, natural resource-based and restoration strategies, and sustainable development. Data were obtained taking into account geographical focus, methodological approach (where applicable), and conceptual contributions. The selection covers a range of disciplinary areas: geography, cultural studies, ecology, environmental science, and regional development, providing an interdisciplinary synthesis.

Most of the included works were published in high-impact journals such as GeoJournal of Tourism and Geosites, Sustainability, Ecologies, and Environment and Planning, demonstrating the academic quality and relevance of the sources. Several studies were funded by the government or linked to environmental organisations, reflecting both academic and applied significance. Where necessary, visual data such as satellite imagery, geospatial modelling and environmental indicators were taken into account, although the main focus of this review is on the conceptual and policy aspects.

The entire selection process was documented and conducted by a team of seven researchers with expertise in landscape planning, cultural heritage, urban geography, and environmental policy. Consistency among reviewers was ensured through double-checking inclusion criteria and joint synthesis of themes.

The result is a robust, comprehensive and globally contextualised analysis of the relationship between resource potential and cultural heritage in the context of sustainable territorial development.

LITERATURE REVIEW

In the distant abroad, research on heritage conservation is well-established in Europe, North America and Asia. For example, in Europe and the USA scholars have explored adaptive reuse of heritage buildings and the integration of heritage into urban planning and sustainable development. Koch (2024) emphasises that major contemporary threats to heritage include climate change, tourism pressure and governance deficiencies.

In a recent bibliometric review, Min (2025) analyses how the field of cultural heritage management has evolved from site-based conservation toward systemic urban policy integration, community participation and socio-ecological approaches. In East Asia, Zhang (2024) presents a systematic review of cultural route heritage in China, offering insights into heritage management in resource-intensive contexts and globalised tourism flows.

In the near abroad, researchers in the post-Soviet space have addressed the institutional, legal and community aspects of heritage conservation. For instance, Martynenko & Trofimova (2019) analyse legislative frameworks in Russia and Belarus and identify systemic weaknesses in regulation, oversight and economic integration of heritage. Volkova et al. (2025) examine heritage preservation amid rapid urbanisation and tourist flows in Russia's Krasnodar Territory, highlighting the interplay between heritage, ecological systems and sustainable development. Central Asia more broadly has begun to feature in the literature: Imankulov (2024) looks at restoration and reconstruction of architectural heritage in Kazakhstan and Central Asia, stressing threats from globalization, urbanisation and environmental change.

In Kazakhstan specifically, several recent studies provide relevant empirical and theoretical contributions. Kadyrbekova et al. (2023) evaluate how Kazakhstan's rich cultural heritage can be strategically used to stimulate domestic tourism and national pride, offering a systematic methodology and policy recommendations. Aldybayev (2021) discusses current problems of cultural policy and heritage preservation in Kazakhstan tied to the Silk Road legacy, noting shortages of specialists, funding and effective integration. Abdikarimova et al. (2025) examine the role of ethnic tourism in preserving Kazakhstan's cultural heritage and local traditions, discussing both benefits and risks such as commercialisation and authenticity loss. Together, these bodies of work – in distant, near and national contexts – establish a foundation from which the present review builds; yet there remains a gap in explicitly addressing the intersection of cultural heritage preservation in territories with high natural-resource potential, which is the focus of this article.

The Aktobe Region in western Kazakhstan presents a remarkable case of a territory combining significant natural resource wealth and the attendant development pressures associated with resource exploitation. The region boasts

abundant mineral and hydrocarbon potential: it plays a leading role in Kazakhstan's reserves of chromium, nickel, titanium and phosphates, while also hosting significant oil and gas deposits. For example, the region is cited as comprising the full periodic-table of useful minerals in Kazakhstan, with reportedly more than half the national nickel reserves, over one-third of phosphates, and the bulk of chromium ore (SPK-Aktobe, n.d.).

Exploration and mining of chromite deposits around the town of Khromtau are well-documented: the Kempeirsai deposit in Karagaly district is estimated to hold over 300 million tons of Cr_2O_3-bearing rock. These metal-rich deposits support a cluster of processing and beneficiation plants, notably the chrome ore-processing complex in Khromtau and the metallurgical works near the city of Aktobe. In parallel, the region's hydrocarbon sector remains active, with oil and gas extraction contributing to regional GDP and attracting associated infrastructure development and logistics.

This combination of metal mining, ore processing, hydrocarbon production, and industrial infrastructure frames the Aktobe Region as a classic "resource-rich territory" (i.e., endowed with substantial natural capital) and raises several implications for both economic development and cultural heritage management. On the one hand, resource extraction brings investment, employment, infrastructure (roads, rail, power), and economic diversification possibilities beyond mere raw export. On the other, it also generates a high level of environmental and socio-spatial transformation: tailings and processing waste, changed landforms, increased transport routes, heavy industrial emissions, and alteration of natural and historical landscapes. Research on mining impacts in the Aktobe Region indicates that chromium-ore extraction in the Khromtau area has led to significant environmental burdens – landscape change, soil degradation, groundwater contamination – which in turn may affect heritage landscapes and archaeological sites situated in or adjacent to mining concessions (Berdenov et al., 2025; Beketova, 2019; SPK-Aktobe, 2023).

The dual character of the territory – abundant natural resources and significant cultural/historical assets – places the region at a crossroads of sustainable development. The challenge lies in reconciling efficient resource utilisation (and its economic benefits) with the conservation of cultural heritage, which itself constitutes a form of territorial capital. In the literature on resource-rich regions, scholars emphasise that such territories are exposed to the so-called "resource curse" or dependency risk, but that effective governance mechanisms can convert natural resource wealth into broader sustainable development outcomes (Kostakis & Lolos, 2024; Min et al., 2025). In the case of Aktobe, the interplay between resource extraction, industrial infrastructure, and heritage conservation presents a fertile field for investigation: how to integrate the management of cultural heritage into a region undergoing rapid resource-led transformation? The current review aims to situate the Aktobe Region within this conceptual framing and explore how the literature on heritage preservation in resource-intensive contexts can draw lessons for this territory.

The Aktobe Region hosts a diverse array of cultural heritage monuments and sites that reflect its deep historical roots, ethnocultural significance and evolving identity. These heritage assets range from ancient archaeological settlements, architectural monuments, museological institutions, to Soviet-era memorial complexes (Berdenov et al., 2025). For example, the region contains the ancient settlement of Balasagun (though more commonly referenced in Kyrgyzstan, but related legacy settlement patterns exist locally) and other early medieval fortifications, which illustrate regional links to the historic Silk Road and nomadic cultures. In the urban centre of Aktobe, key monuments include the mausoleum of Abulkhair Khan, a memorial complex commemorating Kazakh unity and statehood, and the Republican-level "Alley of Heroes" memorial dedicated to the Great Patriotic War, featuring multiple stelae and sculptural works (Jelen, 2022; Koch, 2024; Nastou, 2024; Zhang et al., 2024). Museums play a critical role in the region's heritage ecosystem: the Regional Museum of History and Local Lore in Aktobe holds artifacts from Syntashta culture and Scythian/Sarmatian burial mounds. Furthermore, the region reports approximately 75 cult-objects (temples, mosques, memorials), including 27 of national significance and 48 of local significance (SPK-Aktobe, 2023).

These sites carry multiple layers of value: historical-archaeological value (ancient settlements, burial mounds), architectural and artistic value (mausolea, memorial sculpture, places of worship), social and educational value (museums, memorial complexes), and touristic and regional-branding value (heritage sites as destination assets). Their spatial distribution is noteworthy: many lie either in the city of Aktobe or its immediate surroundings, while others are located in more remote districts adjacent to mining or processing industrial zones. This spatial proximity to resource extraction zones creates tensions but also offers opportunities around heritage and industrial tourism composites.

From a heritage management perspective, the Aktobe Region thus combines urban and rural heritage assets, national and local monuments, and a territorial spread that intersects with resource-intensive land use. This raises questions about buffer zones, monument monitoring, industrial encroachment, stakeholder capacities (local communities, mining companies, heritage agencies) and funding regimes. For heritage to function as a lever of sustainable territorial development in Aktobe – not just as a passive legacy but as an active asset-these issues must be addressed.

Resource-rich territories face distinct dynamics when it comes to cultural heritage preservation. The presence of high natural-resource endowments leads to intensified extraction, industrial infrastructure, transport connectivity (roads, rails, pipelines), and sometimes large population influx or transient workforces. This development footprint often overlaps with heritage landscapes, archaeological sites, and traditional ways of life. In the distant abroad (for example Western Europe, the USA, Japan, China), scholars have documented how mining, heavy industry and urban sprawl intersect with heritage conservation. For instance, adaptive reuse of industrial heritage in Western Europe has become a key strategy: old factories and mining sites are repurposed into museums, cultural venues and tourism destinations (Koch, 2024). In the USA, the National Historic Preservation Act and related frameworks mediate the conflict between infrastructure development and heritage preservation; yet mass tourism, climate change, and urban expansion remain persistent threats

(Yiamjanya et al., 2024; Dmitriyev, 2022; Nikolić et al., 2024). In East Asia, the phenomenon of rapid urbanization and infrastructural build-out has placed enormous stress on cultural heritage corridors – e.g., in China the upgrading of Silk Road heritage sites is challenged by the demands of industrial corridors and high-volume tourism flows (Zhang, 2024).

In Kyrgyzstan and Uzbekistan, mining and large-scale infrastructure (e.g., hydropower, open-pit mining) have intersected with ancient settlement zones and Silk Road heritage sites; often heritage protection is secondary to economic development. Across global contexts, several regulatory and stakeholder-based models for heritage-resource territory interaction have emerged. First, state regulation: in many countries cultural heritage is legally protected via dedicated laws, administrative structures (ministries of culture, heritage agencies), and listing systems. These laws typically include duties for heritage impact assessments (HIAs) before industrial projects, buffer zone requirements, monitoring regimes, and penalties for damage. For example, in China the "Principles for the Conservation of Heritage Sites in China" outlines a methodological framework for heritage site conservation. Second, international organisations: the UNESCO World Heritage Convention (1972) sets global standards, promotes heritage as part of sustainable development, and provides technical assistance and funding for heritage in vulnerable or resource-intensive zones (Hølleland, 2017).

Third, corporate and private-sector initiatives: mining and oil-gas companies increasingly integrate heritage management into their ESG (environmental, social, governance) policies – commissioning archaeological surveys, financing site stabilization, partnering with local museums or communities, and participating in heritage tourism projects.

Fourth, local/community initiatives: increasingly recognised as vital to heritage resilience, community-driven approaches empower local stakeholders, enhance cultural continuity, and can mediate between resource development and heritage protection (Banda, 2024; Abeywickrama, 2024; Hernández-Escampa, 2024; Hussein et al., 2025).

In resource-rich territories, the regulatory challenge is to ensure that heritage conservation is not marginalised during rapid extraction and infrastructure build-out. Buffer zone delineations, cumulative impact assessments, adaptive reuse strategies (for industrial heritage), integration of heritage into regional economic diversification (heritage tourism, cultural industries) and stakeholder partnership models are key. The literature (Seila, 2025; Koch, 2024) identifies 29 factors undermining effective heritage management, including legislative weakness, limited funding, stakeholder exclusion, environmental hazards, and industry dominance.

For example, in Western Europe many former mining sites (coal, metal) have been converted into industrial-heritage parks, museums and cycle-tourism routes, thus aligning resource legacy with heritage value. In contrast, in many post-Soviet contexts the absence of coherent heritage-industry governance means that industrial expansion often overrides heritage protection. Hence, the Aktobe Region's feature as a territory with significant resource extraction and processing (chromium, nickel, oil & gas) needs to adopt regulatory practices that incorporate heritage impact evaluation, industrial-heritage synergy (e.g., mining heritage as tourism asset), community participation and public-private partnerships.

In sum, cross-national experience shows that for territories with high natural-resource potential, preserving cultural heritage demands multilayered regulation: legal frameworks, international standards, corporate accountability, community engagement, and integration into sustainable development pathways. The Aktobe Region can draw lessons from distant and near abroad contexts to develop a heritage-resource interface that supports both economic development and cultural resilience.

In Kazakhstan, the legal and institutional framework for cultural heritage preservation is anchored in the Law of the Republic of Kazakhstan "On Cultural Heritage" (Law of the Republic of Kazakhstan, 2020) which defines objects of cultural heritage, procedures for registration, buffer zones, modes of state protection, and liability for violations. Under this law, cultural heritage includes tangible monuments of material culture, sites, structures, and landscapes, as well as intangible cultural heritage components. Additional regulatory mechanisms include the Regulation on the Implementation of State Protection of Monuments of History and Culture, which sets out the operational procedures for monuments' listing, monitoring and restoration. Regional executive bodies (akims), local heritage management units, and the Ministry of Culture and Information are responsible for the implementation of heritage policy.

In practice, for a region such as Aktobe, registration of monuments, delineation of protective zones, state-budgeted restoration funding, and public-private cooperation frameworks operate in concert with mining and industrial sectors. For example, the regional investment portal indicates that Aktobe Region lists 75 cult-objects, of which 27 are national-level and 48 local-level (SPK-Aktobe, 2023). However, several authors have pointed to implementation gaps: insufficient funding, limited capacity in local heritage units, and weak integration between industrial development planning and heritage protection frameworks (Abdikarimova, 2025). Moreover, buffer zones around mining or industrial areas may not always be appropriately defined or monitored, causing risk to adjacent heritage assets. The Kazakhstan regulatory model is gradually evolving towards integrated territorial planning – combining heritage conservation, industrial zones, tourism development and community participation – but still requires stronger mechanisms for heritage-industry interface, monitoring of heritage condition, and alignment with sustainability agendas.

Preserving cultural heritage is increasingly recognised not only as a cultural mission but as a strategic component of sustainable territorial development – especially in regions facing resource-intensive economies. Heritage assets can contribute to the so-called triple bottom line of sustainability: social (identity, community participation), economic (tourism, creative industries, heritage branding) and environmental (conservation of landscapes, cultural-natural interlinkages). Empirical evidence supports the positive relationship between heritage and regional economic growth: Kostakis & Lolos find that in Greece regions with higher cultural heritage endowment exhibited stronger growth over 2000-2019 (Kostakis, 2024). This suggests that heritage functioning as regional asset can diversify economic base away from resource dependency. In Western Europe, industrial heritage diversification (e.g., former coal mines re-imagined as

museums and visitor centres) is well documented, transforming resource-exhaustion zones into cultural-tourism clusters and thereby reinforcing resilience. This task assumes particular importance in the Aktobe region.

The region is abundant in mineral resources and home to significant mining and processing enterprises. Concurrently, it possesses a rich cultural and historical heritage that has not yet been adequately incorporated into regional development initiatives. In this context, the preservation of cultural heritage can become a connecting element between the resource economy, territorial identity and sustainable development paths (Volkova et al., 2025; Jelen, 2022).

Archaeological discoveries from the Hunnic-Sarmatian period in the Aktobe region substantiate this hypothesis. In the Kobda district, the Derbisali burial ground, dating from the 2nd to 4th centuries AD, was discovered. It contained a military sabre, wooden and faience vessels, silver jewellery and household items. Given the presence of approximately 400 burial mounds dating back to the Hunnic-Sarmatian period within the region, these sites possess significant potential as archaeological monuments. These sites have the potential to serve as the foundation for the development of archaeological tourism, museum exhibitions, educational routes, and the integration of the territory into its brand identity. Consequently, archaeological heritage transcends its role as a mere monument, becoming an asset with the potential to generate social and economic value (Beketova et al., 2019).

A further salient aspect pertains to the region's industrial heritage, which is frequently disregarded yet harbours considerable potential for sustainable development. There are several such sites in the Aktobe region:

1. The Algin Chemical Plant, a manufacturing facility in the chemical industry, is currently either operating at a reduced capacity or partially operational. Its infrastructure, buildings and production lines may be of historical interest as evidence of the Soviet/post-Soviet industrial era and the technological modernisation of the region (Berdenov et al., 2025).
2. The Mamyta Coal Mine, a coal mine and coal enterprise, was historically an important part of the industrial complex of the Aktobe region. The abandoned or partially operational mine exhibits features indicative of industrial heritage, including kopras, tunnels, conveyors, and miners' residential settlements.
3. The Kromtau district is renowned for its nickel, chromium and other metal deposits, which are extracted from the region's quarries. The most notable of these deposits are Nikeltau Quarry and Badamshi Quarry, which are located in the district. These deposits are further processed in the vicinity of the villages, where extraction and preliminary processing facilities are situated. The district also features enrichment factories, which are integral to the mining and processing of these materials. The Nikeltau district (Nikeltau village) is notable for the region's resource history. It is proposed that these industrial territorial systems (comprising quarries, settlements and infrastructure) be reinterpreted as industrial cultural heritage (Berdenov et al., 2016; Berdenov et al., 2024; Dmitriyev et al., 2022).

The importance of this phenomenon in the context of sustainable development is a subject that merits further examination. It is evident that industrial heritage has the potential to serve as a foundation for a novel phase of territorial transformation, characterised by a transition from extraction to reuse, a shift in focus from raw materials to tourism and cultural-industrial entrepreneurship. For instance, the transformation of a former factory into a museum, an exhibition space, or a multifunctional centre is a prime example. The transformation of a mining village into an industrial park has been achieved by the introduction of visitor attractions, creative studios and collectives. Quarries, characterised by their open walls and reservoirs, serve as mirrors of the landscape, as well as locations for photography and recreational activities.

RESULTS

The preservation of cultural heritage has evolved from a narrow focus on the protection of monuments to a comprehensive system of value management that links culture, economy, and community development. In contemporary scholarship, cultural heritage preservation is defined as the coordinated set of legal, managerial, and social actions that safeguard both tangible and intangible assets while enabling adaptive use and transmission to future generations (Min et al., 2025).

Developed countries have institutionalised this approach through multi-level governance frameworks and integration with sustainability agendas. In the United States and Western Europe, robust legislative frameworks, including the National Historic Preservation Act (U.S., 1966) and the European Heritage Strategy for the 21st Century, facilitate the establishment of heritage inventories, the enforcement of protection measures, and the allocation of financial resources for restoration initiatives. Adaptive reuse has become pivotal to these policies, facilitating the transformation of redundant industrial or historic buildings into museums, innovation hubs, or creative spaces (Saifi, 2025; Özgeriş et al., 2024). Empirical analyses of adaptive-reuse projects across crisis-affected industrial zones demonstrate measurable gains in local employment, tourism, and environmental performance (Hernández-Escampa, 2024; Hussein et al., 2025).

European Union initiatives such as Horizon 2020 and Creative Europe have further institutionalised "heritage-led regeneration" (Kostakis & Lolos, 2024), promoting transdisciplinary research, digital documentation, and participatory governance. These programmes establish a correlation between cultural value and socio-economic renewal, thereby positioning heritage as both a planning parameter and an investment priority (Tost et al., 2021). In East Asia, particularly in nations such as China and Japan, heritage policy is characterised by a commitment to achieving a harmonious balance between the principles of conservation and those of modernisation. As demonstrated by Zhang et al. (2024), a study of the Silk Road reveals a harmonious balance between large-scale infrastructural expansion and site zoning, along with the implementation of heritage impact assessments (HIAs) in accordance with the Principles for the Conservation of Heritage Sites in China. In the Japanese context, this approach is further enhanced by the incorporation of resilience measures, including earthquake-proof retrofitting and climate adaptation, which underscores the integration of risk governance into heritage management (Nastou et al., 2024; Shen et al., 2024; Van Tricht, 2025; Dobričić, 2024; Aktürk, 2021).

Conversely, within the post-Soviet and Central Asian contexts, the regulatory framework remains less developed. A comparative analysis of Russia and Belarus reveals fragmented legal frameworks and weak enforcement (Martynenko & Trofimova, 2019), while studies from Kazakhstan and Kyrgyzstan point to financing gaps and limited community participation (Imankulov, 2024). Nevertheless, the emergence of new partnerships between state agencies and extractive industries signifies an increasing recognition of the potential for corporate social responsibility and heritage stewardship to coexist (Rhodes II, 2024; Tiainen, 2014; Mahmood, 2017). The experience of developed countries demonstrates that cultural heritage preservation is most effective when embedded in an integrated governance model combining legal protection, adaptive reuse, technological monitoring, and community engagement. This transforms heritage from a static artefact into a dynamic component of sustainable territorial management.

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