

Restoration of the Historical Dagla's Hill in Markopoulo of Attica

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This paper aims to investigate the historical and natural restoration of the landscape of Dagla's Hill, located in the Markopoulo region of East Attica, Greece. The research presents a design methodology that could be effectively implemented by landscape professionals in Greece. The case study area holds significant archaeological value, as it features several monuments dating from the late ancient to the Hellenistic-Byzantine period. Additionally, it is situated adjacent to Saint George's Stream, which has been protected since 1993 due to its environmental significance. The case study examines the regulatory framework and current conditions of the hill, utilizing the Strengths-Weaknesses-Opportunities-Threats (SWOT) analysis to highlight key points of interest, weaknesses, threats, and opportunities. Examples of similar global restoration projects were also analysed. A key finding is the need to address the factors contributing to the degradation of the hill and to restore its historical continuity. To achieve this, the study proposes the creation of the "Path Through the History of Markopoulo." This route, consisting of pathways and viewing points, will link the various monuments from different historical periods into a cohesive narrative of the hill's history. Moderate interventions are also recommended to reduce soil erosion and address gradual desertification, along with proposals to improve accessibility and increase foot traffic on the hill.

Keywords: archaeological landscape, restoration, environmental interest, landscape architecture

1 Introduction

The approach to heritage planning (Pantzou & Vlizos, 2021; Malouchou-Tufano, 2021) emerged from the need to effectively protect remnants of both recent and distant pasts, which were increasingly threatened by rapid urban, peri-urban, and rural changes. The earliest international principles for conservation and restoration, such as the Venice Charter (1964) and the UNESCO World Heritage Convention (1972), emphasize a holistic, multidisciplinary approach. These frameworks argue that monumental structures are part of a larger context – an environment whose integrity must be preserved (Zigomalas, 2015). Protection should extend beyond individual monuments, addressing cultural landscapes (Malouchou-Tufano, 2021; Chouliaras, 2021). Landscape perceptions now encompass not just cultural expressions but also natural systems, highlighting the complexity of these interrelated systems. However, a comprehensive approach that integrates all these elements remains lacking (Oldham et al., 2021).

The recently passed Nature Restoration Law is Europe's first continent-wide legislation focused on restoring natural systems and ensuring the conservation, development, and management of landscapes for climate resilience. It extends the European Green Deal and the New European Bauhaus Declaration (IFLA Europe, 2023). The European Commission (2024) reports that over 80% of habitats are in poor condition. Restoring wetlands, rivers, forests, grasslands, and marine ecosystems is crucial for biodiversity, clean air and water, crop pollination, flood protection, limiting global warming to 1.5 °C, and enhancing Europe's resilience to natural disasters and food security risks. Despite past environmental neglect, landscape architects must now play a key role in reshaping these altered landscapes (Gkoltsiou & Paraskevopoulou, 2021).

The paper aims to tackle the issue of landscape reclamation from the historical and natural perspective with a special focus in Greece. A holistic landscape

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reclamation approach is missing in Greece especially at the implementation level. Therefore, the research will present a design methodology and *in situ* interventions that could easily be implemented by Landscape professionals in such archaeological places, with a focus in Greece.

2 Material and Methods

2.1 Case Study

The study area, 33 km south of Athens and 550 m south of Markopoulo, covers 70,000 m² with significant cultural and environmental features (Fig. 1).

At the top of Dagla's Hill, the medieval Dagla's Tower, known also as Liada's Tower, and an unidentified church remain. The Tower was part of the 13th century Phryctoria beacon system during the Frankish occupation (Fig. 2). To the northwest stands the Temple of Panmeggistoi Taxiarches (Fig. 3), a cross-in-square church, along with the ruins of the Church of Saint Konstantinos while to the southwest, the ruins of the early Christian Basilica of Saint Aimiliano, built on a Roman bath, remain. Only the Taxiarches church is accessible, visible from Hyppodromou Avenue. The steep slope north of the Basilica, along with nearby trash trucks, limits access and visibility, reducing the environmental value of Saint George's stream. Additionally, pebbles and rubble in the northwest alter the area's character.

The study area has low acoustic levels due to extensive agricultural land use in Mesogeia. Being 11 km south

of Athens International Airport, high noise levels occur along the aircraft landing axis. However, studies that took place in 2006 and 2007 (Enveco Company, 2016) show that the area stands out the Lden >65 dB(A) zone and simultaneously, out the Lnight 55–60 dB(A) zone. The former Merenta rock quarry is no longer operational, and nearby highways contribute to noise, mainly during trash truck traffic or on weekends in the summer.

2.2 Method Used

2.2.1 Desk Study

The first methodological step was a desk study, involving research into legislation, zoning laws, and environmental constraints. The hill is within the Merenta Mountain archaeological area, about 1000m north of the protected Laurio Mountain zone. To the south, Saint George's stream flows into the Vravra wetland, part of the Natura 2000 network. Since 1993, it has been classified as an area of environmental interest.

The area falls within Zone B2 (medium-protected monuments), with allowed uses like residences, agricultural warehouses, and public spaces, subject to restrictions. It borders industrial Zone C2 and agricultural land (Zone A), with areas for greenery, sports, and housing.

Research also included climatic and physiographic data. The climate is warm and dry in summer, with moderate winters. Temperatures range from 26.9 °C in July to 8.5 °C

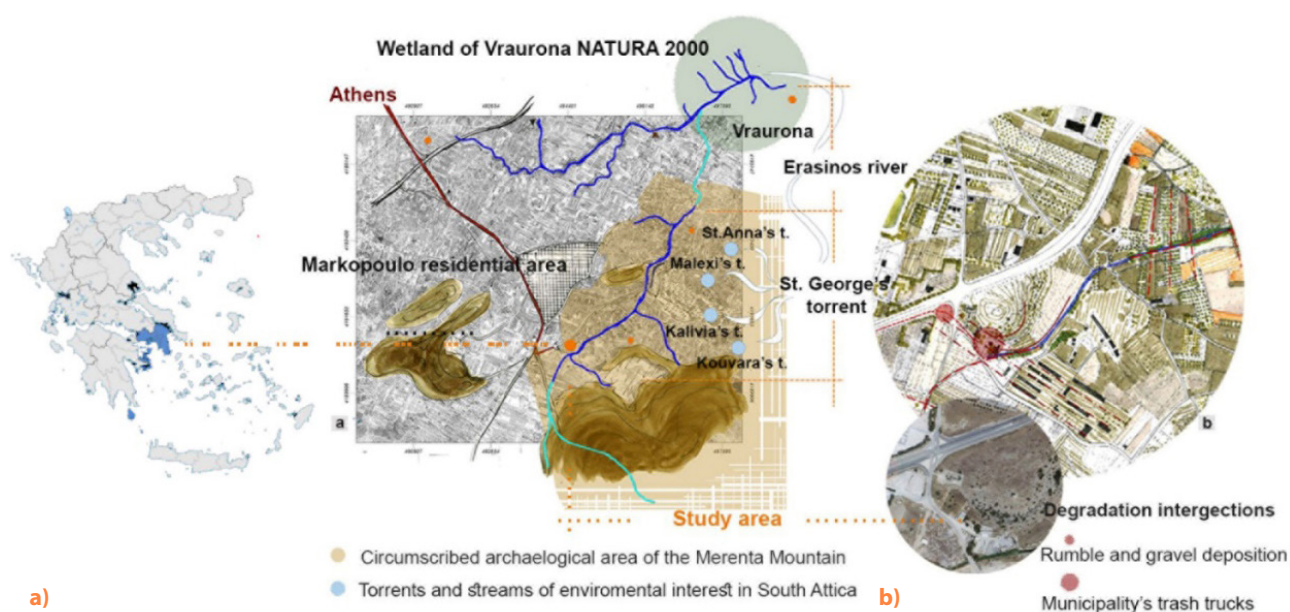


Figure 1 a) – Map of the wider area, protection zones, environmental interest territories and access to the study area; b) – The landscape of the wider area
Source: Authors archive



Figure 2 The Dagla's Tower at the top of the hill
Source: Authors archive



Figure 3 The church of Pammeggisti Taxiarhes north-westwards the hill
Source: Authors archive

in January. Winds dominate from the north in summer and autumn.

Geologically, Dagle's Hill features intense relief, classified as a mount or butte. The soil is karstic with low permeability and belongs to the tectonic cover of Hymettus, Penteli, and the Lauritic Peninsula.

The area falls within the Mediterranean Vegetation Zone (*Quercetalia ilicis*) and the Oleo-ceratonion subzone, also known as the Thermomediterranean Zone. Pine forests and brushwood dominate the hillsides. Degraded vegetation caused by grazing and fire forms spiny, downy, and toxic species. Characteristic flora includes the lentisk or mastic (*Pistacia lentiscus*), the turpentine tree (*Pistacia terebinthus*), the kermes oak (*Quercus coccifera*), common olive (*Olea europaea*), mock privet (*Phillyrea latifolia*, *Phillyrea media*), the aleppo pine (*Pinus halepensis*), the phoenicean juniper (*Juniperus phoenica*), the cade juniper (*Juniperus ocycedrus*), myrtle (*Myrtus communis*), holm oak (*Quercus ilex*), judas tree (*Cercis siliquastrum*), lavender-leaved anhyllis (*Anthyllis hermanniae*). In deeper gorges, species such as the carob (*Ceratonia siliqua*), the almond-leaved pear (*Purus amygdaliformis*), and the black hawthorn (*Rhamnus graeca*), whorled heath (*Erica verticillata*) and the strawberry tree or madrone (*Arbutus unedo*) can be found, as also others as the Greek cyclamen (*Cyclamen graecum*), the Mediterranean meadow saffron (*Colchicum cupani*), the Yellow Star of Bethlehem (*Gagea paduncularis*), the rosy garlic (*Allium roseum*), the star of Bethlehem or Ornithogalum white (*Ornithogalum atticum*), the Autumn Squill (*Scilla automnalis*), the sea squill or sea onion (*Urginea maritima*), the tassel hyacinth (*Muscari comosum*), croci us the smooth crocus (*Crocus laevigatus*), the *Crocus crewei*, the dwarf iris (*Iris pumila*), the sand crocus (*Romulea columnae*), the common sword-lily (*Gladiolus segetum*), the 'Arcadian Sun' (*Sternbergia sicula*), and species of Orchidaceae (Paraskevopoulos,

2020). 98 avifauna species are also found, including predators like the Golden Eagle (*Aquila chrysaetos*) and Black Kite (*Milvus migrans*). In contrast, Vravra wetland shelters a wider range of mammals, e.g., fox (*Vulpes vulpes*), marten (*Martes martes*) and amphibian as the Marginated Tortoise (*Testudo marginata*), the eyed skink or gongilo (*Chalcides ocellatus*) (Enveco Company, 2016).

Alongside the desk study, research was conducted on similar interventions in Greece, like the archaeological sites of Ramnounta and Plato's Academy. These sites feature monuments in clearings with pressed soil, low groundcover, and dense Mediterranean vegetation. Towers on mounds were also examined, such as the Tower of Trizina, which blends with the hill's contours, and the tower of Vravra, encircled by a grid of olive trees. The Vravra site, 7.9 km northeast, is notable for the coexistence of Artemida's sanctum and Saint George's church near the Erasinos River, resembling the study area. The Epidaurus Theater, set on a verdant hill, was analysed for its natural setting, accentuated by pine tree lines marking its entrance.

2.2.2 In Situ Research

Within a 500 m radius of the hill, the landscape is a grid of land parcels intersecting Saint George's stream and its continuation, underscoring the area's significance (Fig. 1b). Visual analysis shows the main inflow at the intersection of Markopoulou and Hypodromou Avenues, 550 m north of the settlement. The only nearby buildings are the remains of the Agricultural Bank of Greece premises to the northeast (Fig. 4). Additionally, the storm-water moat of Markopoulo is interrupted by Hypodromou Avenue and the upper section of the stream.



Figure 4 View to the Southwest part of the hill. The premises of the Agricultural Bank of Greece are visible at the background
Source: Authors archive



Figure 5 Degradation of the stream area and optical disturbance
Source: Authors archive

Two degradation points are evident: rubble and gravel near Hypodromou Avenue, and waste from trash trucks between the hill and the stream, both negatively impacting the area's character and obstructing visual connection between sections (Figs 5, 6). The relief varies from 17 m on space in between the southern low point and hilltop to a gentler 6m slope in the north, containing historical monuments.

The entrance to the Taxiarches church is visible at the crossroad, while the Tower can be accessed via a nearby uphill path along the church's stone fence. However, once at the Tower, there is no further access to other monuments. Descending to the Saint Aimiliano ruins is impossible due to the steep slope. The only route is back to the church, through areas with containers and



Figure 6 Sharp slope, basin for putting gravel
Source: Authors archive



Figure 7 Southern aspect of the tower whereas lines of olive trees stand vertically to the contour lines of the hill
Source: Authors archive

trash trucks, to reach the basilica. The lack of accessible paths and the resulting deterioration are evident (Fig. 7). The following diagram shows main land uses as they have been described above and the most important landmarks to be preserved (Fig. 8)

2.2.3 SWOT Analysis

The SWOT (Strengths-Weaknesses-Opportunities-Threats) analysis helped identify the strengths, weaknesses, opportunities, and threats of the study area. Data collected from previous research stages were used to assess these factors (Fig. 9).

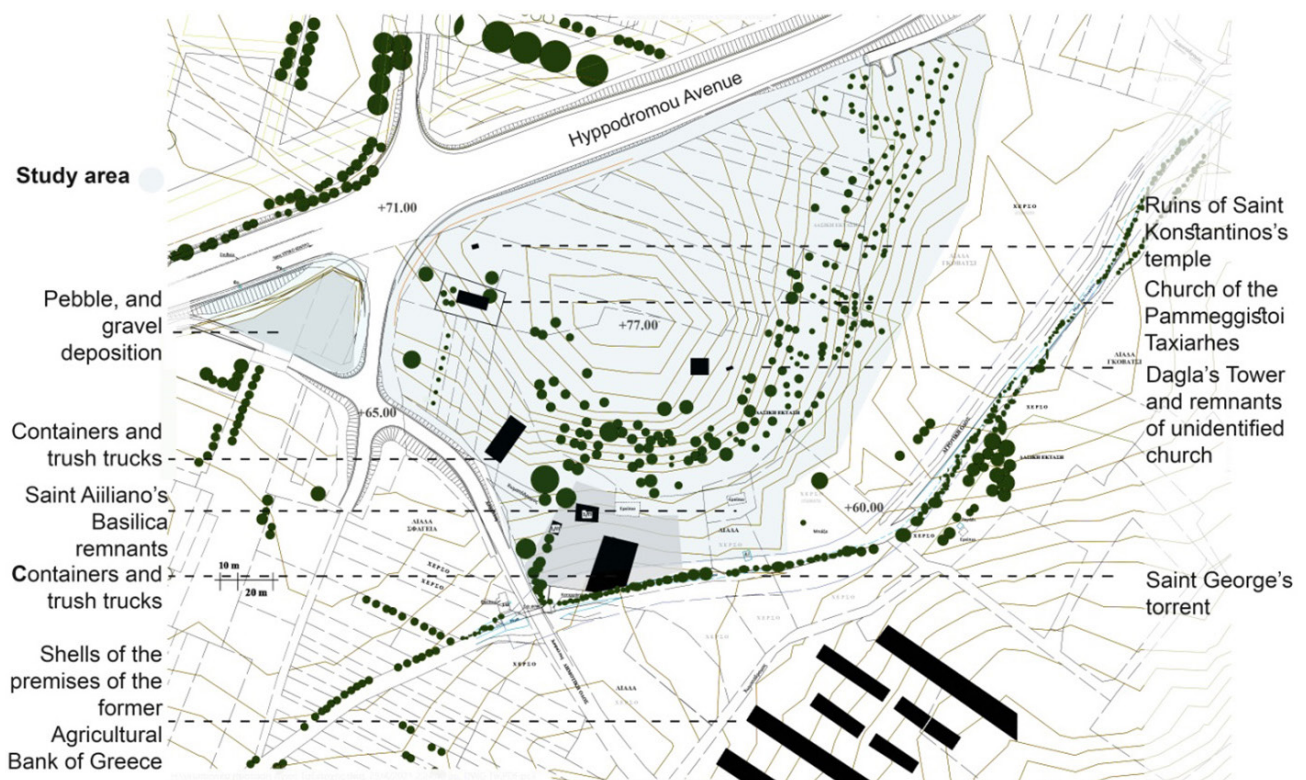


Figure 8 Surveying the existing situation of the study area
Source: Authors archive

<p style="text-align: center;">Strengths</p> <ul style="list-style-type: none"> • Site of great historical interest • Contiguity to the Hippodromou avenue, approximately 550 m southwards the settlement of Markopoulo • Quick and easy access • Proximity to Saint George's stream of environmental interest 	<p style="text-align: center;">Opportunities</p> <ul style="list-style-type: none"> • Emergence of the historical and environmental salience of the area • Stimulus for visitation due to cultural landscape elements • Potential development of the area
<p style="text-align: center;">Weaknesses</p> <ul style="list-style-type: none"> • Hill with a steep slope Constructions of impermissible uses which downgrade the historical character of the area • Soil erosion • Adjacency to industrial zone • Total absence of infrastructure for the identification of archaeological sites • Deficient vegetation 	<p style="text-align: center;">Threats</p> <ul style="list-style-type: none"> • Uncontrolled dumping due to lack of inspection by the state • Degradation and gradual desertification

Figure 9 SWOT analysis diagram
Source: Authors archive

3 Results

3.1 The Design Proposal

The SWOT analysis emphasized the importance of historical continuity and environmental restoration for sustainable development. It highlights the need to address hill degradation, restore soil, prevent desertification, enhance vegetation, and preserve the stream and area's

history. The study proposes creating the "Path Presenting the History of Markopoulo" (Fig. 10).

The landscape design (Fig. 11) envisions a circular path connecting monuments from various historical periods, following the hill's contours and marked by platforms and viewpoints. The entrance along Hippodromou Avenue serves as the main access, leading to the Saint Emilianus ruins, with vertical access paths guiding

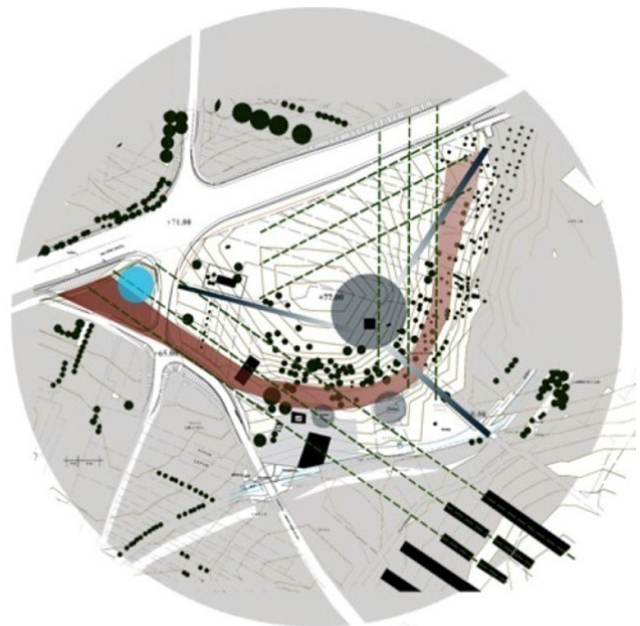
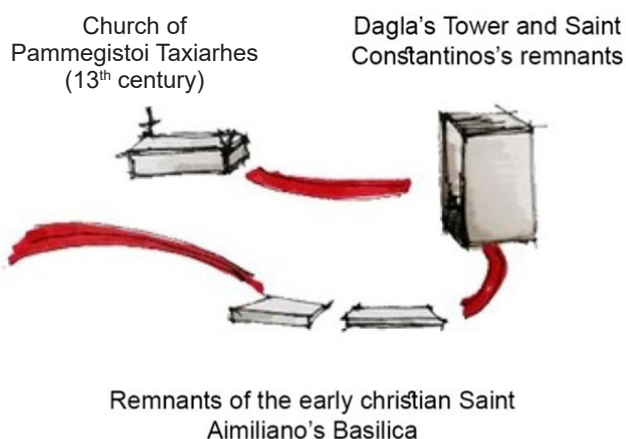


Figure 10 The "Path through the history of Markopoulo" and synthesis factors
Source: Authors proposal



Figure 11 Masterplan
Source: Design by the authors

visitors to the tower. Terraces are strategically placed at key sites, offering moments of reflection, while water is emphasized through an artificial pond and the restoration of Saint George stream. The design incorporates the architectural orientation of the Agricultural Bank of Greece, shaping the olive grove layout to highlight its historical significance and enhancing the natural landscape with indigenous vegetation (Papafotiou et al., 2017a; 2017b; 2020).

The landscape reclamation proposal centres on two core concepts: the design of infrastructure elements and the restoration of planting. The primary focus is

the creation of a path system that smoothly follows the hill's contours, with the main entrance to Dagla's Hill archaeological site accessed via Hippodromou Avenue. From here, a descending ramp leads from the +13.00 level, revealing the main entrance, marking the start of the historical route. To stabilize the slopes, a terraced limestone wall, constructed from material removed during the widening process, is used, along with slabs for paving. The path curves along the hill's southern contours, serving as the primary access at the +8.00 level, while a secondary eastern entrance elevates visitors from the +6.00 level via gentle steps. Three vertical paths provide access to the Tower and summit, with one linking



Figure 12 Ground plan and section A-A' of the wetland at the entrance of the area
Source: Design by the authors

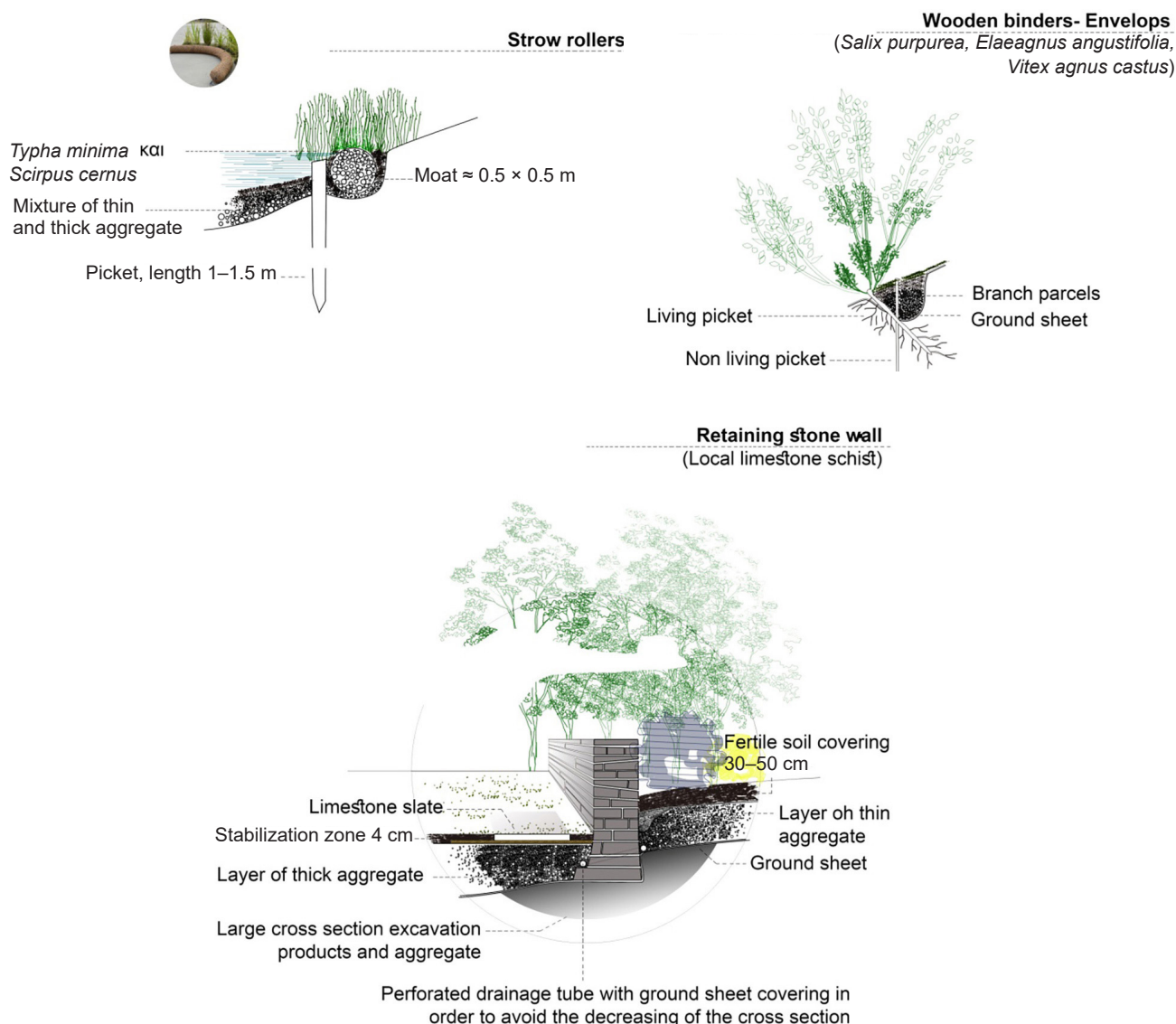


Figure 13 Construction details of the retaining limestone wall, the envelopes, and the strow rollers
 Source: Design by the authors

to Saint George’s stream, offering visitors the opportunity to explore the area. These vertical routes are designed with earth-filled structures, concrete steps, and ramps for accessibility. Platforms around the monuments, formed through selective excavation and filling, provide better sightseeing, with retaining walls where necessary and compacted earth surfaces for permeability.

The soil retention method involves applying soil coverage in areas with large gaps, up to 30 cm on slopes and 50 cm on flat sections, with exposed bedrock for contrast. *Oxalis pes-caprae* is seeded for ground cover and soil fertilization, followed by organic material. Organic coverings such as straw and cellulose are used to stabilize the soil and enrich it over time. Native shrubs and scrub species are planted according to the layout

(Fig. 11), while tree planting is planned for later, once soil fertility improves.

The new lake utilizes subsurface flow, fed by an upstream stormwater ditch and discharging into the St George stream (Fig. 12).

After removing surface deposits, the steep slope is graded with excavation byproducts and large aggregates, including fill, coarse aggregates, fine aggregates, and a fertile soil cover (30–50 cm). This process also creates a secondary pathway to the lake, with a cantilevered concrete platform at the entrance, evolving into a green roof as it extends toward the water body. For slope retention, methods include a stone wall, wooden binders, and straw rollers at the summer lake level (Fig.13). Vegetation management involves

sowing *Oxalis pes-caprae* and, after a year, replacing burned shrubs with species like *Pistacia lentiscus* and *Myrtus communis*, planting an olive grove, and covering the northern side with medium-height shrubs. The hilltop is covered with native species, and the retaining wall is framed with *Artemisia absinthium* and *Rosmarinus officinalis*, while *Cupressus sempervirens* and *Populus nigra* italic stand in the line to form the entrance to the site. Lakeside and stream vegetation includes *Elaeagnus angustifolia* and *Salix purpurea* (Papafotiou et al., 2020; Kanellou, 2019).

4 Discussion and Conclusions

Dagla's Hill, a site of historical and environmental significance, is threatened by soil degradation and desertification due to a lack of awareness. This paper proposes a restoration plan that includes pathways and plateaus, using restoration techniques to unify, protect, and enhance the site's aesthetic and functional value while integrating it with its surroundings for visitors.

The design advocates for a holistic approach to landscape reclamation, addressing the challenges of neglected historical sites. It highlights the need for interdisciplinary collaboration to tackle both short- and long-term issues, ensuring that landscape and nature guide decision-making for a balanced cultural, social, political, and environmental vision.

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