UNDER THE MEDITERRANEAN I

Studies in Maritime Archaeology

edited by
STELLA DEMESTICHA & LUCY BLUE

WITH KALLIOPI BAIKA, CARLO BELTRAME,
DAVID BLACKMAN, DEBORAH CVIKEL, HELEN FARR
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HONOR FROST FOUNDATION

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The First Marine Structures Reported from Roman/ Byzantine Ashkelon, Israel

Do they solve the enigma of the city's harbour?

Ehud Galili, Baruch Rosen**, Asaf Oron***, and Elisabetta Boaretto*****

The inland territories of ancient Ashkelon served as a productive and rich agricultural hinterland, giving the city commercial and strategic advantages. Archaeological finds and literary sources point to an intensive maritime activity and international trade, yet no harbour has been discovered there. The coastline of Ashkelon is straight, sandy, and lacking bays, and could not provide shelter for seagoing ships during winter storms. This contradiction has been noted but never resolved. During 2002 and 2004 two wooden piling installations were discovered some 130 m offshore and 5-7 m deep. Dated by radiocarbon analysis to the Late Roman-Byzantine periods, they are interpreted as an offshore mooring facility and artificial beaching installation respectively and are described and discussed.

Keywords: wooden pilings, wooden mole, mooring, harbour, anchorage.

Ancient Ashkelon is situated on the coast of the Judean plain, a productive and rich agricultural hinterland (Figs 1a-b). The city is located on the coast adjacent to the Via Maris, which connected Egypt with Syro-Canaanite coastal points to the north. Ashkelon also served as the sea terminus to the incense trade route, connecting the East with the Mediterranean coast (Avi-Yonah and Eph'al, 1975). This location gave it commercial and strategic advantages, which brought about its development as an important urban centre, beginning in the Middle Bronze Age (20th-17th century BCE). Its flourishing trade was terminated with the end of the Crusader period (late 13th century CE). The success of the city depended heavily on the sea and port facilities that were needed to maintain such extensive maritime trade. The existence of a landing place is inferred from the archaeological evidence of continuous sea trade found in the city. However, no built harbour facilities have been discovered there.

A diversity of imported goods has been recovered in archaeological excavations at Tel Ashkelon. There is historical evidence for trade in oil, wine, and other agricultural products, which were distributed all over the Mediterranean (Stager, 1992; Devorjetski, 2001: 121-127; Stager and Schloen, 2008). This evidence points to widespread maritime ties between Ashkelon and the large trading centres of the Mediterranean basin.

Evidence of the role of Ashkelon can be found also in historical records. In Pseudo-Scylax's guide for seafarers from the 4th century BCE, Ashkelon appears as a

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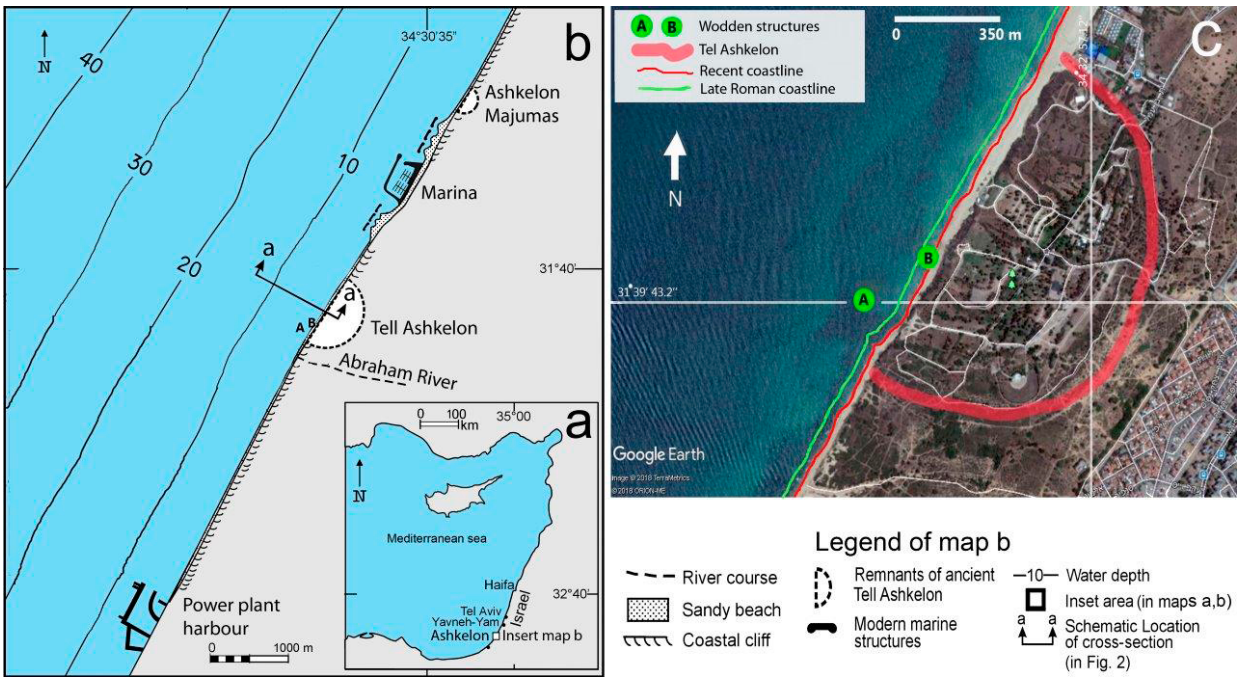

Figure 1. Location map: a) the eastern Mediterranean and the Israeli coast (E. Galili); b) Ashkelon coast, including the location of the cross-section a-a (see Fig. 2) (E. Galili); c) Tel Ashkelon, the location of the two wooden installations (A, B), the location of the coastline during the Late Roman period (green line) and at present (thin red line) (Modified by E. Galili after Google Earth: Image ©2018 TerraMetrics; © 2018 ORION-ME; © 2018 Google; Image © 2018 Digital Globe).

coastal city (Stern, 1974: 3: 8-10). William, Archbishop of Tyre, visiting Ashkelon in 1153, after the Crusader conquest, wrote:

> Ascalon derives no advantage from being situated on the seacoast, for it offers no port or safe harbour for ships. It has a mere sandy beach and the violent winds make the sea around the city exceedingly choppy so that, unless the sea be calm, those who come there are very suspicious of it. (Babcock, 1943; Brundage, 1962: 126-136)

The Arab historians Ibn Shaddâd and Abu al-Fidâ, citing earlier sources, stated that Ashkelon did not have a harbour in which ships could anchor (Sharon, 1995: 65). Victor Guerin, who surveyed Ashkelon's ruins between 1854 and 1863, echoed his predecessors:

> The pattern of the Ashkelon coast is not at all suited for giving shelter to ships, therefore Ashkelon never had a port or anchorage that could provide safe haven for ships, but only a dangerous sandy beach. (Ben-Amram, 1982: 100, 109-110)

Despite the intensive surveys and excavations carried out to date, no remains of a built port have ever been found in Ashkelon. No historical description suggests that the city had a port, while some categorically deny its existence. The coast of Ashkelon is straight, sandy, and lacks bays and islets that could provide shelter for seagoing ships during storms. The nearest temporary shelters for ships are Tel Ridan anchorage, 40 km to the south (Raban and Galili, 1985), and Yavneh-Yam anchorage, 35 km to the north (Galili and Sharvit, 1991; 1996; Galili *et al.*, 2002), and these could not be used in winter. Thus, Ashkelon is situated at the centre of a 75 km-long coastal strip that lacks havens for ships during storms and certainly does not enable safe loading and unloading of goods in a stormy sea.

This article reports the discovery of two marine-associated installations made of wood at Ashkelon. The finds constitute the first known mooring facility and marine approaches in Ashkelon. The structures, interpreted as an offshore mooring facility and a shore installation, are described and discussed below.

The finds

Underwater and coastal surveys at Ashkelon were carried out by the Israel Antiquities Authority (IAA). The underwater archaeological remains opposite Tel Ashkelon (Figs 1a-1c) are usually covered by a protective layer of sand. Changes in the amount of the sand-cover in the shallows, caused by natural or human interventions,

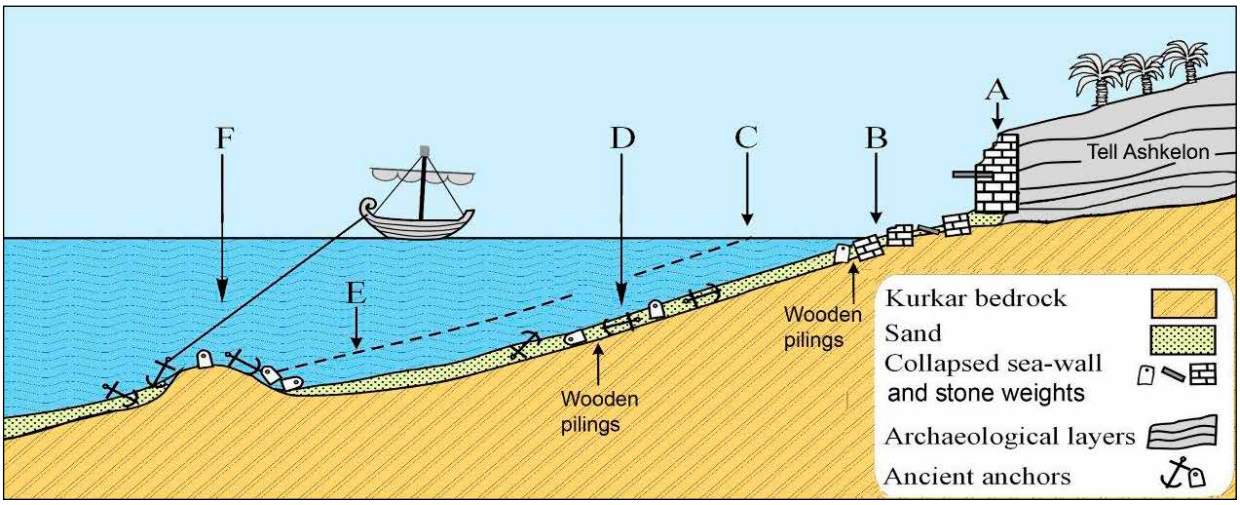

Figure 2. Schematic possible reconstruction of the cross-section of Tel Ashkelon coast during the Late Roman-Byzantine periods (for the location of the section, see line a-a in Fig. 1b): A) ancient seawall with granite columns in secondary use; B) remnants of the seawall and ancient settlement that collapsed into the sea, and stone weights (depth 0-1 m); C) ancient coastline; D) remnants of wrecked watercraft (depth 2.5-4.5 m); E) ancient level of sand; F) offshore anchor hold on a submerged kurkar ridge (after Galili et al., 2001).

periodically expose these remains (Galili *et al.*, 2001). The finds on the sea-bottom have included:

1. artefacts and architectural elements derived from the ancient city site, which is subjected to marine erosion found scattered in the shallows, 1-30 m offshore at 0-1 m depth (Fig. 2 B);

2. artefacts originating from shipwreck assemblages, located in the breakers zone, some 70-130 m offshore at 2.5-4.5 m depth) (Fig. 2 D);

3. and concentrations of lost anchors scattered on or near submerged *kurkar* reefs some 200-600 m offshore, at depths of 6-10 m (Fig. 2 F). These have been interpreted as offshore anchor holds.

In addition, indirect evidence for artificial beaching facilities has been recovered in the shallows, some 5-25 m offshore, at water depths 0.5-1 m including clusters of biconical millstones made of basalt (weighing 100-180 kg each), some of which were filled with lime plaster, and perforated olive-press stone weights made of limestone (200-300 kg each) (Fig. 3). Given that these stones were found in very shallow water, they could not have been part of a lost ship's cargo: on the Israeli coast, heavy objects originating from shipwrecks are usually found in the breaker zone in water 3-4 m deep, some 100-120 m off the present coastline. It is assumed that these stone weights were being re-used to stabilize capstans and movable slipways (Galili *et al.*, 2001). Such wooden capstans were used in the region for

Figure 3. Secondary-use millstones and perforated olive-press stone weights made of basalt and limestone respectively discovered in the shallows opposite Tel Ashkelon. They were probably used for stabilizing capstans and movable slipways (E. Galili).

hauling ships until the beginning of the 20th century (Hornell, 1934: 105, fig. 12).

The recent finds of lines of wooden pilings on the seabed off Ashkelon are the first evidence of marine facilities built in an attempt to improve the connections

between this city and the sea. The pilings were recorded under water by divers using measuring tapes, an underwater camera, and a water-resistant drawing board. They have been deliberately left at sea for future studies. The remains of these wooden pilings will stay where they were found until a comprehensive study of the site is completed. They will be retrieved after such study and when their long-term preservation is assured.

The offshore wooden installation (Structure A)

The offshore installation is located 130 m off Tel Ashkelon, at a depth of 4.6 m, on a rocky seabed with sandy patches interspaced by pebbles (N 31º 39´ 43.19´´; E 34 º 32´ 27.74´´) (Galili, 2004). Here, the shore is straight and sandy, offering no sheltered anchorage (Figs 1b and 1c). The remains of six upright wooden pilings were recorded. When recorded, they protruded some 50 mm vertically above the sea-bottom (Figs 4, 5, 6a). No excavation was conducted to prevent damage to the delicate, waterlogged, wooden remains. Of the six, three were semi-circular in section (300-400 mm in diameter), one was rectangular (360 x 240 mm) and one was an approximate quarter circle in section (280 x 260 mm). The pilings were driven in a line (7.2 m long) parallel to the coast at an angle of 40º east. The distances between the pilings range 1-2.1 m. Because the areas north and south of the pilings are presently covered by shifting sediments, it is unknown whether the wooden piling line continues in either direction. The area between the installation and the present-day coastline was surveyed for several years when exposed, and no sign of any connection to the coast

Figure 4. A diver checking a wooden piling in Structure A (E. Galili).

Figure 5. Detail of the wooden piling of Structure A (E. Galili).

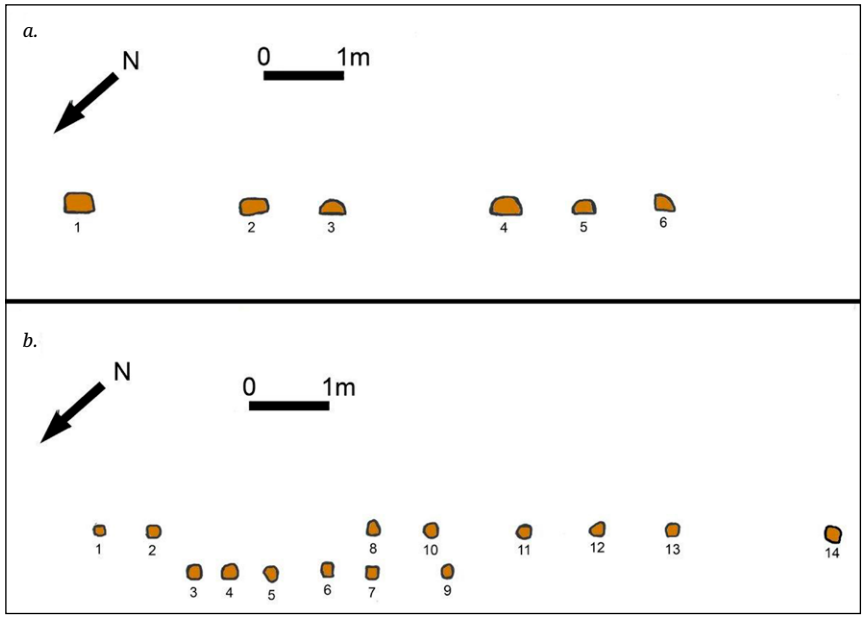

Figure 6. Plans of the wooden structures: a) Structure A (E. Galili); b) Structure B (E. Galili after J. Sharvit).

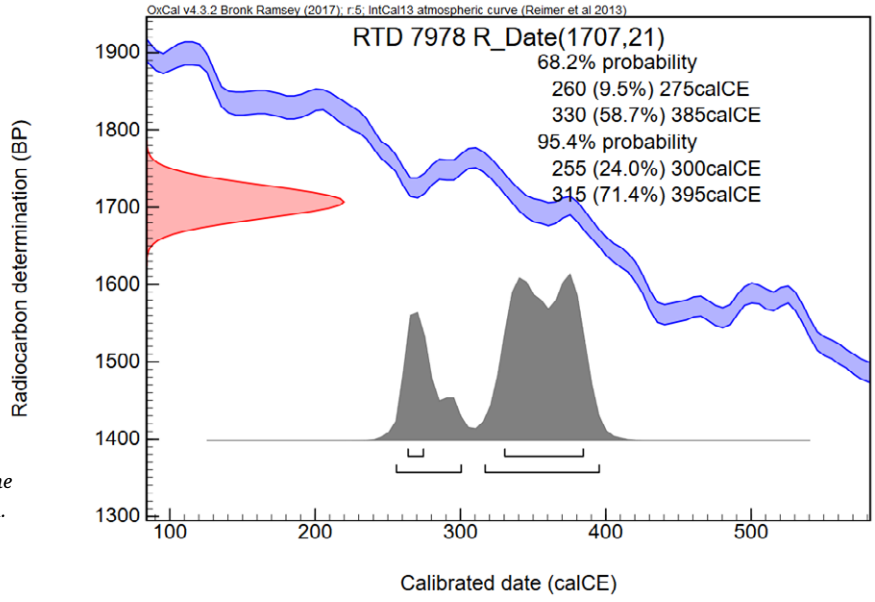

Figure 7. The probability distribution of the calibrated range of RTD 7978, Structure A.

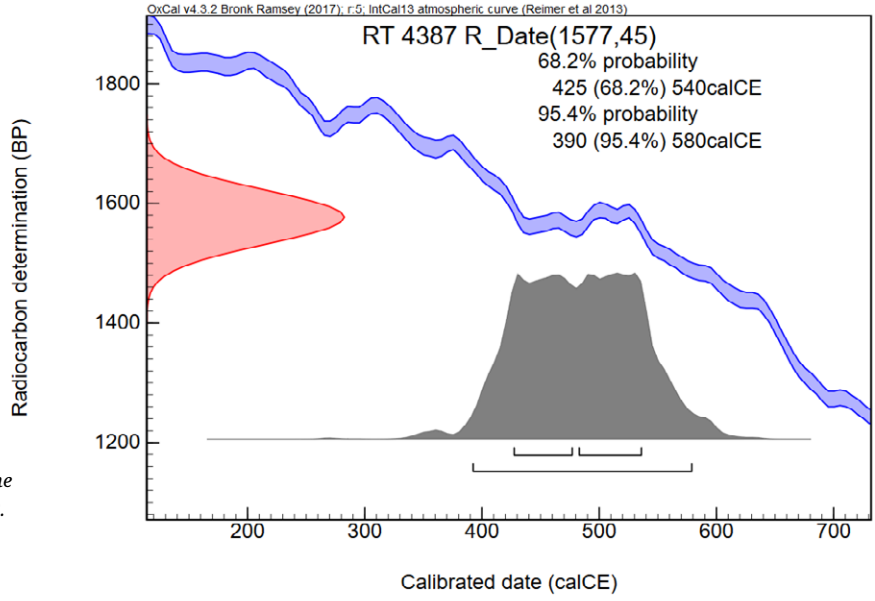

Figure 8. The probability distribution of the calibrated range of RTD 7978, Structure B.

was found. Three of the pilings were sampled (Nos 1, 4, 6) for future wood identification. One of the pilings (No. 1) was dated by radiocarbon. The sample RTD 7978, was pre-treated to eliminate the environmental contamination and measured by Accelerator Mass spectrometry technique (AMS) based on the Dangoor Research Accelerator Mass Spectrometer at the Weizmann Institute (Regev *et al.*, 2017). The calculated ^{14}C age of the multiple rings considered is 1707 ± 21 years ^{14}C BP. The calibrated range for this sample is 260 CE (9.5%) 275 CE; 330 CE (58.7%) 385 CE (for the ±1 σ, σ = standard deviation) or 255 CE (24.0%) 300 CE; 315 CE (71.4%) 395 CE (for ±2σ). The calibration was obtained using Oxcal v.4.3.2 ©Bronk Ramsey (2017) based on Bronk Ramsey (2001), based on the calibration tables of Reimer *et al.* (2013). The calibrated range, which covers the second half of the 3rd and the whole 4th century CE should be considered as a *terminus post quem* for the construction of the structure, which could, therefore, be attributed to the Late Roman or Byzantine period (Fig. 7).

The coastal wooden installation (Structure B)

This wooden installation (9.8 m long) is located in the shallows opposite Tel Ashkelon (N 31º 39´ 47.14´´; E 34 º 32´ 36.6´´) (Sharvit 2002). Thirteen wooden pilings were discovered on a sandy seabed rich with pebbles. The

pilings were arranged in two parallel lines (500 mm apart, at an angle of 42° east), at a depth of 1 m, 5 m from the present coastline at the north end of the structure and 7 m at its south end (Fig. 6b). The rectangular pilings were inserted vertically in the sea-bottom, protruding some 200-300 mm above it. Some of them have preserved their original rectangular section (150 x 200 mm) while others have been eroded. South of the pilings structure and adjacent to it, three basalt millstones were found. One of the pilings was radiocarbon dated. Sample RT 4387 was measured by Liquid Scintillation Method at the Weizmann Institute (Boaretto, 2004). The calculated ^{14}C age of a large number of rings is 1577 ± 45 years ^{14}C BP. The calibrated range for this sample is 425 (68.2%) 540 (for ± 1 σ), and 390 (95.4%) 580 CE (for ± 2 σ). The calibration was obtained as for sample RTD 7978 above. The calibrated range, which covers the 4th and the large part of the 5th century CE should be considered as a *terminus post quem* for the construction of the structure, which could be therefore attributed to the Byzantine or a later period (Fig. 8).

Discussion

Ashkelon's role as a sea gate

Underwater archaeological finds and literary sources point to intensive maritime activity and international trade in ancient and medieval Ashkelon. It served as an active sea gate from the Late Bronze Age (~1500 BCE) to the end of the Crusader Period at the end of the 13th century. During these periods it played an important social, economic, and political role in the history of the southeast coast of the Mediterranean. However, all information sources suggest that the city never had a sheltered, built harbour. Judging by the archaeological finds and the historical records, it seems that in Ashkelon ships anchored a few hundred metres offshore where they found submerged *kurkar* ridges that were used as anchor holds (Fig. 2 F). Cargoes and passengers could have been transported between shore and ship by lighters (Galili and Sharvit, 1996; 2000; Galili *et al.*, 2000; 2001).

Classification of ancient shore-sea approaches along the coast of Israel

To search for harbour facilities in Ashkelon, one has to look at similar structures that have developed since the start of navigation along the Israeli coast. In addition to built harbours, there are several types of anchorages, moorings, and artificial beaching facilities along the coast that are based on natural morphological features. Using archaeological findings, one may draw a tentative typology for harbours, anchorages, and mooring facilities on the Israeli coast. The following is a revised, updated version of the typology set out by Galili and Sharvit (1994):

1. **Built harbours:** facilities, such as quays, breakwaters, jetties, etc. were usually constructed by governments starting during the Iron Age or Persian period. Such facilities were identified at Akko, Atlit and Caesarea (Raban, 1985: passim; 1993; 2009; Galili, 2009; 2017b; Galili *et al.*, 2018).

2. **Proto-harbours based on natural features (3-7 m water depth):** a sheltered area on the lee side of a partly submerged *kurkar* ridge, having some manmade improvements. These were located about 70-200 m offshore. They were used from the Middle Bronze Age by seagoing vessels for overnight anchoring and while waiting for favourable winds. Such features were identified at Caesarea (Galili *et al.*, 1993; 2011; Galili, 2017a; Ratzlaff *et al.*, 2017), at Apollonia (Grossmann, 1997; Galili *et al.*, 2018), at Yavneh-Yam (Galili and Sharvit, 2005; Golani and Galili, 2015), and at Tel Ridan (Raban and Galili, 1985).

3. **Isolated stone-built piers:** three such features were recorded in Caesarea: a Crusader pier made of re-used Roman columns on the city seafront and two ashlar-built piers in the southern anchorages: the northern one was destroyed by the construction of a modern pier and the southern one was made of pierced ashlars, probably the base for a vanished wooden pier (Galili, 2017b).

4. **Isolated wooden marine installations:** remains of ancient wood pilings associated with marine installations have been discovered underwater in Akko and Atlit. Two such previously unpublished structures discovered near Tel Ashkelon are the focus of this article.

5. **Isolated slipways:** three such slipways, dated to the Hellenistic period, were discovered in the northwest section of Tel Dor (Raban, 1981).

6. **Rock-cut mooring facilities:** rock-cut bollards have been recorded south of Tel Shiqmona and south of Tel Akhziv, while mooring holes have been found south of Tel Dor (Galili *et al.*, 2018).

7. **Shallow-water natural anchorage (3-7 m water depth):** this type is similar to the Type 2 proto-harbours mentioned above, but without any manmade improvements. Such anchorages have been found at Akhziv, Shavey-Zion, at Atlit north and south bays (Galili and Sharvit, 1999), Neve-Yam, Dor (Kingsley

Figure 9. Schematic possible reconstruction of a mooring facility made of wooden pilings off Tel Ashkelon, and a movable artificial beaching facility (E. Galili).

and Raveh, 1996), Ma'agan-Michael, Tel-Taninim (Zarka), Caesarea, Michmoret, and Jaffa (Galili *et al.*, 2018).

8. Very shallow-water natural anchorages (1-3 m water depth): a shelter created by small natural features close to the coastline. This type of anchorage usually uses minor bays and abrasion platforms for anchoring fishing boats and lighters. Traditional fishermen currently use similar features at Zarka, Shiqmona (south of Haifa), north of Acre, and south of Akhziv.

9. Natural offshore anchor hold: a submerged *kurkar* ridge, located some 200-600 m offshore, with its peak lying at 4-12 m below sea-level. Features such as this provided an optimal holding ground for anchors. Ancient vessels chose such places for anchorage in areas where no shelters or port facilities were available and where the sea-bottom was generally silty or sandy. Two anchorages of this type have been found off the coast at Ashkelon and one off Mikhmoret in central Israel (Galili *et al.*, 2018).

10. Harbours at the outlet (estuary) of a coastal river: it was suggested that Israeli coastal river channels could have served as inland harbours for seagoing vessels during the Bronze Age (Raban, 1985). However, no archaeological evidence confirming the existence of such an inland harbour has yet been found.

Building wooden marine construction in Israel in antiquity

Substantial wooden marine constructions are extremely rare on the Israeli coast due to lack of local sources of raw timber and an ensuing lack of proper technical proficiency (Liphschitz and Biger, 1995; Rosen *et al.*, 2004). The technologies of marine constructions using wood are more typical of Atlantic Europe and northern shores of the Mediterranean, where suitable wood is abundant (Liphschitz and Biger, 1995).

Function

The Structure A pilings, found 130 m from the present coastline, were probably intended to support a permanent structure that was stabilized by being driven into the sea-bottom. The now-vanished upper structure probably protruded above the sea surface. It seems reasonable to assume that it served as a facility associated with marine activity. As only one line of well-founded pilings was located, the possibility that any kind of stable working platform existed above the water is reduced. The piles could have been used for mooring watercraft offshore (Fig. 9). The facility would have enabled the mooring of lighters or small to medium-sized vessels by tying one end to a piling and casting an anchor at the other end.

The Mediterranean Sea is characterized by a micro tidal range, so watercraft cannot be beached and maintained using the tide. In antiquity, Mediterranean watercraft were artificially beached on open, bare beaches lacking any long-lasting artificial beaching facilities (Votruba, 2017). Structure B discovered in the

Figure 10. Launching a boat with a movable slipway on Anfushi beach, Alexandria (Photo E. Galili 17.6.1996).

shallows off Tel Ashkelon was probably on the sandy shore or the beach when it functioned. Coastal erosion shifted the coastline eastward and today the exposed structure foundations are observed at 1 m depth. Given its location, this structure was associated with the sea, but could not have served as a mole or a dock. However, it could have been used like bollards, for tying up lighters, or might have served as a part of wooden slipway or artificial beaching facility. The existence of movable slipways and capstans on the beach opposite Tel Ashkelon has been previously proposed and was based on the discovery of clusters of biconical millstones and perforated oil-press weights in the shallows adjacent to the wooden structure. It was suggested that these stones in secondary use were intended for holding movable slipways (Galili *et al.*, 2001) (Figs 9-10). The existence of such facilities was associated with the term *Nadiraya de Ashkelon* mentioned in the Talmud (Sperber, 1993: 163-166). Similar wooden slipways were seen in use in contemporary Alexandria (Fig. 10). Wooden capstans were used in the early 20th century in Haifa bay (Hornell 1935: 105, fig. 12). The shoreline wooden pilings reported above may have been part of the artificial beaching facilities on the Ashkelon coast.

Conclusions

The reasons for the development of Ashkelon as a major marine trading centre stemmed mainly from considerations such as connections with the hinterland, accessibility to inland trade-routes, and the geopolitical situation, and not because of coastal characteristics and easy approach. Ships arriving at Ashkelon would have by necessity anchored in the open sea, hundreds of metres offshore, using *kurkar* sandbanks and underwater rocks to ensure an anchor hold. Coastal lighters probably transferred goods and passengers between the coast and the anchored ships. The indirect evidence for artificial beaching facilities on the coast suggests that small boats were hauled ashore for repairs and protection from winter storms. The offshore Structure A may be considered as the first manmade mooring facility discovered off Ashkelon. It enabled small to medium-sized ships to moor some 100 m off the city coast during calm seas. Structure B, now situated in the shallows could have been used for mooring (like bollards) or as a part of an artificial beaching facility.

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