

The Abandoned Settlements of Cyprus Under Immediate Threat Due to Climate Change: A Case Study of the Foinikas Settlement in Paphos

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Abstract. The island of Cyprus is home to many settlements that have remained frozen in time, standing as silent witnesses to a turbulent past. Their abandonment resulted from various political, social, economic, and geomorphological factors. Yet, these traditional settlements now confront a new, pressing challenge: the climate crisis. Desertification, shifting rainfall patterns, and rising temperatures accelerate the deterioration of the built environment, erasing tangible traces of history. The gradual disappearance of these settlements underscores the urgent need for strategies to protect and manage cultural heritage in the face of new environmental challenges.

This study focuses on the abandoned settlement of Foinikas in the Paphos district, chosen as a case study due to the temporal and spatial dynamics of the interaction between water bodies and settlements. The abandoned village lies on the north-western shore of Asprokremmos, Cyprus's second-largest natural water reservoir. The dynamic impact of water has altered the settlement's footprint, submerging entire sections, while exposure to climatic conditions gradually erodes the traces of memory. The study demonstrates that unless solutions are found to mitigate climate-related threats, Foinikas is expected to become a mere memory. The research proposes the revitalization of the settlement through the creation of an experiential sugar production museum, leveraging the settlement's historical connection to water and its ties to sugar production. The design integrates local and cultural assets with innovative architectural solutions, proposing a dynamic model of sustainability and resilience in response to environmental challenges. This study advances an innovative strategy for preserving cultural heritage, ensuring historical continuity and resilience against climate threats and natural hazards.

Keywords: Abandoned settlements, Sustainable development, Cultural heritage

1 Introduction

1.1 Cyprus: A Field of Expansionist Policies, the Emergence of Turkish Cypriot Consciousness, and the Present-Day Reality

Cyprus is the third-largest island in the Eastern Mediterranean in terms of both population and land area. Positioned at the crossroads of three continents and rich in natural resources, it has historically been a target for numerous conquerors and a meeting point of civilizations. The island has one of the oldest histories of human civilization in the world, standing as a prime example of resilience and cultural continuity. Its strategic location shaped its trajectory, making it a key point of interest for the ancient Middle East and subject to successive conquests [1]. Following repeated raids, the Ottomans conquered Cyprus in 1571, marking the beginning of a new era of governance. Turkish soldiers settled on the island alongside artisans and farmers from Anatolia, with land being granted to settlers. The first population census in 1832 recorded 92 Muslim villages and 172 mixed communities, with religious autonomy acting as a barrier to social integration. Key historical events, such as the Greek War of Independence and the Greco-Turkish War, further strained relations.

In 1878, Cyprus was placed under British administration, though the Ottomans retained nominal sovereignty. Greek Cypriots sought union with Greece, while Turkish Cypriots began asserting their political autonomy. The Zurich-London Agreement led to the establishment of the Republic of Cyprus in 1960, yet tensions persisted. These culminated in the Turkish invasion of 1974, resulting in the occupation of 37% of the island. Despite international recognition of the Republic of Cyprus' sovereignty over the entire island, the northern part remains under the control of the so-called "Turkish Republic of Northern Cyprus." The consequences of the invasion and ongoing occupation have been devastating. Approximately 200,000 Greek Cypriots were displaced to the south, while 60,000 Turkish Cypriots relocated to the north, accompanied by 120,000 settlers from Turkey [2]. Today, Cyprus remains a divided homeland, with large portions of the countryside abandoned. However, the depopulation of many of these areas is not solely a consequence of historical events but also the result of modern challenges, including climate change. Desertification, rising temperatures, and the depletion of water resources further threaten the sustainability of these regions. Thus, preserving cultural heritage is not only about historical legacy but also about ensuring the survival of traditional settlements in the face of the climate crisis.

1.2 Paphos: The First Kingdom, the Formation of the Turkish Cypriot Community, and a Harbor for Displaced Populations

The city of Paphos is in the southwestern part of Cyprus and is one of the island's smallest provinces in terms of area and population. During the Hellenistic period, Paphos was the first capital of Cyprus, with its impressive mosaic floors attesting to its cultural and economic prosperity [3]. However, the city suffered significant destruction due to conquests and powerful earthquakes. Over time, the city's organization evolved around two main cores: the traditional center and the coastal zone. During Ottoman rule, the Turkish Pasha settled in central Paphos, solidifying the presence of a Turkish

community. Before the Turkish invasion, most Turkish Cypriot villages on the island were in the Paphos region, primarily in mountainous and semi-mountainous areas. After Cyprus gained independence in 1960, intercommunal tensions led to the spatial isolation of the Turkish Cypriot community. Moutallos, the Turkish Cypriot quarter of the city, became physically separated from central Paphos, reflecting the broader political instability of the island. Following the 1974 invasion, a significant number of Greek Cypriot refugees resettled in Paphos, often occupying ex-Turkish Cypriot properties.

In 1973, the population of Paphos was approximately 57,000, accounting for 9% of Cyprus' total population, which exceeded 600,000 at the time. Greek Cypriot residents of the province numbered around 42,000, while Turkish Cypriots constituted 15,000, representing 26% of the local population, a proportion higher than the overall 18% of Turkish Cypriots in Cyprus [4]. The substantial presence of Muslim communities in Paphos was influenced by the region's geomorphological characteristics and the availability of large undeveloped areas. Turkish Cypriots frequently settled in river valleys, such as those of Ezousa and Diarizos, forming spatial enclaves based on social and religious factors. The following map illustrating all Turkish Cypriot settlements in the Paphos district before the 1974 invasion, alongside the region's water networks, including rivers, lakes, and reservoirs, demonstrates the community's clear tendency to settle near these water sources. This preference was driven both by vital daily needs and security considerations, while water also played a significant role in their religious rituals.

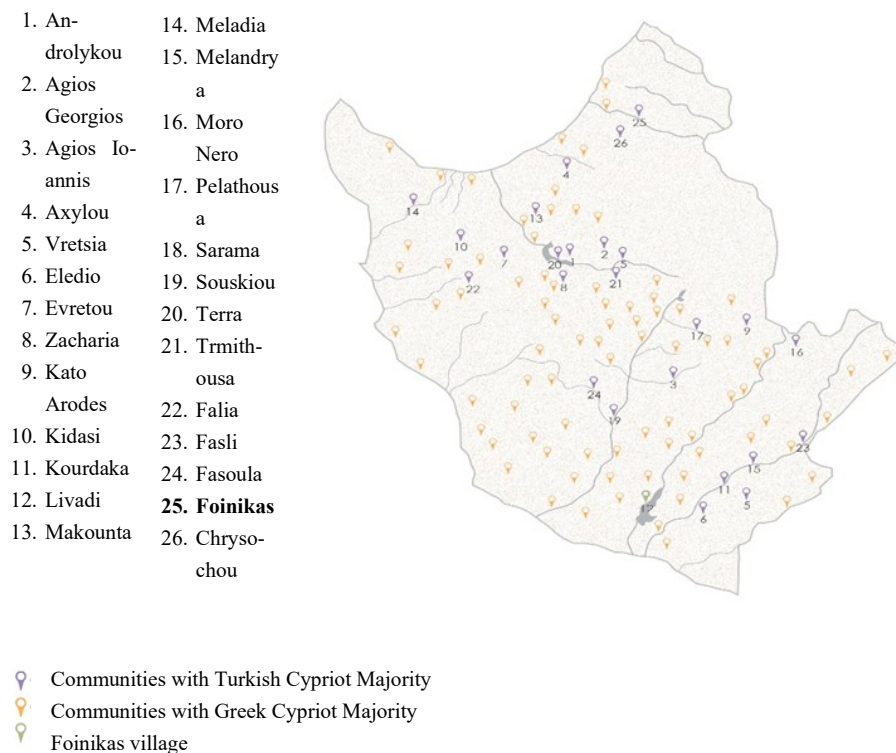


Fig. 1. The concentration of the Turkish Cypriot communities near the water resources

2 Abandoned Settlements

2.1 Factors leading to the Abandonment of Traditional Settlements

The Turkish Cypriot issue has been the central national concern on the island for centuries, with consequences that extend from individual human relationships to broader public life. The division of Cyprus led to a forced population exchange, resulting in the abandonment of many areas and settlements. However, rural depopulation in Cyprus is a long-standing phenomenon driven by multiple factors beyond political events. Historically, Cypriot villages have been affected by multiple crises, including colonial policies, pandemics, and heavy taxation during the Ottoman period. Additionally, natural disasters such as earthquakes and flooding have played a significant role in accelerating this process [5]. Considering the increasing risks posed by climate change, it is crucial to focus primarily on the environmental drivers of abandonment, as understanding these factors is key to developing strategies that can help protect vulnerable communities from future threats. The combination of these factors left rural settlements vulnerable, leading to their gradual neglect and the eventual collapse of historically significant structures. On the other hand, the abandonment of a settlement allows for the untouched preservation of its original forms and the passage of time, offering authentic witnesses of a prior social fabric and a foundation for creative re-evaluation.

2.2 The Importance of Preserving and Showcasing Historic Settlements

Abandoned settlements constitute a vital part of cultural heritage, as they embody the collective memory and identity of the island. They serve as living records of Cyprus' long history and as irreplaceable witnesses of the past. Each abandoned settlement requires a different approach for its evaluation, which involves understanding the factors that led to its desertion and determining appropriate ways to manage it effectively. The protection of these settlements necessitates a multifaceted strategy based on three key pillars:

- Raising awareness among stakeholders and local communities
- Mobilizing state resources and strategic policies
- Planning and implementing sustainable architectural interventions

The reuse and rehabilitation of abandoned settlements have already been explored in modern proposals, including the development of agrotourism, the establishment of museums, and the promotion of research and education. The case of Fikardou illustrates successful architectural restoration supported by state policy yet highlights the limits of such efforts in achieving social revitalization. In Parsata, the approach focuses on preservation for educational and museological purposes, without aiming for repopulation. Pano Pyrgos, despite its unique character and touristic potential, lacks a strategic development plan. However, many of these initiatives have not yielded the desired results due to legal, economic, and political obstacles, lack of coordination, and insufficient public participation. Moreover, the absence of a clear strategic vision has hindered efforts for sustainable conservation. Managing these areas is not merely a cultural

obligation; it is also an opportunity to foster a sustainable and multicultural society in which history and heritage serve as tools for strengthening collective identity.

2.3 The Impact of the Climate Crisis on Cultural Heritage

While the abandonment of traditional settlements has primarily resulted from socio-economic and historical developments, their preservation today depends on their ability to adapt to environmental challenges. Climate change threatens not only the structural integrity of these sites but also their potential for sustainable reuse [6]. Research suggests that effective management of abandoned settlements must incorporate environmental considerations, recognizing that the climate crisis is not merely a future threat but an ongoing reality.

The climate crisis exacerbates the neglect and destruction of abandoned settlements, creating conditions in which both the natural and human-made elements of Cyprus' historical identity are at risk of disappearing [7]. The effects of climate change are becoming increasingly evident on the island, with the growing frequency and intensity of extreme weather events, such as prolonged droughts and devastating floods, posing a direct threat to the already vulnerable structures of traditional settlements. These phenomena not only cause gradual deterioration of the built environment but also lead to significant geomorphological changes, further undermining the stability of these settlements. In many cases, the lack of immediate interventions results in irreversible damage, accelerating the complete collapse of historical sites. Given the projections for further intensification of these climate-related phenomena in the coming decades, strategic intervention is now an urgent necessity. Water resource management is of particular importance, as water has historically been a crucial factor in the development and sustainability of traditional settlements. Addressing this challenge requires the implementation of innovative and sustainable solutions to ensure the protection of these sites, not merely as relics of the past, but as functional components of a contemporary, resilient environment. Managing cultural heritage in the era of climate crisis is not just an academic concern; it is an imperative call to action. The formulation of strategic conservation policies must focus not only on the preservation of historical monuments but also on ensuring the continuity of Cyprus' rural heritage in the face of emerging environmental challenges.

3 Water Resources

3.1 Water Resource Management in Cyprus: From Prolonged Droughts to Extreme Floodings

Throughout its history, Cyprus has struggled with water management, as its inhabitants continuously sought to secure this vital resource. For a long time, groundwater extraction was the primary solution, as it was cost-effective, provided high-quality water, and required no government intervention. However, excessive use of underground reserves led to over-extraction of aquifers, gradually depleting water resources. In 1963, the President, Archbishop Makarios, announced a national development plan, explicitly

stating that the lack of sufficient water was the most urgent problem the state needed to address. As part of this strategy, systematic studies and the construction of both storage and enrichment water projects commenced [8].

The significance of this issue is reflected in the extensive development of reservoirs across Cyprus. The island has one of the highest densities of dams and artificial lakes in Europe, serving as the primary sources of water supply and irrigation. Today, 108 dams and artificial lakes operate in the free areas of the Republic of Cyprus, providing water for both agricultural and urban use [9]. The progress in water resource management has been remarkable when compared to other countries of similar size and development level. Despite the significant infrastructure improvements and advancements in water resource management, Cyprus continues to face serious challenges. Decreased rainfall over the past decades has worsened the situation, culminating in 2008, when the island experienced one of the most severe droughts in its history. The Cypriot government was forced to import water from Greece, spending €40 million on transportation.

Just a decade later, Cyprus faced the opposite problem: excessive water inflow. Rainfall between October 2018 and January 2019 was recorded as the highest in 120 years, rapidly increasing water reserves in the dams. However, this extreme condition also highlighted the lack of effective processes to mitigate the social, economic, and environmental consequences of heavy rainfall, particularly in urban centers. These deficiencies serve as a reminder that the dire predictions regarding climate change could prove catastrophic. Flooding is not an unfamiliar phenomenon in Cyprus. Historical records document the flood of 1330 as one of the most devastating in the island's history. More than 100 major floods have been recorded over the centuries, resulting in nearly 200 casualties. Their impact includes property destruction, loss of agricultural crops, power outages, and disruptions in road networks. In recent years, flood events have been on the rise, as climate change continues to challenge Europe, threatening human lives and having severe consequences on the environment, infrastructure, and private property.

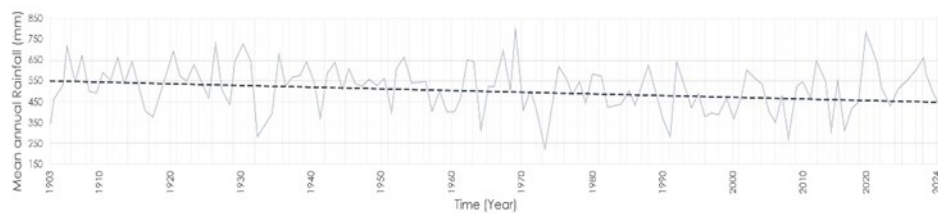


Fig. 2. Average annual rainfall in Cyprus

3.2 European Strategy and Local Challenges: Looking to the Future

Recognizing the need for a unified approach to flood risk management, the European Union introduced a directive in 2007 requiring member states to assess and manage flood risks under extreme weather conditions [10]. In response, the Cypriot government has developed flood hazard maps to identify high-risk areas prone to excessive rainfall. By utilizing the national Geographic Information System (GIS), which integrates spatial and hydrological data with environmental and topographic information, a study identified 25 settlements across the island that are located less than 100 meters from major watercourses. Among these is the abandoned settlement of Foinikas, situated next to the Xeropotamos River. These locations are classified as high-risk areas, given their historical significance and the potential destruction of valuable cultural heritage in the event of future floods.

— Settlements within 100 meters of watercourses:

Skoulli, Kannaviou, Agios Neophytos, Diplarkatzia, Agia Marinouda, Acheleia, **Foinikas**, Lakkos tou Fragkou, Kato Archimandrita, Chasampoulia, Kissousa, Kato Platres, Agia Mavri, Limnitis, Karavostasi, Peristeronari, Galata, Syrianochori, Peristerona, Akrounda, Paliometochi, Deftera, Pallouriotissa, Kalavasos, Tochni.

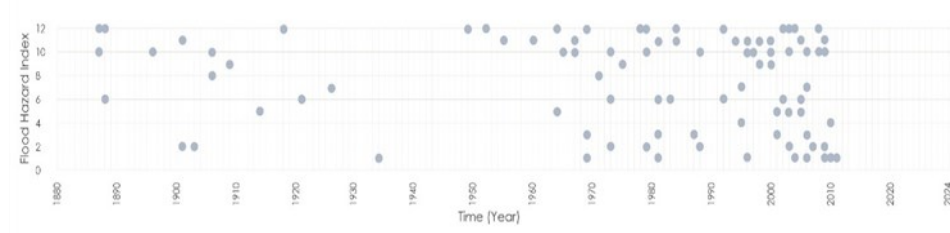


Fig. 3. Recorded floods and their magnitude of risk in Cyprus

3.3 Innovative Approaches to Water Resource Management

With predictions indicating that rainfall in the coming decades will continue to sustain both natural and artificial reservoirs, including dams, mines, and quarries, new ideas are required for the creative utilization of water resources. Climate change demands the development of new strategies for sustainable water management. Beyond the traditional construction of dams, innovative solutions are needed to optimize water distribution and usage, ensuring both the protection of settlements and the sufficiency of water supplies during periods of drought. The management of water resources must evolve to address the dual challenges of drought and flooding. This requires adaptive, sustainable solutions that not only preserve Cyprus' hydrological balance but also safeguard its cultural heritage from the increasing risks posed by climate change.

4 Case Study

4.1 The Settlement of Foinikas: Unique Geomorphology and Its Relationship with Water

The rare phenomenon of excessive rainfall in 2019 left a significant mark on Cyprus' geomorphology, affecting the spatial distribution of water reserves, landscapes, and ecosystems across the island. Considering potential future extreme climatic events, this study seeks to examine their temporal and spatial impact by exploring the dynamic relationship between water bodies and settlements, emphasizing the need for strategic management. The village of Foinikas, located in the Paphos district, was deemed the most suitable site for addressing this issue, given its distinctive landscape and the remnants of its rich history embedded within its abandoned structures. The current state of the settlement, alongside the spatial characteristics of the Asprokremmos Dam, its potential integration into urban networks, and the presence of existing infrastructure and building stock, provide the foundation for reinterpreting its future [11]. At the same time, a multi-scale analysis of the settlement highlights its historical connection with water, dating back to medieval times, when local inhabitants relied on primary resource extraction for their livelihoods.

The village's natural setting has played a defining role in shaping its identity at various historical phases. Its rugged terrain is formed by a combination of steep mountain slopes that enclose both sides of the dam and a sudden flattening of the land where the historic core of the settlement is located. The abandoned village is situated along the northwestern bank of Asprokremmos, Cyprus' second-largest dam. This reservoir collects water from the Xeropotamos River, which originates in western Troodos, flows through the Paphos forest, and empties into the island's southern coast. Before the construction of the dam, the river passed through the village, serving as a vital source of water. Evidence such as the numerous water mills along its route provides insights into the traditional occupations of the local population. Additionally, historical records indicate that Foinikas, due to its highly fertile land, was part of a large sugarcane production network known as Royal Casalia. Today, access to the village is limited to a rough road that is frequently impassable due to seasonal flooding, as it crosses the riverbed, submerging vehicle passageways during heavy rainfall.

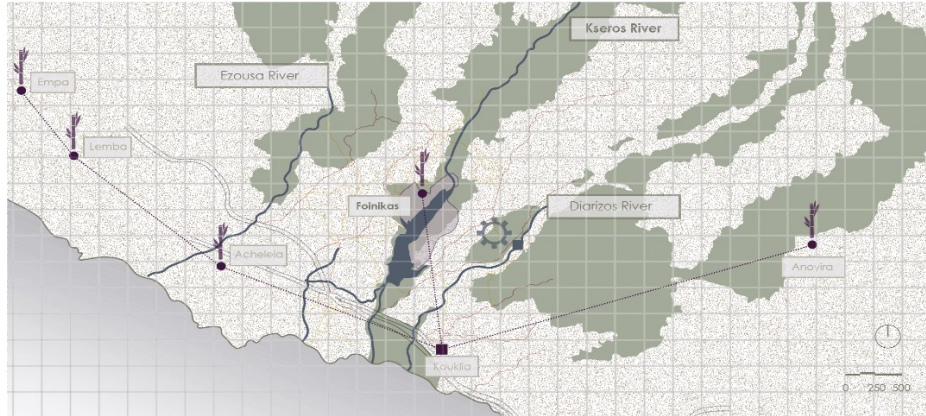


Fig. 4. The natural elements of the wider region and the networks of productive cooperation

Due to the settlement's historical significance, extensive studies have been conducted on the area's unique topography. Research data, combined with modern technological methods, have revealed valuable insights into the spatial arrangement of Foinikas. Axonometric models illustrate the village's position relative to the watercourses of Xeropotamos, Diarizos, and Ezousa, just a few meters from the sea, where the waters eventually merge. The region's geomorphological composition also explains why Asprokremmos Dam was strategically constructed at this location. The dam sits at the base of high hills within a network of interconnected water channels, functioning as a catchment basin for rainwater. Stratigraphic analysis confirms Foinikas' integration within the broader region, while aerial photometric scanning has uncovered significant aspects of the settlement that are invisible to the naked eye. One crucial finding regarding expected high rainfall is the identification of areas within the settlement that will be submerged in the event of a water level rise. By scanned imagery, researchers have documented submerged sections below the current waterline, revealing unknown features such as the historic route that connected to Ktima [12].

4.2 Reasons for Selecting the Abandoned Settlement of Foinikas

- The dynamic proximity to water offers an opportunity to examine a design-based approach for the settlement's future, considering present conditions while drawing from past practices
- Its proximity to the existing infrastructure, and the potential for connectivity with nearby urban and rural networks provide a strategic gain for future development
- The distinctive typological and morphological characteristics, which once formed a self-sustaining, enclosed community, highlight its architectural significance
- The settlement's historical reliance on water resources for production, agriculture, and essential activities underscores the functional and spatial interrelation between water and the built environment

- The recurring droughts that have affected the village in the past present an opportunity for a water-centric revitalization strategy that could transform this essential element into a tool for sustainable design
- The geomorphological features of the region, which were critical in selecting the site for Asprokremmos Dam, reinforce the need for strategic water management in response to the unpredictable risks posed by global climate change

4.3 Converging Factors: Urban Migration, the Turkish Invasion, and the Construction of Asprokremmos

Foinikas remained inhabited until Cyprus gained independence in 1960. However, this period was not only marked by political transformation but also by socio-economic shifts, particularly urban migration. Dozens of villages were abandoned as their inhabitants moved to urban centers in search of better living conditions. Foinikas were no exception to this trend, with its population gradually declining. Aerial photographs document the village's transformation over the decades, capturing its transition from an active community to a state of abandonment and, eventually, complete desolation. The vibrant atmosphere of the village in 1963 gave way to scenes of forced evacuation by 1993, while the most recent aerial images from 2013 depict its total neglect—structures collapsing and vegetation gradually reclaiming the built environment, blurring the boundaries between natural and artificial landscapes. This evolving condition raises pressing questions about the settlement's future and presents an opportunity for the introduction of a new design framework that could, to some extent, counteract its gradual deterioration and restore aspects of its once-thriving existence.

- 1960 – Urban Migration and Intercommunal Unrest

The establishment of the Republic of Cyprus was accompanied by a surge in urban migration, prompting many villagers to leave their homes in search of better opportunities. Simultaneously, rising intercommunal tensions forced large portions of the Turkish Cypriot population to abandon their residences and relocate to designated enclaves. Despite these challenges, Foinikas remained inhabited by approximately 200 Muslim residents [13].

- 1974 – The Turkish Invasion and the Forced Evacuation of Foinikas

The Turkish invasion of Cyprus and the subsequent illegal occupation for half a century brought about dramatic changes to the settlement. Following the invasion, Turkish Cypriot residents were forcibly displaced from Foinikas. For a brief period, Greek Cypriot refugees—who had been uprooted from the north—took temporary shelter in the abandoned homes of the village. However, their stay was short-lived as the settlement's conditions continued to deteriorate.

- 1982 – The Construction of Asprokremmos Dam and the Permanent Desertion of Foinikas

Water resource management has long been a critical issue for Cyprus. As part of an extensive irrigation infrastructure development plan, the construction of

Asprokremmos Dam was completed in 1982. The dam, designed as a retention basin for the Xeropotamos River, had immediate and irreversible effects on Foinikas:

- The remaining inhabitants were forcibly relocated by the government to refugee settlements
- Several buildings near the riverbanks were submerged, dramatically altering the village's spatial footprint

With a capacity exceeding 50 million cubic meters, Asprokremmos Dam has overflowed seven times since its construction, four of which occurred in the last decade alone. The increasing water levels in recent years confirm predictions regarding shifting precipitation patterns due to climate change. The presence of the dam has had a dynamic impact on the abandoned village, as the fluctuating water levels lead to the periodic submersion of certain structures. During certain times of the year, parts of Foinikas are submerged, emphasizing the settlement's intrinsic connection with water and underscoring the urgent need for strategic managing of its architectural remnants.

5 Research Methodology

This study employed a multifaceted methodological approach, integrating literature review, spatial analysis, geomorphological assessment, and architectural synthesis. The methodology was structured into four main stages:

- Historical and Theoretical Research
 - Collection of primary and secondary sources on the history of settlement abandonment in Cyprus
 - Analysis of social, political, and economic factors contributing to the abandonment of Foinikas
 - Investigation of climate crisis impacts on the preservation of cultural heritage
- Cartographic and Geomorphological Analysis
 - Examination of aerial photographs and cartographic data to track the evolution of the settlement over time
 - Analysis of Foinikas' location in relation to Asprokremmos Dam and water fluctuations
 - Use of Geographic Information Systems (GIS) to evaluate flood risks and erosion threats
- Architectural and Environmental Assessment
 - On-site documentation of the built environment and current condition of the settlement
 - Analysis of morphological characteristics and construction materials
 - Study of the settlement's relationship with the natural environment and potential for revival using sustainable methods

- Synthetic Revitalization Proposal
 - Development of a sustainable reuse scenario for the settlement through the creation of an experiential sugar production museum
 - Formulation of architectural strategies that address historical identity, environmental challenges, and cultural heritage preservation
 - Identification of sustainable solutions to enhance the settlement's resilience against climate change and ensure its long-term protection

This comprehensive approach allowed for a multilayered understanding of the challenges facing the abandoned settlement and led to a strategic proposal for its revitalization, integrating architectural, environmental, and cultural dimensions.

6 Proposal

6.1 Analysis of the Settlement's Form and Function

Any proposal aimed at ensuring sustainability in the face of climate challenges must be based on a careful analysis of the specific characteristics of each settlement. In the case of Foinikas, examining its fundamental features is crucial for determining its proposed future use. Within this framework, the research examined the relationship between the settlement's religious and social structures that shaped human organization, movement, and daily life from prehistoric times to modern cities. Belief systems inherently encompassed individual and social ethics, influencing the articulation of coexistence. This highlights the extension of religion into the structuring of interpersonal relationships and the spatial organization of settlements. Foinikas was predominantly inhabited by Turkish Cypriots, a fact that is reflected in its spatial layout, which follows the principles of Islamic tradition. Religious structures played a central role in the settlement's development, serving as key reference points. One of the primary criteria for establishing residence was proximity to water sources, while natural fortification was also a decisive factor in site selection [14]. The settlement was organized around the central core, with residential buildings developing peripherally in an organic, unplanned pattern of expansion.

- Main Circulation Axis:

Understanding the daily life of the settlement's inhabitants requires distinguishing between public spaces based on religious, social, and administrative needs. In this point, these three cores were concentrated along a primary circulation axis, which accommodated the limited vehicular traffic of the time. Pedestrians played a crucial role in shaping everyday life, as the central road served as a space for social interaction, the expression of emotions, and the reinforcement of human connections.

- Religious Center:

In Foinikas, the Ottoman Mosque was not situated at the settlement's core but occupied a distinct and prominent location. It had direct access to the road network and was closely connected to nearby water sources, which were essential for religious rituals.

Notably, the mosque's proximity to the school underscores the strong link between religion and education in Muslim communities.

— Social Center

Unlike many other settlements where social life revolved around public squares, in Turkish Cypriot communities, it mostly took place within private and semi-open spaces of residential properties. Courtyards functioned as key meeting points, while their access patterns reveal the inward-looking and security-conscious nature of the minority community. Property boundaries were often defined by enclosing walls that limited visual contact with the interior of homes, thereby reinforcing privacy. Architecturally, the houses followed the traditional *makrinari* typology, characterized by elongated layouts and a pronounced vertical orientation toward the river.

— Administrative Center

Foinikas' strategic location was a key factor in its establishment, dating back to the era of the Knights Templar, who leveraged the area's geomorphological advantages to construct an impregnable fortress. Even during its most recent period of habitation, the settlement retained this strategic character, with a cluster of buildings that housed administrative functions. These structures, notable for their unique architectural quality, were strategically placed in elevated positions, reinforcing territorial control over the surrounding landscape.

— Agricultural Activities

Agriculture played a central role in the settlement's economy. Crops such as wheat and vineyards were cultivated on open lands near water sources, while sugarcane farming was particularly significant, concentrated along the banks of the Xeropotamos River. Additionally, livestock was housed in solar-heated, semi-open shelters within the designated boundaries of each property.

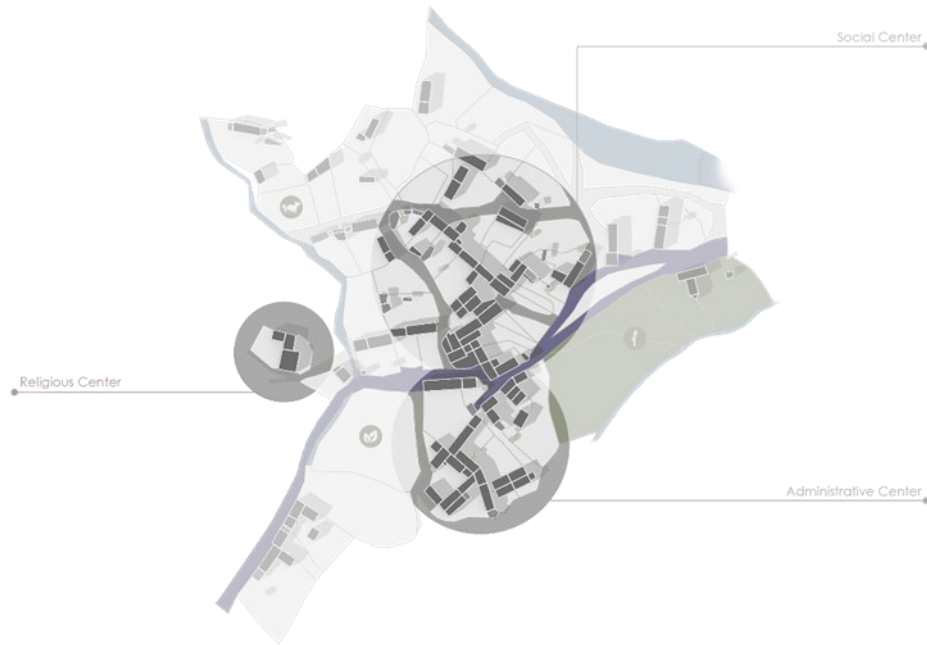


Fig. 5. The organization and operation of the settlement

6.2 Evaluation criteria for settlements for new design proposals

— Geomorphological and Spatial Aspects

The geomorphological advantages of each region can be harnessed in creative ways to meet contemporary needs. Foinikas' location in a rugged landscape, nestled between towering mountains and the valley of its historic core, offers a unique opportunity for solitude—an experience that is increasingly rare in modern urban life. At the same time, the settlement's privileged position should be capitalized upon, with a redefinition that integrates proposals for urban mobility while preserving its rural character on the outskirts of an expanding metropolitan area. Moreover, Foinikas' longstanding ability to function as a self-sufficient entity should be a guiding principle in any future interventions. Its historical relationship with water—an element that directly influenced its development and morphology—remains a crucial factor. The construction of the artificial reservoir fundamentally altered the landscape, reshaping the settlement's footprint and accessibility, ultimately leading to its complete abandonment. Forecasts for increased rainfall and the potential disappearance of the settlement underscore the ongoing dynamic relationship between water and Foinikas, not just in the past but also in its future [15]. Preserving and studying the area's unique geomorphology is essential, as it serves as both a living testament to the region's history, culture, and architectural legacy, and a key factor in ensuring sustainable development.

— Architectural and Morphological Aspects

Foinikas' architectural heritage is a rich and multifaceted phenomenon that reflects the settlement's history, cultural identity, and social structure. The settlement's formation was shaped by the needs and ambitions of successive ruling groups, who left their mark on its architecture, spatial layout, and functionality. The tripartite division of the settlement into distinct zones is a legacy from its earliest phases of habitation, persisting across various historical periods. The primary road linking these three zones functioned both as a dividing element between different land uses and as a unifying factor in the social life of its inhabitants. The enduring relevance of this organizational structure underscores its fundamental role in defining the settlement's function, structure, and identity. The built environment is characterized by the predominance of Makrinari-style dwellings, the low height of buildings, and the central role of courtyards in residential life. Locally sourced stone from nearby cliffs and wood for doors and ceilings contribute to the natural and harmonious aesthetic of the settlement. Today, Foinikas deserves careful study and preservation, as their distinctive architectural character is embodied in its structured landscape, where the ruins serve as a tangible record of its living history.

— Social and Humanitarian Aspects

The formation of settlements is primarily influenced by social dynamics that emerge from human coexistence. A key aspect of Foinikas' identity is its habitation by a Muslim minority, whose religious ideology significantly shaped the settlement's form. The vertical orientation of buildings toward adjacent water sources, the mosque's proximity to the river, and the concentrated housing patterns all reflect the integration of religious principles into the spatial organization of the community. Additionally, the experience of being an ethnic minority contributed to the settlement's self-sufficient structure, with inhabitants utilizing local natural resources and the geomorphology of the land to their advantage. Foinikas was shaped by historical hardships, and its evolution serves as a compelling narrative of resilience. This history also provides a valuable foundation for reconsidering its future. Foinikas stands as a living testimony to a rich but vanishing tradition, forged through the coexistence of two distinct cultures. It serves as evidence that harmonious cohabitation and mutual understanding among different peoples are possible. In an era that embraces cultural diversity as a means of ensuring peace, security, and progress—while recognizing cultural heritage as a shared legacy of humanity, preserving and revitalizing the settlement could play a pivotal role in promoting coexistence.

6.3 Methodological approach for proposing architectural interventions

This research introduced a globally relevant issue into public discourse, aiming to mobilize state mechanisms and stimulate social interest before significant parts of cultural heritage are irreversibly lost [16]. Additionally, it proposed a specific and innovative approach to addressing the challenge of excessive rainfall through the establishment of a micro-industry adjacent to a water body, such as the Asprokremmos Dam. By introducing a new program into the abandoned settlement of Foinikas, the proposal

envisioned a potential reversal of time, restoring an active role to the settlement. However, this process did not involve imitation or replication of past models. Instead, the goal was to seek the “new” from a reflective perspective, one that envisioned the future without neglecting the past. The proposal for the revival of Foinikas centered around the creation of a contemporary experiential sugar production museum, which would operate using traditional methods and equipment.

The selection of this thematic focus is based on four key pillars:

- Recognition of Foinikas’ historical significance during its peak as part of an extensive sugar production network
- Utilization of the region’s geomorphological advantages and fertile soil, which support sugarcane cultivation
- Preservation of the settlement’s living history, incorporating the museum experience into the existing ruins
- Ensuring resilience to climate challenges through a water resource management model for both drinking and irrigation needs

As a concept, the museum aims to challenge traditional forms by proposing a new approach to presenting and highlighting cultural heritage. The primary goal is to transform visitors from passive observers into active participants and co-creators of the museum experience. Similarly, the exhibits will evolve from static objects into dynamic storytelling elements. The museum space itself will no longer be confined to enclosed rooms and hallways but will be redefined as an open and adaptable creative laboratory, continuously evolving in response to visitors’ needs and perspectives. It will function as a meeting place and a platform for dialogue, where visitors can explore and contribute to interactive activities. The museum experience will become a creative and collective process, forming a living cultural and social centre that fosters both the revival of the past and the sustainability of the future. The design approach is rooted in highlighting the core elements of Foinikas’ identity and transforming them into structural principles for the new program.

The proposal draws inspiration from six key spatial characteristics:

- The transition from the hill to the leveled historic core inspires the creation of an entrance and an elevated second level
- The tripartite structure of the settlement informs the segmentation of the museum narrative into distinct thematic episodes
- The primary axis linking the three centers serves as a reference for the creation of a unifying social gathering space
- The simplicity of the traditional “makrinari” typology influences the architectural character of the new installations within the ruins
- The integration of transitional spaces and topography informs the creation of informal communal areas
- The dynamic role of water dictates the spatial organization of functions and protection against rising water levels

Defining these principles and guided by the study on utilizing the existing building stock, the scenario for the reactivation of the settlement was formulated.

- In the old administrative center, it is proposed to house the first section of the museum, which will include agricultural processes and will be combined with outdoor spaces that bridge the buildings (A, B, C, D, E). This area contains structures that require subtle additions for their functional adaptation to the new uses. The new condition aims to restore social interaction in the most public part of the settlement's earlier phase.
- In the old densely built Mahala (neighborhood), a tiered outdoor plaza is proposed as a memory landmark of the settlement's previous phase\). This area consists of ruined buildings that will be complemented with clearly defined references to the historical elements lost over time. The new condition seeks to simulate the mode of interaction of the formerly introverted society of Foinikas.
- In the loosely structured strip, it is proposed to accommodate the second section of the museum, which will include processing activities (F, G, H, I, K, L). This area contains buildings in free spatial arrangement, which will be structured through a ground-level path with complementary markings. The distances between them allow for expansion and independent operation of each unit. The new condition seeks to restore the vertical movement towards the water, which was an integral part of the daily mobility of Foinikas' inhabitants.
- Regarding the final phase of the predefined transformations, it is proposed that, at a later stage, the mosque and the old church be restored according to academic standards. This initiative, carried out within a collective effort, is expected to awaken the settlement's potential for dynamic reactivation.
- As for the new additions, they are concentrated on the second level, which will include an introduction to the narrative as well as all the supporting functions necessary for the smooth operation of the museum (1, 2, 3). The most prominent element is the placement of a canopy, conceived as a contemporary version of the once-dominant circulation axis. This addition seeks to achieve the harmonious coexistence of the settlement's various cores and facilitate functional movement between them.

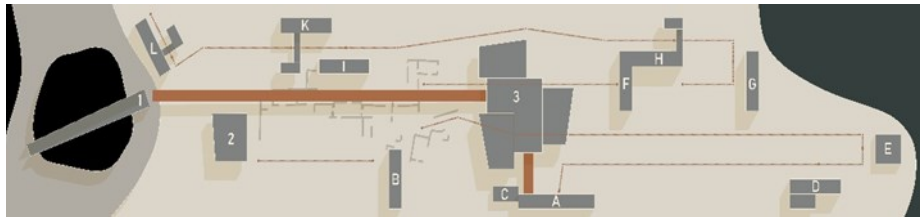


Fig. 6. The organization of the proposal building program

The design organization is completed with specific interventions that reinforce the character of the proposal. The museum facilities strive to harmonize with the environment and respond to the archetypal forms typically associated with similar structures. An effort is made to establish a dialogue with the existing context by maintaining proportional relationships in relation to the dimensions of the original buildings, while variations in height accommodate the requirements of the building program. The new additions remain to the simplicity of the rectangular prism and are positioned on the

second functional level to minimize their footprint on the ground. All structures are built with wooden frames, maintaining an organic dialogue with the landscape's color palette. Additionally, the lightness and adaptability of the structures are enhanced through the construction logic of timber joinery and perforated movable panels that blur the boundaries between enclosed and open spaces.

Regarding the memory plaza, strict guidelines are followed to highlight existing structures, mark those that once stood, and distinguish the additions. Masonry walls are completed at the points of the old buildings in the historical fabric with encased containers filled with stones. The different heights create spaces for pause and observation, while any alterations to the existing structures are marked by wooden walkways. The choice of compacted earth for the flooring preserves the natural character of the landscape, as in all corresponding interventions. For example, the ground-level path connecting the museum's narrative is made of perforated panels that allow for seamless integration with the environment.

The elevated pathway stands out through its materiality and the rhythm of its columns, while the interruption of verticality imparts a lighter character. The canopy maintains the clarity of its role as a unifying element. Simple proportional relationships and structural timber fulfill both the conceptual intent and the functional requirements of shading and accommodating the foyer. Openings in the roof allow natural light to enter and enable the vertical growth of vegetation, making it an integral part of the whole. The reception area introduces a contemporary touch to the complex without deviating from the overall character of the settlement.

Every architectural endeavor is a living organism that must integrate traditions, ensure historical continuity, and absorb contemporary challenges. Every proposal should interact with the community and culture, encapsulate experiential reality, and ultimately strive to transform the existing into something greater. Architecture should provide physical, emotional, and spiritual fulfillment—comprising elements that cannot be fully explained in words but must be experienced. Architecture goes beyond construction, economics, and industry, it is a poetic narrative. Beyond functional requirements, it concerns the framing, reflection, and enhancement of its elements, its users, and its surroundings. It is about the holistic satisfaction and sensory enjoyment of buildings and landscapes, not merely as “eye candy” but as lived experiences.

These reflections seek to find application in the narrative of Foinikas' future and that of any cultural heritage site. This approach aligns with international sustainable management strategies for abandoned settlements, such as those implemented in historic villages of Italy and Spain, where the reuse of existing structures was accompanied by new programs ensuring their long-term survival. The restoration of Foinikas aims not only at preserving cultural memory but also at establishing a sustainable operational model that could evolve into a timeless center for culture and environmental management.

7 Conclusions and Future Perspectives

7.1 Key Findings of the Study

This study highlighted the complex relationship between abandoned settlements, cultural heritage, and the climate crisis. Through the case study of Foinikas, it was demonstrated that the abandonment of a settlement does not necessarily mean the loss of its identity but rather underscores the need for its redefinition and adaptation to contemporary challenges. The analysis of Foinikas' confirmed that its preservation requires a multidimensional approach that combines architectural design, sustainable resource management, and cultural revitalization. Foinikas' proximity to the Asprokremmos Dam creates new challenges and opportunities for its management, as fluctuating water levels directly affect the structural stability and the potential reuse of existing buildings. Based on these findings, the proposed transformation of the settlement into an experiential sugar production museum demonstrated the potential to merge cultural heritage with new sustainable development strategies.

7.2 The Importance of Preserving Abandoned Settlements

The preservation of abandoned settlements is not only a cultural duty but also a strategic choice for sustainable development. Traditional settlements embody the collective memory and cultural identity of a region, serving as living testimonies to historical continuity. Their abandonment does not merely entail the loss of architectural and urban elements but also the dissolution of the social and cultural structures that once surrounded them. In the context of the climate crisis, the protection of these settlements becomes even more urgent. Extreme weather conditions, rising temperatures, and changes in water resource management exacerbate their structural deterioration and increase the risk of complete loss. However, the research demonstrated that abandonment should not be viewed as a passive process but as an opportunity for the redefinition of these spaces' uses. Through reuse strategies and adaptive interventions, abandoned settlements can be transformed into hubs of sustainable development, promoting cultural tourism, local economies, and environmental resilience.

The case of Foinikas illustrates that the preservation and revival of an abandoned settlement can serve as a model for other similar regions. The proposed approach does not solely aim at conserving the existing structures but also at creating a sustainable development model that meets the needs of the local community while addressing the challenges of climate change.

7.3 Future research guidelines for the effective implementation of strategies for climate crisis adaptation of abandoned settlements

This study opens new avenues for further research and implementation of the proposed reuse strategy. Key areas for future investigation include:

- Application of Innovative Technologies for Settlement Resilience: The utilization of modern recording and monitoring methods (such as digital scans and drones) can contribute to the management of abandoned settlements by providing

valuable data on the condition of buildings and their rate of deterioration. Additionally, the use of sustainable materials and restoration techniques could be explored for the conservation of architectural heritage.

- Development of a Participatory Design Model: The involvement of local communities, cultural heritage organizations, and research institutions in the planning process is crucial. Creating a framework that integrates the social dimension into the management of abandoned settlements can ensure the long-term sustainability of the proposed interventions.
- Testing Adaptive Strategies for Addressing the Climate Crisis in Real Conditions: The development of a pilot program for the reuse of abandoned settlements could provide valuable insights into the application of sustainable strategies on a larger scale. In this context, integrating bioclimatic design methods and sustainable management could play a critical role in the future management of similar settlement.
- Exploring Funding Mechanisms for the Implementation of the Proposal: The feasibility of the proposal largely depends on securing financial resources. Investigating funding opportunities through European cultural heritage, sustainable development, and environmental management programs could support the realization of such an initiative.

In summary, this study underscores the need for a new approach to the management of abandoned settlements, one that combines the protection of cultural heritage with contemporary challenges of sustainable development. Foinikas can serve as a model for the enhancement and reuse of similar sites, offering a dynamic and adaptive solution for the future of cultural heritage in the era of climate change.

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