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Architectural Rehabilitation of Charasteen Cave in Duhok: A Locally-Led Accessibility and Heritage Intervention within the UNESCO–EU MADAD Framework with Support from the Kurdistan Regional Government

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1 ABSTRACT

This paper is the result of a successful architectural and heritage intervention at Charsteen (Charasteen) Cave in Kurdistan Region of Iraq, which is a very important cultural and spiritual place for Zoroastrians. In accordance with the framework of the UNESCO-EU MADAD "Support to Livelihoods through Cultural Heritage Development" program and with support from the KRG, the project was implemented using a low impact design approach that made safe access available while protecting the sanctity of the environment and the cultural significance of the cave. As the Head Architect Engineer and Project Coordinator of WADI (a German international organization) the author was responsible for leading the total redesign and implementation of the site's Master Plan; UNESCO experts, as well as the Duhok Directorate of Antiquities and Heritage, the Tourism Department, the Local Workers Union, and the International Labour Organization (ILO) provided the author with the necessary supervisory, coordinating, and technical assistance. The project consisted of a minimal amount of physical intervention with a focus on adaptive reuse, environmental protection, and the use of natural materials. Water supply line additions, a water-recycling system, sewage systems, improved lighting, and the stabilization of circulation pathways were among the infrastructure upgrade actions taken. A workforce consisting of women, persons with disabilities, Syrian refugees, IDPs, and local community members who were employed under ILO-Cash for Work schemes were involved in all aspects of the project. Capacity building activities involving training in heritage conservation, site management, safety, and construction techniques were also conducted to promote increased community involvement in the site's future stewardship. Utilizing an analytical-applied methodology, this paper will detail the entire process of the intervention from analysis/design phase to demolition/re-construction/evaluation phase, and assess the extent to which it achieved a balance of accessibility, heritage protection and community inclusion. Ultimately, the results of this study clearly show that when implemented under international frameworks locally-led, low-impact architectural interventions can be carried out successfully and maintain the highest levels of preservation and sustainability. The project has established a viable model for sustainable and inclusive restoration of vulnerable heritage landscapes in disaster-affected areas.

Keywords: architecture, accessibility, heritage, UNESCO, Kurdistan

2 INTRODUCTION

Cultural Heritage in conflict areas are at risk from Social Displacement, Environmental Deterioration and Economic Instability. In the Kurdistan region of Iraq (KRI) the pressures were increased as a result of the Syrian Crisis that displaced over 227,000 people to Iraq – 96 % of them settled in KRI. This resulted in an increase in population that placed pressure on the infrastructure, depressed wages and also limited employment opportunities especially for Vulnerable Community Groups.

In this sense, the EU-UNESCO MADAD initiative "Supporting Livelihoods through Cultural Heritage Development" is an example of how cultural heritage sites are being protected by creating job opportunities for Syrians and vulnerable people in Iraq using Cash for Work programs in the form of Employment Intensive Schemes. As part of this initiative, Charsteen (Charasteen) Cave a Zoroastrian religious site located near the old Dohuk Pass has been chosen for rehabilitation.

Prior to the intervention, the site presented many problems such as; dangerous walkways, inadequate infrastructure, uncontrolled flow of visitors, poor lighting and environmental damage. On the other hand, because of the sacred nature of the site, and the natural beauty surrounding it, a very particular approach was needed to create a project that would respect the spiritual dimension of the place and the natural environment surrounding it.

In order to carry out this project, the author performed all the architectural analyses, redesigned the master plan, produced the technical details and implemented the works at the site from May 2023 until May 2025. The other actors involved in this project were mainly UNESCO, ILO, Directorate of Antiquities of Duhok, Department of Tourism, and Workers Union that acted in a coordinating role and/or supervising one.

The present document describes the whole process of rehabilitation of the site and shows that with a minimum amount of resources, with an adaptive and inclusive towards the local communities' design, we can protect the heritage sites while providing jobs, training and social values. This study is guided by the following research questions:

- How can minimal-impact architectural interventions enhance accessibility while preserving the spiritual, cultural, and environmental integrity of sacred heritage sites?
- How does a locally led design and implementation approach influence heritage preservation outcomes within internationally supervised frameworks?
- What are the social impacts of employment-intensive heritage rehabilitation?

3 METHODOLOGY

The Charsteen Cave rehabilitation project employed a hybrid analytical applied methodology, integrating architectural assessment, heritage conservation, environmental management, and community development. The approach encompassed several complementary components:

3.1 Broader Urban Context and Long-Term Considerations

The rehabilitation process of Charstein Cave needs to be considered within the context of the broader urban and demographic trends that are impacting Duhok City, as shown in Figure 1. Illustrate the map of Iraq, showing the Kurdistan Region, including the map of Kurdistan Region showing Duhok, and including the map of Duhok showing the Charsteen site location.. For the past decade, the city has been absorbing large numbers of refugee and internally displaced persons, which has exerted considerable strain on the city's infrastructure, housing, and land reserves. While the demographic trend is a positive indicator of the city's capacity to adapt to crises, the urban sprawl that has ensued has led to the city expanding beyond the initially planned urban boundaries, thus leading to the increasing consumption of land reserves, which may otherwise be used for agricultural and forestry activities.

In this context, the heritage site that is Garstein Cave not only provides a sense of urban identity but also becomes a focal point that can be used to inform the urban planning strategies that will be adopted in the future to ensure that Duhok City does not become overly sprawled, thus leading to the degradation of the natural environments that surround the city.

Fig. 1: Location of the charsteen site in Duhok, Kurdistan Region, Iraq.

3.2 Site Analysis and Documentation

The purpose of a thorough site analysis of Charsteen (Charasteen) Cave was to provide an understanding of its historic, environmental, and physical aspects. A comprehensive site analysis was performed through conducting a topographic survey of the site that would include mapping of site features and terrain, a structural assessment to determine the level of hazard or risk involved with the site and to assess the current condition of the site, photography for use as a visual record and/or for comparison in the future, mapping of the site's circulation paths and potential hazards to enable safe passage of visitors to the site, and extensive observations of the site's environment to assess both the climate of the site and the natural characteristics of the site. All of the data collected from this analysis were used as a basis for making decisions regarding the final design of the cave and any interventions made on the site.

3.3 Stakeholder and Institutional Coordination

Coordination was needed at the daily and weekly level to work with the WADI team, UNESCO, the International Labor Organization (ILO), the Duhok Department of Antiquities and Heritage (DHAH), the Duhok Department of Tourism, the Duhok Workers Union, and local community leaders (Department of Media and Information, 2025).

3.4 Minimal-Impact Design Principles

This restoration used a “minimal impact” or reversible design approach that utilized non-invasive methods and natural materials (Lin et al, 2024). The principles for this were used as a guide for placement, construction, and detailing for all new components to match the sites' cultural, archaeological, and environmental attributes according to UNESCO and ICOMOS preservation guidelines (International Committee for the Management of Archaeological Heritage (ICAHM), 1990) (UNESCO, 1972).

3.5 Applied Materials Testing

All construction materials, as well as the technical components planned for installation on-site have been subjected to an extensive evaluation process in order to assure their appropriateness for a highly sensitive cultural-historical heritage environment. Materials used in civil and structural construction (i.e., limestone blocks and dust, steel products, reinforcing steel bars, concrete, sand, soil, wood) were assessed with respect to strength, durability, compatibility with the natural and built environments, and potential long term performance of each material type under the specific climate and geology of the region in which they would be installed. Likewise, the electrical and water supply systems were evaluated to confirm their safe functioning, compatibility with the existing heritage environment, and low-impact design into the heritage environment. Engineers from WADI worked closely with experts from UNESCO and the DoAH to evaluate all materials in accordance with the applicable national building codes, and in compliance with UNESCO/ICOMOS standards for the conservation and restoration of cultural heritage. Through this multi-faceted assessment, it was assured that only those materials meeting structural requirements, environmental considerations, and those most suitable for the heritage environment, were selected for inclusion in the proposed site rehabilitation project.

Fig. 2: Women cleaning the Charsteen’s external surfaces from the grass.

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3.6 Employment-Intensive Approach

The use of an Employment-Intensive approach (in accordance with ILO guidelines) allowed for the involvement of women, refugees, internally displaced persons (IDPs), persons with disabilities and members of the local community through the provision of Cash-for-Work programs (as shown in Figure 2). Manual building techniques enabled social inclusion while allowing for detailed, heritage-specific rehabilitation.

3.7 Continuous Monitoring

The use of a multi-level monitoring system (daily, weekly, monthly, and quarterly inspections) provided oversight of the project through Progress Reports; Site Visits; and Coordination Meetings. Oversight from UNESCO; Department of Antiquities and Heritage (DoAH); International Labour Organization (ILO); Tourism Authorities; and Workers' Unions ensured that all participants were compliant with safety, cultural and labor standards. This methodology brought together high levels of analytical detail; participation from stakeholders; low impact on the cultural resource; validation of materials used; inclusive job creation and systematic monitoring to enable a sustainable and culturally relevant rehabilitation process.

4 SITE CONTEXT AND HERITAGE SIGNIFICANCE

The Charsteen (cave Char-Steen) archaeological site is located in the city of Duhok, in the Kurdistan Region of Iraq. It is near the Duhok dam and is situated where the Dohuk river meets the White Mountain range. Historically, this location served as a sacred Zoroastrian worship place. The site represents a symbolic representation of water, earth, air and fire. “Charsteen” is the Kurdish word for four pillars. Remains found at the archaeological site show evidence that it was used as a fortification during ancient military campaigns. Due to the natural environment and the flow of water, the site requires careful treatment to prevent environmental damage. The site is known as one of the most significant cultural historic sites in the area of Duhok and has been restored through a collaborative effort from UNESCO, the WADI organization, the Directorate of Antiquities and Heritage of Duhok (Government of Kurdistan), and the European Union. The site includes an ancient temple carved out of rock, known as the Charsteen temple (see Figure 3). This temple has been dated thousands of years old and contains four natural rock pillars and a recently restored temple (known to be Zoroastrian) and is thus a major historic and tourism destination. In addition to the cave (temple) the site also includes an Anahita canal, open fire temple, rock fire, fire altar, fire temple, Anahita temple, tomb, cave, tunnel, simiting place, juicer, and is encircled by a fence (Nhili, 2022).

Fig. 3: Entrance of Charsteen cave (4 pillars).

5 NEEDS ASSESSMENT AND PROBLEM DEFINITION

Prior to intervention, a full site assessment was conducted at Charsteen (Charsteen) Cave, and it revealed several challenges related to function, environment, and safety that impacted the site. One key issue was poor condition of pedestrian walkways and handrails which were broken or did not meet compliance requirements. Lighting within the cave was limited and improperly positioned, as shown in Figure 4. Drainage systems failed to address water stagnation which led to rapid erosion of the cave's surface.

Furthermore, there was no control over stormwater run-off, no proper disposal of waste, and no formalized system to manage visitor traffic which posed threats to visitors and to the site's archaeological integrity.

Fig. 4: Pre-existing situation. Unsafe stairs, no stairs, deteriorated handrails, and bins on the west side of the Charsteen Cave.

The assessment found significant quantities of dense vegetative growth throughout circulation paths and on the outside of the cave, as shown in Figure 5. Using characteristics of leaves; growth patterns; and local environmental factors, the primary climbing and groundcover species was identified as Hedera helix (English ivy). While Hedera helix provided positive effects such as improved erosion resistance and microclimate stabilization, it also created negative impacts by obscuring the cave's entrance, signage, and interpretive features thereby limiting visibility and way-finding. This information directly influenced the need to provide for specific clearing and controlled vegetation management efforts and not total removal.

Fig. 5: Hedera helix (English ivy) covers symbolic representation of water, earth, air and fire, and the exterior surfaces of the Charsteen Cave.

6 DESIGN PHILOSOPHY AND MINIMAL INTERVENTION APPROACH

The overall design strategy for the rehabilitation of Charsteen Cave was based on a “minimalist” design philosophy that protected the cave's sacred/cultural/environmental aspects as much as possible. Three main principles were used in developing the architectural decisions of this project: a conservation-first approach to preserve the integrity of all archaeologically-sensitive layers and the spiritual essence of the cave; an environmentally sensitive approach to ensure that the site would be compatible with its natural surroundings; and reversible design elements to allow for the possibility of future modifications or removals without permanently damaging the heritage of the site. Additionally, the design solution incorporated the use of local/natural materials throughout to maintain the site's historic ambiance and create a seamless visual experience. In lieu of introducing new architecture into the cave system, the rehabilitation focused on improving existing circulation paths, consolidating unstable surface areas, and incorporating subtle safety features. This design strategy provided for both enhanced visitor access and safety while maintaining the cave's original authenticity and sanctity.

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7 MASTER PLAN REDESIGN

The redesign of the Master Plan was designed to improve circulation, increase the level of safety, protect the Heritage, and ensure that the new infrastructure integrates with the existing infrastructure while maintaining a “minimal impact” philosophy. The redesign of circulation has been addressed by creating stabilized stone walkways, standardized limestone steps, connecting the limestone steps with steel stairs and timber cladding of the existing iron paths to stabilize the rock. Amenities to support the visitors have also been improved, including the inclusion of rest points, an open stage for cultural activities, timber kiosks, seating areas and signs providing interpretation in Kurdish, Arabic and English. Infrastructure components (water supply networks, water recycling systems, sewage pipes, electric wires and lighting) are located away from sensitive archaeological zones as shown in Figure 6. In addition, the deteriorated existing structures have been repurposed via adaptive reuse as maintenance facilities, visitor resting areas and interpretive nodes to extend the useful life of the site. Rehabilitation of the environment has been accomplished through the controlled management of vegetation, the planting of trees, irrigation networks and relocating waterfalls to reduce their impact on the archaeological zones. Overall, the redesign of the master plan has effectively integrated improvements to accessibility, enhancements to the visitor experience and improvements to the existing infrastructure while preserving the site's Heritage, environmental integrity and cultural values.

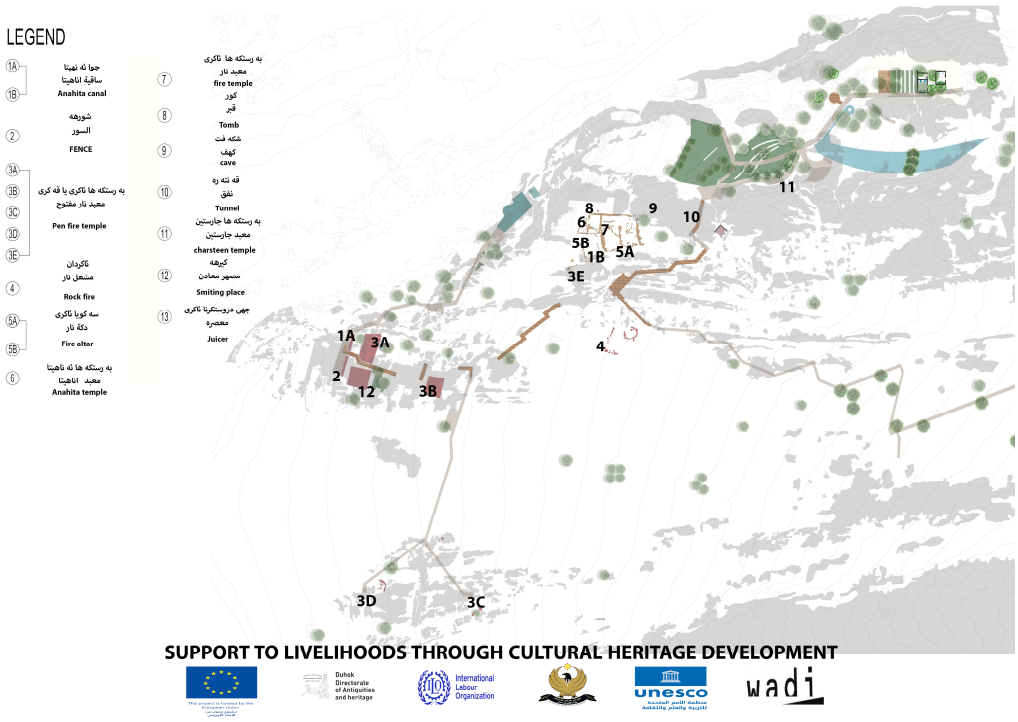

Fig. 6: The designed master plan.

8 IMPLEMENTATION AND CONSTRUCTION PROCESS

The implementation process for the construction of Charsteen Cave involved a series of planned and carefully controlled phases. The phases began with selective demolition and removal of unsafe or deteriorated infrastructure at Charsteen Cave; this was followed by the installation of natural stone staircases, timber-metal handrails, drainage channels and upgraded lighting systems. All the works were designed to provide enhanced accessibility and safety for visitors to the cave while providing the least possible disturbance to its heritage fabric.

The implementation was structured into six primary areas of work: Site Clearance Works; Pavement Works; Steel & Wood Works; Landscaping and Water Systems Works; Electrical and Lighting Installations Works.

Phase One of the project involved clearing the entire site of vegetation, removing grass, roots and all other forms of organic debris from the site, and safely disposing of all biological waste that had been removed from the site. The existing lighting system was carefully disassembled and then stored under close supervision. All deteriorated asphalt, concrete pavement, timber stairs, stone tile finish and parts of the reception building including floor tiles, cladding, ceiling tiles, windows, doors, electrical fittings and air

conditioning units were demolished and removed from the site. Associated services including entrance blocks, toilet facilities and pipe systems, and redundant seating, stairs and handrails were removed to ensure compliance with both heritage protection and safety standards.

The pavement and tiling works were coordinated closely with the Duhok Directorate of Antiquities. A detailed review of the Bills of Quantities (BoQs) against site conditions was undertaken to resolve technical issues and to modify designs where necessary, as can be seen in Figure 7. The excavation, sub-structure construction and installation of durable, safe, and compatible to the heritage fabric pavement systems were completed to provide improved access for visitors to the cave, while preserving the visual and cultural integrity of the cave.

Fig. 7: Stone stairs. The before and after intervention.

Steel works involved the design, manufacture and construction of handrail components, staircase and floor structural framing, benches, waste recycling containers, shade structures, stainless steel safety chain systems and signage systems (Fig. 8), that were constructed in compliance with regulatory requirements regarding both functional performance and safety, while visually being non-obtrusive. The wood works provided functionality and compatibility by installing stair treads, flooring, roofing and gabion-timber elements treated to ensure longevity under various environmental conditions and maintaining their natural appearance.

Fig. 8: Tunnel. The before and after intervention (iron and timber).

Coordinating landscaping, irrigation, and water systems was completed with the help of the Duhok Directorate of Water Resources and the Duhok Directorate of Antiquities. The revised drawings and trenching plans were developed to include galvanized storage tanks, booster pumps and polyethylene piping for drip irrigation for pipeline systems. Planting trees contributed to landscape stabilization, improved microclimate conditions and long term site sustainability, as shown in Figure 9.

The electrical and lighting works were performed together with both Duhok Directorate of Electricity and Duhok Directorate of Antiquities. The Electrical BOQ was reviewed and site visits conducted for optimal routing of trenches and cable path. Where required, design changes were made; all new installations were completed as part of a low-impact, heritage-sensitive approach to enhance both safety, visibility and the overall visitor experience.

Fig. 9: waterfall, ground cover, and shrubs 6. The before and after intervention.

9 INFRASTRUCTURE UPGRADING

Infrastructure improvements for this project included careful planning to protect sensitive areas by creating a new water supply system, sewage, water recycling, and electrical systems. Local and small-scale trenching with materials that are suitable and compatible with the environment/heritage area was done to minimize environmental and heritage impacts, increase durability and enhance visitor comfort and site resilience (Syriacpress, 2025). Materials such as plumbing fixtures, electrical components and construction materials were brought up to the top of the mountain, and a pump booster was utilized in order to cast concrete to build the water tank, as shown in Figure 10.

Fig. 10: Transporting materials and fittings and casting concrete for the water tank using a crane and a pump poster.

10 ADAPTIVE REUSE STRATEGY

The adaptive reuse strategy is about the rehabilitation or repurposing of previously used structures for new uses, with the goal of conserving structural elements while protecting historic architectural characteristics and extending the useful life of the location (Albrifkany et al, 2021). The rehabilitated areas at Charsteen Cave now house rest points for visitors, storage for tools, maintenance facilities, and educational stations. The overall purpose of the project was to have a reduced ecological footprint while increasing usability of the site. This involved creating both covered and uncovered rest places, as shown in Figure 11, as well as an open-platform stage for cultural events utilizing a stone masonry seating platform, timber kiosks and rest areas adjacent to the tunnel, and a complete water distribution system that would provide irrigation to all landscaping elements (shrubs, grasses, etc.). Restrooms are located in the reception area and in proximity to the open-stage. The irregularly shaped natural rock stepways were replaced by a series of regular local limestone stairways and two sets of steel stairways were installed to allow visitors to transition between the archaeological stairway and the limestone stairway. Minimal amounts of steel were utilized in order to minimize intervention to the site and protect it. Several pathways were created utilizing iron and clad with wood to protect the rocky surfaces.

Fig. 11: Creating covered rest places which situates on the west side of the cave (Before and After interventation).

A water collection tank was developed to allow recycled water to be used from artificial waterfalls that had been relocated approximately 100-200 meters away from the cave to further minimize the effects of this aspect of the project, as shown in Figure 12. Ground cover, shrubs, and trees were planted as part of the landscaping aspects of the project. Signs in three languages (Kurdish, Arabic, and English) were also designed and installed as part of the project. All water, sewage, and electric systems were carefully routed away from archaeological areas with approval from Duhok DoAH Supervisors, and documentation was maintained to assist with future maintenance needs. Overall, the adaptive reuse projects at Charsteen Cave have extended the functional life span of the site while preserving its environmental and heritage attributes.

Fig. 12: artificial waterfalls that had been relocated approximately 100-200 meters away from the cave to further minimize the effects of this aspect on the entran cave's surfaces (Before and After interventation).

11 CAPACITY BUILDING AND WORKFORCE INCLUSION

The Charsteen Cave project focused on developing the capacity of and promoting inclusion for workers within the framework of UNESCO and ILO goals that combine heritage preservation with long-term sustainable livelihoods. The project provided training opportunities at all levels of society (community, technical/professional) as well as providing vulnerable populations (women, refugees/IDPs, and members of the host community) direct training through labor-intensive heritage preservation construction/masonry/carpentry/safety and maintenance of infrastructure and environmental practices. At a professional level, the project staff/engineers received specialized training from the EU-MADAD, UNESCO, ICOMOS and ILO that included cultural resource management, conservation techniques, monitoring, site maintenance/tourism planning and additional technical training on the application of B.R.C. Gabion Systems for structural and landscape stabilization of sites. Evaluation and Impact Analysis

The data in the impact evaluation tables confirms that Charsteen Cave has achieved tangible advances in terms of: accessibility; safety; and the preservation of its heritage values by using a low-impact, reversible approach to intervention. In addition to stabilizing key archaeological features at the cave, the project was able to improve environmental conditions in the surrounding area by installing erosion controls and implementing a sustainable irrigation system. Furthermore, the project used local and natural materials which provided an additional layer of compatibility with the heritage characteristics of the site. The project also provided significant social economic returns on investment, providing in excess of 1200 days of employment

opportunities for vulnerable groups; enhancing the technical capacity of local communities; and significantly improving the site's readiness for sustainable cultural tourism; as demonstrated by the information contained within Tables 1 and 2.

	Impact Area	Indicator/ Measure	Baseline	Target/ Goal	Post-Intervention	Measurement Method
1	Accessibility & Safety	Number of stabilized pathways	Informal, uneven paths, erosion, and slip hazards	Safe, continuous pathways	Stone pathways	Site survey, visual inspection
		Number of stairs repaired/constructed	Irregular, unsafe stone steps	Regularized stairs compatible with the heritage	New Limestone stairs constructed	Construction logs, photographs
		Lighting coverage	Limited/ non-functional lighting	Adequate low-impact lighting for safety	Energy-efficient lighting installed along main routes	Site inspection, visitor survey
2	Heritage Conservation	Archaeological structures stabilized	Deterioration and exposure to environmental risks	Stabilized structures with minimal intervention	Key archaeological elements have protected	Expert assessment, site documentation
		Minimal intervention compliance	Risk of intrusive repairs	Compliance with UNESCO / ICOMOS principles	Interventions reversible, non-invasive, and site-sensitive	Project design review
		Adaptive reuse success	Abandoned/ deteriorated structures	Functional reuse without loss of heritage value	Structures reused as rest points, stages, kiosks	Site inspection, photographic record
		Condition of heritage fabric	Weathering and structural decay	Improved structural and visual condition	Heritage fabric preserved and enhanced	Measurement Method

Table 1: Charsteen Cave: Impact Evaluation Table, Accessibility and Safety, and Heritage Conservation.

	Impact Area	Indicator/ Measure	Baseline	Target/ Goal	Post-Intervention	Measurement Method
1	Environmental Resilience	Vegetation coverage managed	Uncontrolled growth affecting structures	Controlled, protective vegetation cover	Vegetation managed and replanted strategically	Site survey, GIS mapping
		Irrigation/water systems functional	Inefficient or absent systems	Sustainable irrigation and water reuse	Irrigation and recycled water systems operational	Functional testing logs
		Erosion/soil stability	Soil erosion near paths and slopes	Reduced erosion and stabilized soil	Gabions, and landscaping reduced erosion	Field measurement, photo monitoring
		Sustainable material use	Use of incompatible or modern materials	Local, natural, sustainable materials	Limestone, timber used	Project materials report
2	Community & Economic Impact	Jobs created	Limited local employment	Inclusive job creation	1200 workdays (women, refugees, IDPs, locals)	HR/project records
		Workforce diversity	Low inclusion of vulnerable groups	Gender and diversity inclusive workforce	Inclusive workforce	Employment records
		Capacity building/training	Limited heritage-related skills	Strengthened technical and conservation skills	On-site and formal training completed	Training reports, attendance
		Community engagement	Limited community involvement	Active local participation	Community leaders and workers engaged	Meeting records, interviews
		Tourism readiness	Site not prepared for visitors	Improved visitor experience	Site ready for cultural and eco-tourism	Visitor surveys, tourism data

Table 2: Charsteen Cave: Impact Evaluation Table, Environmental Resilience, Community and Economic Impact.

The intervention was carried out in accordance with UNESCO and ICOMOS conservation principles, which emphasize minimal intervention, reversibility, respect for authenticity, and sensitivity to the environment. The project also adopted UNESCO's integrated approach to heritage conservation and sustainable development, which emphasizes community involvement in conservation and development work.

12 CONCLUSION

The rehabilitation of Charsteen Cave is a successful example of how to conduct an inclusive, sustainable, and sensitive approach to preserving heritage sites.By using minimum impact design, reusing structures already on-site, protecting the environment through good stewardship practices, and working with the local community, this project was able to preserve the cave's spiritual, cultural and historical importance by making it more accessible and safer for visitors, all without reducing the site's authenticity. This project also contributed to creating jobs and developing the capabilities of the local communities through the use of inclusive and skill based approaches, and produced environmentally friendly infrastructure projects consistent with international preservation standards. Overall, this project demonstrates that if heritage sites are carefully planned, and low-impact design strategies are implemented, the preservation of these sites can be achieved in conjunction with the support of social and economic development, especially in crisis affected areas.

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