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Sustainable Development and Indigenous Knowledge: The Role of Ancestral Communal Pools (*Birket*) in Southern Lebanon

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Abstract
This article explores the pivotal role of ancestral communal pools, known as *birket*, in fostering sustainable water management, social resilience and climate adaptation in southern Lebanon. Rooted in centuries-old indigenous knowledge, these open-air reservoirs have historically enabled rural communities to manage scarce water resources through collective action and seasonal rituals. Despite the pressures of modernization, conflict and environmental degradation, many *birket* still exist – serving not only as functional infrastructure but also as vital symbols of cultural identity and solidarity. Based on a detailed survey and fieldwork in the historical region of Jabal Amel, this study highlights the practical and symbolic significance of *birket*, especially in border zones marked by displacement and ecological fragility. Examining their socio-ecological value and restoration potential, the article makes a case for integrating traditional water systems into national strategies for sustainable development and climate resilience – particularly in contexts where centralized infrastructure remains insufficient or ecologically unsound.

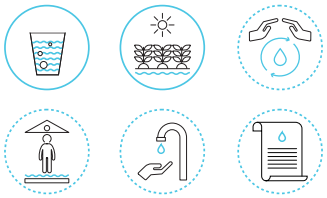
Policy Recommendations

- Recognize *birket* as heritage infrastructure in cultural/environmental registers and municipal plans.
- Fold *birket* into the next National Water Strategy update as decentralized, complementary storage.
- Embed *birket* in education: Add short case studies to national environmental toolkits (MEHE/UNESCO, 2025–2030).
- Create a hydro-cultural registry of water assets by 2026 to prevent ad-hoc conversion of key sites.

KEYWORDS

hydro-cultural heritage
legal pluralism
indigenous water knowledge
communal governance
nature-based solutions

WATER ICONS



< Fig. 1 Image from Le Pays d'Israel, a collection of 19th-century views of the Holy Land published in Paris (Source: Charles William Meredith van de Velde, 1857. Public domain, via Wikimedia Commons).

Introduction

Water, the most critical resource of the twenty-first century, has long shaped the social, political and ecological foundations of the Levant. Lebanon, a country often mythologized for its abundant springs and fertile valleys, paradoxically faces chronic challenges in managing its water resources sustainably (Catafago and Jaber 2001). These challenges are rooted in infrastructural and governance shortcomings as well as in the underappreciation of traditional and community-based water management systems that have proven resilient over centuries. In the southern rural regions of the country, particularly within the historical territory of Jabal Amel, water scarcity has long been a defining feature of life. Here, the scarcity of perennial watercourses has led to the development of intricate and adaptive water management systems, shaped by indigenous knowledge and deeply rooted in collective practice (Gharios 2022). Among the most prominent of these systems is the *birket* (fig. 2) – a communal rainwater harvesting pool that has served social, economic and ecological functions in the villages of southern Lebanon for generations.

Despite its functionality and symbolism, the *birket* has received scant attention in contemporary water policy and academic discourse. As Lebanon grapples with the compounded effects of climate change, political instability, infrastructural decay and regional displacement, the imperative to recognize, protect and include traditional water management systems in broader sustainability frameworks becomes urgent (Gharios 2022). Climate models for the eastern Mediterranean forecast a significant decrease in annual rainfall, a reduction in snow cover and more erratic seasonal precipitation – all of which threaten the reliability of conventional surface and groundwater systems (MoE 2016). In this context, ancestral systems such as the *birket* offer a buffer against environmental shocks and serve as living testimonies to the adaptive ingenuity of marginalized communities.

This article investigates the *birket* as both a physical infrastructure and a social institution. It argues that the *birket* functions as a vernacular hydro-technology that aligns with the principles of nature-based solutions, echoing recent international calls to embrace low-carbon, context-specific water infrastructure. The communal nature of these pools fosters collective responsibility, equitable water access and seasonal rituals of maintenance, repair and sharing – all of which contribute to a deeper sense of environmental stewardship and local empowerment. Unlike modern water infrastructure systems that often exclude users from governance and management, *birket* systems operate on shared norms and inherited rights, often articulated through customary law, oral tradition and village-level negotiation.

The study is situated within a broader scholarly effort to decolonize water knowledge by recognizing non-Western forms of expertise and practice (Gharios 2022). Much of Lebanon's legal and infrastructural water management architecture is modeled after French colonial precedents, themselves layered upon Ottoman and Islamic precedents. Yet underneath these formal systems lies an enduring matrix of customary practices that remain active in many rural settings. The *birket*, in this sense, offers an entry to understanding the palimpsestic nature of Lebanese water law and the cohabitation of codified and customary regimes of regulation. Through the lens of the *birket*, this article explores how indige-

^ Fig. 2 *Birket* of Taybeh, 1982 (Source: Photographer unknown; private collection of Abbas Kawsan, used with permission).

nous knowledge systems might contribute to climate adaptation, sustainable development and post-conflict rural recovery.

The argument advanced here is threefold. First, *birket* systems exemplify locally appropriate, environmentally sustainable and socially inclusive forms of water management that predate and, in some cases, outperform centralized modern systems. Second, the failure to incorporate *birket* in contemporary water strategies reflect broader patterns of epistemic marginalization that undervalue rural and indigenous knowledge systems. Third, the rehabilitation of these systems – when grounded in participatory frameworks and linked to development priorities – can serve as an effective tool for sustainable water governance, climate adaptation and rural revitalization.

By engaging with the *birket* as both a historical legacy and a practical resource, this article seeks to connect heritage with development, indigenous practice with modern planning and climate science with local action. The goal is to frame *birket* as living systems, not relics – recognizing them as a resilient hydro-cultural heritage that continues to shape landscapes, livelihoods and identities in southern Lebanon.

Historical Context

Water management in Lebanon reflects a complex and layered history shaped by successive civilizations, each contributing new legal, social and infrastructural systems to the governance of water. From Roman aqueducts to Islamic waqf institutions and Ottoman land law, Lebanon's hydraulic landscape is a palimpsest of traditions, shaped by centuries of adaptation to topographic, climatic and geopolitical realities (Gharios 2022). Within this intricate framework, the *birket* – a communal rainwater harvesting pool – emerged as one of the most enduring and contextually appropriate technologies, particularly in the rural highlands of southern Lebanon.

The roots of Lebanon's hydraulic culture lie in antiquity. Roman engineering, with its monumental aqueducts, canals and cisterns, introduced a culture of infrastructure building that persisted for centuries. The ruins of Roman waterworks across the Beqaa Valley and Mount Lebanon continue to testify to the importance of controlling water for both domestic and agricultural needs. During the Islamic Golden Age (8th to 13th centuries CE), new legal and social frameworks emerged around water governance, emphasizing equity, conservation and public accessibility. Under Islamic law (sharia), water was classified as a common good (*mubāḥ*) and thus not subject to private appropriation unless captured or diverted for beneficial use. This legal ethos was expressed through institutions such as the *sabil* (public fountains), *hima* (protected communal lands) and *waqf* (charitable endowments),

which collectively ensured that water remained a socially governed resource embedded in ethical and religious obligations (Caponera 1992; Mallat 2003).

The Ottoman Empire further codified water management through the 1858 Land Code and subsequent regulatory instruments that shaped property rights and water access. In Ottoman Lebanon, communal tenure systems such as *musha'* (shared agricultural land) were prevalent, and these often coexisted with customary rules around water use. These informal norms, referred to as *'urf*, governed everything from irrigation schedules to maintenance obligations. They were passed down orally and were often enforced by local elders or village notables rather than imperial officials. Following the collapse of the Ottoman Empire and the establishment of the French Mandate in 1920, a new layer of statutory water law was imposed. Drawing on French civil law traditions, the colonial administration introduced technical planning agencies and centralized oversight, which gradually eroded the authority of customary arrangements. However, these formal structures rarely reached the rural peripheries, where ancestral practices persisted out of necessity (Gharios 2022).

What emerges from this history is a form of legal pluralism, in which statutory, religious and customary laws have overlapped and competed over time. In the absence of strong state infrastructure – especially in Southern Lebanon, historically marginalized by geography and politics – communities continued to rely on inherited social systems to manage their limited water resources. Within this context, the *birket* evolved as both a hydrological solution and a governance institution. Unlike private cisterns or state-engineered dams, *birket* were typically communally constructed, maintained and managed. They served multiple purposes: irrigation of crops, watering of livestock, provision of domestic water, and more recently, recreational and construction-related uses.

The social life of the *birket* was as important as its utilitarian function. Positioned at the edge of villages, often in natural depressions or at springs, *birket* were gathering spaces that hosted seasonal rituals, labor-sharing events, and dispute resolution processes (fig. 1). Their upkeep – typically carried out in the dry autumn months – was a community affair involving men and women of all ages. Silt was manually removed, walls were reinforced with local stone or clay, and irrigation gates were calibrated according to crop schedules and rainfall expectations. This collective labor reinforced social cohesion and affirmed local ecological knowledge, especially in regions where state presence was minimal or absent.

In the Jabal Amel region, which comprises much of southern Lebanon, these pools became integral to village identity. Families took pride in the size, clarity and volume of their *birket*, and oral histories often referenced the circumstances of their construction or expansion. As rainfall patterns fluctuated and spring flows diminished – especially during the long, dry summers – these reservoirs became critical buffers, allowing villages to irrigate tobacco fields, water herds and maintain subsistence agriculture. Their existence was not static: Many were expanded or replicated as village populations grew. In some cases, smaller satellite *birket* were added in outlying farmlands to serve seasonal workers or herders.

With the turn of the twenty-first century, the relevance of *birket* systems began to wane under the pressure of urbanization, war-related destruction and the expansion of centralized

water infrastructure. Many pools were filled in, repurposed or abandoned. Yet others persisted, sustained by the same communal norms and adaptive practices that had supported them for centuries. In villages like Marwaheen, the *birket* was reclaimed and restored through a combination of municipal initiative and donor support, offering a contemporary illustration of how ancestral practices can be integrated into modern water and development planning.

What makes the *birket* particularly relevant today is not just its historical legacy, but its alignment with current global priorities around sustainability, decentralization and resilience. The United Nations' emphasis on nature-based solutions, participatory water governance and climate adaptation provides a policy framework within which *birket* systems can be valorized and scaled. They exemplify low-tech, high-impact infrastructure that can be maintained locally with minimal external inputs. Moreover, they offer a living example of how heritage and innovation can coexist: By recognizing and investing in such systems, policymakers can foster environmental sustainability as well as cultural continuity and rural agency.

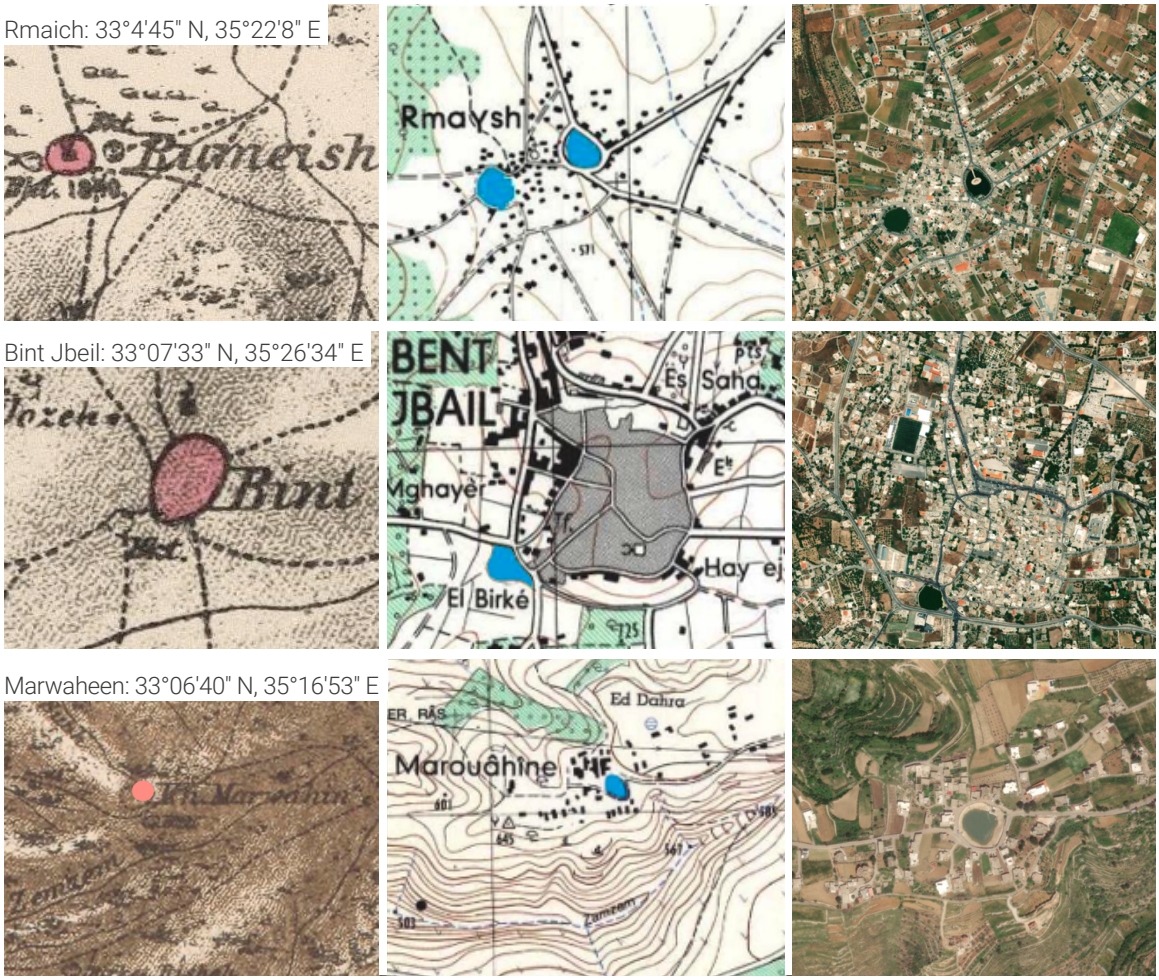
In summary, Lebanon's water history reveals the persistence and adaptability of indigenous systems amid shifting legal and political orders. The *birket* represents a particularly illustrative example of this resilience. As a technology, it reflects the ecological intelligence of communities who learned to store rainwater in arid and semi-arid contexts. As a social institution, it embodies a culture of cooperation, stewardship and collective memory. With a proper understanding of this historical context, it is possible to safeguard the *birket* as heritage and use it to reimagine a sustainable water future.

Methodology and Case Studies

This study adopts a multidisciplinary and multi-scalar methodology combining spatial analysis, historical documentation, oral history and ethnographic fieldwork. The aim is to understand the physical distribution and status of ancestral *birket* (communal water pools) in southern Lebanon, as well as their functional, social and symbolic roles over time. As a research object, the *birket* is both material and cultural: It is part of the physical landscape while simultaneously anchored in social practices, local governance traditions and collective memory. Empirically, the article draws on multi-scalar research conducted across 86 villages in southern Lebanon, where over 100 historical *birket* sites were surveyed using a combination of remote sensing, historical cartography, oral history and field observation. The case of Marwaheen, a village once deeply impacted by Israeli occupation and later revitalized through the restoration of its abandoned *birket*, serves as a key case study. The Marwaheen project restored a water infrastructure asset and catalyzed local agricultural innovation, renewing interest in indigenous forms of environmental management.

1. Research Design

The research began with an extensive literature review covering the evolution of water law and governance in Lebanon and the wider Levant. Key sources included legal codes from the Ottoman and French periods, academic theses, NGO reports and previous hydrological assessments. This provided the foundation for understanding the legal pluralism and socio-political context within which *birket* practices emerged and operated.



^ Fig. 3 Three case studies of Rmaich, Bint Jbeil and Marwaheen (Source: left, Conder and Kitchener, 1881; middle, Lebanese Army maps, 1962; right, Esri, NASA, NGA, USGS © OpenStreetMap, Microsoft, Esri, TomTom, Garmin, METI/NASA, USGS | Vantor).

To document the spatial distribution of *birket*, a comparative analysis was conducted using a combination of historical and contemporary cartographic sources. These included:

- The 1881 *Survey of Western Palestine maps*, produced by the Palestine Exploration Fund;
- The 1962 topographic series of the Lebanese Army (1:20,000 scale);
- Recent satellite imagery (2018–2023).

These sources were georeferenced using geographic information systems software, allowing for a spatial overlay of historical *birket* sites with current land-use patterns. This visual data was supplemented by ground-truthing (direct verification of remote data through field observation) during field visits across 86 towns and villages in southern Lebanon, covering the nine *caza* (districts) located within the South and Nabatiyeh governorates.

2. Fieldwork and Oral Histories

Field visits were conducted during the summers of 2018 and 2019, with follow-up site checks in 2022. In each village, local municipal authorities, elders and farmers were interviewed to validate the existence and use of traditional *birket*, identify names, assess current conditions and understand community perceptions. These interviews followed a semi-structured format, guided by questions around historical use, seasonal maintenance practices, water allocation systems, communal rituals and perceptions of decline or restoration.

Oral history was prioritized, particularly given the erosion or absence of formal records in many rural settings. In several cases, villagers could recall the year or circumstances under which a *birket* was constructed, expanded, damaged during war or converted into another use (e.g., parking lot, public park). This qualitative data not only enriched the mapping effort but also provided insight into the symbolic meanings and evolving social functions of the *birket* over time.

A total of 101 *birket* were identified, distributed across 86 villages. Each pool was classified according to its current status: functioning, abandoned, destroyed, repurposed or restored. Their physical characteristics – size, construction material, water volume and elevation – were documented where accessible. These were cross-referenced with historical maps to assess continuity and change.

Conclusion

Ancestral communal pools (*birket*) in southern Lebanon are not vestiges of a bygone water economy; they are living, small-footprint infrastructures embedded in social norms, seasonal rituals and place-based knowledge. Our survey across 86 villages shows that where communities still steward them, *birket* persist, and modest, well-targeted works deliver quick, low-cost gains in water security and local livelihoods. Read through the lens of legal pluralism, they also illuminate how customary practices have long complemented – and at times outperformed – centralized systems in marginal and borderland settings. The path forward is pragmatic rather than nostalgic: Prioritize light-touch rehabilitation in high-potential villages through municipal–NGO collaboration; fold *birket* into the next National Water Sector Strategy as decentralized, complementary storage; and formalize village maintenance committees that keep decision-making close to users, paired with practical financing mechanisms. Education matters too: Showcasing *birket* in school toolkits can sustain practice transfer and climate literacy, while recognizing key sites within a national hydro-cultural registry may help to prevent ad-hoc conversion. Taken together, these steps align heritage with adaptation – advancing SDG 6 (decentralized storage and equitable access), SDG 13 (low-carbon resilience to rainfall variability) and SDG 15 (support to cultural landscapes and micro-habitats) – and, crucially, strengthen rural agency.

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Georges Gharios recently served as the National Programme Officer for Natural Sciences at UNESCO Beirut. He earned a PhD in water law from the University of Dundee, Scotland. As an agricultural engineer with substantial farming experience, his expertise spans water governance, traditional knowledge, the blue economy, biodiversity and the history and archaeology of water. He has a keen interest in the customs and practices of water conservation in Lebanon and water diplomacy across the Levant. Georges has served as a consultant for numerous international organizations and authored journal articles and presented at various conferences on the topic of water governance. He taught for five years at the American University of Technology in Halat, where his courses covered water law, water policy, water politics and soil sciences.

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