

The Shaduf of El-Siliyien: Documenting a Rare Survivor of Water-Lifting Practice in Fayoum

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Abstract

Studying and understanding Fayoum's water heritage highlights the need to record and preserve the remaining elements of traditional water-lifting technology in Fayoum. Hidden among the agricultural fields of El Siliyien village in Fayoum is a forgotten and abandoned Shaduf representing a rare and undocumented example of a water-lifting device in Fayoum. The paper documents this surviving traditional Shaduf through field investigation and examinations of historical maps. It combines field documentation, photographic recording, local oral testimonies, and an analysis of the Shaduf's components with previously documented ones to identify its characteristics, construction, and place among Fayoum traditional water-lifting technology.

Keywords

Shaduf;
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1. Introduction

Water lifting machines have played an essential role in human societies, particularly in areas where rainfall was insufficient to provide water for agricultural and domestic needs. The need for mechanical water lifting emerged in a variety of circumstances where wells were the principal source of water, where rivers and canals lay below the level of the cultivated fields, or where water had to be raised to higher parts of buildings. A variety of water lifting devices were developed, ranging from simple devices to more sophisticated ones. These devices include The Shaduf, water screw, Tympanum, Saqiya or Noria and several types of pumps. Their development and use were related to local environmental conditions, agricultural needs, and available sources of power. (Hill, 2004, pp. 127:129).

Among these water lifting technologies is the shaduf, which is one of the simplest water lifting machines. It is made of two wooden beams, a counterweight, and a bucket of water attached to a rope or a pole. (Nenci, 2018, p. 72). Its remarkable long use and widespread application make it one of the most successful and practical machines ever invented. This success is attributed to its simplicity as it can be easily made by local carpenters using available materials. (Hill, 2000, p.130). Several sources indicate that the oldest depiction of the shaduf in Egypt is found in the tomb of Meryra in Tell El Amarna from the 18th Dynasty. fig1 (N. DE G. Davies, 1903, PIXXXII).

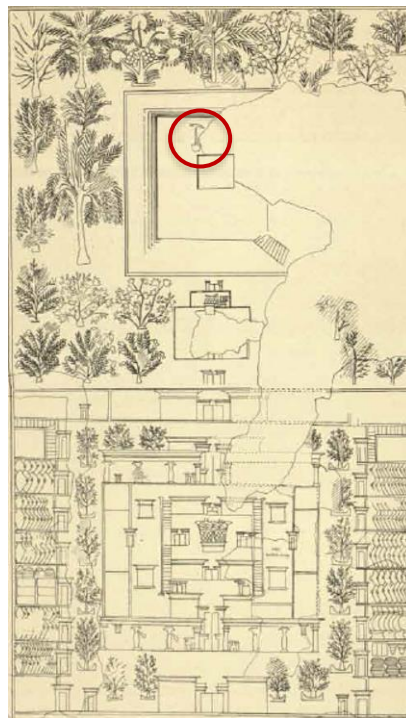


Figure 1: circled in Red is what is believed to be a shaduf from the tomb of Meryra in Tell Amarna, Davies 1903, plate XXXII.

In Mesopotamie, the shaduf appeared in an Akkadian Cylindrical Seal from the Sargonid Period 2500 B.C. (Bonneau, 1993, p. 93). Elio Nenci thinks that these ancient identifications of the Shaduf appear to be strained and hypothetical (Nenci, 2018, p 72). Research Archaeologist Anna Stevens confirms that the scene from Meryra tomb (**fig. 1**) is the oldest depiction of the Shaduf in Egypt (Stevens, 2021, 92-93). Elio Nenci thinks that the earliest true

depiction of the shaduf in Egypt is found in the tomb of Ipuy in Deir El Madinah (TT217) (figs. 2, 3) from the 19th Dynasty. (Nenci, 2018, p.72). It is nevertheless clear that the earliest appearance of the shaduf in Egypt dates back to the New Kingdom.

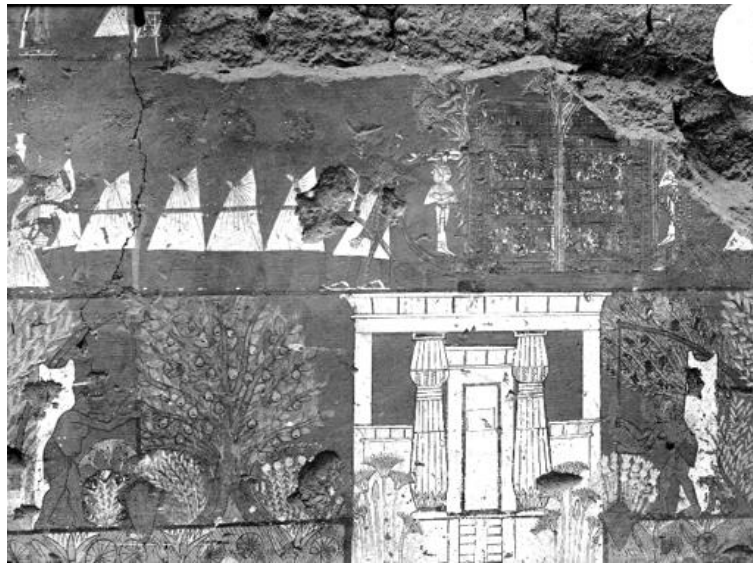


Figure 2: East wall, south side, from the transverse chamber of the tomb of Ipuy (TT217). Depicted is a scene of a garden that is no longer visible today. Circled in left and right of the scene are two men using a shaduf to irrigate the garden. Photographic archive of the Egyptian Museum in Turin Years 1905 – 1914. Plate C00083. <https://archiviofotografico.museoegizio.it/en/archive/theban-region/deir-el-medina/tt217-tomb-of-ipuy/?photo=C00083>



Figure 3: Reproduction of the garden scene from the tomb of Ipuy TT217 by Norman de Garis Davies. Painted at Deir el Medina for the Egyptian Expedition of the Metropolitan Museum of Art, 1924.

<https://www.metmuseum.org/art/collection/search/557816>

In the Graeco-Roman era, the Shaduf was known as κηλώνειον “Keloneion” in Greek (Bonneau, 1993, p. 93), and in Latin it was known as “Tolleno”. They were in use in Egypt until the 20th century (Stevens, 2021, p. 93). In the 1970s of the 20th century, architect and Ethnographer Nessim Henry Henin wrote one of the most significant documentation books of Egyptian Villages titled “Mari Girgis, un village en Haute-Égypte”, a small hamlet located

within Akhmim, Sohag governorate. The book was translated into Arabic in 2018. In one of the book's chapters Henin describes the Shaduf as it is typically used to irrigate small areas no larger than a few carats and it allows water to be raised from one meter to three meters and sometimes up to four meters. (Henin, 2018, p. 71).

2. The Types of Shadufs

Henin observed three types of the Shaduf in this Egyptian village in Upper Egypt. **The first type** that he documented is called The Shaduf with stone supports (**fig 4**), which the villagers call عود الحجر or the stone pole. This type of the shaduf rests on two vertical supports built of limestone. Each support is called ناطور Natur or نواطير the plural Nawatir. A thick horizontal crossbeam of an acacia branch, called عارضة Arda, is fixed across the upper end of each support. At equal distances from the center of the crossbeam, two palm fiber ropes called شدادى Shadadi are attached. They encircle a small wooden piece parallel to the crossbeam called عراك Arak, this moves within another wooden piece called رغلة or Raghla, which is attached to the long pole with two nails (**fig 5**). Near the end of the long pole العود or 'ud is a stone piece called لواية Lawwaya. It is sometimes replaced with a lump of clay called طيانة Tayyana. This piece serves as a counterweight to the water being raised during the functioning operation of the shaduf. At the opposite long pole, a straight branch of sidr or acacia wood, approximately two meters long, is attached. This part is called جباد Jabbad. The Jabbad is tied to the long pole by means of a palm fiber robe. At the lower end of the Jabbad, a piece of wood shaped like a hook is attached to the Jabbad by two pieces of palm fiber ropes.

A galvanized metal bucket is suspended from the hook. The operation of the shaduf is as follows: the farmer stands on a small stone platform, which forms a foothold; then the farmer holds the jabbad with both hands and pulls it downward as a result the long pole rises at the opposite end, where the counterweight is located. The jabbad is then released and the bucket rises under the action of the weight of the counterweight, pouring its water into a small channel called صدر Sadr or فحل Fahl. The shaduf raises approximately two litres of water per second to a height of up to approximately two metres. (Henin, 2018, pp. 71- 77).

The second type that Henin observed is called the Double Acacia wood Shaduf (**fig 6**). It follows the same mechanism as the shaduf with the stone supports "Natur" and it consists of the same components, but these are made of acacia wood. This type of shaduf rests on two wooden supports, each consisting of three branches whose lower ends are firmly planted in the ground. Their upper ends are tied together with palm fiber rope. The supports of the Natur in this type of Shaduf are sometimes called وجاف Waggaf from the verb وقف to stand. The double Shaduf is operated by two farmers.

The Third type of shaduf observed by Henin is called Palm Rib Shaduf (**fig 7**) or عود الجريد. This type of shaduf consists of several palm rib stalks of equal length, stripped of their leaves and tied together with palm fiber ropes. Their thicker lower ends are planted firmly in the ground and surrounded by stones for reinforcement. When the shaduf is to be operated, the Jabbad is attached to its upper end. The mechanism of this type of shaduf relies on the elasticity of the palm ribs. When the farmer pulls the Jabbad downward, the palm ribs stalk bends; when he draws it upward, it springs back while carrying the bucket of water.

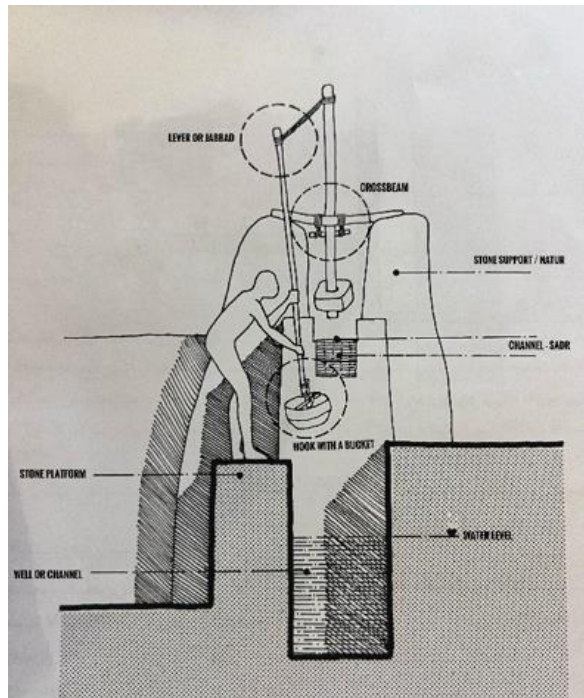


Figure 4: Shaduf with stone supports
(Henin, 2018, p. 73)

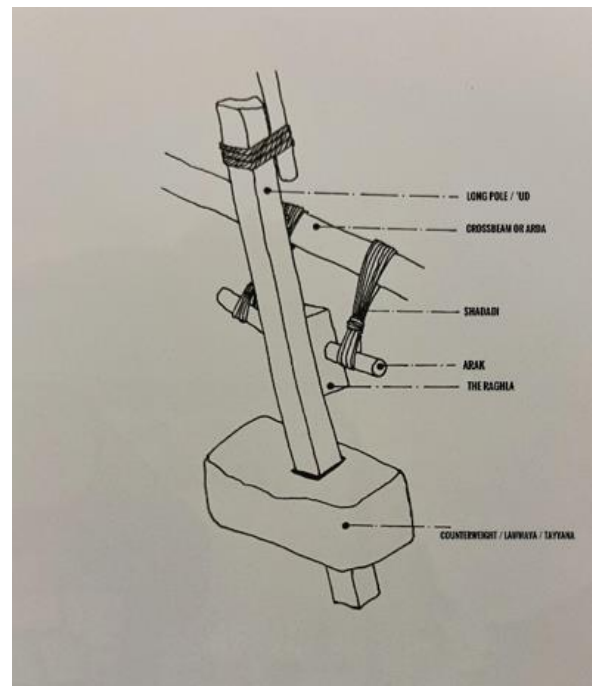


Figure 5: Details of the Shaduf
(Henin, 2018, p. 76)



Figure 6: Double Shaduf of Acacia wood
(<https://www.metmuseum.org/art/collection/search/263124>)

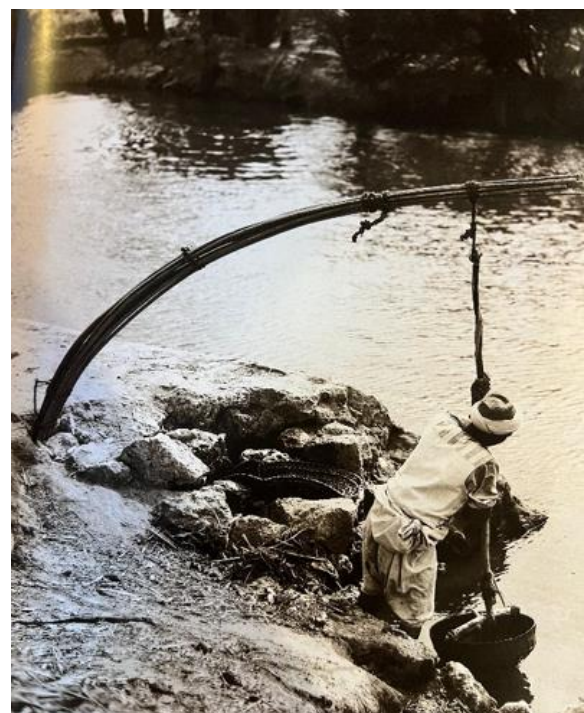


Figure 7: Stalk of Palm ribs Shaduf
(Henin, 2018, p. 74)

3. The Shadufs in the Fayoum

After reviewing the history and types of the Shadufs in Egypt, another question arises: What about the Fayoum? Was the Shaduf widely used in the Fayoum as a traditional water lifting device? This question led me to turn to both ancient and modern sources in search of evidence documenting the use of the Shaduf in the Fayoum.

One of the earliest archaeological pieces of evidence of the use of the shaduf in Fayoum is traced back to the Graeco-Roman period. In Philoteris, or Kom Madinat Watfa, Archaeologists were able to unearth a limestone T-shaped foundation which was divided in two halves by a groove. This limestone platform was the foundation of a shaduf (**fig 8**) to lift water from one of the several wells dug around the water storage basins in the ancient town. On the waterproof limestone foundation once stood two mudbrick pillars which suspended a long pole on a crossbeam. Archaeological evidence for shadufs in the ancient world is extremely limited, as the device was primarily made of perishable materials. ((Malouta and Wilson, 2013, p. 278) As a result such shaduf foundation installations would have left few remains that could survive archaeologically. The shaduf installation identified in Philoteris appears to be the earliest shaduf installation from Graeco-Roman Egypt to have been found and documented in situ. (Kopp, 2019, p. 350). In fact, shadufs and Saqiya were the main means of lifting water in the water management system in Philoteris (Kopp, 2020, pp. 129-130). Perhaps the use of the shaduf was widespread throughout the Fayoum alongside the waterwheels and Archimedean screws during the Greco-Roman period. (Hassan et al., 2008, p. 120). Although Al Nabulsi, in his Fayoum description written in 642 AH, 1244 AD, made no mention of the shaduf's use in the Fayoum, it must have continued to be used on a small scale throughout the Islamic period. Al Nabulsi does, however, provide detailed figures of water-related installations in the region such as the number of waterwheels, the oil presses and the watermills (Nabulsi, 1898, pp. 6-7).

The absence of mention of the Shaduf from Nabulsi's account may suggest that its use was limited and less widespread than the other water lifting devices mentioned. Peter Kopp notes that Shaduf irrigation was generally not directed to irrigate large fields but was more commonly used for horticulture such as small garden and orchards. (Kopp, 2020, p. 129). This explanation is further supported by Major R. H. Brown in his 1892 book *The Fayum and Lake Moeris*, where he mentioned that the Shaduf was used in the Fayoum alongside the animal-driven waterwheels "Saqiyas" but only to a small extent and for small areas. His observation suggests that although the shaduf remained part of the Fayoum's traditional water-lifting practices, its use was relatively limited, sometimes rare, and was likely associated with irrigating small plots of land. (Brown, 1892, p. 16).



Figure 8: Shaduf foundation in Philoteris (Kopp, 2019, p. 354.)

4. The Shaduf of El-Siliyein

4.1 The Story of Discovery

The story of my discovery of the Siliyien Shaduf began in June 2025, during my ongoing field research into Fayoum's water heritage infrastructure. As part of my weekly fieldwork, which I call the Fayoum Water Heritage Hunt, I have been searching for surviving components of Fayoum's traditional water remains, guided by historical maps showing the locations of waterwheels of both types - water-driven and animal-driven - as well as watermills, bridges, and dams.

My fieldwork plan at the time was to investigate Sinaru village, located north of Fayoum city, and its surrounding hamlets in search of surviving watermills and waterwheels. I first visited Sinaru to investigate several watermill locations marked on the 1914 Survey of Egypt map. Unfortunately, when I reached the indicated sites, I found no surviving remains. By the time I arrived at Ezbet Dekem Hamlet, one of Sinaru's hamlets, I asked several local farmers whether they knew of any surviving waterwheels or watermills in the area. An old farmer suggested that I visit El Siliyien village, where, he told me, a large number of animal-driven waterwheels could still be found concentrated in an area known locally as Dawar El Fegel, located roughly between the villages of El Siliyien and El Tawfiqiya.

Following the residents' directions, I made my way to the area known among farmers as Ard Dawar El Fegel. I was able to document eleven animal-driven waterwheels there. Unfortunately, none retained their original wooden wheels; since the 1970s, all had been replaced with metal wheels. Nevertheless, the circular mud-brick bases on which the waterwheels had stood were still there, preserved. During the survey, however, I made an unexpected discovery. Adjacent to Ard Dawar El Fegel was a small plot of land locally known as Ard El-Shawadif, which literally translates to "the land of the shadufs." When I asked the farmers about the name, they explained that several shadufs had once stood on this small plot but had since been removed. One shaduf, however, had survived in situ and could still be seen. Guided by the children who help their parents in the work, I was led across the fields until, finally, I saw the surviving Shaduf. That moment marked the beginning of the real story: documenting a rare and previously little-known survivor of Fayoum's water heritage...the Shaduf of El Siliyien.

4.2 Description of the Shaduf

4.2.1 The location and the canals

The Shaduf is located in El-Siliyien village (29°23'04.7"N 30°48'09.5"E.), one of the villages of Sinnuris Administrative Center, on land known locally as أرض الشواديف Ard of El Shawadif or "The Land of Shadufs," adjacent to the Land of Dawar El Fegel. Since June 2025, I have visited the area two times, July 2025 and March 2026. According to the local testimonials, the land of Shawadif is identified as No. 3 on the cadastral map (**fig11**). It is known by this name because the land was historically irrigated using Shadufs, with approximately five or six shadufs functioning there. Since the early twentieth century, the farmers gradually replaced these shadufs with traditional wooden waterwheels powered by animals Saqiyas and these wooden waterwheels continued to operate until 1978; then they were replaced by metal waterwheels powered by animals too (**fig 9**). I spotted about 5 metal waterwheels functioning.

The farmers informed me that there are approximately 11 metal waterwheels in the lands of Dawar el Fegel and El Shawadif.

Most of the old shadufs in the area were either broken or collapsed in place, and their owners used its wooden components as firewood. Fortunately, the family of Gouda – the owners of El Siliyien Shaduf - preserved the last remaining Shaduf in the area in its original location. They continued to use the Shaduf until recently, approximately 20 to 15 years ago, when they purchased a diesel water pump.

The shaduf itself is surrounded by four main canals (**fig 10**). The farmers call these canals as follows: Bahr el Alou, Bahr Darbia, Bahr Amsisa and Bahr Emra. I verified the names of these canals on the cadastral map of El-Siliyien village (**fig 9**), which was surveyed in 1901- 1902, and found that the names of the canals are still pronounced exactly as they were then. The Shaduf itself lies in between Dariba and Amsisa canals, and it gets its water from a secondary canal branching from Bahr El Alou; the local farmers refer to this secondary canal as Khalig Abu Ras خليج ابو راس. All the above-mentioned canals branch off from Bahr Naqalifa بحر نقاليفه, which itself branches from Bahr El Zawiya, one of the main branches of Bahr Youssef, which starts from Fayoum city distributary.



Figure 9: Photo of one of the Metal waterwheels in Dawar El Fegel and Shawadif Lands in El-Siliyien Village, by the author (June 2025).



Figure 10: The Location of the Shaduf and the canals surrounding it. Google Maps, February 2026.

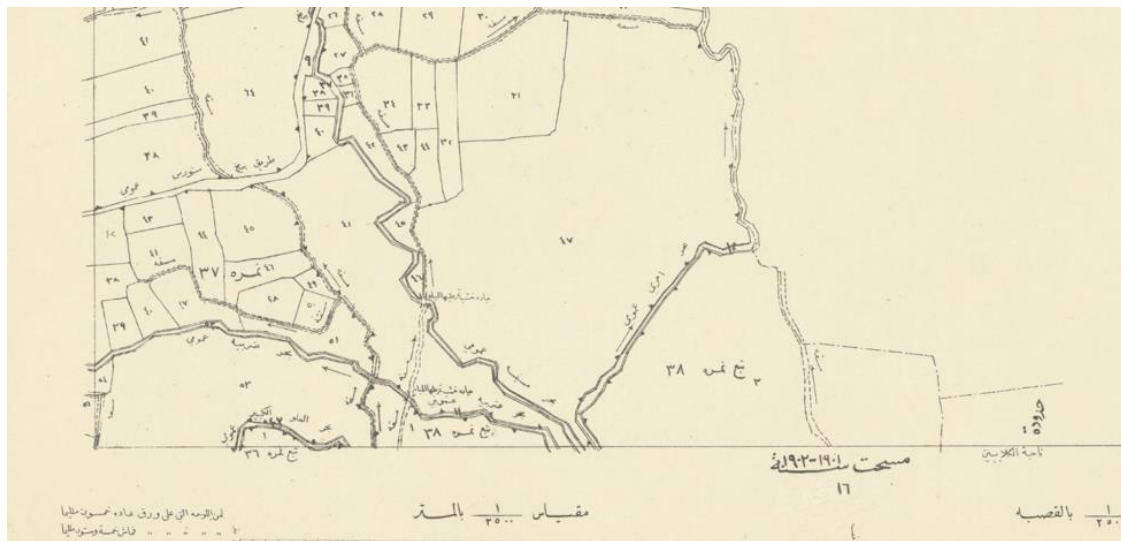


Figure 11: Detail of el Siliyien Village Cadastral map, surveyed in 1901-1902, showing the names of the canals. Part of plate no. 13, Library of Congress.

(<https://www.loc.gov/resource/gmdsetmaps.2009580338002/?sp=75&st=image&r=0.016,0.666,0.614,0.294,0>)

4.2.2 Components, Dimensions and type

The El-Siliyien shaduf belongs to the second type of the wooden shadufs described by Nessim Henry Henin. However, unlike the double shaduf described by Henin, the Siliyien shaduf is a single one. Its components generally correspond to those of the second type described earlier in the article, although it differs from the shaduf of Mar Girgis village in the types of wood used for its making. The Siliyein Shaduf (**fig. 12**) consists of wooden supports made of olive wood, rather than acacia wood. The farmer in Fayoum refers to this part of the shaduf as

Qawayim قوايم (figs. 13, 14) (singular Qa'yim) or support, rather than Waggaḥ or Natur وجاف / ناطور, the names used by the inhabitants of Mar Girgis village in Upper Egypt.



Figure 12: The Shaduf of El-Siliyien, by the author (June 2025).



Figures 13,14: Left and right supports of the Shaduf of El-Siliyien, by the author (March 2026).

Each of the wooden supports (*Qawayim*) consists of a forked olive wood branch. The right support is 1.23 m, while the left support is 96 cm; both carry the crossbeam. The support here differs from Nag Mar Girgis shaduf, where each of its supports consists of three branches of acacia wood. The Crossbeam in El-Siliyien shaduf is 96 cm (fig. 15), is locally called by the farmers as “Arada عراضة same as the inhabitants of Mar Girgis village. It is made of Olive wood too. However, the pole carrying the counterweight is made of casuarina wood (fig. 16). It is 1.78 m. measured from the top counterweight stone. As for the other wooden components in the wooden pole carrying the counterweight, e.g. (*Shaddadi* ropes, *Arrak* 50 cm, and *Raghla*

25 cm.) (figs. 5, 17), I have not yet been able to know the Fayoumi terms for these parts. Luckily, these components are still preserved in El-Siliyien Shaduf. The farmers call these components wooden parts. On the top of the counterweight pole, there is a metal nail, perhaps to tie the Jabbad or the lever pole to the counterweight pole. (fig. 18). In El-Siliyien shaduf, the *shaddadi* ropes (fig. 19) were made of palm fibers, with some plastic ropes added to them recently to enhance the decaying old ones, indicating recent use. The stone counterweight (fig. 20) is called in Fayoum El Hagar, the stone, الحجر, unlike the Upper Egypt terms *Lawwaya* or *Tayyana*. It is made of limestone, and its upper part is formed of cement and gravel. These were added to the stone recently to add more weight to it. El Siliyien Shaduf lacks the Jabbad, the wooden part that carries the bucket.



Figure 15: Crossbeam or Arada of El-Siliyien shaduf, by the author (March 2026).



Figure 16: The Stone pole or the counterweight pole, by the author (March 2026).



Figure 17: The wooden parts of the shaduf and the ropes, by the author in March 2026.

El Siliyien Shaduf was operated by a worker who stood on a platform (**fig 21**) beside the Shaduf. This platform in El- Siliyien Shaduf is called *Qa'eda* or قعدة, unlike Mar Girgis village inhabitants who used to call it *Dawwasa* دواسة. The worker would start يشودف (*Yishawdaf*) an Arabic verb for operating the Shaduf. The farmer or the worker would raise the Jabbad until the bucket was filled with water, and once filled, the weight of the bucket balanced against the stone; this allowed the stone to raise the Jabbad. The worker then empties the water into a small irrigation channel locally known as the *Fahl*, الفحل (**figs. 22, 23**). The same term is used by the inhabitants of Mar Girgis village describing the irrigation corridor leading the water to the fields (Henin, 2018, p. 77). El Siliyien shaduf irrigated approximately 17 carats of land (A carat is 175.033 square meters). The land is currently cultivated with mango trees, but historically it was planted with olive trees. These trees did not require continuous or large quantities of water; thus, the Shaduf was sufficient to provide the irrigation needs to the land.



Figure 18: detail of the top of the counterweight pole with the metal nail, by the author (March 2026).



Figure 19: Shadadi ropes made of palm fibers and plastic, by the author March 2026.



Figure 20: The stone counterweight. Its base is limestone, while the top part is covered with cement & gravel by the author (March 2026).



Figure 21: the platform where the worker stood to operate the shaduf, by the author (March 2026).



Figures 22 -23: The Shaduf and the *fahl*, or the irrigation corridor leading the water to the fields, by the author (March 2026).

5. Conclusion

The Siliyien shaduf represents a rare and undocumented example of water-lifting devices in the Fayoum Governorate. Its structural design shares some similarities with the second type documented by Nessim Henry Henin in the village of Mar Girgis, Akhmim, Sohag, but they are not entirely alike. The Siliyien shaduf is single, while the second type in Nag Mar Girgis is double. This leads me to the question: were there standardized designs for each type of shaduf in Egypt? The answer is no. The Siliyien shaduf exhibits some local variations, being a single shaduf and using different types of wood. These variations largely reflect the agricultural and irrigation conditions of each region and sometimes influence the shaduf's design. Moreover, this provides important evidence of how local farming communities are able to adapt water-lifting technologies depending to their specific needs. As for the shaduf's date, according to the local testimonials, it is likely that it was installed in the late 19th or early 20th century and remained in use. During this period, parts that deteriorated with use, such as ropes, were replaced and even enhanced with added plastic ropes, and the stone was reinforced with cement and gravel. In fact documenting El-Siliyien Shaduf, which is the last Shaduf in the Land of Shawadif and might be the only surviving Shaduf in Fayoum Governorate, represents a step towards a broader understanding of the history of water management and traditional irrigation methods in the Fayoum.

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