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The Vernacular Boats of Egypt's Natural Lakes: Documentation of Living Maritime Heritage

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Abstract

Boats are essentials of human interaction with aquatic net-ecosystems. Despite Egypt's long-standing reliance on its maritime sphere and an increase in the study of ancient maritime life during the past few decades, the scarcity of references and academic readings discussing the living boats of the Egyptian natural lakes provides great opportunity. Often, the living boats of today are the last vestiges of long-lost vessels of the past. Aware of these lacunae, the authors developed as complete record of the extant boats of Egypt's natural lakes as possible. The goal was to document these boats as living heritage, basically in a format of "boat curriculum vitae," to be used as direct evidence of the maturation of a new paradigm of understanding recent and—when possible—ancient maritime engagement in terms of cultural continuity, cultural relativism, and diffusion.

I. Introduction

Egypt possesses a diversity of aquatic ecosystems, ranging among two seas, ten lakes (eight natural and two artificial), and the Nile River (Fig. 1).[1] Five of the Egyptian natural lakes are aligned eastward to the Mediterranean coast[2]: the Northern Lakes,[3] Mariut (in the western section), Edku, Borollous, Manzala (in the middle Deltaic section[4]), and Bardawil (in the eastern section), east of the Suez Canal. Except for Mariut, these lakes are all linked to the sea by channels that either represent defunct Nile branches or are breaks in the weak parts of the sandbars separating the lake from the sea.[5] There are also the Suez Canal lakes: Timsah, and the Bitter Lakes. The eighth, Qaroun Lake, which lies at the northern edge Upper Egypt is a special case, since its drainage does not reach the river or the Mediterranean.[6]

These lakes affected directly and indirectly the everyday life of the Egyptians, from ancient times to present. Since the lakes naturally support fishing, transportation, and agriculture, all of these areas also supported some aspects of trade, boat industries, maritime-related cultural/religious beliefs, agricultural techniques, and so forth. While much has been made of the importance of the Nile River in the history of Egypt, the lakes have been subject of far less attention. Yet, the boats that ply them

Note: The writing of most Arabic terms and toponyms may be found in Table 11. All tables are located at the end of the article.

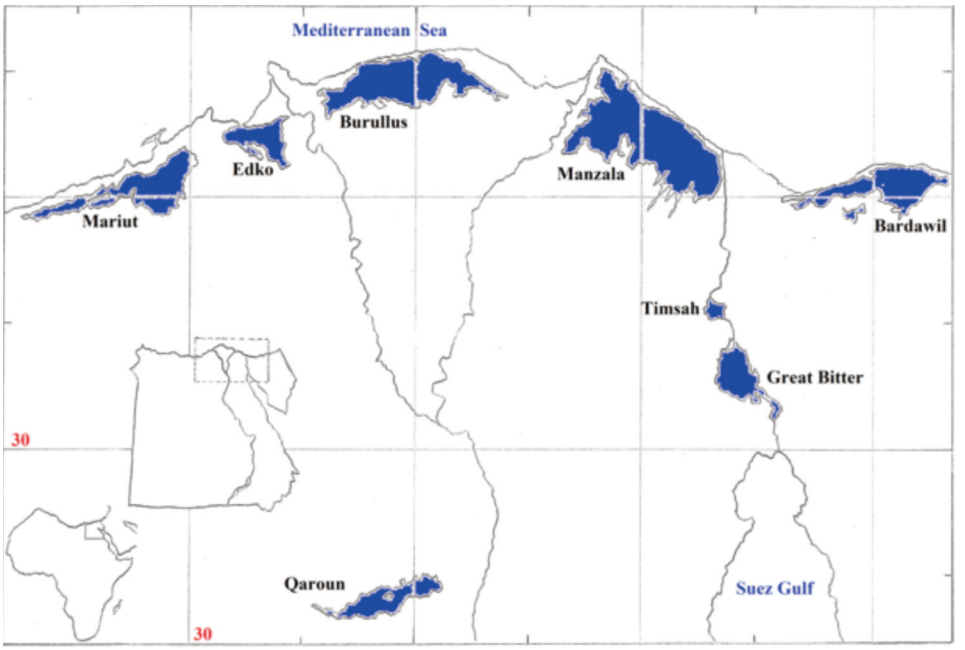

Figure 1: Map of Egypt showing the studied natural lakes.

today fall under the UNESCO definition of "cultural heritage," laid out in its medium-term plan 1990–1995 as "the entire corpus of material signs—either artistic or symbolic—handed on by the past to each culture and, therefore, to the whole of humankind,"[7] and thus they should be treated as such. Indeed, a strong case can be made that the boats could be subject to both the Convention Concerning the Protection of the World Cultural and Natural Heritage[8] and the Convention on the Protection of Underwater Cultural Heritage.[9]

In order to be fully realized as cultural heritage, the boats should be subject to the same approaches as other items of material culture, namely, a complete process of 1) identification, 2) preservation, 3) management, and 4) exhibition.[10] Documentation, as provided here, is an initial step toward heritage identification; a necessary step, especially as the march of time witnesses the further loss of these historic professions and constructions (i.e., as a result of population growth, food demand, land use, eutrophication, pollution, and globalization[11]). It is fair to characterize the historic vessels of Egypt's lakes as threatened heritage.[12] The lakes' continuous degradation, wind-blown sands, municipal and industrial run-off, spread of aquatic plants, filling up, drought, losses resulting from illegal fishing practices, and the all-too-familiar trend of urbanization in all areas are causing intensive ecological problems and, consequently, shrinkage of the lake surfaces, degradation of fish populations, loss of bird habitat, and, last but not least, the disappearance of local boats.

The boats of Egypt's lakes may not be as iconic as those of other populations elsewhere in the world, but they are still remarkable in terms of local and regional cultural heritage, and they could serve as icons in the future. Safeguarding them is thus a necessity before this heritage disappears.

While there is considerable opportunity to focus on modern maritime cultural heritage preservation in Egypt, this manuscript pursues but one such avenue. Indeed, it would seem that maritime cultural heritage of Egypt is receiving greater attention in recent years, with studies of pharaonic,[13] Greco-Roman,[14] Islamic,[15] and even the contemporary[16] era becoming more prevalent. Yet, no systematic complete documentation study of the contemporary boats navigating the Egyptian natural lakes has been performed. Indeed, it seems the only mention of such craft are secondary or tertiary in other subjects, which almost unintentionally note the lake boats. The lakes themselves have even been subject only to fairly cursory historical surveys regarding their maritime-related activities, in reference to specific issues such as fishing as an economic activity, water installations, and native birds. The pilot study published in this manuscript is the first to focus on the lake boats from the perspective of maritime archaeology.

This core objective of the study is to advance a detailed, systematic survey of the watercraft of Egypt's natural lakes in order to comprehensively document, record, quantify, and assess each lake's living boats through a cultural maritime heritage approach. Such work would contribute to similar efforts elsewhere in the world,[17] including the World Heritage Marine Program of 2005.[18] This effort aims to better understand vernacular boats, boat building techniques, shipyards, sailing traditions, fishing techniques, cargo lading, shanties, etc., as part of the cultural heritage of the collective maritime sphere (cultural identity), which can be then understood in a regional Mediterranean perspective (inter-cultural exchange, cultural relativism), and global partnerships (heritage globalization). Moreover, it aims to strengthen and support the few extant maritime heritage academic research endeavors and researchers concerning tangentially related projects.

The survey presented here recorded the currently accessible boats, with references to recently lost ones, when available. The data collected addresses, with each of the eight Egyptian natural lakes, the boat types, local names, tasks, crewmen, fishing gear, and fishing/hunting techniques, as well as any other related details that could be obtained. The lakes were visited, and boat data were empirically recorded.

II. Material and Methods

II.I. Method Tools

In the course of summer 2016, this field survey was conducted on the eight Egyptian natural lakes, at different selected locations within each lake. Visiting and recording the entirety of every lake was not feasible, so this sample was taken as a representative set. An average of two locations at each lake were selected. Locales were chosen based on initial reconnaissance, the authors' and locals' personal contacts, regard or esteem among local fishermen, the ancient and central role the location had within each lake history, and practical access to areas that encompassed all (or a maximal number) of the kinds of boats navigating each lake. Some locales were visited multiple times.

The study used anthropological method tools: direct and participant observation; and non-standardized individual and focus-group interviews. The latter were focused on elders and long-living individuals who represent an irreplaceable source of local knowledge on diverse topics. Moreover, non-intrusive transect surveys combined photography, written record collation, and measured-survey components (e.g., tape-measured recordings).

II.II. The Studied Lakes and Field Locations

II.II.I. Lake Mariut[19]

The lake is located in the western Delta, northern Egypt, at Alexandria, and is the smallest of the Delta lakes, with a total surface of 68.8 km^2. [20] Its depth fluctuates from 0.3 to 6.3 m (average 0.83 m).[21] The water level in Lake Mariut is currently kept at 2.8 m below sea level through continuous water pumping into the Mediterranean at El-Maks.[22] The present lake is just a small part of the large ancient Lake Mareotis basin, divided recently into smaller basins known as Mallahat.

fieldwork locations:

1. Forn El-graya, Elmekwa, Elkabary
2. Nag' ElArab, Nobaria, Elwardian
3. Kobri Abo El-Khair, Bab El-Abid, El-Tamininat, Apis Moharem Bek
4. The Mediterranean-Lake connection area namely, Elmaks

II.II.II. Lake Edku[23]

Lake Edku lies 35 km east of Alexandria, in El Behera Governorate,[24] and has a total surface area around 126 km^2.[25] Its depth varies between 0.30 at the outer edges (*sharagi*) to 4.20 meter at the deepest part (*batin elbar*), (average of 0.65 m). [26] The lake connects to the sea via the Boghaz Elkadeem.

fieldwork locations:

1. Railroad Crossing, Elma'dia shuttle station, Edku
2. El-Ganash Kiosk, Nemra khamsa, Edku
3. Abu-Shanab Family Shipyard & Azak or Azal Elmina, Elma'dia, Edku

II.II.III. Lake Qaroun

The lake (Birket Qaroun) is located 100 km southwest of Cairo, at Fayoum. Its size is approximately 232 km^2 (Egypt's third-biggest lake), and its depth fluctuates between 5 m at the east to 12 to the west.[27] It is set 45 m below sea level, on the remnant of a prehistoric freshwater lake in the Fayoum depression in the western desert,[28] northern Upper Egypt.[29]

FIELDWORK LOCATIONS:

1. Kahk Village, Ibshway, Fayoum
2. Sanhoor Village, Ibshway, Fayoum
3. Shakshok village, Ibshway, Fayoum

II.II.IV. TIMSAH LAKE

Timsah Lake is a natural basin located within Ismailia governorate. It has a surface area of 15 km^2, with a depth average of 10 m.[30] It holds both a freshwater basin from agriculture runoff and a saltwater basin breaching from the Suez Canal (*El kanal*) through an opening at the Nemra Seta region. Both basins are connected to each other via an opening called Boghaz El-Halakah or Boghaz El-Timsah.

FIELDWORK LOCATION:

1. Boghaz El-Halakah, Belajat region, Timsah Lake, Ismailia Governorate

II.II.V. BITTER LAKES[31]

Both the Little Bitter Lake and Great Bitter Lake are connected, creating the great Bitter Lake, and extend through Ismailia and Suez governorates. The lake follows the Suez Canal stream and has a total surface area of 234 km^2.[32] Several islands are scattered within the lake, including Aboromanah, Fayed, and Defreswar.

FIELDWORK LOCATION:

1. Srooh Fayed, Fayed District, Ismailia Governorate

II.II.VI. LAKE BURULLUS[33]

Lake Burullus is the second-largest lake in Egypt, located in Kafr El Shiekh governorate, almost 420 km^2, with depth fluctuation between 0.30 to 1.80 m[34] (average of 0.80 m).[35] Several islands within the lake exist, with the most prominent being Sengar, Elkom-el-Akhdar, and Zawia.

FIELDWORK LOCATIONS:

1. Shipyard of Haj Mahmoud Elkasas, Borg Elborollus, Kafr Al-Sheikh
2. Shipyard of Haj Ali Asfour, Elshakhloba, Sedi Salim, Kafr Al-Sheikh
3. Elshakhloba anchorage, Sidi Salim, Kafr Al-Sheikh

II.II.VII. LAKE MANZALA[36]

Lake Manzala lies between the Damietta promontory and the Suez Canal and borders the Mediterranean, to which it is connected by two channels.[37] It is the most productive and largest lake, with a total area of 720 km^2 and depth average around 1.15 m.[38] The size of the lake has resulted in it being divided into 30 basins.[39] Clusters of islands are scattered within the lake, including Ibn Salam, Tenis, and Tell Ma'abed. Along Lake Manzalla's southern shoreline eastward from Damietta to Mattria are aligned several lakeshore villages (*shotot*), e.g., Shata, El-Roda, El-Gamalia, El-Shabool, El-Nasima, and finally El-Mattaria.

FIELDWORK LOCATIONS:

1. Alladia Anchorage, Mattaria Lake, Daqahlia
2. Izbet El Burg, Al-Jerbi, Damietta-Ras El Bar Road, Damietta Nile Branch

II.II.VIII. LAKE BARDAWIL

Lake Bardawil is one of the clearest lakes and, likely, the most important wetland in Egypt.[40] It is located north of Sinai, separated from the Mediterranean by a sandbar that reaches 1 km wide, and is connected by two straits (Abosalah and Zaraniq). It is approximately 650 km^2, and its depth fluctuates from 0.3 to 3 m.[41] The lake extends from Romanah village in the west to Zaraniq in the east (90 km). There are four basic ports at Bardawil lake: Nasr, Eghzwain, El Telol, and Negela.

FIELDWORK LOCATIONS:

1. Romana village, City of Bir El-Abd, North Sinai
2. El-Telul port, City of Bir El-Abd, North Sinai

III. RESULTS AND DISCUSSION

The data collected from each lake is presented below, including a table providing boat typology, local name(s), dimensions, propulsion system, primary task, construction time, number of crew, and an illustration. It is followed by explication of the most remarkable boat structure within each lake and a general review of some of special matters related to the lake and its boats. The lakes are noted below according to an assigned priority based on the maritime archaeological value and the degree of threat to which the boats are subjected.

III.I. LAKE MARIUT

(Table 1)

FALAYEK, plural of feluka (felucca), is a general name

used for all the lake's local boats.

Fiberglass boats treated by lamination of resign and pigments, are lighter and need no regular maintenance, which is why they predominate at the lake.

The Mariut kareb or sambok is distinguished from a similar Burullus type by its frontal decoration/attachment (*shelb*) that resemble bird-outstretched wings, used for fixing fishing tool.

The obsolete "lotus": 30 years ago, boaters used to live on islands in the quite large lake, in special huts. Each family then needed transportation to ferry materials and supplies for daily life (*ta'een)* from the mainland to the islands. It was the lotus that served this primary purpose. It was used also to carry reeds from the lake to elsewhere for manufacturing of mats and rugs and for thatching.

The lotus disappeared completely from the lake almost 25 years ago, when the lake size shrank, island numbers dwindled, water became polluted, and fishermen shifted to other profitable professions. Its synchronized disappearance with the reduction of lake size further confirms that it was used mainly for transportation rather than fishing, a premise supported by its heavy-built hull, like the Manzala reed-carrying romes, and only possessed by boaters resident on the lake islands. It seems that the lake lotus came in different sizes; the larger version had one or two sails (*aele'*) comprising a yard (*ariah* or *qariah*) fixed to a spar (*sari*). The mast, which stood on the bottom of the hull, was fitted through a deck beam called the *booma*.

A similarly named boat now fishes at the lake-sea connection area (Mariut outtake El-Maks), but it is smaller in size (4 by 0.90 m or 5 by 1.70 m), resembles a heavy-built canoe propelled either by outboard motor or rowing, and has an up-raised bow appropriate for the sea's severe waves. Twenty years ago, this Mediterranean sea lotus had a hollowed deck beam to receive a mast that no longer existed. This was recently replaced by a primitive sail created by raising a blanket on a vertical pole when needed, a technique known as *ambookah*.

III.II. Lake Edku
(Table 2)

The feluka, sombok, and kareb all have flat bottoms, unlike the obsolete lotsy, which possessed a keel attached to slightly carved futtocks. It has no floor frames. Virtually all of the lake boats are operated by punting, but they can also take a 4 m yard affixed to a 2.40 meter mast to take advantage of the wind.

The obsolete lotsy: The lotsy is no longer built but was common some 30 years ago. It has an atypical twin of the same name, used to navigate the Nile at Rashid, that is propelled by either oars or outboard rather the sail. All of the lotsy boats observed in the Nile are built with a hollowed keel attachment to receive the mast, but this seems to be unintentional or an afterthought. An "old" boat, of indeterminate vintage and in a decrepit state, was seen beached on the Nile bank north of the village of Borg Rashid at Rashid city. It had a mast step. This is clear evidence of the disappearance of the sail even from the Nile River—not only from Edku Lake—during the last 30 years. The old lotsy along the Nile near Rashid had a minimum size of 3.50 by 1.50 meters and maximum of 10 by 3 meters, and thus had dimensions and design similar to a boat type called the zerakh, seen on the Damietta branch of the Nile at Nazllet El-Borg, El-Gerbi. It was used in the Rashid branch for both fishing and transporting materials between banks as a ferry. Shipwrights at Rashid attested to lotsy usage at Edku Lake decades ago, commenting, "The lotsy hull has a very shallow draft, up to 40 cm, fitting for Edku's shallowness." One reason for the disappearance of the lotsy from Edku is the current confined lake space and its shallower waters. In order to sail, these boats need both open water and adequate depth so that the bottom does not hit the lakebed when winds swing the boat.

The obsolete lake lotsy was a frame-based boat with futtocks that give a rounded chine, unlike the hard-chined bottom-based lake boats (feluka, sombok, and kareb). The lotsy comprised four main compartments from the stem to the rear stern being: forward *motobsah*; forward *kora*; aft *kora*; and, lastly, aft *motobsa*. The forward and aft *kora* are supplied by a bench for sitting and are separated from each other by a midship beam called the *gaghoos*. In the small-size lotsy, the sail was fixed in the first quarter between the forward *motobsah* and forward *kora*, rather than at midship as in a larger lotsy. The lotsy is known by its long extended stem, the *matrooh*; the stem became such an essential characteristic that it

often entered into colloquial discussions, such as when fishermen would tease one another saying, "Go and die! Your lifespan looks as long as a lotsy's front!" It is marked by its 9-meter boom (*ariah*), fixed to 6-meter mast (*sari*) that stands up on a keel attachment, the *meda*, which passes through an opening in the deck beam (*elbank* or *booma*). The lotsy set its sail when underway downstream (*mengar*) along the canals linked among the separated lake basins, and furled it when going upstream (*kase'*) especially when loaded with plants; in these circumstances it had to be pulled by men who stood streamside using ropes in a technique called *ellaban*. The sail foot was fastened to the foredeck by means of fixed beam (*hawash*) and to the stern by yard according to the direction of the wind. At the stern, the rudder was controlled by a wooden bar/tiller (*osab eldafah*). The lotsy was used for nocturnal fishing; during nighttime operations on the lake, use was made of an oil lamp called *fanoas* or *mesh'al*.

III.III. Lake Qaroun[42]

(Table 3)

The obsolete feluka: Some thirty years ago, Qaroun had a very special boat known as the feluka, slimmer than the markeb sead. It featured a flat stern (*ters*) and was and operated by sail and, oddly, four oars due to the heavily built hull, which could carry up to 4 tons of mullets (*Mugil cephalus*). This unique boat became obsolete as the sizes of catches diminished, but it still remains because local fishermen hope for a return of the fish. It had mostly the same boat parts as the markeb sead, and the same working hours as well. The feluka was rarely beached and was kept most time fishing in the water.

The feluka fishing technique was similar to that seen at Bardawil Lake, namely, *boasat*, except here only one feluka functioned, rather than the two sall as at Bardawil (see below). Simply, the feluka moves in circles while releasing its sunken net (12 m). Once the fishermen see the mullet leaping from the water surface, they start setting the three-layered floating net (rigged with reeds) on the edges of the last circled net to receive the fish, which jump almost 3 m high as they attempt to escape.

Markeb sead[43]: This is the only fishing boat in Lake Qaroun. Its heavily built hull is frame-based, is wide amidships and pointed aft, and has a forked bow extended forward to penetrate the water. Each of the frames (*dolo'*) comprises five connected pieces (the bottom piece [*raked*], which is angled [*koo'*] and the lateral futtocks, *kaem*). The keel (*shohia*) forms the boat's backbone; its frontal upraised element (*badan*) terminates with an upturned attachment (*natah*). The boat consists of several compartments; 1) the foredeck (*elmokdem*) ends with a bordering beam (*arada*) used for keeping the anchor rope and preventing water leaks to the boat center; 2) central hollowed space (*elbatn*) holds the oars and mast backstay beam and serves as entrance to the below-deck aft and fore cabins; 3) aft ceiled part (*elwestany*), from which the fishing net is thrown; and 4) a triangle cockpit (*koraimah*), where the crew-leader stands to set the net, orient the sail, and control the rudder tiller.

Propulsion is provided by two oars (*ood*) tied to lateral attachments 30 cm tall on the gunwale. The oars run are operated by two rowers (*elwestany* and *elmokdem*) who sit on the side of the boat that opposite that of the oar. Relative to its 6 m length, each oar is light in weight. The rig of the triangular sail (*qel'*) consists of a 5 m mast (*sari*) fixed on a mast partner (*sallayiah*) that sits on the keel and passes through the central deck beam (*bank*). The mast that is set up by the boater has a yard (*boosah*) with a maximum length of 20 to 30 m. This supports approximately 40 m^2 of fabric that is furled and unfurled by means of cords, while the sail foot is fastened to two metal rings at the bow. The sail is easily rotated and controlled by a rope (*rage'*) according to wind direction.[44]

Two main fishing techniques (*tarhah*) are used. The first one is undertaken at night (*boori*); at dusk, the fisherman throws his net; he overnights in the cabin and, in early morning, trolls the net. The second is by day (*karkabah*), most probably the same as the *dabah* practiced on Bardawil Lake (both Arabic names mean "beating"). This technique depends on setting the net when moving forward then coming back along the same way while shouting and hitting water with a pole, then moving forward one more time and hauling in the net.

III.IV. Lake Timsah

(Table 4)

There are two primary types of boats; that as feluka 'ood which comes in different sizes, is marked by its keel and requires a higher fishing professionalism than does the other, the bottom-based sall. A third type, a composite of these two, is the kaik, of medium size, having between its freeboard and

upper surface the appearance of the sall, while its lower hull has the advantages of the feluka 'ood, which has a keel.

The lake boat foredeck is called the *botonsah odam*, and its stern counterpart is the *botonsah warah*, while the forward cuddy (cabin) is named *setam* and the after cabin is *el-khon*. The sail consists of a vertical mast (*sari*) supporting a cross yard (*gariah*).

III.V. The Bitter Lakes

(Table 5)

Feluka: The feluka, which is light-built in a frame-first technique, has a keel with futtocks (*dolo'*) laid down, unlike the sall, which is bottom based. Also, it has two central attachments (*mekdim* and *warani*) to fix the oars, just like the Fayoum markeb sead. Each rower sits on the side opposite that of his oar.

The sail is called *shera'* or *omash* and uses a 6 m. mast (*sari*), which penetrates a midship deck beam (*bank*) and is fixed on the boat bottom by an attachment called *salayiah*. The mast carries a 10 m. yard (*ariah*) rigged to the prow by rope termed *mokademah* and is opened by another called *kawam*, while astern a third one (*rage'*) lashes the sail foot for control of the sail and to keep the boat on the desired path.

The boat foredeck (*setam*) has hatch that leads down to a below-deck stowage compartment (*wagarah*). Water, food, utensils, and other tools are kept below, while two frontal attachments (*sham'a*) are there to hold the anchor. In contrast, under the stern (*batonsah*) there is a locker space called el-*khon*, used for keeping a net or for use as berth. The midship (*baten*) features side attachments (*shekremat*) for the oars and three-part bottom slabs (*farsha*). A keel (*ood*) runs down the boat; its upraised parts of the front are called shohiah. The internal gunwale is flanked by wood slabs (*kawertah*) fixed up on other laid down slab (*merayah*).

A few decades ago, the feluka was of a much bigger in size than those that exist today, exceeding 8 meters and used to carry more crew. With fewer fishermen and a decline in the trade, the boats were built smaller in size.

The feluka employs fishing techniques[45] targeting large fish such as *lout* and *darag*. The sall's primary net is called *karkabah* or *ashrat*. The sall will set a winding path, deploying nets, and then, as the crew beat the foredeck with two clubs to make noise, return back to the same (starting) point marked by a buoy. Both trawlers, (lanch and febrah), marked by their forked front and wide aft tersah, use trawl nets (*shanakah*/*garafa* and *gofah*) that are now prohibited because they drag the fishes' spawning ground and destroy other fishing gear.

III.VI. Lake Burullus

(Table 6)

The lukafah is the most significant among the other lake boats,[46] as it distinguishes Burullus Lake to the extent that boaters there emphasize its uniqueness "in the whole world." This vessel provides a sense of local pride. The name derives from the verb root *lakafa,* which means "caught," referring to the boat special fishing technique (*ghazal lukafa*) which rapidly catches fish. A funnel-shaped net, named by analogy to the boat itself, *lukafah* (also known as *gerbah*), is typically attributed to a miniature size of the lukafah known as the feluka. It is bundled to a triangle-shaped frame comprising two vertical 3 m. wooden poles and a 1.5 m. metal base. The fisherman ties and grabs it by hand at anywhere along the aft sides and presses it down into the lake bed so that it drags the bottom when the boats are running with strong winds, either by day or night. Another fishing technique used by the same boat is called *wanah*: two lukafahs move parallel to each other in U-shape path and throw their nets. This rarely used technique is practiced exclusively during winter, when oxygen reduction at the bottom forces the fish to swim to the surface in a confused state[47] and thus easily netted.

The boat is frame-based (*farma* or *adm*), and then planked over. The futtocks are not angled-chine, as is usual in the frames of sea boats, but slightly rounded to match the nature of the lake's shallow water. Its design is unique, and looks like an upside-down concave-bottom plate, or like a plunger stuck to the water surface. Its convex keel (*letrabel*) stabilizes the boat and can achieve optimal speed by offset heeling, in respect to the boat width and its heavy sail. This design allows the boat's lower stern (*elwestaniah*) to touch the lake bottom slightly while moving, causing fish to come out of their nooks and, hence, be caught by the lukafah net held to the side of the boat.

The boat hull has successive compartments, beginning with the front (*booz* or *baden*), to a flat deck forming the boat chest where a hatch (*korah zewada*) leads down to a locker (*koshek*) that serves for shelter, sleeping, and cooking. Some heavy rocks are present

in the bottom of the boat as ballast, to achieve balance and stability. The mast separates the last foredeck from the rear one (*elwestaniah*), which ends with a 3 by 1 m rudder with a 5 m tiller. The poop deck has another opening (*korah samek*) that leads down to a cabin (*elkhon*) used for storing fish, to keep the catch from drying out in the sun and heat. The whole boat deck rests on up-curved beams (*dawakis*) the largest three beams being known as *shent.* Two of them flank the foredeck opening and the third forms, with the huge *engliziat*, the two supporting side beams of the vertical mast (backstay).

The sail comprises three main components; the first is a vertical 11 m. mast (*sari*) that stands to the middle of the boat on a 5 m keel attachment step (*meda*). The raised mast is flanked by two supporting crossbeams, and a rope (*kataf*) rigs the mast to the deck beam (*shent*), while two other lateral ropes (*fayat*) tie the upper part of the mast to the sides of the hull (*bawatees* or *zenar*) by means of metal rings. The second part is a 26 to 31 m wooden boom (*ariah*) lashed to the mast by a cord that penetrates an opening in the top of mast. Thanks to the unusual length of the yard,[48] it consists of three parts, the upper part (*abadah*), the central part (*elaom*) and the sail foot (*mekdem*), which almost touches the foredeck and is bundled to the upper mast by a rope called (*gasar*). The yard is heavy, so can only hold one person, who climbs over it to release the sail. The spar is never down except for maintenance or replacement. Both the first and second parts of the sail—mast and yard—are together known as *kormah*. The third part is the triangular sail (*gel'*), which is furled and unfurled by a curtain-like mechanism (brailing); the cord by which it is called the *shaghol*.

The feluka, which is a miniature version of the lukafah, and the dongol are steered by a quarter rudder when the sail (*talfi'a*) is in use, just like pharaonic boats. Its primary fishing technique is *nashah*, best practiced by night.

III.VII. Lake Manzala

(Table 7)

Markeb sead: Sail boats of the markeb sead type are the most distinguished among the boats of Manzalla Lake. All kinds of Markeb sead[49] (zahria, loux) have keels, unlike the rowboats (feluka and kareb megdaf), which do not. The frame-based, lightly built, and mono-propelled method (sail) boat has a keel (*ood*) and futtocks (*sont*). The foredeck (*setam*) starts with the boat's forked front (*booz*) with up-freeboard lateral attachments (*sham'a*) to hold the anchor. Next is a cabin (*eisha* or *shoom*), where the fishermen cook, eat, and rest. The aft is called *batonsah*, which has a square hatch (*went*) that leads to a fish stowage compartment. Then comes a 35 by 35 cm opening called the *khon*, used as an airshaft and light source. Finally, there is a 2 by 1 m rudder.

Its sail consists of 4, 6, or 9 m mast that goes up through a deck beam called the *tablah* or *hoon*. The mast sits on a keel attachment (*medah*), while the distance between the deck and the bottom (stanchion) is known as *gawoos*. A horizontal yard (*gariah*) is attached to the mast and its upper part (*goody*), while the lower part (*mekdem*) rests on the foredeck by means of wooden pole (*gharizet el-mokdem*). Attached to the mast is a remarkable horizontal wooden spar (*sare'ah* or *makas*), used to mantain boat balance when the weight of the catch causes the boat to list. This spar offsets heeling through application of a counterweight (e.g., a person hanging from the spar), especially when using the *geinab* fishing technique.

III.VIII Lake Bardawil

(Table 8)

The sall is the type of boat currently navigating Bardawil Lake[50] almost exclusively, the motorized sall being the primary version in use. This is a little bit different from the rowboat, being of a larger size that qualifies it for higher loads and having two lateral frontal attachments (*sham'a*) that are used to hold the anchor, while the straight post, absence of oars attachments, and the frontal keel (*amood mad*) assist. The traditional sall design has a completely solid deck except for a large hatch at the foredeck (*batonsa odam*) used by the crew when throwing the net. This design is interrupted by a cabinet surmounted on the frontal hatch and a tiny opening at the stern.

Salls have two special fishing techniques.[51] The first, undertaken by day (from ca. 05:00 am to 05:00 pm especially on days when the moon is visible), is called *boasat* because of its net outrigger built of reeds (*boas*). The second method, called *dabah*, is used by night (from sunset to ca. 06:00 am, especially on moonless nights, when there are more fish). Concerning *boasat*, it is a unique method and accomplished by two salls. Each has a net (*ghazl*) and about seven crew. Both vessels are towed by other two motorized salls (*motor shak*). Each group goes parallel to the other. When the fishing leader gives a

spoken signal (i.e, *A'la-Allah*) the two formerly linked nets on each boat are thrown into the water, As the boats start to approach each other, moving in circles to meet again at one point, fishermen collect the nets by hand or, recently, by a motor. This kind of net (*boasat*) has a floating horizontal unit made of reeds, and sunken vertical one provided by lead weights (*rosas*), where grey mullets ("leaping fishes") pass and cannot escape. Eventually, they start to jump above the water surface (*yezkah*) to finally rest on the floating nets. The nocturnal *dabah* technique relies only on one jet-propelled sall, three crew, and a net of three layers of different mesh sizes (2 *badan*, 1 *sagan*). The crew set the net into water and keep it there all night; they then collect it at dawn. During the wait, fishermen can sleep inside their boats or rest at a nearby island (e.g., Meshref, Romana, Elqals, or Elromiah). The *dabah* technique nets fishes different from those of the *boasat*.

The obsolete sailboat was described by one of Romana village fishermen as such: "My grandfather used to travel across the lagoon in a sail-propelled boat that was widespread before the Israeli conquest over Sinai at 1967. This sailboat was very similar in hull shape to the current sall with a keel (*ark mad*), stern rudder, mast, and yard holding a mechanically unfurled and furled triangular sail."

Canoe-like boats/rowboats could be seen in the lake (transported over trucks from fishermen houses to the lake and vice versa), but were mainly designed to fish at El-Salam Canal, which ends near Baloza and its extension eastward (El Sheikh Gaber Canal). The small version of this boat uses oars, while the larger version uses both oars and a 4 m punting-pole (*medra'*). In general, the boat has a flat-bottom base (*farsh*) supported by frame beams (*dolo'*), planked and laminated by coring materials to be waterproof. The boat is middle-free with two lateral upper attachments (*shegerm*) used for holding the oars, while the foredeck (*batonsa odam*) has frontal attachments that are prepared to receive rope by which it could be towed. On the aft deck (*el-laban*) there is a tiny square cockpit where a crewman stands to throw his net in order not to fall. It uses specific types of net such as the floating cast net (*tofeeh*), and the sinking *isphinx*.

IX. Lakes: Overall Remarks

Some general patterns of lake- and boat-related matters were observed and so are grouped and listed below.

Working Hours

All the Egyptian lakes support fishing by day and night according to season and boat type, while working hours are flexible and almost collectively approved by the local public. Night shifts require specific treatment depending on the moon phase, and water level fluctuation in a system known as *rabiat el-qamar*, since earlier moon phases (eclipsed light) means that the water ebbs and the light is low, hence fish are abundant and cannot see nets. A full moon (*qamar masloop*) causes increased water flow, so fish swim deep and, in case of saltwater, fishing conditions are less ideal, as the salt reflect the moonlight, causing schools to flee.

Overnight fishing prompted crews to sleep within their boats' cabins or inside shanties (called *sokna* at Burulus) founded on islands, uplifted land, or even a wrecked boat. Currently, some lakes prohibit fishing during specific times. For example, the Bitter Lake restrict fishing during night hours, while other lakes ban fishing during specific months (e.g., from December to February at Qaroun and from January to April at Bardawil).

Boats and Boaters Network

Both the lakes boats and even fishermen themselves set up a nation-wide network[52] among the lakes, usually due to low-fishing seasons or changes in the lake ecological system (e.g., salinity, biological aspects, etc.) that consequently result in new fish types that are economically feasible. It is noticed as well that crews could shift to fishing at sea (the Mediterranean or the Red Sea) when lake fishing is not feasible, such as at Mariut, Edku, Manzala, Burullus.

Concerning crews, Lake Qaroun fishermen present a special case, since their presence at all the other lakes is accepted. Although Qaroun also receives fishermen from Burulus and Damietta Sialah, as is the case in most of the lakes, it exports its netters to Suez (Aboromanah, Bitter Lakes), Ismailia (Timsah Lake), Burullus, Edku, Mariut, and much more to Aswan (Keshkah, Garf Hussein, Abu Simbel, and Lake Nasser). Only Manzala Lake stands self sufficient with its local boat crews while exporting some to other lakes (e.g. Burullus, Mariut, and Bardawil). The latter's shore has had a Matriah fishermen's village a few km east of el-Qels since the

Figure 2, A–D: The romes boat.

19th century, by analogy with Matriah of Manzala Lake.

Regarding boats: imported boats are found in all locations, most probably moved on a trial basis, which sometimes succeeded but often failed. Many such boats not native to the lake in question can be found wrecked or simply ignored on the lake shores. For example, Mariut imported the heavy-built romes,[53] marked by its wide aft (*metras*), built at Matriah, Manzala Lake (Fig. 2) primarily to carry reed plants. Edku imported the same romes and Mariut sombok; Qaroun also imported romes; and Timsah imported romes under the name *lanch motor* (since its wide aft bracket is ready to receive an outboard motor). The Bitter Lakes imported the markeb sead from Qaroun.

Anchorages

No terraces of jetties or wharves were observed, and just backwater areas for boats to anchor/mooring spots were identified. These simple anchorages have different names across the lakes; for example, *ellaghm* or *el-maghfarah* at Mariut, *mordah* at Edku, *marsa* at Qaroun and Bardawil, *sabanah* at Timsah, and *halakah* at the Bitter Lakes and Burullus. Manzala Lake is a bit different because of its huge surface, and there are two kinds of anchoring spaces. At one, known as *resoah* or *marsa,* boats are anchored to the shore and empty their cargoes of fish. The second, called *mena sead*, is larger and directly touches the lake shore; here are found the main fish selling units known as *halaka*. For example, there are three famous *mena sead* at Mattriah of Manzla Lake: Ghasna, Alladia, and El-Awkbien.

Fishing Gear and Techniques

The fish nets of the lakes are mostly made from cotton or nylon twines by the crew themselves, and are made in different mesh sizes (*magah*) according to the intended catch. Some range up to 11 m long and can include a three-layered wall of webbing called *eidah*; others are single-layered and as short as 3 m long, best known as *ghazl*, of which there are two kinds; one with wide openings (*fereg*) and one with narrow openings (*zereg*). The latter is an illegally practiced trammel net, to intentionally catch high-

priced feeders and juveniles (*kataket*) which are sold to fish farms and elsewhere.

The Egyptian lakes present an assemblage of different and constant fishing techniques, only some being described here. The word used to express a technique is different among the lakes, for example, *tarhah* at Qaroun, *herfa* at Timsah and Manzala, and *shoghl* at the Bitter Lakes. Primarily inherited from father to son, each technique is run by specific boats and specific crews, has relatively consistent working hours, and is named either by analogy to the local name of the desired fish (e.g., *bolty*) or the way it is operated (e.g., *senar*, using iron baited hooks, and *gawabi*, using a ring covered-net) (Table 9). Lake Edku is an example of such rigid system of labor specialty.

Spots where aquatic reeds and other stiff plants (e.g. reeds, *Eichhornia crassipes*, *ward el Nile* or *bashneen*) grow, known as *bawasat* or *manaseb* at Burullus and *gharzah* at Manzala, are scattered within the freshwater lakes and are preferred by crews to set their nets. These locations provide shelter and organic particles for schools of fish, which gather abundantly to feed. Some lakebed grass, small crabs, and submerged aquatic plants known as *hamool* at Bardawil and as *ghalat* at Bitter Lake hang within the webbing and cause tangling while the nets are trolled, and hence impede the fishing process.

Trailer and Towing Boats

The major boating systems of the lakes present different propulsion methods, among which is towing, a technique well known even from ancient times. Today, the method is amended to accommodate the use of engines.

Lake-Based Industries

The native reed plants are commonly processed into mats such as *hagnah*, *heesh*, *boos*, or *burdi*, and are used for floor covering, thatching, bird catching, small palm-tree wrappings, wind protection for crops protection, or even as coffins (especially at Burullus), following the pharaonic tradition. The practice, called *keep* or *seded,* is a broadly spread profession in the Egyptian lakes environs, especially those of freshwater where excellent conditions and a long growing season occur, such as Edku, Burullus, and Manzala. The manufacturing process goes through steps; it begins with cutting the desired reed stems scattered on lake shores or on internal islands, which are then dried under the hot sun, and later tied together into bundles by strings using a primitive tools and H-shaped frame called *nasbah* (Fig. 3).

Fowl

The Egyptian natural lakes, in general, and the northern lakes specifically, provide suitable breeding habitat (especially islands) for wintering birds from Turkey, Cyprus, Greece, and elsewhere, from September to January (Table 10). Generally, catching ("quail netting") is done on land and in water either by shotguns or bird trap-nets. The latter is known as *tarkibah* or *mansab* at Bardawil, and *shorok* at Manzala.

In-water hunting is preferred onboard less elaborate small boats, such as the light, fast-moved dongol at Burullus, and kareb at Edku. Qaroun boaters encircle birds by nets using two boats and pull them out toward the northern shores, especially when no wind in blowing, as the birds will not fly and instead crouch on the water surface. Mariut crews specifically ensnared sleeping ducks during the night, using reeds. The birds are temporarily blinded by flashing torches.

Terrestrial hunting is different from lake-based hunting. For example, Qaroun crew use birds of prey, especially on its only island, Elqarn, at places of even surface so the raptors can feel free when flying. The raptors' legs are provided with metal hooks that fasten into the flesh of waterfowl. Bardawil crew hunt only on land either by shotgun or bird trap-nets. The latter set on sandbars in different locations, such as Elmohamadiat at Romanah, Elgazira, Dahab, Elmasry, and Hamrah. Each fisherman has his specific catching yard, which varies from 150 to 350 m^2. The net is bundled to poles and comprises two layers, the outer one called *badan* and the inner called *sagan*. This catches birds by moving from the open water (*rahel*) of the lake toward its shoreline.

Boat Construction

The Suez Canal lakes, Timsah, the Great Bitter Lakes, and Bardawil are highly connected in term of building techniques (as well as fishing gears and techniques: *elghab* and *tawelah/aali* at the Bitter Lakes resemble *bawasat* and *dabah* at Bardawil, respectively), and boat types and names (feluka and sall exist at both Timsah and the Bitter Lakes). Yet, the slightly remote Bardawil occasionally acquired

Figure 3: The process of crafting reed bundles (*akiab*), Mastarooh, northern Burullus Lake..

only boat names, which applied to different designs. The northern lakes, Mariut, Edku, Burullus, and Manzalla, are on a different network. Qaroun and Bardawil lakes break down the geo-connection factor and offer unique, and most of the part similar characteristics although far away from each other, most probably rendered to close ecological patterns (e.g., salinity status, water depth, etc.). There is much to be learned from further study of these interconnections.

Labor Division-Based Sex and Age

Boating is a male-based profession at all the Egyptian natural lakes, and only at Kobri Abo El-Khair, Bab El-Abid, El-Tamininat, Apis-Moharem Bek, Lake Mariut, Alex, females were seen boarding ferries passing from a canal side to the other to get home supplies. Children under 18 help their elderly relatives along the fishing process and after, for example, hauling, shouting and beating during netting-based noise techniques, preparing recreational drinks (e.g., tea), cleaning the boat and nets.

Boat Crafting Raw Material

Different local and imported trees are used for shaping the boats different parts. Mulberry (*tut*) and acacia (*sont*) are used for crafting the hull, eucalyptus (*kafor*) for crafting the mast and yard, *felawah* for crafting the keel and futtocks, while an indeterminate "Swedish white wood" (*galad*/*Sweed*; pine) is used for the outer planking.

Boat Crafting Tools

Manufacture tool kit used to build boats (*yemed*) varies among manual options; common tools include

the ax for cutting (*balta*), adze for shaping (*'awakah* or *mangara*; this is the main tool in the toolkit), hammer (*shakoosh*), hand-saw (*sarak*), chisel (*azmeel*), bradawl (*sombok*), and nail (*dofra*), plane (*fara*). Others depend on electricity such as chainsaw, wood-cut machine (*desk*), and drill. The most historic boat-building tools, including the wooden mallet (*qadoom* at Qaroun and *mashwalah* at Burullus), rope based-saw (*monshar habel*), and manual thread-drill (*barima yadawy*), were exclusively observed at Sanhoor Village, Ibshway, Fayoum, especially the rope-based saw (Fig. 4). The wooden mallet and the chisel are basic tools for caulking planks, a process termed *galfatah* or *qalfata*, depending upon the area.

Propulsion Systems

The lakes scenes present different operating methods; sailing is, of course, the oldest and best established, having been observed on the large watercraft of Burullus and Manzalla. Rowing is a technique operated by one crewman on low, sleek-profile boats, or by two on larger boats as at Qaroun and Bitter.

Punting is one of the dominant propulsion systems at the majority of Egyptian lakes, regardless boat size, since it is basically constrained by water depth rather than boat size. Punting poles are made widely from bamboo stalks or, exclusively at Edku, from a "special wood planted at Upper Egypt." The pole has different names in each lake, i.e. *medra* at Mariut and Edku, *kasf* at Manzala, and *medra* at El Salam Canal near Bardawil. The pole is not attested at Qaroun, Timsah, Bardawil, and Bitter Lakes because of slightly deep water there, estimated by

Figure 4: Craft manufacturing tools. **A:** (Left) General boatbuilding tools. **B:** (Left, below) Modern electric tools. **C: (**Below) Primitive tools from Sanhoor Village, Ibshway, Fayoum.

the depth measurement unit *aamah,* which equals about 2 meters. Furthermore, punting poles can be used as mooring posts to anchor the boat anywhere in the lake.

IV. Concluding Remarks

The survey provided here is but a glimpse. It is information gathered from numerous local sources, presented as a part of an ongoing PhD research project by Magdi A. Koutkat concerning the heritage of aquatic ecosystems at the natural lakes of Egypt. The dissertation, titled *Heritage Approach to Egypt's Aquatic Ecosystem: A Focus on the Natural Lakes*, is inseparable from an effort to archive part of the Egyptian living maritime heritage through documenting lake boats, studying their detailed characteristics, and, fundamentally, providing *any* kind of information before it is lost. As early works often are, this manuscript leaves numerous lacunae and may seem as a bit of a pastiche. This is an inevitable result, but it is *a* result where none previously existed. Preserving the record of Egypt's natural lakes boats as tangible cultural heritage in a gargantuan task. If this work serves to inspire any others to advance the state of knowledge, be it through criticism or addition to this work, then the effort is meaningful.

The survey intended to explore several distinct but limited features of each lake's boats with a focus on the most special one among them. Yet, other information was collected along the way and included above. These special features reflect overall general conditions widely dominating the whole body of Egyptian lakes, such as the dynamic changes in its aquatic eco-system on the physical, biological, and chemical characteristics. The survey also revealed insights over the obsolete boats used to navigate the lakes some decades ago and still recalled (with unknown accuracy) by current fishermen, from which future researchers could follow and infer changes in boat structure. Surprisingly, it became evident that hunting of migratory birds is an essential aspect of the greater "fishing" cycle, so it could not go unmentioned in this study. Yet, it requires its own dedicated research.

Perhaps the biggest issues to be addressed in further research, related to the continued existence of boats, is the viability of fishing in general. If the lakes continue to change due to human intervention, fishing can be expected to continue to change at a drastic rate. Consequently, monitoring lake-water eutrophic status, salinity status, mesh sizes, illegal fishing practices, and illegal harvesting of fish fry are necessities. Without a resource to pursue, the boats themselves will become obsolete, as so many forms already have, and will be further lost to history.

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42 The lake has an oblong east-west shape (almost 55 km) marked by several villages on its southern shore, known as Bar Elteen, while on the northern side, Bar Elramel, sand and mountain dominate the scene. Each of the southern villages has a distinct docked anchorage representing the start (*sareh*) and final destination (*nazel*) of the fishing trip, and serves also as a fish market (*halaket samek*).

43 The lake is strictly managed by the government, while each *markeb* has a license number and can navigate freely anywhere within the lake.

44 Wind is a basic steering factor in Qaroun Lake, as there are two different winds per each season: during summer, *sharky* blow from the east and *tayab gharbi* come from the northwest; in winter there are *gharbi* from the west and *qeblawy* from the south.

45 Each fishing basin (known generally as *halaka* or *sorooh*) has a special license number and boat color. For example, Fayed's boats are blue, Fanarah boats are green, and Abo-romanah boats are white. Fishermen can navigate and fish anywhere until reaching the buoyed stop sign (*shamandorat*) or solar-power lamps (*fwanees*) that mark the lane for the Suez Canal ships to pass.

46 The lake boats can navigate and fish anywhere on the lake without limitations.

47 In a temperate climate (e.g., Egypt), winter causes reduction of oxygen, especially at the lake bottom, and leads to fish loss in a phenomenon known as winterkill; see Using Science to Create a Better Place, Hydromorphological Literature Review for lakes, Integrated Catchment Science Program, Environment Agency, England, 2009, p. 24, Online: https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/291691/scho0309bprb-e-e.pdf.

48 The shipyard is responsible for building the boat in its entirety, excluding only the yard, which is created by the boat-owner himself after launching the boat for the first time at a celebration in which the owner, his relatives, and his colleagues gather.

49 Fishermen said, "Forty years ago, there was bigger size of zahria that is now extinct. As a result of the lake size shrinkage, wind strength decreased to a point that there was not enough power to operate the large boat." Its dimensions are estimated to be 17 by 4.5 m, and, although slimmer, it matches those still navigating Burullus Lake. It is inferred that those obsolete boats are similar to the transshipment boats currently carrying water containers, known as *malao*.

50 All ports and their anchored sall vessels are subject to government control. Boats in each port have a distinct license number allow it to navigate (*sareh*) and return back (*merawah*) within the same port.

51 Other nets illegally used are the: *dahabana*, designed for catching mullets; *kalsa*, a trawl net, designed to catch crustaceans; and *shanshola*, used for thinlip mullet (*Liza ramada*). All cause destructive impacts to fish fry/juveniles/fingerlings, and as a result minimize their stocks.

[52] Mobility or migration of mariners, fishermen, and craftsmen among regional localities and even among different states (e.g., Greece, Phoenicia, and Egypt), is well known from since at least the ancient historic period, and probably existed prior. Cf. Linder, E. Mobility of Craftsmen Among Greek and Phoenician Shipwrights: A Working Hypothesis, in: Harry Tzalas (ed.), *6th International Symposium on Ship Construction in Antiquity* (*Tropis* VI), Hellenic Institute for the Preservation of Nautical Tradition, Lamia 1996 Proceedings, Athens 2001, p. 397 .

[53] Interestingly, the design and distribution of this romes is identical with the *Kasiotikos* boat (*Kasiotikon*) used to navigate the Nile River, its branches, and different lakes since the 3rd century CE onward, attributed to the Roman site of Kasion/Kasiotis in the El-Quels region of northern Sinai, Egypt. Cf. Verreth, H., The Northern Sinai From the 7th Century BC Till the 7th Century AD: A Guide to the Sources, Volume I, Leuven, 2006, pp. 434–439.

Table 1: III.I. Lake Mariut boats.

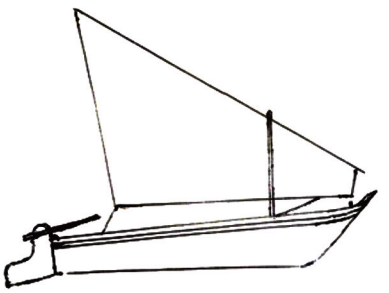
N.	Boat Type	Boat Local Names(s)			LOA by Width/M.	Propulsion System(s)	Task(s)	Crafting Period (days)	On-board Crew
1	Rowboat								
			1-1	-Feluka	-6 b 0.95 -5.75 by 0.90 -5 by 0.60	-Rowing -Punting (*medra*) -Sail	Fishing	10	2–3
									
	Fiberglass		1-2	-Kareb -Sombok Eskandarani	-4 by 60 -4.5 by 0.70	-Rowing -Punting	Fishing	6	1–2
									
2	Limousine Boat (obsolete)	Lotus			12 by 3.60 ?	-Sail (one or two, according to size) -Rowing -Punting	Transferring reeds, food, fish, and boater's family within the lake for picnic	30?	1-8?
									

The lotus at the Mediterranean-lake connection area El-Maks.

Table 2: III.II. Lake Edku boats *(continued on next page)*.

N.	Boat Type	Boat Local Names(s)			LOA by Width/M.	Propulsion System(s)	Task(s)	Crafting Period (days)	On-board Crew
1	Canoe-like boat								
			1-	Feluka	-7.0 by 0.70 -8.0 by 1.0	-Punting -Sailing	-Fishing	10	2–4
									
									
									
			1- 2-	Sombok	-4.60 by 0.62 -6.50 by 0.75	-Punting -Sailing	Fishing	8	1–3
									

Table 2: III.II. Lake Edku boats *(continued from previous page)*.

N.	Boat Type	Boat Local Names(s)			LOA by Width/M.	Propulsion System(s)	Task(s)	Crafting Period (days)	On-board Crew
1	Canoe-like boat								
			1-3	Kareb	-4.50 by 0.60 05.0 by 0.70	-Punting -Sailing	Fishing	6	1–2
									
2	Sailboat	Lotsy (obsolete)			-8.0 by 2.0 -6.0 by 1.5	-Sailing -Punting	-Fishing -Transportation of reed stems (*burdi*)	15	2–10
									

Drawing by Mahros Lahma, Lahma Shipyard, Rashid, Behiera Governate.

Table 3: III.III. Lake Qaroun boats.

N.	Boat Type	Boat Local Names(s)			LOA by Width/M.	Propulsion System(s)	Task(s)	Crafting Period (days)	On-board Crew
1	Sailboat								
			1-1	Felukah (obsolete)	8.5 by 2.5	-Sail -Rowing (4 oars)	Fishing	?	up to 10
			1-2	Markeb Sead Shera'i	-8.3 by 2.25 -8 by 2.2 -7.90 by 2.10	-Sail -Rowing	Fishing	20	4–6
 									
2	Cruiser			Markeb Fosha	-6 by 2 -5.5 by 1.60	Rowing (3.80)	Tours	7	up to 8
									
3	Speedboat			Lanch	-9 by 2.5	Outboard motor	Governmental activities (control, research, etc.)	?	1-10
4	Dinghy			-Zoorek -Matat	5 by 2	Outboard motor	Governmental activities (control, research, etc.)	?	1–5

Table 4: III.IV. Lake Timsah boats (*continued on next page*).

N.	Boat Type	Boat Local Names(s)			LOA by Width/M.	Propulsion System(s)	Task(s)	Crafting Period (days)	On-board Crew
1	Sailboat	Feluka 'ood							
			1-1	Feluka 'ood kamel	6.7 by 1.5	-Sailing -Rowing	Fishing	60	6–7
									
			1-2	Feluka 3/4 'ood	5.5 by 1.25	-Sailing -Rowing	Fishing	45	5
									
			1-3	Fluka 1/2 'ood	4.5 by 1.2	-Sailing -Rowing	Fishing	30	3
									

Table 4: III.IV. Lake Timsah boats (*continued from previous page*).

N.	Boat Type	Boat Local Names(s)			LOA by Width/M.	Propulsion System(s)	Task(s)	Crafting Period (days)	On-board Crew
2	Rowboat								
			2-1	Kaik	5.5 by 1.25	-Rowing -Sailing	Fishing	30	5
									
			2-2	Sall	4 by 1	-Rowing -Sailing	Fishing	20	2
									
3	Cruiser			Lanch	varied	Engine	Tours	Variable	Variable
									

Table 5: III.V. Bitter Lakes boats (*continued on next page*).

N.	Boat Type	Boat Local Names(s)			LOA by Width/M.	Propulsion System(s)	Task(s)	Crafting Period (days)	On-board Crew
1	Sailboat	Feluka							
			1-1	Big Feluka	6.75 by 2.10	-Sailing -Rowing (oar, 5.6 m)	Fishing	60	8
			1-2	Medium Feluka	6.50 by 1.8	-Sailing -Rowing	Fishing	45	4–5

Table 5: III.V. Bitter Lakes boats (*continued from previous/on next page*).

N.	Boat Type	Boat Local Names(s)			LOA by Width/M.	Propulsion System(s)	Task(s)	Crafting Period (days)	On-board Crew
1	Sailboat	Flukka							
			1-3	Small Feluka	5.50 by 1.50	-Sailing -Rowing	Fishing	30	2–3
									
2	Rowboat								
			2-1	Big Sall	4.50 by 1.50	-Rowing (oar, 1.70 m) -Sailing	Fishing	20	2–3
									
			2-2	-Small Sall -Small Ter'a	3 by 1.20	-Sailing -Rowing	Fishing	17	2
									

Table 5: III.V. Bitter Lakes boats (*continued from previous page*).

N.	Boat Type	Boat Local Names(s)			LOA by Width/M.	Propulsion System(s)	Task(s)	Crafting Period (days)	On-board Crew
3	Outboard Boat								
			3-1	Lanch	8 by 2.20	Outboard motor	Fishing	Variable	Variable
									
	Speedboat		3-2	Febrah	5 by 1.80	Outboard motor	Fishing	Variable	Variable
									

Table 6: III.VI. Lake Burullus boats (*continued on next page*).

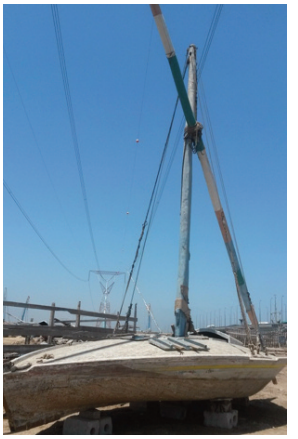
N.	Boat Type	Boat Local Names(s)			LOA by Width/M.	Propulsion System(s)	Task(s)	Crafting Period (days)	On-board Crew
1	Sailboat	Markeb Shera							
			1-1	Lukafah	-16 by 7 -15 by 6.5 -14 by 5.80	-Sailing -Punting	Fishing	90	4–5
									
			1-2	Feluka	12 by 5	Sailing Punting	Fishing	60	3
									

Table 6: III.VI. Lake Burullus boats (*continued from previous/on next page*).

N.	Boat Type	Boat Local Names(s)			LOA by Width/M.	Propulsion System(s)	Task(s)	Crafting Period (days)	On-board Crew
2	Canoe-like boats								
			2-1	Basoka	7 by 2	-Sailing (*talfe'a*) -Punting	Fishing	10	2
									
			2-2	Dongol	5 by 1.5	-Sailing (*talfe'a*) -Punting (*kasf* = *medra* but smaller in size)	Fishing	3	1
 									
			2-3	Sambook	3 by 0.60	-Sail (talfe'a) -Punting (*kasf* = *medra* but smaller in size)			
									

Table 6: III.VI. Lake Burullus boats (*continued from previous page*).

N.	Boat Type	Boat Local Names(s)			LOA by Width/M.	Propulsion System(s)	Task(s)	Crafting Period (days)	On-board Crew
3	Towing Boat								
			3-1	Markeb	9 by 3.5	Sail (two)	Towing reeds' trailer boats and the reeds themselves	50	3–5
									
			3-2	Lanch	6 by 3	Engine	Transferring food (*zewada*), fish, & boaters in & out of the lake in case lukafah was kept in water for 24/48 hours and need suppplies	30	Variable
									
4	Ferry	Ma'diah			12 by 3.60	Engine	Transporting people between lake shores	60	Variable

Table 7: III.VII. Lake Manzala boats (*continued on next page*).

N.	Boat Type	Boat Local Names(s)			LOA by Width/M.	Propulsion System(s)	Task(s)	Crafting Period (days)	On-board Crew
1	Sailboat	Markeb sead							
			1-1	Zahria (obsolete)	17 by 4.5	Sail	Fishing	120	Variable
			1-2	Zahria	13.5 by 3.75	-Sail (26 m) -Towed by lanch	Fishing	60	2–6
									
			1-3	Zahria	13 by 3.5	-Sail (15 m) -Towed by lanch	Fishing	45	2–4
									
			1-4	Loux	11 by 2.60	-Sail (12 m) -Punting (*ghabah*)	Fishing	30	1–3
									

Table 7: III.VII. Lake Manzala boats (*continued from/on next page*).

N.	Boat Type	Boat Local Names(s)			LOA by Width/M.	Propulsion System(s)	Task(s)	Crafting Period (days)	On-board Crew
2	Rowboat								
			2-1	Feluka	6 by 1.20	-Rowing -Punting (*ghabah*)	Fishing	15	1–3
									
			2-2	Kareb Megdaf	4 by 1	-Rowing -Punting (*ghaba*)	-Fishing -Selling outlet	20	1–2
									
3	Trailer Boat (utility boat)		3-1	Mekery (obsolete)	?	Towed by big towing boat	Transporting construction materials	?	?
	Barge		3-2	Malao	17 by 4.5	Towed by big towing boat	Transporting water to island residents	90	Variable
									

Table 7: III.VII. Lake Manzala boats (*continued from previous/on next page*).

N.	Boat Type	Boat Local Names(s)			LOA by Width/M.	Propulsion System(s)	Task(s)	Crafting Period (days)	On-board Crew
	Barge		3-3	Romes	13 by 2.5	Towed by towing boat	Bringing reeds from inside the lake	60	10
									
			304	Hasakah	6 by 1.5	Towed by towing boat	Bringing reed plants from inside the lake	20–25	2–7
									
4	Towing Boat								
	Tugboat		4-1	Big Lanch	16 by 4	Engine	-towing minor boats and malao boat -transporting reeds, water, & supplies to people living on islands	Variable	Variable
									

Table 7: III.VII. Lake Manzala boats (*continued from previous page*).

N.	Boat Type	Boat Local Names(s)			LOA by Width/M.	Propulsion System(s)	Task(s)	Crafting Period (days)	On-board Crew
	Towing Boat								
	Speedboat		4-2	-Small Lanch -Hasakah Motor -Farghet	4 by 1	Outboard motor	Tours, transportation of goods, people, fish	Variable	Variable
									

Table 8: III.VIII. Lake Bardawil boats (*continued on next page*).

N.	Boat Type	Boat Local Names(s)			LOA by Width/M.	Propulsion System(s)	Task(s)	Crafting Period (days)	On-board Crew
1	Motorboat	-Sall -Markeb -Felukah			7.12 by 1.53	Kicker outboard motor (*motor shak*)	-Fishing -Towing	60	2–7
									
2	Rowboat	Kareb							
			2-1	-Small Boat -Ter'a Boat	3.5 by 1.25	Rowing	Fishing	14	2
									
			2-2	Big Boat	4 by 1.5	-Rowing -Punting	Fishing	21	3–4
									

Table 8: III.VIII. Lake Bardawil boats (*continued from previous page*).

N.	Boat Type	Boat Local Names(s)			LOA by Width/M.	Propulsion System(s)	Task(s)	Crafting Period (days)	Onboard Crew
3	Sailboat (obsolete)	-Markeb Shera' -Markeb Gal'			?	Sail	Fishing	?	?

Table 9: Natural lakes of Egypt, their boats, and fishing techniques.

N.	Lake	Lake Boats	Fishing Techniques																						
			Toraha	Gawaby	Senar	Ganeb	Kotamiah	Hablah	Nashah	Markha	Tabab	Klob	Bolty	Karkabah/Ashrat	Floating Ghazel	Shanakah/garafa/gofah/shanshola	Kalsa/Dahabana	Boasat	Lout and Darag	Dawar	Dabah	Gambary	Isphinx	Tofeeh
1	Mariut		*	*	*	*	*																	
2	Edku	Fluka					*	*	*	*	*													
		Sombok						*	*		*													
		Kareb		*					*			*												
3	Qaroun																							
4	Timsah			*	*			*					*	*	*									
5	Bitter	Fluka																	*					
		Sall												*										
		Lanch															*							
		Febrah															*							
6	Burullus																							
7	Manzala[a]	Zahria																				*		
		Fluka																			*			
		Kareb	*	*	*	*														*				
8	Bardawil	Sall															*	*			*			
		Row-boat																					*	*

Note:

[a] Manzala Lake fishing techniques are best commemorated in a sentence narrated in rhyme: "Elgaharah[s] get out of water tired as drunk, just for tiny Shabbara fishes. Is there a better technique rather than *tabab el mayah* that gets me sick? The *gonab* technique is exhausting and there is also *gorab* that requires wind so that boats could navigate Matariya basin." One of the historic fishing techniques is called *elgaharah*, operated by a fisherman himself (*elgaharah*), standing in shallow water (*gill*) in order to catch fish, especially *shabara*, with only his hands.

Table 10: Birds of Egypt's natural lakes. (Note: this is based only on surveyed sites within each lake and does not reflect the whole lake.)

Birds		Lake							
Common Name (English)	Local Name(s)	Mariut	Edku	Qaroun	Timsah	Bitter	Burullus	Manzala	Bardawil
Common Gull	Noores Abaid	*			*	*	*		
Eurasian Coot	Ghoor Aswad Momtaz Aswad	*	*	*	*	*	*	*	*
Common Teal	Batt Sharsheery	*							*
?	Sefsaf								*
Common Chiffchaff	Saksook								*
?	Rokab								*
Quail	Seman							*	*
Water Rail	Mara'y								*
Greater Flamingo	Bashroosh							*	*
?	El-Tomees								*
Bluethroat?	El-Hasani								*
Heron/Bittern?	Waq								*
Woodcock	Elghaby Ferakh Elghab Ferakk Hesh	*	*		*			*	*
Cormorant	Ghorab el Bahr								*
?	Degty							*	
?	Omsalam							*	
?	El-kohel							*	
?	Mestekawia							*	
Blue-cheeked Bee-eater?	But Iraqi					*	*		
?	Abo Ali					*			
Pelican	Bag'			*	*				*
Egret	Balashon Swa'y			*		*			
Peregrine Falcon	Shaheen			*					
Grebe?	Za'weet			*					
?	Sha'ir			*					
Mallard/Little Green Bee-eater?	Khodary			*					
Common Pochard	Homran	*							

TABLE 11: Arabic terms, including toponyms.

A'la-Allah / على الله

aamah/ آمه

abadah/ عباده

abo ali/ ابو على

Abu-Shanab Family Shipyard & Azak or Azal Elmina, Elma'dia, Edku / ورشة أبوشنب، و أزق المينا، منطقة المعدية، إدكو.

adm/ عضم

aele' /إلع

Alladia Anchorage, Mattaria lake, Daqahlia / مينا صيد علاديا، بحيرة المطرية، الدقهلية

Alladia/ علاديه

Ambookah/ امبوكه

amood mad/ عمود مَدْ

arada/ (عرّاضه

ariah/ اريه

ark mad / عرق المَدْ

ashrat/ عشرات

aweoaka / عواقه أو بلطه

azmeel/ أزميل

badan/ (بدن

bag' /بجع

balashon/ "بلشون

Baloza/ بَلوظه

bank/ بنك

barima yadawy/ بريمه يدوى

bashroosh / البشاروش

basoka/ باسوكه

baten/ بطن

batonsa odam/ بطنسه أُدام

batonsa odam/ بَطُنسَه أُدَّام

batonsah/ باطونسه

batonsah/ بطنسه

batt sharsheery/ بط شرشيرى

bawasat/ بواساط

bawatees/ بواطيس

(big boat) / قارب كبير

fluka (big) / فلوكه كبيره

lanch (big) / لانش كبير

sall (big) / صال كبير

boasat/ بواساط

Boghaz El-Halakah, Belajat region, Timsah Lake, Ismailia Governorate / بوغاز الحَلقة، منطقة البلاجات، بحيرة التمساح، الاسماعيلية.

bolty/ بلطى

boori/ بورى

boos/ بوص

boosah/ بوصه

booz / بووز

botonsah odam/ بُطنْسه أودّام

botonsah warah/ بُطنْسه وره

burdi/ بردى

but Iraqi / بط عراقى

dabah/ دابه

dabah/ دابّه

dabah/ دَبه

dahabana/ دهبانه

darag/ دراج

dawakis/ دواقيس

dawar/ دَاور

degty/ دجتى

desk/ ديسك

dofra/ ضُفره

dolo'/ ضلوع

dongol/ دُونْجول

eidah/ عِده

eisha/ عشه

El-Awkbien/ العقبيين

El-Ganash Kiosk, Nemra khamsa, Edku / كشك الجناش، نمره خمسه، إدكو

el-khon/ الخُن

el-kohel/ الكُحل

el-laban/ اللبان

el-maghfarah/ المغفره

El-Telul port, City of Bir El-Abd, North Sinai / مينا التلول، مدينة بئر العبد، شمال سيناء

elaom/ الأم

elbatn/ البطن

elghaby/ الغابى

ellaban/ اللّبان

ellaghm/ اللغم

Elmaks/ المكس

elmokdem/ مُقدم

Elqarn/ القرن

Elshakhloba anchorage, Sedi Salim, Kafr Al-Sheikh / حلقة سمك الشخلوبة، سيدى سالم، كفر الشيخ

elwestaniah/ الوسطانيه

elwestany/ الوسطانى

engliziat/ إنجليزيات

eskandarani/ سّمبوْك اسكندرانى

fara/ فاره

farghet motor/ فرغة موتور

farma/ فارمه

farsh/ فَرش

farsha/ فرشه

fayat/ فايات

Febrah/ فيبره

felawah/ فلاوه

feluka/ فلوكه

feluka 'ood/ فلوكه عود

feluka 1/2 'ood/ فلوكه نص عود

feluka 3/4 'ood/ فلوكه تلت تربع عود

felukah/ فِلوكه

Ferakh Elghab/ فراخ الغاب

Ferakk hesh/ (فراخ هيش

fereg/ فِرج

Forn El-graya, Elmekwa, Elkabary / فُرن الجَرايه، المَقوه، القبارى

gaghoos/جاغووس

galfatah/ جلفطه

gambary/ جمبرى

ganeb/ جانب

gariah/ جاريه

gasar/ جصّار

gawabi/ جوابى

gawaby/ جوابى

gawoos/ جاوو

geinab/ جناب

gel' /جلع

gerbah/ جربه

ghabah/ غابه

ghalat/ غلت

gharizet el-mokdem / غريزة المقدم

gharzah/ غُرزه

Ghasna/ غصنه

ghazal lukafa/ غزْل لقافه

ghazel (floating) / غزل عايم

ghazl/ غزل

ghoor aswad/ الغوّر الاسود

ghorab el bahr غراب البحر

goody/ جودى

hablah/ هبله

hagnah/ حجنه

halaka/ حلقه

halakah/ حلقه

hamool/ حامول

hasakah/ حسكه

hasakah motor/ حسكة موتور

hawash/ حوّاش

heesh/ هيش

herfa/ حرفه

homran/ حُمران

TABLE 11: Arabic terms, including toponyms.

hoon /هوون

isphinx /إسفينْكسْ

Izbet El Burg, Al-Jerbi, Damietta-Ras El Bar Road, Damietta Nile Branch / عزبة البرج، الجيربى، طريق دمياط رأس البر، النيل فرع دمياط

kaem /قائم

kafor / كافور

Kahk Village, Ibshway, Fayoum / كحك، إبشواى، الفيوم

kaik /كيك

kalsa /كلسه

kamel / فلوكه عود كامل

kareb megdaf /قارب مجداف

kareb /قارب

karkabah /كركبه

karkabah /كَركَبه

kase' /كاسع

kasf /قصف

kataf /كتاف

kataket /كتاكيت

kawam /قوّام

kawertah /كاورته

keep /كيب

khodary /خضارى

khon /خُن

klob /كلوب

Kobri Abo El-Khair, Bab El-Abid, El-Tamininat, Apis Moharem Bek / كوبرى ابو الخير، باب العبيد، التمينانات، أبيس محرم بك

koo' /كوع]

kora (aft) / كوره خلفيه

kora (forward) /كوره امام;

korah samek /كورة سمك

korah zewada /كورة زواده

koraimah /قُريِمه

kormah /قرمه

kotamiah /كتاميه

lakafa /لَقَفَ

lanch motor / لانش موتور

lanch /لانش

letrabel /ليترابل

lotsy /لوتس

lotus /لوتس

lout /لوت

loux/لُوكس

lukafah /لُقّافه

lukafah /لقافه

magah /ماجه

makas /مَقّصْ

malao /ملاّو

manaseb /مناصب

mansab /منْصب

mara'y /مراعى

markeb fosha /مركب فُسحه

markeb gal' /مركب جَلْع

markeb sead shera'i / مركب صيد شْراعى

markeb sead /مركب صيد

markeb sead shera'i /مركب صيد شْراعى:

markeb shera' /مركب شِراع

markeb shera' /مركب شراعى

markeb /مركب

markha /مارخه

marsa /مرسى

mashwalah /مشوله

matat /مطاط

matrooh /مطروح;

meda /ميده

medah /ميده

fluka (medium) /فلوكه متوسطه

medra' /مِدراع

medra /مِدر

medra /مِدره

mekdem /مقدم

mekdem /مقدم

mekdim /مِقدم

mena sead / مينا صيد

mengar /مِنجَر

merayah /مرايه

mestekawia /مستكاويه

mokademah /مقدمه

momtaz aswad /ممتاز أسود

monshar habel /مُنشار حبل

mordah /مُوردْه

motobsa (aft) /مطوبسه خلفيه

motobsah (forward) /مُطوبسه اماميه

motor shak /موتور شك

Nag' ElArab, Nobria, Elwardian / نجع العرب، النوبريه، الورديان

nasbah /نصبه

nashah /نشه

natah /نطّاح

noores abiad /نوورس ابيض

omash /أوماش

omsalam /ام سلام

ood /عود

osab eldafah /عصاب الدفه

qadoom /قدُّووم

qamar masloop /قمر مصلوب

qel' /قلع

rabiat el-qamar /رَبية القمر

rage' /راجع

rahel /راحِل

Railroad Crossing, Elma'dia shuttle station, Edku / مزلقان القطر، موقف المعديه، إدكو

raked /راقد]

resoah /رسوه

rokab /روكاب

Romana village, City of Bir El-Abd, North Sinai / رُمّانه، مدينة بئر العبد، شمال سيناء

romes /روميس

rosas /رُصاص

sabanah /صَبانه

saksook /سكسوك

salayiah /صلايه

sall ter'a / صال ترعه

sall /صال

sall /صَال

sallayiah /صلايه

sambook /سامبوك

Sanhoor Village, Ibshway, Fayoum / سنهور، إبشواى، الفيوم

sarak /سراق

sare'ah /سارعه

sari /سارى

seded /سدد

sefsaf /صفصاف

seman /سمان

senar /سنار

setam /سيطام

sha'ir /شاعر

shagho l/شاغول

shaheen /شاهين

shakoosh /شاكوش

Shakshok village, Ibshway, Fayoum / شكشوك، إبشواى، الفيوم

sham'a /شمعه

shegerm /شيجيرم

TABLE 11: Arabic terms, including toponyms.

shekremat /شكريمات

shent /شنت

shera' /شراع

Shipyard of Haj Ali Asfour, Elshakhloba, Sedi Salim, Kafr Al-Sheikh / ورشة علي عصفور، الشخلوبة، سيدى سالم، كفر الشيخ

Shipyard of Haj Mahmoud Elkasas, strait of Borg Elborollus, Kafr Al-Sheikh / ورشة حاج محمود القصاص، بوغاز برج البرلس، كفر الشيخ

shoghl /شُغل

shohia /شُحيه

shohiah /شحية

shoom/شوم

shorok /شُرك

(boat, small) /قارب صغير

fluka (small) /فلوكه صغيره

lanch (small) /لانش صغير

sall (small) / صال صغير

sombok /سومبك

sombok /سومبوك

sont/سُنط

Srooh Fayed, Fayed District, Ismailia Governorate / سُروح فايد، مركز فايد، الاسماعلية

swa'y /سواعى

tabab /طبب

tablah /طبله

talfi'a /تلفيعه

tarhah /طَرحه

tarkibah /تركيبه

ter'a (boat) / قارب ترعه

ters /تِرس

tofeeh /طُفيح

toraha /طوراحه

wagarah /وَجَره

wanah /وَنَّه:

waq /واق

warani /وَرّانى

went /ونت

yemed /يمدْ

yezkah /يزكح

za'weet /زعويط

zahari /زهّارى

zahria /زِهريه

zenar /زنار

zerakh /زيرخ

zereg /زِرِج

zoorek /زورق مكيرى