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CASE STUDY

Slope Stabilization, Soil Restoration and Green Infrastructure Development on a Degraded Riverbank at the Historic Malabadi Bridge in Kozluk (Turkey)



Project full title: Enhancing Technical and Vocational Skills for Implementing Nature-Based Solutions (NbS) to Combat Land Degradation

Project acronym: NbS4LD

Project number: 2025-1-TR01-KA220-VET-000357096

Project activity: WP2 Developing Educational Resources on NbS for Combating Land Degradation

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1. INTRODUCTION

This case study has been analysed by [Ankara Intercultural Research Association \(AKAD\)](#). The organisation was established on February 18, 2021, in Ankara to enhance and develop civil society activities and conduct research for intercultural interaction. It was founded by seven individuals, including architects, engineers, dietitians, academics. The association has a total of 16 members, including five board members and three audit board members.

The Malabadi Recreation Area project restored a 25,000 m² degraded riverbank slope beside the historic Malabadi Bridge in Batman Province, Türkiye. Prior to intervention, the site experienced severe soil erosion, sparse vegetation, and increasing vulnerability to drought and extreme temperatures. Implemented in 2025 under the Batman Tourism Master Plan, the project combined ecological restoration with heritage conservation and tourism development.

Using a hybrid green–grey infrastructure approach, the intervention included a 350 m stone retaining wall, soil rehabilitation, afforestation with 250 trees, 50 shrubs, and 1,500 herbaceous plants, and an automated drip-irrigation system. Public amenities such as walking paths, an observation terrace, parking areas, and visitor facilities were also developed.

The project successfully reduced erosion, increased vegetation cover, improved biodiversity, and enhanced the landscape surrounding the UNESCO Tentative List monument. It also created recreational opportunities, supported local tourism and employment, and strengthened institutional cooperation among provincial and local authorities. The Malabadi Recreation Area demonstrates a replicable model for integrating Nature-Based Solutions, cultural heritage management, and sustainable tourism to restore degraded land in semi-arid regions.



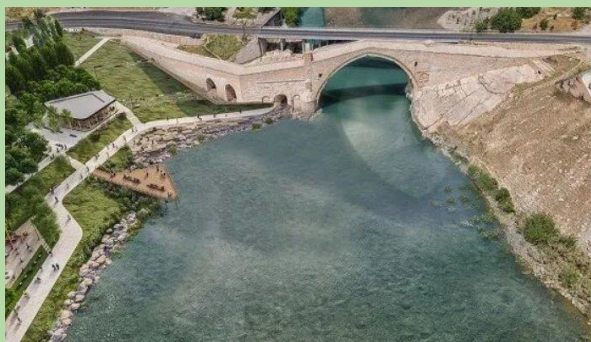
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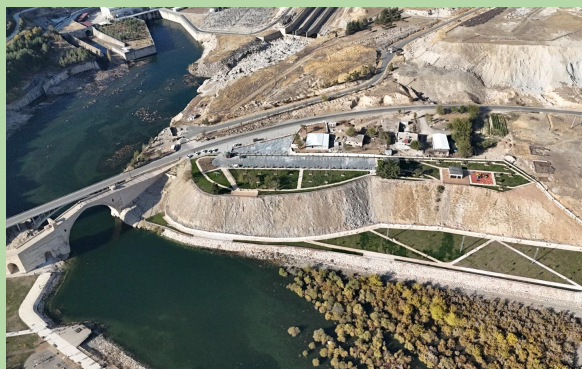
[Satellite view of the project area before intervention, showing the degraded riverbank slope (marked in green) on the Batman side of the Malabadi Bridge - Source: Google Earth]



[Construction phase (mid-2025): excavation works and construction of the 350 m dressed-stone retaining wall along the riverbank.
- Source: Batman Governorship]



[Completed Malabadi Recreation Area (close-up): integrated landscape with the historic 12th-century Malabadi Bridge, public space and water-edge amenities - Source: Batman Provincial Special Administration]



[Aerial view of the completed area (October 2025): slope stabilization, restored vegetation cover, parking and visitor amenities - Source: Batman Provincial Special Administration]

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2. CONTEXT

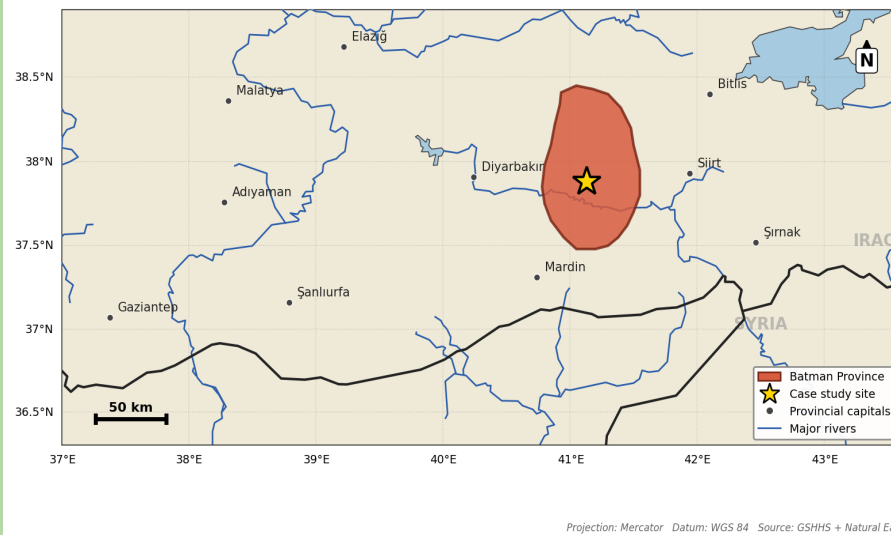
2.1 LOCATION

Country: Türkiye. Region: Southeastern Anatolia Region. Province: Batman. Site: Northern bank of the Batman River, immediately east of the historic Malabadi Bridge, on the Diyarbakır–Bitlis tourism corridor between Silvan and Kozluk. Approximate GPS coordinates: Latitude 38.180° N - Longitude 41.200° E.

Map 1 — Country scale: Türkiye
Location of Malabadi Recreation Area



Map 2 — Regional scale: Southeastern Anatolia
Location of Malabadi Recreation Area within the regional context

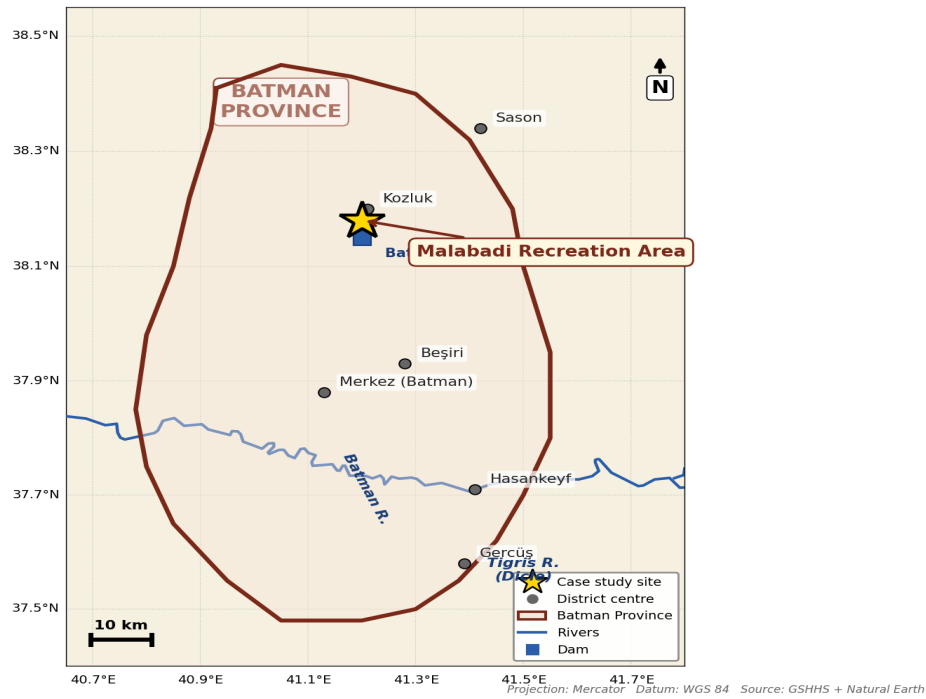


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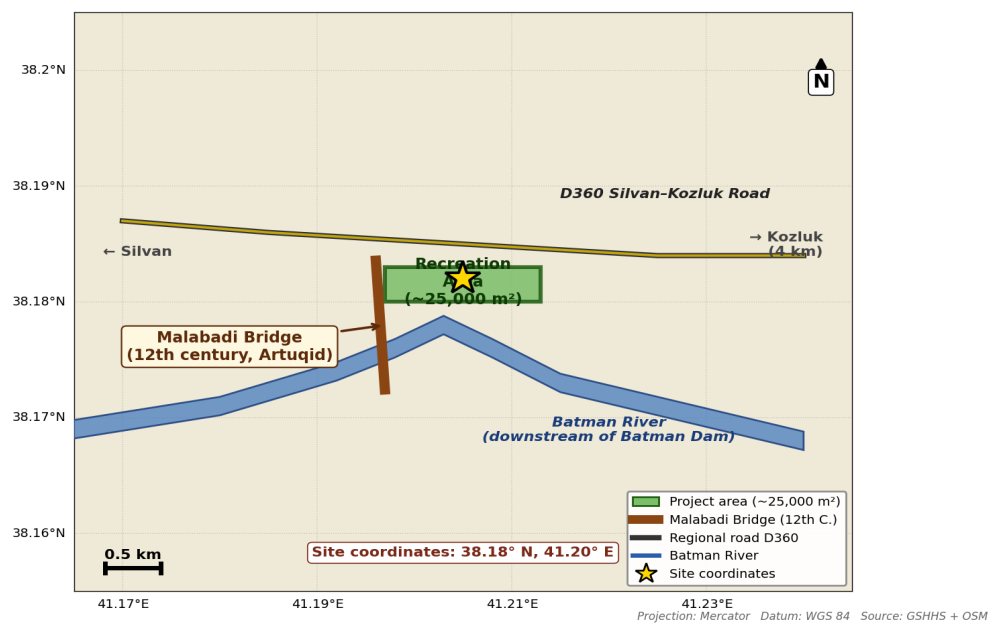
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Map 3 — Provincial scale: Batman Province
Location of Malabadi Recreation Area within the province



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Map 4 — Site scale: Malabadi Recreation Area
Intervention area on the northern (Batman) bank of the Batman River



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2.3 LANDSCAPE TYPE

Degraded/disturbed riverbank slope. Cultural heritage landscape. Peri-urban green infrastructure adjacent to a UNESCO World Heritage Tentative List site.

2.4 LAND DEGRADATION CHALLENGE

Soil erosion. Vegetation degradation. Poor land management. Climate change vulnerability.

2.5 BASELINE DATA

Land condition	• Site: ~25,000 m² of degraded riverbank slope between a regional road and the Batman River, immediately downstream of Batman Dam and adjacent to the Malabadi Bridge. The site comprised a steep, exposed slope of stony, shallow soil with limited horizon development and no formal management. • Soil: thin, calcareous, stony soils typical of Southeastern Anatolia's Tigris Basin, with low organic matter and high erodibility on slope sections. • Vegetation cover: <10% woody cover; sparse drought-adapted herbaceous species and isolated shrubs dominated; tree cover within the project footprint was negligible. • Erosion status: active surface erosion driven by intense seasonal rainfall events on bare slope, contributing sediment to the Batman River downstream of the dam.
Environmental context	• Climate: continental semi-arid; hot, dry summers and cold winters. Mean annual precipitation in Batman Province is approximately 450–500 mm, concentrated in winter and spring, with prolonged dry summers; summer maxima frequently exceed 38–40 °C. Studies of the Tigris Basin report increasing drought frequency and significant decreasing precipitation trends over recent decades (Gumus et al., 2023). • Hydrology: the Batman River, a major tributary of the Tigris, flows immediately south of the site; flow is regulated upstream by Batman Dam. • Biodiversity: the wider landscape supports Mediterranean–Irano-Turanian vegetation and riparian woody species (Salix, Populus, Tamarix); the project site itself was floristically depleted. • Ecological pressures: aridification, soil erosion, summer heat extremes, informal access on bare slopes.
Socioeconomic context	• Population: Kozluk district hosts approximately 52,000 inhabitants; the site is rural but lies within a strategic heritage-tourism corridor (Diyarbakır–Batman–Bitlis). • Livelihoods: mixed agriculture (cereals, livestock), small commerce, and an emerging tourism sector linked to Batman's

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	cultural heritage (Hasankeyf, Malabadi, Mor Kiryakus Monastery). - Land management: public land bordering the historic bridge protected zone, under provincial administration. - Resource dependency: increasing local orientation toward heritage and nature-based tourism, with the Malabadi Bridge as a recognised regional symbol but with no visitor infrastructure on the Batman side prior to the intervention.
Policy and governance	Institutional framework: although the Malabadi Bridge itself is a registered cultural property and is included on the UNESCO World Heritage Tentative List (ID 6113, listed in 2016), its immediate surroundings on the Batman bank lacked formal landscape protection, vegetation management, or visitor infrastructure. The Batman Provincial Tourism Master Plan (2024) identified the bridge surroundings as a priority site for integrated heritage-and-environment investment under a 16-theme provincial tourism vision.

3. INTERVENTION

3.1 TIMEFRAME

Planning and design: 2024 (Batman Tourism Master Plan). Tender: 16 December 2024. Site delivery: 13 January 2025. Foundation-laying ceremony: February 2025. Construction: January–October 2025 (~270 days). Provisional acceptance: 2 October 2025. Operational: November 2025–present.

3.2 TYPE OF INTERVENTION

Afforestation. Slope and soil stabilization through ecological engineering. Green infrastructure development. Integrated heritage-landscape management combining grey infrastructure (dressed-stone retaining wall) with green infrastructure (afforestation, ground cover, irrigation) to restore ecological functions on a degraded slope while protecting the visual and physical setting of a 12th-century monument.

3.3 IMPLEMENTING ORGANISATIONS

The intervention was led by the Governorship of Batman Province (Batman Valiliği) under the directive of Governor Ekrem Canalp. Project coordination was carried out by Kozluk District Governorship (Kozluk Kaymakamlığı), with planning and design coordination through the Provincial Directorate of Culture and Tourism (Batman İl Kültür ve Turizm Müdürlüğü). The Provincial Special Administration of Batman (Batman İl Özel İdaresi) acted as the contracting authority and financier, with construction carried out by a private contractor following a public

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tender. The intervention is documented as a case study under the Erasmus+ KA220-VET project, with the Ankara Kültürlerarası Araştırma Derneği (AKAD) contributing the documentation to the project knowledge base.

3.4 FUNDING SOURCES

The intervention was financed through public funds via the Batman Provincial Special Administration. The estimated cost was 52,728,407.00 TL; a competitive tender resulted in an initial contract value of 37,950,000.00 TL, representing a 28.02% bid reduction. A subsequent 40% scope increase, covering additional landscaping and finishing works, brought the final contract value to 53,130,000.00 TL (~ €1.5 million as of 2025). Long-term operation and maintenance is the responsibility of the Provincial Special Administration in cooperation with the Provincial Directorate of Culture and Tourism, with revenue from the on-site restaurant and visitor services contributing to operational sustainability.

3.5 IMPLEMENTATION ACTIONS AND MEASURES

- 1) December 2024 — Public tender for the Malabadi Bridge Environmental Landscaping Works published and awarded (16 December 2024).
- 2) January 2025 — Site delivery to contractor (13 January 2025); mobilisation, baseline surveys and slope-condition assessment.
- 3) February 2025 — Foundation-laying ceremony with Governor Ekrem Canalp, Member of Parliament Ferhat Nasıroğlu, district authorities and the local public, formally launching construction within the framework of the Batman Tourism Master Plan.
- 4) February–May 2025 — Earthworks and slope preparation; construction of 350 m of dressed-stone retaining wall along the slope with masonry railings; installation of underground utilities (water, irrigation, electrical, drainage, 200-person septic system).
- 5) May–August 2025 — Soil reconstruction and amendment on the terraced slope; construction of the 120 m² restaurant with 250 m² adjoining seating area, 110 m² mosque with accessible sanitary facilities, 185 m² observation terrace, 250 m² children's play area, 2,300 m² parking for 92 vehicles (including 5 accessible spaces), 4,800 m² of pedestrian walkways, 100-tonne water tank, water well, and a wooden security cabin.
- 6) August–October 2025 — Planting of 250 shade trees (plane, mulberry, ash, Persian lilac and other adapted species), 50 climbing/scented shrubs, and 1,500 botanical plants; commissioning of automatic drip irrigation; installation of 92 Seljuk-motif decorative lighting poles, 3 high-mast floodlight poles (6 projectors each), and 24 high-resolution security cameras.
- 7) 2 October 2025 — Provisional acceptance of the works.

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- 8) November 2025 — Official opening of the Malabadi Recreation and Observation Terrace Area to the public, integrating the site into the Batman Tourism Master Plan alongside Hasankeyf, Mor Kiryakus Monastery and the Mereto Mountain corridor.

4. IMPACT

4.1 ENVIRONMENTAL IMPACT

✓ Improved soil health and reduced soil erosion. ✓ Increased vegetation cover and habitat creation. ✓ Improved biodiversity. ✓ Reduced land degradation. ✓ Improved ecosystem services.

The intervention transformed a bare, eroding slope into a vegetated multifunctional landscape. Slope stabilization through 350 m of dressed-stone retaining wall arrested active surface erosion; soil reconstruction and the establishment of approximately 1,800 woody and herbaceous plants on 11,960 m² of green area restored vegetative cover and re-initiated soil-forming processes. The new tree canopy provides shading that reduces summer surface temperatures and evapotranspiration losses, improving microclimate regulation in a region where summer maxima routinely exceed 38 °C. Reduced surface runoff lowers sediment delivery to the Batman River downstream of the dam, with positive implications for downstream water quality. The combination of structured planting and supplementary irrigation establishes a habitat nucleus for pollinators and small fauna in a previously depauperate slope.

4.2 COMMUNITY IMPACT

✓ Strengthened community resilience and quality of life. ✓ Increased local capacity. ✓ Job creation in the operations and tourism phase. ✓ Heritage-linked economic diversification.

The project provides a high-quality public amenity for residents of Kozluk and surrounding villages, improving access to safe, shaded and barrier-accessible green space (with 5 accessible parking spaces, accessible WCs and adapted walkways). The on-site restaurant, parking, sanitary facilities and prayer space create direct and indirect employment in operations, maintenance and hospitality. By converting a previously underused slope adjacent to one of the world's most important historic stone bridges into a functional visitor area, the intervention catalyses heritage tourism: provincial authorities reported exceeding the 500,000-visitor target for Batman in 2025 and project a 1-million-visitor target as the destination network develops, generating spillover demand for accommodation, food services and local transport in Kozluk district.

4.3 INSTITUTIONAL IMPACT

✓ Establishment of new management structures. ✓ Integration into provincial planning

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frameworks. ☒ Strengthened institutional coordination. ☒ Capacity building for institutions.

The project established a clear inter-institutional coordination model linking Batman Governorship, Kozluk District Governorship, the Provincial Directorate of Culture and Tourism, and the Provincial Special Administration. It is formally embedded in the Batman Tourism Action Plan and Tourism Master Plan (2024), making it part of a 50-year provincial vision that links heritage protection, ecological restoration and economic diversification. Documentation of the project under the Erasmus+ KA220-VET case-study series further integrates it into European-level vocational training resources for nature-based solutions, supporting peer learning across partner countries.

4.4 SUSTAINABILITY OF THE RESULTS

☒ Long-term funding mechanisms. ☒ Institutional support and partnerships. ☒ Local technical capacity for maintenance. ☒ Integration into provincial policies and development plans. ☒ Monitoring and adaptive management.

Long-term sustainability rests on three pillars: (i) institutional ownership by the Provincial Special Administration with a defined operations-and-maintenance mandate; (ii) integration into the Batman Tourism Master Plan, which provides ongoing political and funding support; and (iii) operational revenue from the restaurant and visitor services, which contributes to recurring costs (irrigation, plant replacement, security, cleaning). The automatic drip-irrigation system, dedicated water well and 100-tonne tank ensure that planted vegetation can establish through the critical first 3–5 years in a semi-arid climate. Ongoing site management, supported by 24 high-resolution security cameras, allows both site protection and indirect documentation of vegetation establishment and visitor-use patterns.

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5. CONCLUSION

- **Community relevance:** fully.

The intervention addressed a real community need by transforming a degraded and erosion-prone area into a safe, accessible, and multifunctional public space adjacent to an important cultural heritage site. The project improved recreational opportunities, enhanced visitor experience, and provided environmental benefits for local residents and tourists.

- **Technical effectiveness:** mostly.

The intervention successfully stabilized an actively eroding slope and restored vegetation cover through a combination of green and grey infrastructure. Measures included a 350 m stone retaining wall, soil reconstruction, afforestation with 250 trees, 50 climbing shrubs, and 1,500 herbaceous plants, supported by an automated irrigation system. These actions reduced erosion risks and improved landscape quality and ecological functions.

- **Economic efficiency:** mostly.

Although the project required significant public investment, it generated long-term value through land protection, tourism enhancement, and recreational services. Cost efficiency was improved through a competitive procurement process, while visitor facilities and tourism-related activities contribute to the site's economic sustainability.

- **Institutional support:** fully.

The intervention benefited from strong institutional coordination among local and provincial authorities. The project was implemented through collaboration between the Batman Governorship, Kozluk District Governorship, Provincial Directorate of Culture and Tourism, and Provincial Special Administration, and was aligned with regional tourism development strategies.

- **Innovation:** mostly.

The project introduced an integrated approach that combines ecosystem restoration, slope stabilization, heritage conservation, and tourism development. The use of hybrid green–grey infrastructure, drought-adapted vegetation, and culturally inspired landscape design represents an innovative solution for degraded heritage-adjacent areas.

- **Replication & Scaling Potential:** fully.

The intervention provides a transferable model for restoring degraded slopes surrounding cultural heritage sites. Its modular combination of erosion control, soil rehabilitation, climate-adapted planting, and public-use infrastructure can be replicated in similar landscapes across Türkiye and other regions.

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6. BIBLIOGRAPHY

- Malabadi Bridge. UNESCO World Heritage Tentative List Entry (ID 6113). International heritage documentation. [Link](#).
- Batman Governorship. *Malabadi Recreation Area Environmental Landscaping Project* – Official project announcement and implementation information. Government documentation. [Link](#).
- Veli Gümüş, L. D. Dinsever & Y. Avşaroğlu. (2023). *Analysis of Drought Characteristics and Trends during 1965–2020 in the Tigris River Basin, Türkiye*. Scientific paper. [Link](#).
- Z. Sönmez Pulat. (1993). *The Main Features of the Seljuk, Beylik and Ottoman Bridges of Turkish Anatolian Architecture from the 12th to the 16th Centuries*. Historical and architectural analysis.
- Batman Provincial Directorate of Culture and Tourism. *Batman Provincial Tourism Master Plan (2024)* – Strategic framework for heritage, tourism, and environmental investments.
- A. Yıldırım & S. Karadoğan. (2011). *Morphometric and Morphotectonic Analyses South of the Raman Mountains (Tigris Valley)*
- Malabadi Recreation Area. Project technical documentation, landscape restoration, erosion control, and recreational infrastructure development reports. Institutional documentation. [Link](#).

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