

# 'INJAŞA CISTERNAS AS VESSELS OF KNOWLEDGE: HOW PALESTINIAN TRADITIONAL BUILDING ENDURES

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While conducting fieldwork in the winter of 2021, we visited a cistern hewer in the village of Silwad, Palestine. ‘abū Al-‘abd served us tea boiled over an open fire as he explained the different types of soil in the area: “There are several types of soil,” he said: “*huwar*, *kurkar*, *bnood*, *qasi*, and *trab*. It is not possible to craft a *‘injaša* cistern in *trab*.” He then described the distribution of each soil type, from the area surrounding us to the neighboring villages and towns.

‘abū Al-‘abd is a butcher, a drystone wall builder, a land tiller, and a cistern hewer. His extensive knowledge of the geological strata is not limited to his hewing experience but is also informed by the generations of people who have worked the land through hewing, building, and cultivation. This type of Indigenous knowledge allows hewers such as ‘abū Al-‘abd to determine where they can or cannot hew a cistern. In this chapter, we explore the factors that have contributed to the survival of the *‘injaša* cistern as a living, evolving tradition.

Underground pear-shaped and stone-hewn water cisterns, known as *‘injaša*, represent a unique and Indigenous technology of Bilād Al-Sham (The Levant). In the occupied West Bank, skilled “cistern knowers,” such as ‘abū Al-‘abd, keep knowledge of crafting *‘injaša* alive, ensuring the continued commoning and accessibility to these autonomous water sources on which many rural and pastoral communities depend. Amid intensive forms of settler colonial violence and control, the agency of those who preserve and guard this vital cultural practice matters. Extending expertise beyond the realm of professional practice, this chapter centers cistern knowers—hewers, users, and owners—as holders of primary sources of knowledge. We argue that the survival of the *‘injaša* cistern as a living tradition is not merely circumstantial but also a result of the efforts of those who actively protect, practice, and develop the knowledge essential for its preservation and continuity. By centering cistern knowers, a deeper understanding of the processes involved in Indigenous knowledge transfer and protection becomes possible. This approach also reveals the multiple levels at which such knowledge exists—collectively, locally, and tacitly—contributing to the building tradition’s survival despite ongoing settler colonial violence.

Settler colonialism has fundamentally challenged Indigenous traditions and practices, systematically undermining them in its attempt to erase the cultural and social fabrics of native populations.<sup>1</sup> In Palestine, construction and building traditions are no exception. The severing of the native inhabitant’s connection to the land following the Nakba of 1948 through dispossession, displacement, the disruption of life and livelihoods, and the

1 Omar Salamanca et al., “Past Is Present: Settler Colonialism in Palestine,” *Settler Colonial Studies* 2, no. 1 (2012) 1–8, <https://doi.org/10.1080/2201473X.2012.10648823>; Patrick Wolfe, “Settler Colonialism and the Elimination of the Native,” *Journal of Genocide Research* 8, no. 4 (2006), 387–409, <https://doi.org/10.1080/14623520601056240>; Lorenzo Veracini, “Introducing: Settler Colonial Studies,” *Settler Colonial Studies* 1, no. 1 (2011), 1–12, <https://doi.org/10.1080/2201473X.2011.10648799>; Kyle Whyte, “Indigenous Experience, Environmental Justice and Settler Colonialism,” *SSRN Electronic Journal* (January 2016), <http://dx.doi.org/10.2139/ssrn.2770058>.



1 *'injaşa* cistern opening. Kufur Mālik, October 2021

breaking of social structures have all had a detrimental toll on Indigenous knowledge and practices. In the occupied West Bank and Gaza, systematic processes of home demolition, building prohibition, and indiscriminate assault on vital buildings and infrastructure have led to an irreplaceable loss of building heritage and knowledge. This chapter aims at furthering our architectural understanding and engagement with what remains of these building traditions and the conditions that have allowed some to survive despite and in the face of settler colonial violence.

In Palestine, reliance on autonomous sources of water such as springs and cisterns closely relates to a systematic process of “manufactured scarcity,” wherein the Israeli state uses climatic conditions to justify a system of water apartheid.<sup>2</sup> As a result, Palestinians remain heavily dependent on sources of water that circumvent Israeli restrictions and compensate for the lack of a larger-scale infrastructure for delivering water. Palestinians experience water scarcity in multiple ways in the West Bank, with rural areas most affected and most frequently lacking access to water.<sup>3</sup> These areas are predominantly home to pastoral communities that rely on cisterns to meet both domestic and livestock needs. In other regions of Palestine, cisterns serve as vital structures for socioeconomic stability, providing additional water sources for small-scale irrigation. They also hold cultural and spiritual significance. Cisterns are often seen as sites of spiritual enchantment and protection, underscoring their deeper meaning within the community.<sup>4</sup> Although cisterns have been a subject of research interest, they have mainly been researched as historical artifacts attributed to ancient civilizations. The agency of those living with cisterns, crafting them, and maintaining them remains largely overlooked.

### **'INJAŞA ACTORS, TECHNOLOGY, AND KNOWLEDGE**

The present study of cisterns was mainly informed by conversations with cistern makers and owners, two guided walks with a shepherd, and observations of the renovation of two cisterns and the crafting of a new one. Our fieldwork, conducted in winter 2021 and spring 2022, took place in Ramallah, Al-Bireh, Birzeit, Ain Qinya, Silwad, Ain Yabroud, and the wadis around Ramallah. We additionally met with and spoke to cistern hewers from Jama'in and Masafer Yatta.

The crafting process of a new cistern took place in the hills on the outskirts of Ramallah and involved a team of five men. 'abū Mohammad has been working in cistern hewing for the last thirty years and learned the craft from his father starting at the age of fourteen. He directed and closely supervised the hewing process of his two sons, Mohammad (age 24) and Omar (age 20). Two additional men were responsible for steadily moving the excavated soil out of the cistern by collecting, hauling, and operating an electric pulley. The making of the *'injaşa* was recorded via photographs,

2 On “manufactured scarcity,” see Lyla Mehta, “The Manufacture of Popular Perceptions of Scarcity: Dams and Water-Related Narratives in Gujarat, India,” *World Development* 29, no. 12 (2001), 2025–41, [https://doi.org/10.1016/S0305-750X\(01\)00087-0](https://doi.org/10.1016/S0305-750X(01)00087-0). On water apartheid, see Elisabeth Koek, *Water for One People Only: Discriminatory Access and “Water-Apartheid” in the OPT* (Al-Haq, 2013), [http://www.alhaq.org/cached\\_uploads/download/alhaq\\_files/publications/Water-For-One-People-Only.pdf](http://www.alhaq.org/cached_uploads/download/alhaq_files/publications/Water-For-One-People-Only.pdf).

3 Amnesty International, *Troubled Waters: Palestinians Denied Fair Access to Water* (Amnesty International, August 2009), <https://www.amnesty.org/en/documents/mde15/027/2009/en/>.

4 Tawfiq Canaan. *Haunted Springs and Water Demons in Palestine* (Palestine Oriental Society, 1922).

videos, and field notes. Interviews were conducted with 'abū Mohammad and Mohammad during the cistern construction process and following the completion of the work. While this case study focuses on the central West Bank, the work of the cistern hewers we interviewed spans a greater geographical area, as reputable hewers are often sought after and tend to work beyond their locality. For instance, while 'abū Mohammad is from Yatta and most of his cistern work is to the south of Hebron, his reputation in cistern hewing is well established, and he receives commissions for cistern hewing from as far away as Ramallah.

In Ramallah, we observed the renovation of a cistern damaged by excavation work for a shopping mall in the center of the city. The renovation was conducted by 'abū Omar from Al-Bireh. 'abū Omar works in both construction and cistern renovation and uses similar tools and materials when plastering walls and cisterns. Upon successfully renovating his first cistern, he received several commissions for the renovation of *'injaşa* cisterns in the same neighborhood.

The following section introduces the cistern as an agent of resistance, examining changes in the socioeconomic, political, and cultural factors affecting *'injaşa* construction. This is followed by a section describing changes to the building tools used in cistern construction, and by a third section that delves into the three-tiered system of knowledge needed to craft the *'injaşa*.

## 'INJAŞA AS RESISTANCE

The military occupation of the West Bank and Gaza in 1967 drastically changed life for Palestinians, including their access to land and water. We frame our research by starting with these changes and identifying factors that have directly or indirectly affected the demand for and access to *'injaşa* cisterns.

Prior to 1967, cisterns and springs were the main sources of drinking water for most Palestinians in the West Bank and Gaza.<sup>5</sup> Every household had a cistern that provided water for both domestic use and livestock.<sup>6</sup> In 1967, following the occupation of the West Bank, Israel placed all water in the West Bank under the control of the Israeli military and introduced a permit system for new water infrastructure while declaring all prior water agreements invalid.<sup>7</sup> The loss of access to communal water sources such as springs and cisterns increased the need for rainwater collection infrastructures while making these risky to build.

5 Nidal Al-Batsh et al., "Assessment of Rainwater Harvesting Systems in Poor Rural Communities: A Case Study from Yatta Area, Palestine," *Water* 11, no. 3 (2019), 585, <https://doi.org/10.3390/w11030585>.

6 *A Dual-Track Approach for More Productive and Resilient Livelihoods in the West Bank*, Good Practices no. 3 (Food and Agriculture Organization of the United Nations, 2015), <https://www.fao.org/3/i5204e/i5204e.pdf>.

7 Military Order No. 58 (1967) states, "The construction of any new water infrastructure is strictly forbidden without a permit, and the Israeli water officer has the right to refuse any permit



2 Inside an *'injaša* cistern during renovation. Ramallah, October 2021

From 1967 to 1981, as Palestinians were prohibited from developing rainwater infrastructure, Israel's national water company, Mekorot, drilled thirty-six wells in the West Bank to serve Israeli settlements.<sup>8</sup> Mekorot also

without giving reasons." Military Order No. 291 (1967) states, "All water resources in the Palestinian territories fall under the property of the State of Israel in accordance with the Israeli law issued in 1959." Military Order No. 158 (1967) states, "All cisterns, wells, springs and water projects are to be placed under the authority of the Israeli military government."

<sup>8</sup> Miriam R. Lowi, "Bridging the Divide: Transboundary Resource Disputes and the Case of West Bank Water," *International Security* 18, no. 1 (1993), 113–38, <https://doi.org/10.2307/2539034>.

sells water to Palestinians in the West Bank through the military's civil administration, the West Bank Water Department.<sup>9</sup> Palestinians thus went from having full sovereignty over their water sources to becoming dependent on a water network owned and operated by the military occupation.

This situation was further exacerbated by the Oslo Peace Accords which began in the 1990s, under which the West Bank was divided into multiple areas with differentiated administrative jurisdiction. Area C of the occupied West Bank is a geographical and administrative division set out under the Oslo Accords between the Palestinians and Israel. It falls under Israeli military and administrative rule and covers more than 60 percent of the West Bank. All security, land, and civil matters, including infrastructure and planning, have since been controlled by Israel, which has rejected more than 90 percent of permits to construct vital water infrastructure.<sup>10</sup> Israeli destruction of water pipelines, rainwater harvesting tanks, and even whole communities in Area C of the occupied West Bank has been a common occurrence, normalizing the process of ethnic cleansing and forced displacement of Palestinian communities there. According to the United Nations Office for the Coordination of Humanitarian Affairs, Israel has demolished 5,083 structures, displacing an estimated 7,446 Palestinians from 2019 until 2021.<sup>11</sup>

Villages, towns, and Bedouin communities, especially those in Area C, lack access to central water resources and thus still heavily rely on cisterns for their everyday access to water under this enforced scarcity. Israel's hegemonic control of water infrastructure is further demonstrated through a legal system that denies permission for the construction or renovation of rainwater harvesting structures. In the South Hebron Hills, an area known for its aggressive uprooting of Palestinian communities, cisterns have been directly targeted for destruction, making the reality of communities living there stark and facilitating their further dispossession and uprooting.<sup>12</sup>

Cisterns have also been demolished to make way for new road infrastructure and rapid urbanization across Palestine.<sup>13</sup> Cistern demolition has been a common occurrence since most main roads are built along traditional travel routes that are themselves rich in public 'injaşa cisterns historically

9 Clemens Messerschmid, "What Price Cooperation? Hydro-Hegemony in Shared Israeli/Palestinian Groundwater Resources," in *Proceedings of the International Conference on Sustainable Development and Management of Water in Palestine* (House of Water and Environment, 2007), 347–64.

10 PASSIA, *Area C: The Key to the Two-State Solution* (Palestinian Academic Society for the Study of International Affairs, 2012), [http://passia.org/media/filer\\_public/d0/fd/d0fd4de4-c909-413d-9cff-db058bece0fc/area-c.pdf](http://passia.org/media/filer_public/d0/fd/d0fd4de4-c909-413d-9cff-db058bece0fc/area-c.pdf).

11 "Data on Demolition and Displacement in the West Bank," United Nations Office for the Coordination of Humanitarian Affairs, last updated September 3, 2024, <https://www.ochaopt.org/data/demolition>.

12 Koek, *Water for One People Only* (see note 2).

13 Erika Weinthal and Jeannie Sowers, "Targeting Infrastructure and Livelihoods in the West Bank and Gaza," *International Affairs* 95, no. 2 (March 2019), 319–340, <https://doi.org/10.1093/ia/iiz015>; Salah H. Al-Houdalieh and Robert R. Sauders, "Building Destruction: The Consequences of Rising Urbanization on Cultural Heritage in the Ramallah Province," *International Journal of Cultural Property* 16, no. 1 (2009), 1–23, <https://doi.org/10.1017/S0940739109090043>.

constructed to sustain travelers. According to interviews with cistern hewers, the expansion of the public water network since 1967 by Mekorot in certain areas of the West Bank also contributed to the decline in cistern-hewing commissions, as cisterns were no longer the primary sources of water. Despite such expansions, the water network connected only a fraction of households, leaving many others dependent on cisterns. Therefore, many Palestinians continue to maintain the cisterns that are close to their houses and use the water exclusively for drinking, claiming it is of superior quality to the “piped” water.<sup>14</sup> While facing the prohibition forced by the Israeli army on cistern construction in the occupied territories, the construction of *’injaša* cisterns was not completely halted. Cisterns can be hewed inside a home or closed courtyard, so cistern builders can discretely construct *’injaša* despite the Israeli occupation’s prohibition. Additionally, cistern openings are often hidden by the owners, rendering them invisible to the Israeli military and allowing for the continuation of this building tradition despite the prohibition.

### CHANGES IN TOOLS

We started this research with the assumption that cistern making is a specialized craft and that *’injaša* makers are specialists, with the majority of their work focused on the practice of hewing cisterns. However, analysis of our empirical data revealed this assumption to be untrue. Those who make *’injaša* do not necessarily identify as *’injaša* makers. Consequently, we identified two groups among the hewers we interviewed: tool-oriented hewers, whose work centers on the operation of a power hewing tool, the *komprīša* (compressor), that is used for a variety of hewing commissions in addition to cistern making; and season-oriented hewers, who hew cisterns only seasonally, using traditional hand tools, while engaging in other land-tending work throughout the rest of the year.

Both types said they hew cisterns when commissioned to do so. Both also take on other hewing commissions, such as graves, caves, and building foundations. While tool-oriented hewers identify as hewers more generally, season-oriented hewers do not necessarily identify as hewers. ‘abū Yūsuf (age 73) and ‘abū Jāsīm (age 81), whom we met in Jmā’īn, are seasonal hewers. ‘abū Jāsīm started hewing cisterns prior to the 1967 occupation of the West Bank and learned hewing from his father. ‘abū Yūsuf and ‘abū Jāsīm have together hewed more than fifty cisterns by hand in the Jamaeen area, using traditional hewing tools. After our interview, ‘abū Yūsuf took us downstairs to the storage room to show us a stone-splitting hammer, a pickaxe, and a hoe. In the storage room we also saw a horse-drawn cultivator, jerry cans of olive oil and traditional soap-making equipment. ‘abū Yūsuf explained that he and his fellow season-oriented hewers hew only in the

14 Based on interviews with cistern owners.





3 'abū Yūsuf showing his hewing tools. Jmā'in, May 2023

summer months, a period of lull in the traditional land-tending calendar. For the rest of the year traditional hewers also build drystone walls, till, plant, harvest, and tend the land. In contrast, 'abū Mohammad explained that he hews all year long but prefers the cooler, more comfortable fall and winter months.

In the early 1970s, mechanized hewing equipment became available to Palestinians in the West Bank through the Israeli market. Both 'abū Al-'abd and 'abū Mohammad attribute their start in cistern hewing to their father's

purchase of a *komprīṣa* in the 1970s.<sup>15</sup> The introduction of this power tool facilitated much faster, and thus more profitable, hewing. The family also hired out its *komprīṣa*—by the hour or day—when hewing commissions were unavailable.

Hewing by hand requires a great deal of strength and perseverance, as the tools used for hewing are heavy and the work both arduous and time-consuming. ‘abū Yūsuf explains that those who possess the physical strength and requisite knowledge of soil properties are commissioned to hew cisterns. Those who are efficient, can work in different soil types, and display good artisanry in finishing cistern walls become greatly sought after.<sup>16</sup>

‘abū Omar’s renovation work provides insight into both the specialization of roles in traditional cistern building and the loss of that knowledge as a result of technology transfer today.<sup>17</sup> Historically, cistern hewing and plastering were two distinct professions with different traditions and skills. The plasterer, being the more specialized of the two, is knowledgeable about material mixtures, application tools, and techniques and would apply a mix of earthen plaster followed by a *tawriqa*—a combination of earth, ash, lime, and ceramic powder—as the final waterproofing layer.<sup>18</sup> Application technique distinguishes a skilled plasterer from all others.<sup>19</sup> Since cistern plastering is highly specialized, skilled cistern plasterers were well respected and sought after. The term “cistern plasterer” has even come to mean a highly skilled artisan plasterer. Today the practice of plastering is greatly simplified by the use of readily available cement mixes and waterproofing sealants (such as those used in the construction of swimming pools). Traditional knowledge of the preparation of plaster mixtures and application techniques is little used today and thus difficult to find. Ready-made mixes instead offer a more convenient, more affordable option with less specialized work. In turn, this has allowed cistern builders such as ‘abū Mohammad to offer plastering services and construction workers such as ‘abū Omar to diversify their skills between building construction jobs and cistern renovation.

15 ‘abū Al-‘abd (age 52) from Silwad is a *komprīṣa* hewer, herder, butcher, and peasant. He began hewing cisterns at the age of eighteen. ‘abū Mohammad (age 48) from Yatta began hewing cisterns at the age of thirteen as an apprentice to his father. He has hewed over a hundred cisterns in the South of Hebron area and has a reputation for cistern hewing that lands him commissions as far away as Ramallah. He works with his two sons and hews using a *komprīṣa*.

16 According to several hewers and plasterers, a well finished cistern surface reduces the amount of plastering needed because a thinner layer of plaster is sufficient for waterproofing. This greatly increases the lifespan of the plaster layer and decreases the amount of materials needed, and hence reduces both construction and maintenance costs.

17 ‘abū Omar (age 45) of Al-Bira. In addition to cistern plastering and renovation, ‘abū Omar works in building construction and plastering walls.

18 *Tawriqa*—from the root *waraqa* (meaning paper or leaf)—is the final layer of a cistern plaster with a specific material mix and application technique that gives it its waterproof quality and increases the durability.

19 Notable application techniques use soap, olive oil, or water and a smooth rounded stone for polishing the *tawriqa*. Omar Hamdan, *al-Sha’biyah fi Filastīn* [Vernacular architecture in Palestine], Palestinian Folklore Center, 1996.

## LEVELS OF KNOWLEDGE

The knowledge needed to make *'injaşa* cisterns plays a vital role in the building tradition's endurance. We argue that this knowledge is sustained, developed, and shared across three dimensions: the collective, the local, and the tacit. *Collective knowledge* is know-how that is general, shared culturally, and easy to memorize. In the case of *'injaşa*, this knowledge is a simple formula that guides the shaping process of the *'injaşa* cistern. *Local knowledge* is specific to a certain geography and is concerned with the composition of the various layers of earth in a local village or town. This knowledge is specific, nuanced, and developed over multiple generations working the land. Typically, such knowledge is held by a small group in the local community, mainly elders. Finally, *tacit knowledge* is knowledge learned through the act of hewing; it is developed and held by hewers and transmitted from father to son or from seasoned hewer to apprentice.

In our discussions with *'injaşa* cistern hewers and users, we observed that the knowledge informing the hewing and shaping of the cistern is widely known amongst elders—both hewers and non-hewers, women and men. This orally transmitted blueprint governs the ratios of cistern width to depth, enabling the hewing process irrespective of cistern capacity. Its simplicity facilitates memorization, ensuring that knowledge is easily disseminated and passed down across generations and making it available to anyone in need of it. We argue that such knowledge-sharing practices, which we term “knowledge commoning,” play a vital role in preserving Indigenous practical knowledge. Broad dissemination increases the likelihood of survival. However, in the context of settler colonialism, the dissemination of such knowledge beyond the boundaries of Indigenous communities poses a significant risk. Such knowledge, once externalized, may be appropriated and weaponized to further the settler colonial objectives—such as advancing colonial settlement or contributing to settler self-indigenization.<sup>20</sup>

Local knowledge, on the other hand, is not as widely transmitted, as it is specific to a certain locality and is concerned with the nature of the soil and its layers in different geographies of that locality. This knowledge is accumulated over many generations of working the land and through pattern recognition of characteristics that can identify the type of soil in an area, such as its vegetation and terrain. 'abū Yūsuf built a rectangular, concrete, nontraditional cistern in his home. When we asked what prompted a renowned *'injaşa* builder to construct a nontraditional concrete cistern, he explained that the soil under his home is *Şan*, a vernacular term for a type of hard stone well-known in the village of Jamaeen. 'abū Yūsuf then described his mental map of Jamaeen and the different soil compositions of each area, explaining where *'injaşa* cisterns can and cannot be built. This type

20 See Philip Joseph Deloria, *Playing Indian: Otherness and Authenticity in the Assumption of American Indian Identity* (Yale University Press, 1994); Stephen Pearson, “‘The Last Bastion of Colonialism’: Appalachian Settler Colonialism and Self-Indigenization,” *American Indian Culture and Research Journal* 37, no. 2 (2013), 165-184.



4 'injaša cistern and catchment terrace. Ramallah, November 2021

of knowledge of the land's geology is essential in traditional communities and is held by elders who pass it on, develop it, and share it locally when needed; for example, when making decisions about purchasing land for construction, stone quarrying, or cistern hewing. When considering a hewing commission, hewers may seek this type of knowledge from the area's elders so as to make informed decisions. Hewers prefer to work in soils of *hewwar*, a soft limestone that is easily shaped by hewing tools and retains its shape, as its structural properties are not compromised by moisture conditions. Traditionally, *hewwar* excavated from the cisterns was prized by the community, which would gather the spoil to construct traditional grain storage structures (*khawābī*) and traditional ovens (*ṭawābīn*). Hence, areas that are known to have *hewwar* soils are also known locally as the best locations for 'injaša cisterns.

Tacit knowledge is difficult to express and identify. When we asked cistern hewers how they learned to hew, many were unsure how to answer the question. "We learned it ourselves" and "time taught us" were typical responses. Interviews were thus insufficient for understanding the embodied knowledge needed to hew, although they offered some hints. More useful was our participant observation of the apprenticeship process by which many hewers learn their technique. Mohammad and Omar hew cisterns without much verbal communication with each other or with their father, who directs and supervises the work. He is there to make sure they are safe and do not put themselves at risk of being buried alive. He intervenes when something goes wrong and offers guidance for addressing atypical situations,



5 The neck of a cistern during its hewing in Wādī Al-'uqda, October, 2021

such as the exposure of a large, hard rock or an underground waterway. The apprentices learn the properties of the soil layers by hewing them. The master hewer's directions are easy to miss, however, as most communication is nonverbal. The *komprīşa* is loud enough to drown out verbal communication, and the relationship of the master hewer to his apprentices is intimate. 'abū Mohammad could communicate directions, approval, or disapproval to his sons merely by gesturing with his hand or making a subtle facial expression that unpracticed observers would easily miss.



6 Mohammad taking measurements of the cistern during its hewing in Wādī al-'uqda, October, 2021. To his right is his *komprīša*.

Since the early 2000s, there has been a surge in commissions of *'injaša* cisterns by local and international nongovernmental organizations working the occupied West Bank to supplement the irrigation of olive saplings. In partnership with the Palestinian Ministry of Agriculture, these organizations have advanced a plan for accelerating the planting of olive trees, with the goal of increasing the competitiveness of Palestinian olive oil in the

global market.<sup>21</sup> However, this new interest was motivated not by a desire to preserve cisterns as part of a rich cultural heritage but because they are practical and inexpensive compared to other options.<sup>22</sup> Scholars have critiqued these investments in cistern building and rehabilitation for depoliticizing Palestinian water rights and thus furthering Israeli efforts to deny Palestinians fair access to reliable and secure water networks.<sup>23</sup>

The revival of *'injaşa* construction proved lucrative for the hewers. Yet 'abū Mohammad and 'abū Al-'abd do not recall this period with fondness. The introduction of *'injaşa* cisterns into the donor-driven logics of NGOs often created friction between the systems of knowledge held by the cistern makers on the one hand and by the NGO workers on the other. 'abū Mohammad explained this by describing a conflict between the traditional way of measuring cisterns and the measurement technique required by the engineer overseeing the construction of a donor-funded cistern:

The [Ministry of Agriculture] Engineers called on us. We used to go to the hills and work there without knowing the capacity of the cisterns we were building. The job states: 50 cubic meters cistern. If we make it 60, the 10 are forfeited. And if we make it 49, we would have to come back. Whatever we do [they say], "it is not our problem dear worker, if it is less you will have to come back." We told them to teach us [and said], "this is how we measure." They said, "this [way] is wrong."<sup>24</sup>

Cistern hewers are conventionally commissioned to produce a cistern of a certain depth (and hence width), giving the hewer clear command of the design and control over his knowledge without requiring calculations of capacity. The commissions for donor-funded cisterns prioritized capacity, using a system with which hewers were not familiar. 'abū Mohammad explained that the first section of hewing, the cistern neck, is often the most strenuous, as the top layer is hard rock. The thickness of the neck depends on the depth of this stone layer, which may be one meter or more. The deeper this layer, the more time-consuming the hewing. Yet, given the cistern's shape, its capacity at the neck is nominal. Using a capacity calculation as a basis for payment means that the cistern builder is often underpaid for this part of the work, especially if the neck is long. In a traditional depth calculation, the neck of the cistern is given equal weight to the rest of the cistern's body and, therefore, compensated more fairly.

Enforcing a donor-driven logic of compensation disrupts how hewers work, forcing them to follow a Western logic of quantification and precise

21 Wahbeh Asfour (Ma'an Development Center), interview via Zoom, May 2023.

22 Asfour, interview, May 2023.

23 Zayneb Al-Shalalfeh, Fiona Napier, and Eurig Scandrett, "Water Nakba in Palestine: Sustainable Development Goal 6 Versus Israeli Hydro-Hegemony," *Local Environment* 23, no. 1 (2018), 117–24, <https://doi.org/10.1080/13549839.2017.1363728>.

24 Excerpt from an interview with Ali Harb ('abū Mohammad) in Wādī Al-'uqda, December 11, 2021.

design. This contradicts the local values of abundance and generosity and instead enforces a logic of exact payment for precise work.<sup>25</sup>

## DISCUSSION

Our research exposed limitations in our approach to documenting cistern knowledge. Hewers such as 'abū Mohammad demonstrate that knowing is actively carried out by practicing and doing. It becomes subconscious knowledge that is not easily visualized and plotted on paper. Nor is that knowledge contained in any one hewer, although their knowledge may be considerable. The collective also plays a role in keeping that knowledge alive, relevant, and available.

The factors that contributed to the survival of the *'injaṣa* cistern building tradition are both technical and sociopolitical. Because the *'injaṣa* can be built with minimal alterations to the surface, it can be built inside an existing building or on cultivated land without damage. The discrete building process and invisibility of the finished product allows for the continuation of the building tradition despite the prohibition enforced by the occupation army. Furthermore, the *'injaṣa* is hewn in limestone; it does not require any building material, which makes it adaptable to remote locations, available to all and cheap to construct. In this way, the *'injaṣa* is an autonomous technology that allows for the autonomous collection of water. This is especially important in a settler colonial context where water and land are systematically controlled and denied from the native inhabitants.

A surge in *'injaṣa* construction following the establishment of the Palestinian Authority further contributed to the continuation and adaptation of the *'injaṣa* cistern. This revival was not intentional but rather a byproduct of a policy to increase olive tree cultivation. As more and more donor-based NGOs followed suit, the demand for cisterns increased. This created opportunities for both traditional hewers and newcomers, and the availability of hand-held *komprīṣa* increased the speed and ease of hewing. Meanwhile, the commoning of *'injaṣa*-shaping knowledge and the continuation of Indigenous knowledge of local soil strata have enabled new hewers to continue the building tradition.

Adapting modernized tools to the making of *'injaṣa* also exposes a notion persistent in vernacular architecture studies: that tradition is the opposite of modernity and thus static and unchanging.<sup>26</sup> Recently, scholars

25 The effects of imposing alien design and construction techniques on cisterns in the West Bank reflects experiences in other locations, such as Bangladesh, where colonialism and international aid have also influenced and imposed changes to vernacular design, foreclosing alternative worldviews and the potential for reviving and protecting historical building traditions. Anna Heringer, Lindsay Blair Howe, and Martin Rauch, *Upscaling Earth: Material, Process, Catalyst* (gta Verlag, 2019), 151. See also Mayssoun Sukarieh, "Decolonizing Education, a View from Palestine: An Interview with Munir Fasheh," *International Studies in Sociology of Education* 28, no. 2 (2019), 186–99, <https://doi.org/10.1080/09620214.2019.1601584>.

26 Paul Memmott and James Davidson, "Indigenous Culture and Architecture in the



have challenged such notions in an effort to expand the conversation on vernacular architecture beyond a focus that ignores the dynamic character of traditional building forms in lieu of essentializing or differentiating among its material properties and the social, cultural, and political circumstances in which they are produced.<sup>27</sup> However, the loss of traditional knowledge is a real threat with detrimental consequences to Indigenous communities. Our research shows that the loss or survival of a building tradition not only reflects its ability to adapt or incorporate modernization but indicates the wider context in which the tradition occurs.

### BEYOND STORING WATER

Our attempt to shed light on the *'injaşa* cistern from the perspective of those who build, use, and maintain them increases our understanding of the social life of cisterns and the relationalities the *'injaşa* cistern engenders. Study of *'injaşa* has enabled a deeper understanding of the processes of Indigenous knowledge transfer and protection; the multiple levels in which this knowledge exists collectivity, locally, and tacitly; and the ways it can endure despite ongoing attacks in a settler colonial context.

Modern approaches to cistern building, endorsed by external actors, tend to follow a logic of standardization, quantification, and precision that renders the design and use of cistern transactional and technical. We thus see our study of cisterns as exposing contrasting worldviews: on one side, a modernizing approach to water governance; on the other side, an Indigenous, care-centered, kinship-rooted relationality among people, land, and ecosystems. Traditional hewers embody values of reciprocity, generosity, and care in their practice of cistern hewing. They are generous with their work, carefully study and intrinsically know their locations, and build on relationships of trust and care with their clients (i.e., community). These contrasting worldviews are evident in the Palestinian context and show the complexity involved in preserving cistern knowledge and wisdom without reducing it to an act of simple calculation and design. Our work thus contributes to literature that incorporates theorizations of feminist political ecology, care, and pluralistic understandings of water.<sup>28</sup>

South Pacific Region," *Fabrications* 18, no. 1 (2008), 74–113, <https://doi.org/10.1080/10331867.2008.10539623>.

27 Marcel Vellinga, "Engaging the Future: Vernacular Architecture Studies in the Twenty-First Century," in *Vernacular Architecture in the 21st Century* (Taylor and Francis, 2006), 81–94; Tim Ingold, "Being Alive to a World Without Objects," in *The Handbook of Contemporary Animism* (Routledge, 2014), 213–25.

28 Deborah McGregor, "Traditional Knowledge and Water Governance: The Ethic of Responsibility," *AlterNative: An International Journal of Indigenous Peoples* 10, no. 5 (2014), 493–507, <https://doi.org/10.1177/117718011401000505>; Melanie Yazzie and Cutcha Risling Baldy, "Introduction: Indigenous Peoples and the Politics of Water," *Decolonization: Indigeneity, Education and Society* 7, no. 1 (2018), 1–18, <https://jps.library.utoronto.ca/index.php/des/article/view/30378/23031>.

Our awareness of the knowledge that is held collectively in the Palestinian culture around *'injaṣa* cisterns remains incomplete. By centering local and traditional knowledge sources and engaging with an Indigenous, care-focused relationality to the land, we envision the *'injaṣa* as a world of practices that go beyond water storage to encompass a repository of knowledge about communal stewardship and collective caring for nature and our role in the ecosystem. We focus on cisterns not only as Indigenous architectural spaces but also as vessels for knowledge emancipation. We imagine cisterns as the embodiment of the hidden, subterrestrial potential of covert and quotidian forms of communal land management that do not seek to alter nor impose extractivist imaginaries on their ecosystems.

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# BUILDING IN SOLIDARITY, BUILDING WITH EARTH: THE JORDAN VALLEY SOLIDARITY CAMPAIGN

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