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Literature Review of Integrating Cultural Heritage in the Reclamation Processes

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Abstract:

Aim: Reclamation is a complex and costly process that involves technical and biological activities aimed at restoring degraded areas for specific future uses. The effectiveness of reclamation depends on the chosen direction, which influences whether the land can immediately serve its intended function or requires further development. Beyond environmental benefits, reclamation and development efforts support economic growth, job creation, and improved quality of life, while also contributing to the preservation of cultural heritage and sustainable development. The article presents the results of literature review focusing on answering the following questions: how is cultural heritage linked to the issues of the regeneration of degraded areas and how do different forms of regeneration use cultural heritage to counteract the effects of degradation of given areas?

Design / Research methods: A secondary study was conducted focusing on reviewing existing research materials, concentrated on summarizing the obtained data.

Conclusions / findings: The concepts of reclamation, rehabilitation, restoration, revitalization, recultivation, and revegetation were explained. The research part focused on four approaches to heritage in the context of revitalization: cultural heritage in areas after natural disasters; cultural heritage in areas damaged by human intervention; preparations for intervention in the event of natural disasters and disasters resulting from human intervention; and cultural heritage as a means/tool facilitating the regeneration of given areas.

Originality / value of the article: Materials devoted to the subject of heritage are related to four different aspects. Two of them are associated with the preservation of heritage in degraded areas, the third is related to the group of remedial and preventive actions, and only a small part is devoted to heritage as a tool and its role in revitalization processes.
Keywords: cultural heritage, reclamation, revitalization, reconstruction, recultivation, devastated areas, economic culture.

JEL: Q01, Q56, Z10.

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1. Introduction

Cultural heritage is seen as an important element supporting socio-economic development, a tool for building dialogue and reconciliation in regions affected by ethnic or religious conflicts, and as an expression of the cultural richness and diversity of countries and regions in the world (UNESCO, n.d. a). The main components of cultural heritage include tangible and intangible elements. Tangible heritage includes both immovable and movable goods. This category includes architectural monuments, museums and their collections, historical artifacts, archival and library resources, and the culturally shaped landscape. Intangible heritage refers to practices, ideas, knowledge, and skills passed down from generation to generation. It also includes a set of accompanying instruments, objects, artifacts, and cultural spaces. It is manifested, among others, through oral traditions, language, rituals, social practices, festive ceremonies, performing arts, as well as knowledge and practices related to nature and space, including traditional crafts. Heritage can also be presented through natural and digital components. Natural heritage includes physical and biological formations, groups of these formations, geological and physiographic structures, as well as designated areas constituting the habitat of endangered species of flora and fauna. This category also includes places of exceptional universal scientific, aesthetic, or conservation value. Digital heritage, on the other hand, comprise the collected resources created in the virtual space, reflecting the intellectual and creative achievements of humanity. This includes unique materials in the form of texts, databases, static and moving images, sound recordings, graphics, software, and websites (Knapik, Król 2023). A specific type of heritage is absence heritage (or heritage of absence), which does not yet have a precise definition, however, as noted by the team of James-Williamson et al. (2024), it refers to heritage that has ‘disappeared’: i) purely by accident, ii) deliberately erased, iii) forgotten or destroyed by natural disasters, iv) forgotten or destroyed by human actions/war, v) modified / adapted to suit particular interests.

The protection of cultural heritage can play a key role in stimulating economic development, supporting the growth and revitalization of areas. Activities in this area contribute to the creation of jobs, increasing property values, increasing tax revenues,

supporting the establishment of new industries, and providing space for business initiatives, which in turn translates into an improvement in the quality of life of local communities. A sustainable approach to cultural heritage is not limited only to the protection of buildings and areas of historical importance, but also includes supporting a variety of activities and initiatives aimed at achieving long-term social and economic development goals (Goddard-Bowman 2014).

A human's environment, the place where they were raised and/or live, is a condition for building social capital; it allows one to identify with a given place and build relationships. Cultural heritage plays a motivating role in participating in social processes (Rottermund 2024). Devastated areas are places destroyed or damaged as a result of human actions or natural phenomena. Humans can not only be the source of this destruction, but also contribute to their regeneration and the acquisition of resilience, preventing certain actions, dealing with the consequences, and mastering the ability to rebuild after the disruption. Cultural heritage contributes to the building of such resilience. It supports the creation of an engaged and innovative community, both in the social, environmental, economic, and managerial dimensions (Fabbricatti et al. 2020). Cultural heritage is treated as an important resource that strengthens cultural resilience, reconstruction, understanding, and the ability to accept loss, as well as ongoing changes and uncertainty. It has the ability to absorb disruptions. Its value lies not only in its tangible structure, but also in its role in society (Holtorf 2018). Cultural heritage strengthens cultural identity, expands social capital, and stimulates local communities, constituting an important element of sustainable development (Knapik, Król 2023).

The category of regeneration, used in the title of this article, refers to several interrelated concepts: *revitalization, reconstruction,* and *recultivation*. The *revitalization* process is interpreted as a long, coordinated, and comprehensive process of revival, bringing back to life (moving out of a state of crisis) and supplementing with new functions. Within cities, the revitalization process may include the revitalization of: post-industrial, post-railway, and post-military areas, degraded city centers and multifunctional pre-war areas of urban development, housing estates (especially in the case of large-panel technology), and the landscape of cities. Revitalization is not only associated with renovations, but also with work with

people—this process is carried out jointly by various groups of stakeholders (including the authorities, local community, and other participants). It assumes the use of specific conditions of a given area and the strengthening of its local potentials (Mackiewicz, Staszewska 2023). Within the framework of revitalization, cultural heritage is repositioned; it is a multifaceted effort encompassing revalorization, restoration, reconstruction, modernization, and activities aimed at revitalizing and restructuring historical events, devastated buildings, districts, or cities (Oloidi, Okonkwo 2020). Another concept associated with the issues studied is *reconstruction*, interpreted as reproducing based on preserved remains / fragments / of messages (PWN, n.d.). In the context of cultural heritage, reconstruction is understood as a process of a more technical nature (compared to revitalization), the aim of which is to restore destroyed material resources and infrastructure following an armed conflict or a natural disaster. This process should be carried out taking into account the accompanying elements of intangible heritage, such as beliefs, practices, and traditional knowledge, which are the foundation for preserving the cultural values of local communities (UNESCO 2018). The category of *recultivation* refers to influencing renewed growth or flourishing (Mariam-Webster Dictionary, n.d.) associated with restoring original functions or roles, creating favorable conditions for the development of given processes (including biological ones) and their maintenance (Kozińska, Greinert 2013).

The research aims to synthesize how cultural heritage is linked to the issues of reclamation of degraded areas and how different forms of regeneration use cultural heritage to counteract the effects of degradation of given areas. Identifying research gaps and directions for future research will constitute the basis for ongoing scientific research. It may also be a valuable source of synthesized materials for lecturers and students in subjects related to restructuring devastated areas and cultural heritage management.

2. Research methodology

The literature review presented below was conducted in order to prepare a lecture on the subject “The Restructuring of devastated areas.” There are many publications

in the literature on the reclamation of degraded areas, in particular regarding their classification and directions of application. However, there is no textbook, a compact publication that would discuss the most important issues related to the subject, in particular: soil and air pollution, phases of land reclamation, directions of reclamation and management, lime and fertilizer needs for land reclamation, forestry and agricultural reclamation, reclamation of hard coal and lignite mines and reclamation of copper mine tailings. A considerable gap is also in connecting the above issues with cultural heritage management. A compact publication will be a convenience for teaching staff and students of fields related to environmental protection and engineering, as well as the promotion of sustainable development among the young generation.

The literature on the subject distinguishes two main types of reviews: traditional and structured. Each has its advantages and disadvantages. The main advantage of conventional reviews is their reliance on researcher creativity (PSR, n.d.). Systematized reviews (SLRs) are much more structured. The following features characterize them: i) they are narrowed to specific topics, ii) the selection of sources and the method of searching for articles are predetermined, iii) the text selection method is controlled and based on defined criteria, iv) the evaluation of materials is rigorous (Abamczyk, Korbel 2022). A mixed model combining both approaches was chosen to provide a reliable summary of existing knowledge. A traditional review was used to determine the theoretical bias of reclamation of devastated areas (Section 3.1). It allowed for an overview of the general research topic. Subsequently, an SLR was conducted, narrowing the research topic to the approach to cultural heritage (Section 3.2). The second part focused on a high-level overview of two questions: i) How is cultural heritage related to the reclamation of degraded areas, and ii) How do different forms of regeneration use cultural heritage to counteract degradation effects in given areas? It provided an opportunity to examine existing research gaps and identify needs and directions for future research. The SLR was conducted based on i) the Web of Science (WoS) and Scopus databases of scientific texts and ii) gray literature, available through open access through the Google search engine. For this article purposes, gray literature was limited to scientific texts that were not selected from the WoS and Scopus databases. Combining these two methods also resulted in a small

number of selected texts. Queries were defined for groups of entries connected by the AND operator, as shown in Table 1. However, inoperative pages were removed from the gray literature group, and the focus was shifted to full texts, not just abstracts. Master's theses were also excluded from the analysis. This approach yielded 60 texts that were subjected to content analysis.

Table 1. Research process

Keywords	WoS [number of materials]	Scopus [number of materials]	Google [number of websites/ materials*]
Reference level			
cultural heritage	68,152	88,875	242
reclamation	33,936	70,735	174
degraded area	54	83	171
Sum	102,142	159,693	587
Narrowing level			
cultural heritage AND reclamation AND degraded area	0	1	175
Negative selection	0	0	-115
Texts analyzed	0	1	60

* The most relevant results, without very similar items.

Source: own study.

3. Results

3.1. Reclamation of devastated areas—the theoretical basis

There are many classifications of reclamation directions in the literature. They include an increasing number of reclamation and development methods, which indicates the dynamic development of this field of science. The accuracy of the choice of the reclamation direction depends on a number of factors that characterize the area requiring reclamation as well as its surroundings, both in the spatial and socio-economic sense (Ostręga, Uberman 2010).

Various terms have been used to describe the repair of land disturbed by industrial use, including recultivation, reclamation, rehabilitation, reconstruction, renaturation,

restoration and revegetation. Based on a literature review, in Table 2 are shown basic definition regarded to regeneration of degraded land.

Table 2. Basic definition regarded to regeneration of degraded land

Term	Definition	Source
Reclamation	Represents restoring or giving the usable values to degraded land by appropriate land modeling, improvement of grounds properties, water regulation, soils restoration and roads construction.	Liu et al. (2018)
Rehabilitation	Means the return to the natural state according to the original land development plan in accordance with the aesthetic qualities of the surrounding areas.	Gaćina (2023)
Restoration	Understood as the return to the original state of the altered land, the state before degradation.	Zha et al. (2025)
Revitalization	Is the term that covers both stages: reclamation and land development, and it means the state restoration, giving the opportunity to perform the utility function of this area.	Liu et al. (2025)
Recultivation	Means the creation of a new cultivated landscape defined by various types of human use, such as agriculture and forestry as well as local recreation.	Opryshko, Oblitsov (2013)
Revegetation	Means the process of replanting and rebuilding the soil of disturbed land, it may be a natural process produced by plant colonization and succession, manmade rewilding projects, accelerated process designed to repair damage to a landscape.	Li et al. (2025)

Source: own elaboration based on the sources given in the table.

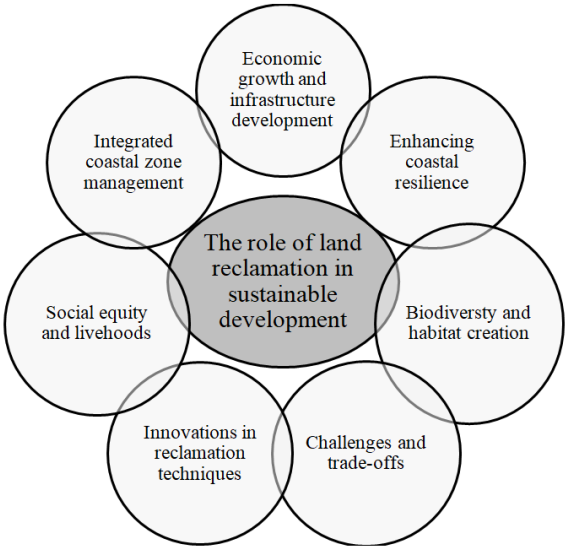
The reclamation of degraded areas has many advantages, including economic, ecological, social and health benefits. The economic advantages include increased land value, stimulation of the local economy and savings for public administration. Improving soil quality, restoring ecosystems, reducing erosion and pollution are the ecological advantages. The social advantages include improving the quality of life, education and environmental awareness. Due to land reclamation air quality is improving and the stress is reduced, which has a positive impact on human health.

Land reclamation plays an important role in sustainable development (Figure 1). By creating new land from coastal or underwater areas, cities can accommodate population growth and foster economic activities. For instance, the Palm Jumeirah in Dubai, United Arab Emirates, is an example of successful land reclamation. This

artificial archipelago hosts luxury hotels, residential complexes and commercial spaces. The revenue generated from these developments significantly contributes to Dubai's economy (Alawadi et al. 2018). The second role is enhancing coastal resilience. Coastal cities face rising sea levels and increased vulnerability to natural disasters. Land reclamation can act as a buffer against storm surges and erosion. The Maasvlakte 2 project in the Netherlands demonstrates this concept. By reclaiming land in the North Sea, the Dutch created a massive port extension (van Hassel et al. 2020). Designing artificial habitats for marine life can enhance biodiversity. An example is the Chek Lap Kok Airport in Hong Kong. It was built on reclaimed land, but the adjacent wetlands were preserved and transformed into a haven for migratory birds (Li, Loo 2016). Land reclamation faces criticism due to ecological disruption, loss of natural habitats, and altered hydrodynamics. The Songdo International Business District in South Korea showcases the trade-offs. While it's a modern, sustainable city built on reclaimed land, it required substantial investment and ecological compensation (Kim, Choi 2018). Technological advances are allowing for more efficient and environmentally friendly methods of remediation. Geotubes, sludge recycling and ecosystem-based approaches are gaining ground. An example is Singapore, which, despite its limited land area, has reclaimed huge areas, including Gardens by the Bay. Their commitment to sustainable practices is an example for other nations (Zappi, Ong 2013). Land reclamation projects should consider social equity. Displaced communities, fishermen, and indigenous groups often bear the brunt of such developments. The Kansai International Airport in Japan faced protests from local fishermen who lost their livelihoods due to land reclamation (Furudoi 2010). Balancing economic progress with social justice remains a challenge. Holistic planning that integrates land use, conservation, and disaster risk reduction is essential. Coastal cities must adopt adaptive strategies. The Mumbai Coastal Road Project aims to reclaim land for a coastal highway. However, it must address concerns related to mangroves, marine ecosystems, and community displacement (Movik et al. 2023).

In summary, land reclamation holds immense promise for sustainable development, but it requires a delicate balance between progress and environmental stewardship. Continuing, it is essential to prioritize responsible practices that serve the interests of both current and future generations.

Figure 1. The role of land reclamation in sustainable development



Source: own elaboration based on The Importance of Land Reclamation (2025).

The requirements for land reclamation vary depending on the circumstances of occupational connection, in wide-ranging geographic terms, depending on which mechanisms of the natural environment are targeted for recovery, restoration, and renovation procedures. These procedures could be of diverse categories, subcategories, and forms (classification). Sequentially, depending on the means of carrying out the reclamation process, each category or form could be divided into successions of various subcategories and subforms (Ukhurebor et al. 2022). In Table 3, based on the literature review classification of land reclamation is presented.

Table 3. Land reclamation classification

Categories	Subcategories	Form
Hydrotechnical	Drainage	Reclamation / drying-out of swamplands, marshlands, or wetlands
	Flood monitoring and management	Flood and water logging monitoring and management/eradication of wet spots
	Irrigation	Humidifying irrigation / fertigation / sterilizing irrigation / unfreezing irrigation/soil-cleaning irrigation
	Drainage and humidifying	Control and management of water-air regime of drained lands / irrigation of drained swamplands, marshlands, and wetlands

	Irrigating or watering	Irrigating of arid areas / irrigating of low-water areas/irrigating under the situations in tropical locations
Agrotechnical	Control and management of drainage	Creating depressions in-ground / mole plowing / narrow conventional plowing / soil adornment / wrinkling / soil slotting / ridging/bed-forming
Land	Accumulation / conservation of soil	Nonmould board releasing / deep plowing / decompaction of the soil / sheeterosion, subsurface erosion, ravine erosion, and soil blowing monitoring and management
	Reconstruction of the soil	Development of topsoil / granulometric enhancement of the soil via the addition of sand and clay / thickening of humus-accrued prospect
	Cultivation and technical	Levelling of the surface / land clearance and management
	Reclaiming and landscaping	Reclamation of open-cast mines such as rock dump pits, peat mines / ash-disposal locations / demolitions instigated by natural catastrophes such as hurricanes, floods, storms, and dust
Vegetative	Phytoreconstructive	Development of woodland belts/complete afforestation/phytoncide or resortplanting
	Conservation of landscape	Protection of water / control and management of wind, snow, bank, landslide, and landslip
Climatic	Thermal	Control and management of frosts, frost-killing and damping-out/basin, and thermal / agrothermal
	Distribution of moisture	Enhancement of precipitation / control and management of snow-melting
	Weakening of wind	Local arrangements / antihurricane measures, especially in Hurricane formation areas
Agrochemical	Salt enriching, acid monitoring, and stabilizing the soil	The use of mineral fertilizers / monitoring and management of nutrient distribution / the use of lime, especially on acidic soils / acid monitoring, especially on solonetzic soda soils, solonchak soils, and other soils with high alkalinity / the use of gypsum, especially on alkali and solonetzic soils / soil conditioning and stabilization against soil puncture / soil silicatization
	Sanitary and disinfecting	The use of arboricides and pesticides

Source: own elaboration based on Ukhurebor et al. (2022); Golchenko et al. (2003).

Based on the work of Ostręga & Uberman (2010), Table 4 presents a classification of reclamation directions, dividing them into general and specific (functions). The existing classifications have been supplemented primarily with such directions as: cultural—with a contemplative function, recreational—with a cultural function and didactic. It should be noted that this classification should be treated flexibly, and individual directions and functions can be combined in any combinations depending on the characteristics of the area requiring remedial actions. The presented classification constitutes a complete list of possible methods of reclamation and development of post-industrial areas, while its development into a detailed classification includes the most important possible directions, which may be extended by additional ones falling within the general directions.

Table 4. General and specific directions of land reclamation

General directions	Detailed directions (functions), examples	Source
Forest	Afforestation with the following functions: biotic, productive and reproductive (economic), protective	Lupardus et al. (2019)
	Tree plantings of landscape (aesthetic), park, and recreational nature	
Agricultural	Crops, breeding	Kumar, Choudhury (2024)
Aqueous	Recreational: swimming pools, water sports	Zhou et al. (2023)
	Economic: retention tanks, drinking water tanks, industrial water tanks	Ji (2022)
	Fishing	Zeng et al. (2023)
	Natural	Ostręga, Uberman (2010)
Recreational	Recreation and tourism: e.g. beaches, sports and recreation facilities, accommodation facilities (camping and tent sites, summer cottages, hotels, guesthouses), catering facilities	Li et al. (2023)
	Sports: e.g. ski slopes, bike trails, infrastructure for traditional and extreme sports	Levin, Paltseva (2023)
	Cultural: e.g. theatres and amphitheaters, stages, exhibitions, exhibition and concert halls, galleries	Chen et al. (2025)

Cultural	Contemplative: e.g. memorial parks, places of remembrance, places of religious worship	Song et al. (2014)
Didactic	Thematic (educational) trails, museums, including industrial museums, open-air museums, eco-museums, archives of documentation related to the history of industry, training centers, historical monuments, cultural parks	Coles (2003)
Natural	Protective: e.g. nature reserves, ecological areas, Natura 2000 areas, natural monuments, documentation sites, nature and landscape complexes, species protection of plants, animals and fungi	Tang et al. (2025)
	Turfing, bushing, greening	
Housing	Housing, social and summer construction	Ostręga, Uberman (2010)
Economic	Industrial: e.g. industrial parks	Zhou et al. (2024)
	Services: e.g. business incubators, warehouses, shops; also in the form of economic activity zones, parking lots	
	Municipal: e.g. landfills	Koda et al. (2023)

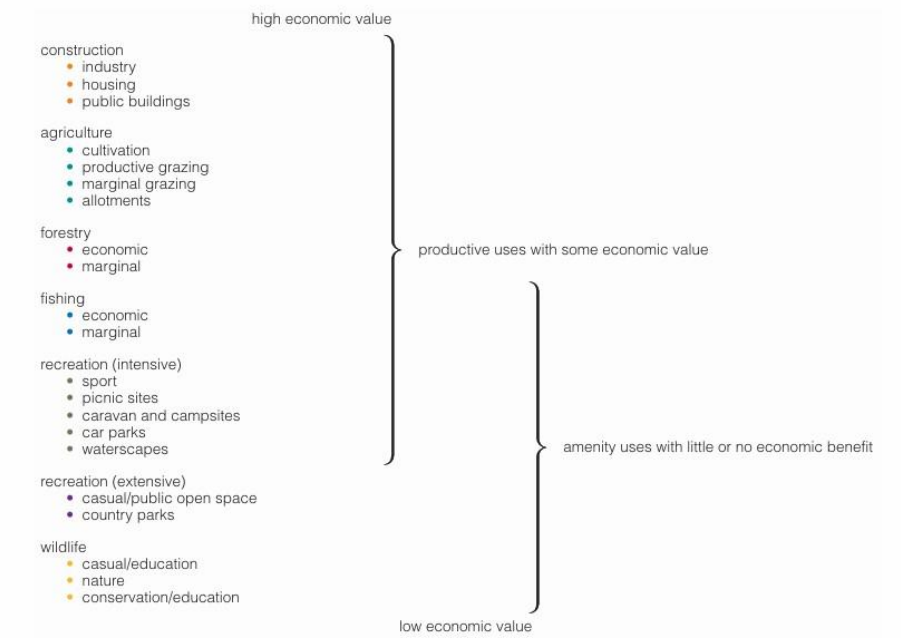
Source: own elaboration based on the sources given in the table.

There may be as many methods of land reclamation and development as there are ideas. However, it is important to take into account the characteristics of the facility in terms of a number of factors in the process of selecting the direction of reclamation, which will allow for defining the optimal functions for the areas subject to remedial actions. The basic directions of reclamation, i.e. agricultural and forestry, are widely known and most frequently used. In many cases, however, using only these two directions would eliminate other possibilities resulting from the specificity of the facilities, as well as from social or economic needs.

Ideally, all brownfield remediation projects would return the land to productive agricultural use, successful forestry, or productive industrial or recreational use. However, in most situations, end use will be determined in part by what is physically possible at the site and by cost. Expected costs per hectare of remediation practices vary considerably, ranging from $185/ha to $3,012/ha and increasing with country GDP. Cost estimates also vary considerably across available data sources, indicating differences in cost reporting practices (Verhoeven et al. 2024). Therefore, remediation

must be funded upfront, through the mine permitting and bonding process, or a very expensive legacy will be left for future generations to sort out. Furthermore, some end uses of remediated land are more valuable than others. Figure 2 compares the economic value of different options for remediated land. Selling reclaimed land for residential or commercial development will generate significantly more income than leaving the land for forest or agricultural development (Sloss 2013).

Figure 2. Economic value of future usage for reclaimed land



Source: own elaboration based on Sloss (2013).

3.2. Revitalization of devastated areas—the approach to cultural heritage

The results of the research conducted by M. Li (2024) indicate the existence of various groups of factors influencing the destruction of cultural heritage. These factors include natural factors (including fires, earthquakes, strong winds, floods, including sea level rise related to climate change), as well as human-induced activities (including terrorism and explosions). Fires occur as a result of electrical and wiring defects, the use of fireworks and arson, as well as careless smoking, honey collection,

lighting bonfires and burning rubbish, as well as due to increased temperature and low rainfall. In addition to their direct impact, heavy rains and floods also cause secondary disasters (for example, collapse of cliffs). Other types of threats to cultural heritage include erosion of river banks and coastlines, sea level rise, strong winds and disasters caused by plants (including their roots), drought, as well as insect activity (e.g. termites) and lightning. Human-caused damage is associated with explosions, terrorist acts, and bombings. The existence of a diverse threat in groups of buildings and archaeological sites in Asia and Europe (Li 2024).

Texts devoted to the issues of revitalization of degrader and / or devastated areas caused by economic, spatial-functional, environmental and / or technical phenomena, from the point of view of cultural heritage, can be divided into three groups of texts, which address the following issues:

i) cultural heritage in areas after natural disasters (including earthquakes, floods, fires, etc.),
ii) cultural heritage in areas damaged by human intervention (including armed conflicts/post-military operations, post-industrial and post-railway operations), and
iii) preparations for intervention in the event of natural disasters and disasters resulting from human intervention.

Cultural heritage can also be perceived not only as a goal of protection, but also as

iv) a means/tool facilitating the regeneration of given areas.

3.2.1.Cultural heritage in areas degraded by natural disasters

The significant impact of natural disasters on cultural heritage has been highlighted in many scientific texts (Fatoric, Seekamp 2017; Costanzo et al. 2018; Min et al. 2020; Rosa et al. 2021; Lawangen, Roberts 2023). Heritage restoration plays an important role in preserving cultural, historical, ritual infrastructure and a sense of place, and helps to restore a semblance of normalcy to communities affected by natural disasters (Dalya et al. 2023). According to Dalya et al. (2023), the impact of a disaster on cultural heritage is a function of three elements: i) the damage and/or disruption caused by the event, ii) the priorities for heritage conservation and their balance with other priorities (including disaster risk reduction), and iii) the

preferences, resources and capacities of individual households to cope with the challenges of post-disaster reconstruction.

Table 5. Examples of studies related with the cultural heritage in areas affected by natural disasters

Type of disaster	Devastated area	Key issues	Source
Earthquake	Nepal, Kathmandu Valley, Bungamati, Thecho, Pilachhen and Harisiddhi districts	- Enforcement of building codes for seismic safety, along with the costs of incorporating traditional architectural features, influenced changes in the tangible cultural heritage of historic urban districts. - Enforcement of building codes for seismic safety, along with the costs of incorporating traditional architectural features, probably also improved seismic safety – increasing the seismic resistance of the buildings. - Reducing seismic risk was a higher priority for government and residents than cultural heritage as manifested in the selection of modern technologies and building materials. - Building codes were partly mutually exclusive with the protection or restoration of traditional heritage. - Heritage was effectively relegated to decorative elements on the exterior of houses.	Dalya et al. (2023)
Intense weather events (floods and destruction caused by intense storm)	Italy, Alberobello in the Puglia region	- Trullo buildings (architectural heritage with a cone-shaped roof made of stones) are an example of the resilience of cultural heritage to extreme weather events. - The protection and mobilization of cultural heritage as a resource to cope with the challenges of climate change in a given territory is associated with the perpetuation of traditional construction techniques.	Mascitelli et al. (2023)
Floods and landslides	Gwatemala, city of Sacapulas	- Development of the black salt beach, the space was reduced, the use of the area was changed by exploring the hot	Yon Secaida et al. (2023)

		springs located below the river bank on the beach (discovery of new beach value). - In addition to the functioning salt industry, the promising tourism industry was stimulated. - Drawing attention to the need to formalize the actions taken.	
Heavy rainfall	Greece, Corfu Town (UNESCO Heritage Site)	- Under the forecasted climate conditions, no significant changes in the flood risk level are expected, and the flood-prone areas will remain largely in line with the current status.	Dimitriou (2022)
Earthquake	Nepal	- A natural disaster may be a potential reason for a revival of tourism (the phenomenon of so-called 'dark tourism'). - The number of tourist arrivals in age groups over 16 years fell immediately after the earthquake, but quickly recovered. - Nepal is a tourist destination with high resilience despite the earthquake. - Media interest and the specificity of Nepali heritage (features of a given place) may have an impact.	Min et al. (2020)
Rainwater and flood disasters	Traditional Villages in Mentougou District, China	- Improved zone management is being implemented in traditional villages to minimize the risk of flooding. - The key factor determining the effectiveness of flood control measures remains the terrain, with the degree of afforestation and vegetation coverage also playing an important role. In the process of spatial planning of rural areas, it is essential to maintain a balance between infrastructure development and environmental protection (including thoughtful land management, planting planning, implementation of regulations on vegetation management).	Lv et al. (2025)

Source: own elaboration based on the sources given in the table.

Another important aspect is to point to the knowledge and techniques of past generations that are resistant to adverse weather conditions. In this case, cultural

heritage is a value and resource that serves to mitigate natural hazards (Mascitelli et al. 2023). Another dimension is related to the specificity of a given cultural heritage, which may affect interest in it (including tourists) regardless of natural disasters. An example is the heritage of Nepal (including natural attractions and religious sites), which encourages visits even after the 7.8 Richter scale earthquake, as well as the specificity of dark tourism, which is characterized by increased tourist traffic to places associated with death, tragedies and disasters (Min et al. 2020). The above affects the resilience of a given place, and thus the speed of its regeneration. Examples of research devoted to the issues of cultural heritage in areas degraded by natural disasters are presented in Table 5.

3.2.2. Cultural heritage in areas degraded by human activity

The damage and destruction of cultural heritage resulting from human activity is widely discussed internationally, both in relation to the destruction resulting from wars and armed conflicts (Between Aleppo…, 2023; Rouhani 2023; Abdelzayed et al. 2023; UN-Habitat 2021; Ali et al. 2022), as well as the introduction of political, economic and social changes (Mackiewicz, Staszewska 2023; Rottermund 2024).

The subject of armed conflicts and wars in the literature on the subject refers mainly to the destruction of cultural heritage sites in Afghanistan, Iraq, Libya, Mali, Nepal, Syria and Yemen (UNESCO, n.d. b). As noted by M. Beiraghi (2012), the instability of a country resulting from social unrest has been classified as one of the most destructive factors threatening cultural heritage. In such a situation, international institutions are unable to enter the country and have difficulty in contacting government entities to assess the risk and save cultural assets. Moreover, the protection of cultural heritage has a much lower priority than saving human lives. Additional elements include the phenomenon of vandalism and looting (robbing and destruction) of cultural heritage, as well as public ignorance about the value of heritage and its protection and the prioritization of political issues (Beiraghi 2012). Cultural heritage can be destroyed unintentionally (as collateral damage), or it can be deliberately ‘attacked’. The aim of the latter may be to erase the memory of the target group—the so-called ‘cultural genocide’ (Between Aleppo… 2023) and destruction (Bouchenaki 2012), or even erasure of the identity of a given group (Ali et al. 2022). Protecting heritage in times of conflict is not only about taking care of its material

dimension (movable and immovable property), but also focusing on protecting the identity of a given community (Jaramillo Contreras 2012). The difficulty of this protection is related not only to fear for life, but also to the complexity of the economic, social and political challenges of post-conflict environments, as well as the difficulty of reconciling the expectations of a diverse group of stakeholders (Abdelzayed Valdeolmillos, Boussaa 2023). The contemporary model of protection of cultural assets should also take into account the growing pressure of modernization, the growing demand for heritage and the shift of the focus from heritage values to social needs (Purchla 2024). Heritage renovation in post-conflict conditions, according to C. Larkin and I. Rudolf (2024), is an ambivalent and random process related to the selective use of emotional historical symbols. It may be related, among others, to the instrumentalization of heritage sites by given social groups, mainly used to support ethnic-nationalist claims and commercial interests (Larkin, Rudolf 2024). Post-war reconstruction can also be a means of cultural diplomacy (Khani 2023). Ali et al. (2022) developed a list of strategies for the revival of cultural heritage after wars, including three groups: i) urban, ii) social, and iii) economic. The first one is related to the reconstruction of urban structures (as it was; mixing old and new; or symbolic revival), functional re-balancing (as it was; adaptation and reuse of heritage with new functions; reconsidering some uses; or adding new uses), and revitalizing the city's memory (reconstruction of landmarks, symbols and heritage building). According to these researchers, social strategy includes the following mechanisms. These activities focus on meeting the basic needs of society and improving the standard of living by creating new jobs. An important element of the strategy is also strengthening the role of the local community through its active participation in decision-making processes and the implementation of reconstruction projects. At the same time, actions are being taken to raise the cultural awareness of residents and educate them on the importance of protecting and revitalizing cultural heritage. Supporting the return of residents to areas covered by revitalization activities by providing them with appropriate living conditions and strengthening social ties within the local community is also of key importance. Another important aspect is the recreation of local customs, traditions and activities related to cultural heritage, which constitute a unique feature of the community's identity. The economic strategy is primarily aimed at stimulating the

local economy by enhancing the area's economic potential through the introduction of new initiatives, the revival of traditional practices, and the provision of financial support. One key approach involves investing in the urban heritage of the area to drive regional economic revitalization, which includes restoring traditional crafts, creating employment opportunities, and promoting culturally rooted activities that can boost tourism. In parallel, the strategy emphasizes securing adequate financial resources for the effective management of cultural heritage revitalization efforts. This includes mobilizing support from the private sector, international institutions, and organizations, as well as encouraging private investment and engagement in the post-revitalization management of the area. Additionally, the plan envisions offering financial advances to local residents to support the restoration, maintenance, and preservation of their heritage assets (Ali et al. 2022).

In the context of post-railway and post-industrial damage, texts on cultural heritage refer mainly to the conservation of architectural objects – individual buildings, mainly railway stations (Chaves 2022), located on the railway line (Qiao et al. 2025), railway revitalization (Lu et al. 2024); reuse of given buildings – as galleries, museums and service buildings often unrelated to their original purpose (Bianchi, De Medici 2023), including the creation of an industrial heritage park (Chen et al. 2025) and carrying out conservation works on industrial buildings (Huang et al. 2025) or objects. The aforementioned elements of cultural heritage were damaged as a result of many elements, including, among others, the specificity of the climate, extreme natural phenomena and the passage of time. The thread related to damage resulting from armed conflicts seems to dominate over the others. Selected studies on cultural heritage in areas being destroyed by human intervention are presented in Table 6.

Table 6. Examples of studies related with the cultural heritage in areas affected by human activity

Type of human action	Devastated area	Key issues	Source
Armed conflict (2014–2017)	Ancient city of Mosul, Irak	- Highlighting the potential of grassroots initiatives to rebuild cultural heritage, restore urban character and revive the cosmopolitan spirit.	Larkin, Rudolf (2024)

		- These initiatives provide space for community resilience. Compared to externally funded initiatives, they have a greater chance of survival and deeper impact. They also have the potential to create network synergies and exchanges between communities, and indicate that historic heritage sites need to be integrated into shared living spaces.	
Armed conflict—bombing (1999)	Knez Milosa Street, Belgrade, Serbia	- An example of cultural heritage destruction as collateral damage during the bombing of a military target. - A case study of the rescue operation of art objects from a government building by spontaneously acting staff of the National Museum in Belgrade.	Radin (2012)
Civil War (1967–1970)	Oron National Museum Collections—destruction of the wooden sculpture collection (Ekpu ancestors figures), Nigeria	Recommend that cultural institutions develop their own physical resources to store endangered objects and create synergies between institutions, individuals and governments.	Kasai Kingi (2012)
Armed conflict	Historic residential areas, Syria	Identifying the consequences of damage to historic residential areas, including: changes to the urban fabric, poor maintenance of buildings (due to high renovation and repair costs), outflow of existing residents and inflow of displaced people (transformation of cities, difficulties in asserting rights to housing, land and ownership), land speculation, creation of informal landfills,	UN-Habitat (2021)

		limited economic activity (destruction of old market areas and craft buildings), loss of traditional crafts, loss of green areas (including traditional orchards-courtyard gardens), increased housing needs, loss of institutional and administrative capacity to undertake planning and management of the city and its cultural heritage.	
Armed conflict (1980–1988)	Iran	- Identify the low interest in research on the impact of the Iranian war on cultural heritage, its protection and post-conflict reconstruction. - Reflect on the factors that contribute to endangered cultural heritage gaining international significance.	Rouhani (2023)
War (2015 action)	Temple of Baalshamîn in Palmyra, Syria	Plans implemented as part of the Collart-Palmyre Project at the University of Lausanne, the aim of which is to publish the documentation kept in the Paul Collart archive and make it available to researchers and Syrian refugees (including photos, sketchbooks and notebooks, a 3D reconstruction of the Temple of Baalshamin and the development of a brochure presenting the history of Palmyra).	Michel (2023)
Political, economic and social changes (systemic transformation)	- Nikiszowiec district, Katowice, Poland - Kaufhaus estate in Ruda Śląska, Poland	Examples of the degradation of infrastructure and public space and increasing social problems. - Description of a workers' housing estate located in the city of Katowice, which until the 1990s was supported by a mine. The Return to Tradition in Nikisz program: Activities	Mackiewicz, Staszewska (2023)

		for the revitalization of social capital and promotion of the unique cultural heritage of the district. Establishment of a branch of the Katowice History Museum (Heart of Nikiszowiec), opening a tourist information point, investment in technical infrastructure and raising the attractiveness of public space, video monitoring, professional activation program. - Historic workers' houses (built before 1918). Reform of the system of allocation and sale of municipal apartments.	
Deindustrialization	Piekary Śląskie, Poland	- Concentration on post-industrial and post-mining areas. - Analysis of a multifunctional approach (innovative strategy combining the to the concept of blue-green infrastructure) revitalization in the context of urban area development.	Kantor-Pietraga et al. (2025)
Damage to railway infrastructure	Beira Train Station, Mozambique	- Analysis of damage, material characteristics and building comfort conditions. - Identification of appropriate repair actions and maintenance tasks. - Emphasis that the conservation of cultural heritage objects is a difficult task and requires a deep understanding of the object in question.	Chaves et al. (2022)
Damage to railway infrastructure	The South Manchuria Railway (Shenyang–Yingkou section), China	- Constructing a hierarchical analysis model for heritage values and using fuzzy control tools to mitigate the influence of subjective cognition on the experimental results.	Qiao et al. (2025)

		- Measuring the degree of risk and the scope of protection required for these architectural heritage objects and the actual needs of the stakeholders. - The preservation and renovation of public buildings among these modern architectural heritages were found to be relatively successful. - The condition of residential buildings does not meet the objective needs of the users. - The city dwellers are more accustomed to their living conditions and take better care of the architectural heritage. On the other hand, the residents of small towns are looking for better living conditions (moving instead of renovation).	
Damage to rail infrastructure, abandonment process	Railway Heritage, Italy	- Treating building reuse as a cultural development strategy and not limiting it to individual buildings but extending it to infrastructure enhances the effect achieved. - Defining the criteria for assessing alternative reuse strategies in the Italian reality in line with the approach of improvement and recycling.	Bianchi, De Medici (2023)
Industrial changes	Greenway Railway in Taichung City, Taiwan	Identifying five forces contributing to revitalization: storytelling, market responsiveness, aesthetics, regenerative capacity, and local cultural design.	Lu et al. (2024)
Industrial changes	Industrial Heritage Parks in Hebei Province: Dahua, Miansan	- Carrying out a comprehensive assessment of industrial heritage parks and conducting an analysis in the dimensions of history and	Chen et al. (2025)

	and Shimeiji, China	culture, transport, aesthetics, infrastructure, practicality and comprehensiveness. - Common features of the parks include their high assessment in the area of history, culture and convenience of facilities and a low assessment in terms of practicality and comprehensiveness (functionality layout, business diversity and general coordination). - Differentiating features include primarily communication accessibility, comprehensiveness and practicality, aesthetics and convenience of facilities.	
Industrial changes	Examples from China, India and the UK	- Addressing the issues of carbon dioxide emissions related to the renovation of post-industrial buildings. - To show the need to reduce carbon dioxide emissions (especially in countries with large populations and rapid urbanization), to identify the reasons why this is not taken into account during the renovation of buildings (to identify the gap in the integration of heritage protection with carbon dioxide emission reduction strategies), and to identify a group of problems that arise when assessing renovation options.	Huang et al. (2025)

Source: own elaboration based on the sources given in the table.

3.2.3. Preventive measures in the event of natural disasters and destruction resulting from human activities

The aim of preventive actions is primarily to minimize the risk associated with the destruction of cultural heritage. Research conducted for this purpose focuses, among others, on developing guidelines for disaster risk management, which can be implemented by managers of given facilities, local and national authorities and international organizations.

Finland is a country described as safe (with a low risk of armed conflict) and at the same time, implementing strategies for the protection of cultural assets in the event of such a conflict. The country in question implements a nationwide register of cultural assets of national importance, which are protected in accordance with the provisions of the Hague Convention. This register includes architectural heritage, archaeological sites, as well as museum, library and archive collections that require protection in the event of armed conflict. As M. Pesu (2012) further notes, these activities can be integrated with systems for preventing and mitigating the effects of natural disasters. The researcher also emphasizes the need for closer cooperation between the cultural heritage protection sector and the emergency services and other relevant entities. There is already an increase in cooperation between institutions responsible for cultural heritage and representatives of other sectors in the context of responding to climate challenges affecting heritage. In the future, regular updating and evaluation of the register is planned. Early planning is crucial, as it is the foundation for the proper protection and conservation of cultural heritage objects. This process should be seen as a shared responsibility of property owners, defense forces, emergency services and heritage protection professionals (Pesu 2012).

Another example of countries using a prevention system is Japan, where a unique 'bosai culture' has developed, focusing on developing the ability to prepare for disasters (mainly natural ones, related to typhoons, floods, earthquakes, tsunamis and seismic activity of volcanoes). Bosai culture is associated with, among others, the development of technical means and requirements, law and a strong civic culture. This culture is associated with the awareness of society resulting from previous experiences, collectivism (social orientation towards the group) and religious and cultural influences. Two types of preventive measures are used in this country: i)

hard—regulations, engineering and architectural requirements, ii) soft—education on Disaster Risk Reduction integrated with formal, non-formal and informal education, and supporting civic culture (Pastrana-Huguet et al. 2022).

M. Beiraghi (2012) draws attention to the need to build an official network of experts involved in the protection of heritage resources. Through the network, it is possible to provide information and share it internationally. In the event of a conflict or disaster, the stage of searching for experts will be omitted, thus saving time for such activities (Beiraghi 2012).

Among other solutions, technological support is also mentioned, based on the rapid collection and analysis of photo galleries and information provided by staff and citizens. Its aim is to preserve the memory of local communities. The system also allows for the assessment of damage during the destruction process (e.g. earthquake) and after the event. The system includes three components: i) a smartphone application, ii) a service for exchanging data with databases and iii) a service enabling control of 3D reconstruction (Costanzo et al. 2018).

Selected studies on preventive actions to prevent the destruction of cultural heritage are presented in Table 7.

Table 7. Research examples focusing on proactive approaches to the preservation of cultural heritage

Type of action	Area	Key issues	Source
Drawing attention to the problem, raising awareness, among others, of the scientific community	Serbia	- Indication of the lack of systematic databases on the impact of floods on cultural heritage, as well as the lack of educational materials on the management of assets with historic buildings in flood situations. - Review of the development of flood protection throughout history, including a presentation of the history of floods in Serbia.	Momcilovic Petronijevic, Petronijevic (2022)
Increase understanding of sandstone degradation mechanisms and support the development of	China	- Investigation of degradation mechanisms that contribute to mitigating the challenges of acid rain and water logging	Lyu et al. (2025)

effective conservation strategies			
Increased understanding of degradation mechanisms of paper-based archival materials	n.d.	- Indication of damage caused by various factors, including extreme weather events (including heavy rain and flash floods). - Investigation of the effects of direct immersion in salt solutions on different types of paper, emphasizing the importance of timely intervention.	David et al. (2025)
Using sensor networks to monitor vibrations	Italy	- Performing coherence analysis to identify frequencies. - Contribution to the design of sensor networks for monitoring structural health.	Pirrotta et al. (2025)
Creating a fire protection technology strategy	Macau	- Study of the development and technological applications of industrial heritage in the field of fire protection. - Search for ideas and strategies related to fire protection of industrial heritage.	Huang et al. (2024)

Source: own elaboration based on the sources given in the table.

3.2.4. Cultural heritage as a tool for regeneration

K. Łagodzińska (2013) indicates three models combining the issues of revitalization and culture:

i) culture-led regeneration, in which culture plays a key role as a catalyst and driver of revitalization processes, implemented through, among others, the creation of flagship cultural facilities or complexes, the development of public spaces or the implementation of place rebranding programs;
ii) cultural regeneration, an approach integrating cultural activities with a broad development strategy for a given area, combining it with environmental, social and economic initiatives;
iii) culture and regeneration, in which separate entities are responsible for the sphere of culture and revitalization, with culture playing a supporting and complementary role to revitalization activities.

Table 8. Main advantages and threats of using cultural heritage in the revitalization process

Advantages
Changing degraded areas (e.g. pathological) into attractive places to live and visit
Promotion of a given place (place marketing)
Strengthening of local identity
Defining the character of a given place, its distinguishing features
Increasing the prestige of a given place (in the eyes of residents and guests)
Building pride in the place of residence
Integration of the local community
Strengthening civic attitudes and civil society
Inspiration for socio-cultural activities
Maintaining social and intergenerational bonds
Activation of older people
Increasing the market value of buildings and their surroundings
A source of inspiration for entrepreneurs (new business opportunities)
Protection of existing jobs (including maintaining existing companies)
Reducing migration to other centers
Stopping the process of depopulation
Development of the tourism market
Increased interest in cultural services
Use of available resources
Preservation of a given heritage element
Maintaining traditional crafts
Possibilities of policy interventions for the protection of cultural heritage
Threats
Gentrification process
Conflict between different expectations of heritage inheritors
Conflict related to differences in the perception of the authenticity of a given heritage
Conflict related to different valuations of heritage protection and development of a given area

Source: own elaboration based on: Konior, Pokojska (2020); Alexandrakis et al. (2019); Galluccio, Giambona (2024); Rodrigues et al. (2025).

Heritage is visible in many aspects of revitalization—spatial, social and economic. It is used primarily in the revitalization processes of post-industrial areas and urban spaces. Cultural heritage provides a number of market and non-market benefits related to both utility and non-utility values (Alexandrakis et al. 2019). A. Konior and W. Pokojska (2020) emphasize that in the coming years the awareness of the importance of heritage will increase, while revitalization processes based on it will gain popularity. These researchers specified a group of advantages (related to

improving the quality of life in many aspects) and threats to the use of cultural heritage in the revitalization process. Both groups are presented and supplemented in Table 8.

4. Concluding remarks

Reclamation involves the targeted development of an area that requires remedial action. The selected reclamation direction determines the scope of work, which may consist of technical activities related to the appropriate land formation, including excavations and dumps, soil and earth cleaning, elimination of pollution, securing technical infrastructure, construction of a communication and drainage system, construction of hydrotechnical devices for the assisted filling of excavations with water from rivers and biological procedures in the case of agricultural or forest reclamation. After carrying out reclamation, it is necessary to start the development phase, defined as agricultural, forest or other use of the reclaimed land. In practice, only in the case of some directions, e.g. agricultural and forest, can the reclaimed area immediately fulfill the planned target functions. In the case of other directions, the development process consists of equipping the area and post-industrial facilities so that they can fulfill the intended functions. The process of reclamation and the development of degraded areas is a complex, time-consuming and expensive undertaking. The proper implementation of these projects requires careful characterization and determination of methods for selecting the most advantageous possible directions of reclamation and development.

Protecting cultural heritage can play a key role in sustainable development. Activities in the area of economic development, supporting growth and rehabilitating devastated areas contribute to the creation of new jobs, increasing property values, increasing tax revenues, supporting the establishment of new industries and providing space for business initiatives, which in turn translates into an improvement in the quality of life of local communities.

Apart from explaining concepts such as reclamation, rehabilitation, restoration, revitalization, recultivation, and revegetation, the article specifies four approaches to heritage in the context of reclamation processes. These include:

-cultural heritage in areas after natural disasters,

-cultural heritage in areas damaged by human intervention,

-preparations for intervention in the event of natural disasters and disasters resulting from human intervention,

- cultural heritage as a means/tool facilitating the regeneration of given areas.

It is noticeable that the last group of issues refers exclusively to aspects of revitalization. This group is discussed primarily from the perspective of the advantages and threats linking the revitalization of cultural heritage with its impact on degraded areas, particularly from the perspective of culture as a catalyst for change (*culture-led regeneration*). The remaining research gap focuses on the two models: *cultural regeneration* and *culture & regeneration*, which constitute a space for further research.

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