

# Haifa:

## A Study in the Relation of City and Coast

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THE origin and growth of a port nowadays are not so dependent as they once were on natural factors, such as an embayment protected from wind and waves, and deep-anchorage facilities. But even nowadays, when engineering can substitute or create most of the conditions necessary for the harbouring of larger ships, and more and more ports are artificial ones,<sup>1</sup> some natural factors still remain of prime importance and, as it were, predestine certain places on the coast to be major ports. These factors are first and foremost those of location and situation—i.e. accessibility from the interior and an advantageous position in relation to other coasts and ports.<sup>2</sup> This applies especially to the East Mediterranean coast which is so little indented and where the use of the few embayments is largely impeded by the configuration of the land-surface behind. Only the combination of a good-sized bay with easy access to most of the country behind provides the conditions for a port of the first rank in the Levant. Such a combination exists in only two places on the East Mediterranean coast; and one of them is Haifa.

### THE COAST OF PALESTINE AND ITS CONFIGURATION

An outstanding characteristic of the geography of Palestine is the great variety to be found in so small an area. This statement applies to the coast as well. Although comparatively short, it too exhibits at least two major types:

(a) a straight coastline of aggradation, i.e. one formed by marine deposition, beginning to the west of the Nile Delta;

(b) a slightly indented, rocky and rugged coast, beginning some kilometres south of Haifa and extending as far as the Taurian coast of Anatolia, i.e. northwards to the Gulf of Iskanderun (Alexandretta) with these characteristics becoming increasingly pronounced.

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Mecking, 1930, p. 327 (cf. Bibliography at end of paper).

<sup>2</sup> Mecking, 1931, p. 1.

The aggraded coast comprises more than three-fourths of the coastline of Palestine. From the outlet of Wadi el-'Arish, the traditional boundary of Palestine to the south-west, to the Cape of Carmel, where the second type of coast becomes more pronounced, the length of the coastline is about 225 km. From Rafah on the Egyptian border to the Cape of Carmel the length is ca. 190 km.

The first third of this aggraded coast takes the shape of a gentle curve running SW-NE. Further north its direction becomes almost meridional. The coast runs roughly parallel to the general trend of the anticlinal axes of the mountains of the Negev, Judaea and Samaria. From the morphogenetic point of view this coastline represents the fringe of a littoral borderland that emerged from the sea in the near geologic past, and became welded to an already existing and consolidated oldland. This coast is not everywhere low. South of Tel Aviv a beach of 200 m. width and more is generally interposed between the shoreline and the cliffs, marking an older coastline. In places the beach is almost absent and the cliffs drop straight into the sea. In the Sharon, north of Tel Aviv, the cliff-coast becomes prevailing: the beach is seldom more than 20 m. wide and sometimes completely absent. These cliffs occur where ridges of dunes consisting mainly of Kurkar-rock<sup>3</sup> meet the coast obliquely. There is a strong surf along all the coast caused by the prevailing west winds. They cause strong wave action coming over wide stretches of open sea. The cliffs therefore are continually receding and produce all the symptoms of active wave-action: wave-cut notches and benches, pocket beaches strewn with Kurkar blocks, products of collapsing cliff-fronts etc.

In order to explain the aggradation of the greater part of the coast of Palestine with its even course, it has been assumed<sup>4</sup> that this configuration is mainly due to the deposition of sands brought and distributed along the coast by an off-shore current. This current is assumed to be part of a closed current-system that follows the coast of the Eastern Mediterranean Sea along all its extent. Moving counter-clockwise along the coast of Egypt this current is assumed partially to absorb and transport sands and other sediments brought into the sea by the Nile.<sup>5</sup> Turning north with the coast of Palestine it deposits and distributes most of the sand-load along this coast, thus causing its extensive aggradation.

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<sup>3</sup> Kurkar is according to Picard. 1938, p. 9, 'a diagenetic, hardened, calcareous sandstone of marine, or of terrestrial origin (older Dunes) distributed in the coastal plain. It is mostly considered as of Pleistocene age, but its formation may take place even within recorded time.'

<sup>4</sup> Adler, p. 28.

<sup>5</sup> *Ibid.*

But there arise doubts as to the feasibility of this process, especially as to whether this current, which is thought to consist of two branches,<sup>6</sup> can be responsible for even a part of the aggradation proper. It may be questioned too, if there is any sand supply by the Nile at all—especially in recent geological times.<sup>7</sup> The current itself along the Palestinian coast is still one of the minor problems of the Eastern Mediterranean. The information concerning its course, width, rate of movement, temperature and salinity is very vague and scanty. According to Nautical Manuals,<sup>8</sup> its velocity is at best one knot per hour in the winter—and even this only with strong west winds. It seems, therefore, that the capacities commonly attributed to this current of transporting, accumulating and in particular distributing and aggrading, are greatly overrated.

Others assume that the Palestinian coast was subject to vertical movements even in historic times, with the southern part of the coast as far as Jaffa still emerging and the northern part subsiding. This would in their opinion<sup>9</sup> satisfactorily explain the shallowness and straightness of the southern portion of the coast and the very different aspect of the northern part with its receding cliffs and the submerged harbour-works in Caesarea. This opinion is nowadays subject to strong opposition from geologists.<sup>10</sup>

There remains another possibility. It has been suggested<sup>11</sup> that the chief cause of aggradation of the southern part of the coast is a process of beach-drifting, brought about mainly by wave-action caused especially by the W and SW-winds,<sup>12</sup> whereas a longshore-current is responsible for the sand supply, and even that only partly. As with so many aggraded coasts, here too the longshore current may

<sup>6</sup> Rim, p. 38.

<sup>7</sup> There are doubts too whether this offshore current transports sands derived from the Nile in recent times and not those derived from the submerged Pleistocene Delta of this river, especially its Pelusium branch. Moreover there may exist another, more important supply-source: recent and in an even larger degree Pleistocene sands of the Wadi el-'Arish (according to a suggestion Prof. Avnimelech made to the author). Similar doubts concerning this assumed current and its role at the Mediterranean coast of the Sinai are expressed by Awad (p. 221): 'Est-il dû aux-alluvions, pourtant quelque peu lointaines du Nil, transportées par un courant marin venu de l'Ouest? Est-il dû au contraire aux alluvions de l'Ouadi El-Arish transportées par un courant venu de l'Est? Ou bien aux deux?'

<sup>8</sup> *Mediterranean Pilot*, 1937, p. 27, and *Mediterranean Pilot*, 1925, p. 47.

<sup>9</sup> Range, 1922, p. 20; *id.*, 1932, p. 60.

<sup>10</sup> Picard, 1943, p. 101, refutes the opinion that tectonic movements occurred on the coast in recent times. Avnimelech, p. 40, maintains that the whole of the coast of the country has been subject to continuous subsidence during Quaternary and recent times.

<sup>11</sup> Adler, p. 32.

<sup>12</sup> These winds reach very high frequency, the more so when lighter winds are discarded. They, therefore, cause the most frequent and strongest waves, having the greatest fetch by blowing unobstructed over wide expanses of sea.

at most cause the accumulation of sand. The beach-drifting,<sup>13</sup> however, could account entirely for the process of aggradation proper.<sup>14</sup>

Whatever the causes of aggradation and cliffing may be, they bring about a coast of the poorest horizontal differentiation, i.e. of very slight interpenetration of sea and land. There are no islands or even islets along it; only 'sea rocks', i.e. partly inundated tiny remnants of a wave-cut platform, dismembered by abrasion. The further north, the larger and more frequent become these reefs, rendering the coast still more difficult of access to shipping. The coastline runs straight, without any indentations as far as Jaffa. Here a little knick of the coastline together with a larger number of reefs—among them the famous Andromeda Rock—were the natural basis of the ancient port of Jaffa, the town that existed according to ancient tradition even before the deluge.<sup>15</sup> North of Jaffa the coast not only becomes thoroughly cliffy, with an increasing number of reefs but there also appear slight indentations. One of these, at Dor (Tantura) forms a little cove. Here too, as in the case of Jaffa, a sort of harbour originated not so much on account of the indentation, as of a group of several reefs running in an S-shaped row for about  $\frac{3}{4}$  km. and forming a kind of natural break-water for a shallow pocket-beach. The use of this tiny harbour which had some minor importance in ancient times is at present very limited, the place serving only as an occasional harbourage for fishing-boats. Eleven kilometres farther north, a still larger indentation of about 800 m. length and 400 m. width forms the Bay of 'Atlit, the site of the port and sea fortress of Crusader fame (*Castellum Peregrinorum*). In the light of modern requirements for a harbour there is no prospect of 'Atlit becoming a major port, especially in view of its proximity to Haifa.

#### THE SYRIAN COASTAL TYPE

From Cape Carmel, where the coastline turns suddenly ENE and then ESE, there begins the second type of configuration of the Palestinian coast. From the typo-

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<sup>13</sup> This beach-drifting is caused by waves running up obliquely to the shallow coast and returning at a right angle. This enables them to displace continuously considerable masses of sand particles, to carry and distribute them along the coast, and thus straighten its course. They may even initiate long-shore currents which considerably contribute to the process of straightening the coastline.

<sup>14</sup> Kuenen, p. 275. It may be mentioned in this connection that some English geomorphologists (J. A. Steers and W. V. Levis) insist on the prime importance of wave action in forming most of the aggraded parts of the coast of South England. They negate the role of long-shore currents, which until now were thought of as the prime agent in forming this type of the coast of England, denying even the existence of these currents along the shore in question; cf. Taylor, p. 174.

<sup>15</sup> Plinius Secundus: *Naturalis Historia*, V, 69.

logical point of view, the sector of the coast that forms the Haifa-Acre Bay, can be described as a 'diagonal coast'. The mountain-massif of the Carmel, whose extension is prolonged to the NNW for two kilometres by a series of submarine rocks,<sup>16</sup> runs out into the sea at an angle of about 60°. The coastline behind the mountain cape recedes then inland in a mild curve to form the bay.

Certain peculiar tectonic and geomorphological features characterize the Syrian coast. Adler,<sup>17</sup> to whom we owe the only geomorphological analysis of the Palestinian coast, termed it therefore the 'Syrian Coastal Type'. According to him, the Bay of Haifa too belongs to this configuration, as does in his opinion even a portion of the coast to the south, as far as Dor. The Syrian-Lebanese coast, the prototype of the 'Syrian Coastal Type', owes its major configuration to faulting and foundering processes that occurred parallel to the meridional flight of the Great Rift Valley including the Beq'a and the Ghab.

What are the characteristics of the Syrian Coastal Type from the morphographic point of view? Their most important feature is that mountain-ranges run parallel to the coast at a short distance from it, as in Lebanon, or for long stretches directly bordering it, as in the middle and northern part of the Ansariyeh Mountains, Jebel Aqra (Mons Casius) and the Qizil Dagħ (Amanus). From these ranges there branch off short spurs, caused mostly by faulting, which project almost straight into the sea. These spurs form a series of short steep headlands along the coast: Rosh ha-Niqrah (Scala Tyriorum of the ancients), Ras el-Abiad (Promontorium Album), Ras en-Natur, Ras Sheqqa (Theou-Prosopon), Ras el-Basiz (Posidion), Ras el-Khanzir (Rossicus Scopulus) etc. Between these promontories the generally straight coastline bends inward, forming a corresponding series of gentle curves that at longer intervals enlarge to veritable embayments: St. George's Bay, Bay of Juniyeħ, Bay of Aqar, Bay of Antioch. The promontories divide up the narrow coastal plain in a number of very small compartments, locked in by mountains to the east and separated one from the other by the headlands. Only in a few instances the coastal plain broadens and extends to more considerable meridional length as in the case of the Plain of Aqar. These small alluvial plains are locally known as 'sahel' and are particularly characteristic of the Lebanese coast; they become progressively smaller towards the north.

In strong contrast to this configuration stands the relatively independent Carmel-massif, which as already mentioned meets the sea at an acute angle—the

<sup>16</sup> Spartan Reef and Carmel Reef of the Admiralty Charts.

<sup>17</sup> p. 11.

only such major occurrence along the Palestinian-Syrian coast. Along all the coast, only this mountain forms a major headland.<sup>18</sup> Important too, as will be shown later, is the fact that Haifa Bay is the submerged westernmost part of the E-W directed series of depressions: the plains of Beth Shan, Harod and Jezreel. On the Syrian coast, there exists only one adequate counterpart to this: the depression of Kebir to the north of Tripoli, the Bay of Tripoli, however, being a much poorer site for a harbour than Haifa Bay. Only from these two embayments, each with a sequence of broad valleys behind, there is easy access to the interior. The remainder of the coast has very poor facilities for communication with the inland areas.

THE DEPTH CONDITIONS  
ALONG THE PALESTINIAN-SYRIAN COAST

The depth conditions as illustrated by the submarine contours (isobaths) along the coast of Palestine and Syria<sup>19</sup> are an additional reason for considering the Bay of Haifa as only a transitional stage to the Syrian Coastal Type. Their course, spacing and pattern contributes to the inhospitality of this coast not less than the lack of natural harbours.

Along the Palestinian coast there extends a submarine shelf<sup>20</sup> of only moderate width. In the SW where the coast forms a great curve, the width is considerably greater than along the meridional part of the coast.

COMPARATIVE TABLE OF DISTANCES FROM THE SHORE OF SOME SIGNIFICANT ISOBATHS ALONG THE PALESTINIAN-SYRIAN COAST

<i>Palestine</i>	Distances in km.			
	200 m.	100 m.	50 m.	20 m.
W. el-'Arish (mouth) . . . . .	45	35	24	8
Rafah . . . . .	31	27	15	4
Ascalon . . . . .	25	18	12.5	1.5
Jaffa . . . . .	18.5	15	10	1.3
Mouth of the Hederah River (32°30' N) . . .	17	12	7	1.5
Cape Carmel . . . . .	12.5	11	10.5	1.7
Haifa Bay (opposite the outlet of the Qishon)	19	17	15	3.5
Between Rosh ha-Niqrah and Achzib . . . .	5.5	3.5	2.5	1

<sup>18</sup> Woolley, p. 180.

<sup>19</sup> The following data are derived from the Admiralty Charts listed in the Bibliography and from Rosenau's *Fishermen's Chart*.

<sup>20</sup> As the limit of the shelf-zone the conventionally used 200 m. isobath will here be applied, although actually the 125 m. isobath is much more suitable to assume this function for the greater part of our coast.

<i>Lebanon-Syria</i>	Distances in km.			
	200 m.	100 m.	50 m.	20 m.
Tyre . . . . .	11	8	7	1
Beirut (port) . . . . .	4	2	1.5	1
Ras Sheqqa . . . . .	2.5	2	1.8	0.9
Tripoli (the port el-Mina) . . . . .	9	4.5	4	2
Latakia (to the SW) . . . . .	4	2.25	1.8	0.25

The mean width of the shelf is about 23 km. for the southern part of the Palestinian coast (Rafah-Jaffa) and ca. 14 km. for the northern part (Jaffa-Rosh ha-Niqrah). A sort of transition appears already west of the outlet of the Hederah rivulet where the 200 m. isobath begins to run much nearer to the coast than hitherto, and continues so until a little distance south of Rosh ha-Niqrah. From Rosh ha-Niqrah to the north the course of the isobaths changes thoroughly. They not only run in considerable lesser distance from the shore (cf. Table), their course too becomes boldly curved—in very strong contrast to their general straightness even along the northern coast of Palestine. They follow closely the course of the Lebanese-Syrian coast at times emphasizing in a very pronounced way its projections and recessions, narrowing their relative distances especially at the steep promontories—an isobath-pattern typical of a coast conditioned mainly by faulting.

#### THE BAY OF HAIFA

Cape Carmel has already been referred to as the boundary of two different types of coastal configuration, although the inclusion of the Bay of Haifa in the Syrian coastal type may be questioned. The bay itself has the form of an half-oval extending in a SW-NE direction, with its broad basis in the SW and a small curved apex in the NE. The length of the bay-coast from Ras el-Kurum to Acre is 20 km., or 12.3 km. as the crow flies; the greatest width of the bay is about 5 km.

The depth-conditions inside the bay are as follows:<sup>21</sup> the 10 m. isobath runs at a mean distance of 750 m. from the land; the 5 m. isobath at about 300 m. (the equivalent distances in the Bay of Beirut near the port are: 400 m. and 200 m.). The course of these isobaths in Haifa-Bay is on the whole regular and straight in the SE-part of the bay. In the northern waters of the bay there appear a number of long, narrow shallows, the biggest of which are shown on the Admiralty Chart as Talbot-Reef, Foxhound-Reef and Acre-Ledge, the latter being a submarine prolongation to the south of the small cape of Acre. Apart from this, the depth

<sup>21</sup> Cf. Rosenau: *Fishermen's Chart*, sheet: Ras en-Naqura-Jaffa, and Admiralty Chart No. 1585.

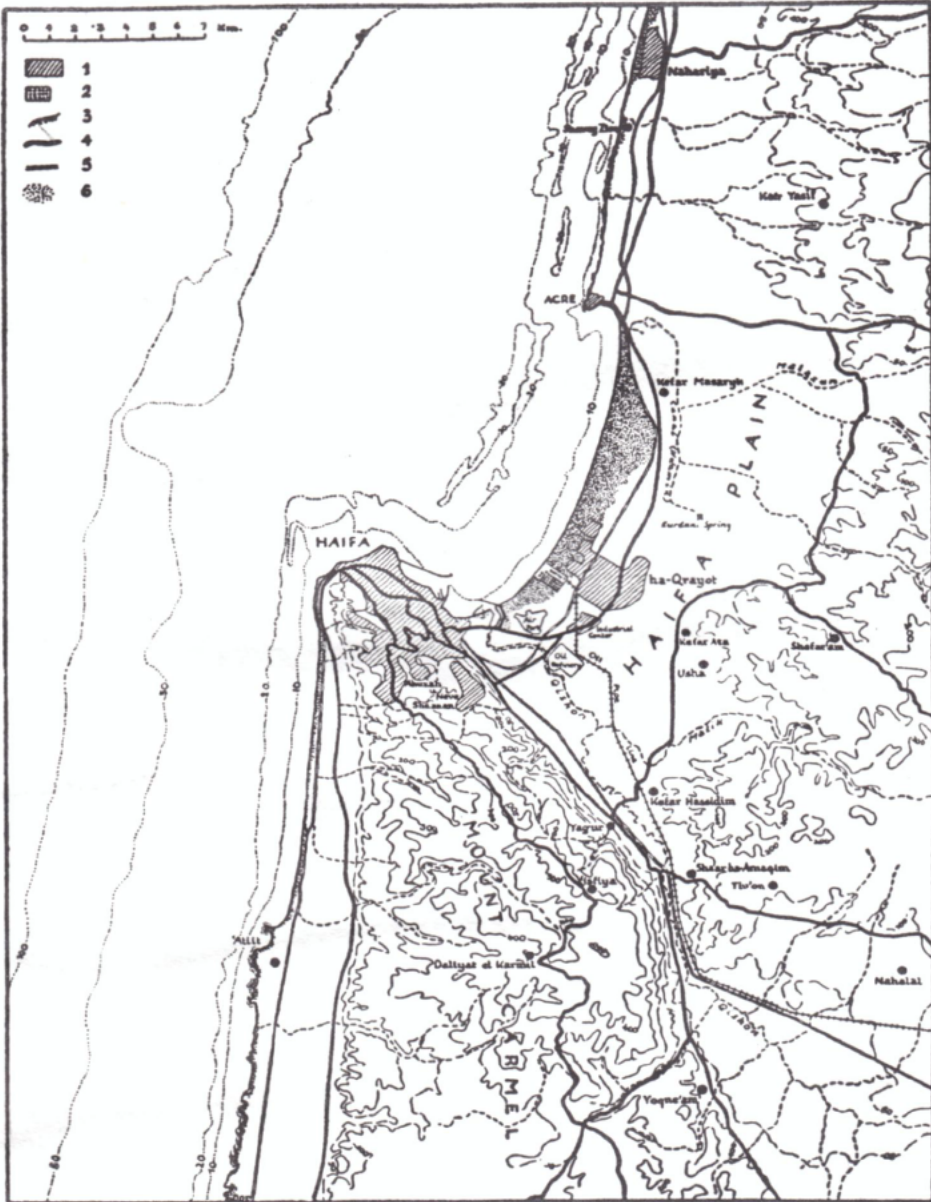


Fig. 1. Haifa and its surroundings.

(Drawn by N. Z. Baer)

- |                  |              |
|------------------|--------------|
| 1 Towns          | 4 Main roads |
| 2 Oil tanks      | 5 Railway    |
| 3 Coastal cliffs | 6 Sand area  |

(By Permission of the Director, Survey of Israel)



in the northern part of the bay is very irregular and changes continuously, quite in contrast to the southern part. There is no doubt that the northernmost part of the bay is relatively swiftly filling up with sands and other sediments—one of the main reasons why Acre, once the leading port, has lost all importance as an harbour.

The origin of the bay is due to ingression of the sea upon a former land-area which subsided along fault-lines running NW-SE. There is geological evidence that the sea extended much further inland in the not too distant geological past, covering the Haifa and Acre Plains in the Pleistocene.<sup>22</sup> There is evidence too that all this area is now in the process of emergence. Intensive alluviation and marine sedimentation are accelerating the filling up of the bay.

#### CLIMATIC CONDITIONS

In contrast to the harbours of the Atlantic and its adjacent seas, where fog and ice are of prime importance,<sup>23</sup> there is only one climatic factor to be taken into consideration with the harbours of the Eastern Mediterranean: the winds. The degree of protection from winds is thus one of the most important criteria for the site of a harbour in this region.

The wind-frequencies in Haifa-Bay as recorded at Acre<sup>24</sup> show a marked shifting of the main wind directions in the half-year periods April-September and October-March, which in Palestine correspond roughly to summer and winter. In the first mentioned half-year there is a marked preponderance of winds from the western quarter: their frequency is 67% (W: 25%; SW: 24%; NW: 18%). Winds from the eastern quarter amount to only 9% (E: 2%; SE: 5%; NE: 2%), while winds from the north total 10% and those from the south 8%. The percentage of calms in this period is 6%. During the winter season the frequency of winds coming from the western quarter decreases considerably, amounting to only 27% (W: 9%; SW: 11%; NW: 7%), whereas the frequency of winds coming from the east increases to 39% (E: 8%; SE: 25%; NE: 6%). Winds blowing from the south amount in this period to 16% of the total, those from the north to 7%. The mean windforce is relatively small, seldom exceeding Beaufort 6, and averaging as a whole between Beaufort 2-3. The most frequent high winds

<sup>22</sup> Picard, 1943, p. 91 ff.

<sup>23</sup> In the whole of the Mediterranean tides are of no importance. The normal tidal variation in the southern part of the Bay of Haifa amounts to 30 cm. with maxima of 40-47 cm.

<sup>24</sup> Data derived from the three sheets: 'Acre. Wind-Roses, 1931-1940' (0600, 1200, 1800 GMT) supplied by courtesy of the Director of the Israel Meteorological Service.

blow from E and SE, whereas the strongest winds experienced at Haifa blow from the SW in the winter season.

#### THE SITUATION OF HAIFA PORT

It is evident thus, especially from the wind- and depth-conditions, that only the southern part of the Haifa-Bay, situated in the lee of Mount Carmel, has some of the natural prerequisites for a large modern port. Even here there are still many natural disadvantages to be taken into account and corrected by technical measures. The Bay of Haifa is one-sided, that is land-locked only from the east and south and wide open to the west and north-west. This accounts for the fact that before the building of the breakwaters, ships in unfavourable weather, especially in the winter season, could not approach the port and discharge their cargo by lighter. They had often to anchor far outside for days on end, or to proceed to Beirut which had possessed a harbour protected by breakwaters since 1893.

Haifa Bay as a whole has two natural sites for a port; the southern part of the bay and the smaller north end at Acre, which for centuries was a port of renown. Shoals and reefs hamper the approach to the latter, which is also exposed to the frequent south- and south-west winds. The southern part of the bay, by contrast, has a much smoother sea-floor and is protected against SW and S winds by Mount Carmel. There was no question as to the suitability of this part for the construction of the first big port in the country.

#### THE PORT

The construction of the port began in 1929 and was completed in 1933. Its main constituent is a breakwater 2210 m. long, 12 m. wide and 4 m. high that begins at Ras el-Kurum, extending to the ESE. A second breakwater on the lee-side, of 765 m. length, extends in a meridional direction. The width of the entrance between these two breakwaters is 183 m. The water-area of the harbour covers 121.4 ha. A triangle-shaped area of 34 ha. the maximum width of which is 350 m. has been filled up with dredged sand at the beginning of the work of construction. On the area thus reclaimed, various sheds and store-buildings, quay-side railway-tracks, road-approaches, loading and unloading facilities and the port-management offices were erected. The length of the quays makes it possible for six ships of 8,000-10,000 tons to be simultaneously moored alongside. It is intended to provide quayside-facilities for six more ships, and consequently to reclaim an additional part of the water-area.

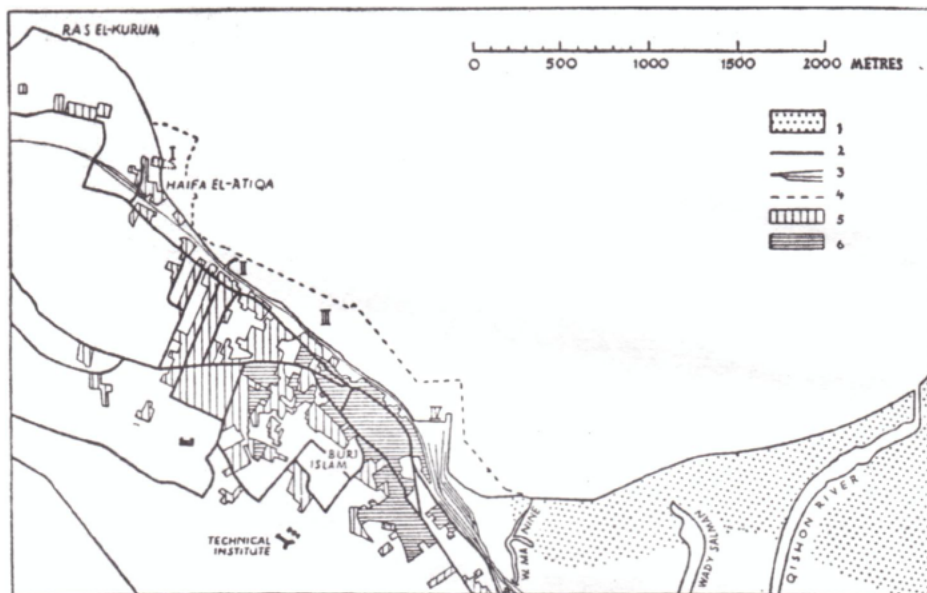


Fig. 2. Haifa, 1919.

*(Drawn by N. Z. Baer)*

- |                            |   |
|----------------------------|---|
| 1 Sand dunes               | I Roman mole  |
| 2 Main roads               | II German jetty   |
| 3 Railway tracks           | III Water area reclaimed by the construction of the port (1933) |
| 4 Border of reclaimed area | IV Turkish jetty  |
| 5 Sparsely built-up area   |   |
| 6 Densely built-up area    |   |

Based on a map surveyed by 7th Field Survey Coy., R. E., E. E. F., 1919.

The basin of the harbour has been deepened throughout by dredging. The part adjacent to the entrance between the two breakwaters was dredged to a depth of 10.7 m. and the area to the west of it to 9.4 m. The basin contains two additional small compartments separated by moles from the main basin. The eastern one is the oil-dock—now only occasionally used since the suspension of the flow of oil from Iraq. East of the port there is a small cooling-basin, that serves the nearby electricity plant and will constitute a part of the basin with the enlargement of the port in the near future.<sup>28</sup>

<sup>28</sup> The following data may serve for comparison: The port of Beirut, the only other major port on the East Mediterranean coast (and except for oil—the principal import and export harbour not only of Lebanon but also of Syria) covers a water area of only 44.4 ha. The port of Tripoli covers a water area of 250 ha. but has no quays capable of accomodating bigger vessels. Besides, the port is dangerous for ships berthing when northerly winds, quite frequent in this region, are blowing. The oil-harbour, terminal of a pipeline branch from Iraq, lies about 4 km. north of the port. The port of Latakia consists

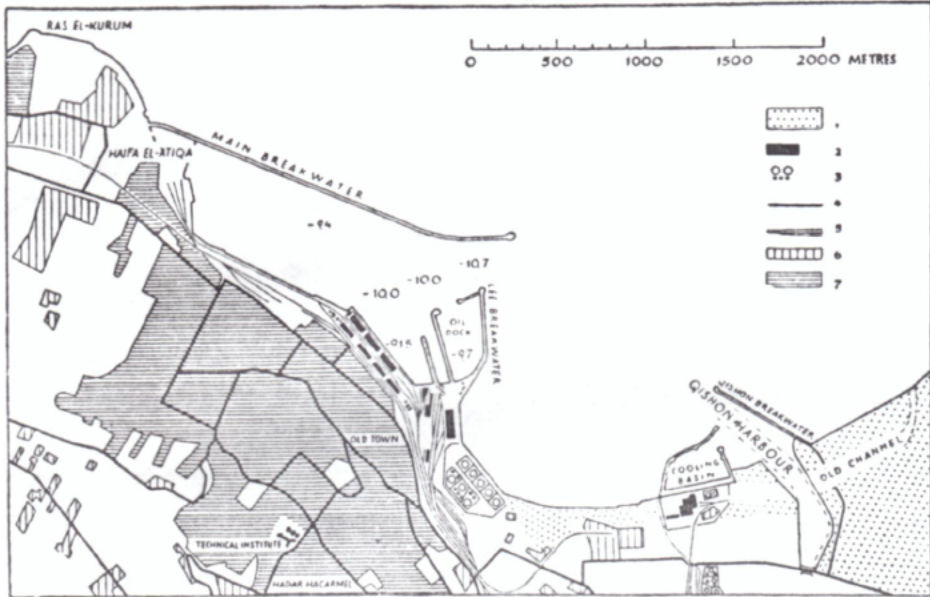


Fig. 3. Haifa and its harbour, 1953.

(Drawn by N. Z. Baer)

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|--|--------------------------|
| 1 Sand dunes                                   | 5 Railway tracks         |
| 2 Major public buildings and harbour utilities | 6 Sparsely built-up area |
| 3 Oil tanks                                    | 7 Densely built-up area  |
| 4 Main roads                                   |                          |

Based on: Haifa, 1:100,000, sheet 1, Survey of Palestine, 1943, and material supplied by the Director, Haifa Port Administration, and by the Qishon Development Department.

At present there is work in progress to create an additional port to the existing main one. This port, the so-called Qishon harbour, will adjoin the cooling-basin immediately to the east. It will consist chiefly of a channel, 2750 m. long, 82 m. wide and 5 m. deep, the future artificial outlet of the Qishon River. The channel follows for some hundreds of metres the artificially straightened course of the Qishon and continues then independently of the river-course. This new outlet of the Qishon will contain sea-water. The Qishon itself will be dammed up immediately east of the Qishon harbour and its waters used for irrigation purposes. Additional berthing-space will be created by basins branching off laterally from

of an open, unprotected roadstead and a small harbour-basin and is suitable for the berthing of small vessels only. Cf. Nathan, Gass & Creamer, p. 260; *The Middle East*, pp. 313-314. In recent years two new important oil-harbours have been added. Saida (Sidon) is the terminal of the Trans-Arabian-Pipeline transporting oil from the Saudi Arabian fields: its annual capacity is about 15 million tons. Baniyas is the terminal of the new pipeline of the Iraq Petroleum Company with a capacity of about 13 million tons per annum.

the main channel. The entrance into the channel will be protected by a breakwater of 600 m. length extending NW, which afterwards will be prolonged by a link of one thousand metres to join the lee-breakwater of the main port. After dredging to a depth of 9 m. the basin formed by this breakwater and that of the cooling-basin will afford ample room for anchorage of even large ships with repairing facilities by a dry-dock to be installed there in the near future. The Qishon harbour itself together with its branches will be usable only for vessels up to 6000 tons.<sup>26</sup>

#### THE MARITIME RELATIONS

We owe to Mecking a detailed study of the factors of location as influencing ports. According to him, two area-relationships are of the first importance: (a) the port's relations with nearby coasts and their ports, especially with those of the neighbouring countries, i.e.: the ultimate destination of sea traffic *from* the port and *to* it; (b) the situation of the port in relation to the land area behind.

##### *The Maritime Relations of the Port of Haifa*

As far as the relationship with nearby coasts is concerned, Haifa is the southernmost natural harbour of the East Mediterranean coast with essential natural advantages, as will be shown later. The next ports of importance are, in the SW, Port Said and Alexandria, the latter commanding even more natural advantages than Haifa. To the north lie Beirut, Tripoli, Latakia and Iskanderun (Alexandretta), the last named of which is only now being transformed into a modern port. To the NW lie the Cypriote ports of Larnaca and Famagusta, both of them second-class ports. In Israel itself there exists no other deep-water harbour. Both in Jaffa (at present scarcely used) and in Tel Aviv the ships have to anchor in the open sea at some distance from the shore and there load and unload their cargoes.

The ports of call and destination for the seaborne traffic to and from Haifa are in the Mediterranean and its adjacent seas: Smyrna, Istanbul, Constanta, Odessa, Piraeus, the main Italian ports, Trieste and Marseilles. In the Atlantic

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<sup>26</sup> Up to now (Sept. 1953) the breakwater of 600 m. length has been finished and so has the dredging of the channel to the depth of 7.5 m. Quays of a length of 345 m. have been constructed and most of the area lying to the west of the channel and north of the pipeline has been properly adapted and built up. (The data concerning the Qishon harbour have been supplied by courtesy of Mr. A. Papper of the Qishon Development Department, Haifa).

and its adjacent seas the ports of Southern England are of importance; for the transoceanic traffic mainly New York.<sup>27</sup>

*The Relationship of Haifa with the Inland Areas*

It has already been remarked that the main natural advantage of Haifa as compared with other Levant ports rests in its accessibility from a very wide region. There is an easy transition from the Haifa Plain, the immediate hinterland of the port, through a gap along the Qishon Valley between the Carmel and the hills of Lower Galilee into the Jezreel Plain. The divide between the Qishon and the Harod leads almost imperceptibly east into the Vale of Harod and the Beth-Shan Plain: it is located near 'Affule at 62 m. above sea-level. The Jordan Valley to the east is not yet so depressed as it is further to the south and, what counts for more, there are a number of routes which permit a relatively easy ascent to the eastern uplands. The deeply incised Yarmuk Valley, a short distance north of the junction of the Harod Valley with the Jordan continues as it were the west-east corridor created by the Jezreel-Beth-Shan depressions. The winding valley of the Yarmuk leads up to the heart of the plateau-lands of Transjordan, where there are no serious relief obstacles to communication either to north, south or east. It should be emphasized, that this succession of broad west-east valleys in Western Palestine provides an easy access from Haifa to a very wide inland area. This natural passage is the more important as Haifa is the first natural harbour north of the Nile Delta, a stretch of 500 km.

Such a broad and convenient passage occurs only once again on the whole East Mediterranean coast, viz. along the depression of Nahr Kebir (often called the Tripoli-Homs gap). Other gaps further north, leading to Latakia are far less convenient, owing to their considerable elevation and comparative remoteness from important economic regions (the Beq'a and Damascus). The importance

<sup>27</sup> The following data for 1951 (courtesy of the Director of the Haifa Port) show the most important ports of origin and destination for Haifa shipping:

<i>Port of origin</i>	<i>Number of ships</i>	<i>Tonnage</i>	<i>Percentage of total tonnage*</i>	<i>Port of destination</i>	<i>Number of ships</i>	<i>Tonnage</i>	<i>Percentage of total tonnage*</i>
New York	59	330,856	15.7	New York	41	245,168	11.6
Marseilles	69	211,571	10.1	Marseilles	88	232,572	11.1
Constanta	51	167,575	7.9	Constanta	53	170,608	8.1
Trieste	67	107,242	5.1	Istanbul	81	110,386	5.2
Genoa	92	96,710	4.6	Trieste	29	66,478	3.2
London	47	60,441	2.9	Venice	28	52,969	2.5

\* The total tonnage handled at Haifa in 1951 was 2,107,565, excluding oil tankers.

for communication of such broad tectonic valleys leading at ease into the hinterland cannot be over-emphasized. In the south-western borderlands of Asia with their mountain ranges running near and parallel to the coast and locking them off from the inland, they assume *mutatis mutandis* the same function concerning communication as the waterways and estuaries of the Atlantic coast.

HAIFA AND ITS FACILITIES FOR COMMUNICATION  
WITH THE HINTERLAND

Thanks to the configuration of its surroundings Haifa forms the natural centre of a network of roads and railways radiating in three directions: south, east and north and connecting Palestine with other countries. There are only two natural 'bottle-necks': one is the narrow gap of the Qishon Valley leading eastwards into the Jezreel Plain; the second the narrow coastal strip south of Cape Carmel. Here the main coastal road and the railway are confined to a strip narrowing down to 200 m. at the foot of the steep western cliff of Mount Carmel. The road through the Jezreel Plain<sup>28</sup> meets the ancient highway Jenin-Nablus-Jerusalem-Hebron-Beersheba and leads northwards through Tiberias and Quneitra to Damascus. This road crosses the Jordan 50 m. above sea-level at the Bridge of the Daughters of Jacob. The railway runs some distance to the south descending to 240 m. below sea-level. It then ascends through the Yarmuk Valley to the eastern plateau-lands. Only the road running along the coast to the north encounters a major obstacle within Palestine: the steep cape of Rosh ha-Niqrah.

To the south the steadily widening coastal plain of Palestine offers an easy passage into that of northernmost Sinai as far as the Suez Canal and both road and railway from Haifa traverse these plains at convenient distance one from another.

The present political situation makes it difficult to describe the true economic potentialities and possibilities of Haifa's port and one has therefore to look back to the situation and the trends in the period of Mandatory Palestine. During that period a sort of wider economic sphere began to take shape for Haifa, extending far beyond the borders of Palestine and promising great developments for the future. Haifa was the terminal of a pipeline from the oilfields of Kirkuk in Iraq with an annual capacity of 2,000,000 tons. Furthermore, the refinery, erected in the Haifa Bay during World War II, exported a considerable volume of finished

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<sup>28</sup> A narrow-gauge railway—now disused—traverses the Jezreel and Harod Valleys from west to east.

oil-products. More and more goods from adjacent countries, especially from Transjordan and South Syria were shipped abroad from Haifa, while as far as imports were concerned<sup>29</sup> Haifa was actually Transjordan's only harbour. Political conditions since 1948 have cut short this development and Haifa's great potentialities as an outlet for the neighbouring countries remain latent until these conditions change.

#### HAIFA-ACRE

With all the advantages of Haifa, it is natural to ask why it played no part in the past history of Palestine. The problem of harbour-sites was then just as important as it is today and even necessitated the construction of ports at certain places not favoured by nature at all such as Gaza or Caesarea.<sup>30</sup> Why did the seafaring Phoenicians and their successors who ruled this part of the coast make no use of the southernmost part of the Haifa Bay, choosing instead sites which necessitated artificial constructions as in the case of Caesarea? Why did Acre and not Haifa become the leading harbour of Northern Palestine from the earliest times until recently? One explanation, advanced frequently, is that the ancient ports, originally quite adequate, silted up in the course of centuries. This may be correct to a point, though the extent of silting-up is often exaggerated, but it still does not answer our question, nor does the explanation that the growing size of ships rendered most of the ancient ports unserviceable.

The most plausible explanation seems to be that in ancient times, especially in the Phoenician era, the relation of a port to the land-interior was of far less importance than it is today,<sup>31</sup> when demands have changed radically. A site naturally protected by sea, elevation and other topographical features was the chief desideratum then and in this respect Acre (Ptolemais of the Graeco-Roman period) had noticeable advantages over sites in the southern part of the bay.

An almost universal characteristic of Phoenician ports and hence of many Graeco-Roman harbours on this coast is their situation on tips of promontories or on islets situated just off the coast (e.g. Tyre, Arados) rather than on the inner curves of the embayments. These promontories provided a highly valued measure of protection in addition to the mountain-barrier to the east and the spurs coming

<sup>29</sup> Imports by far exceeded exports both in Palestine and Transjordan.

<sup>30</sup> The inhospitality of the Palestinian coast is already stressed by Josephus Flavius, when describing the great difficulties that had to be surmounted when Herod built the port of Caesarea. *BJ* I, 409-410. Cf. Reifenberg, p. 20 ff.

<sup>31</sup> 'The location of the Phoenician harbour-towns was determined by purely coastal factors, not by consideration of land routes tapping the interior.' Woolley, p. 180.



down to the sea and locking off the area of one harbour-city from that of its neighbour. Port-sites with favourable landward communications were disregarded by the Phoenicians, if they failed to meet these security requirements. The volume of goods to be transported into the interior by pack-animals was so small as to be of less influence than the security requirements. Moreover, at a time when ships were small, the promontory-site had some harbouring advantages too. Vessels had here a choice of two alternative lee-sides for mooring and hence could find shelter both from sea- and land-winds. Many Phoenician ports were double, or compensating ports; they often had two harbours, an inner and outer one. They thus had no need to build large and elaborate breakwaters; small jetties were for the most part the main prerequisite of a promontory-port.

From the point of view of natural defended position the southernmost part of the Haifa-Bay had obvious disadvantages, situated at the edge of a relatively wide open plain freely accessible from east, north and south with the high Carmel dominating immediately behind. The landspit-like projection of Acre by contrast required only protection by short walls on the north and east side, the most dangerous sides.<sup>32</sup> The land projection into the sea offered sufficient protection for landing craft from the west, north-west and east winds, as they could choose the leeward side in each case.

A small town did none the less exist on the site of present Haifa in late Phoenician times. It lay between what is now the German Colony and Bat Galim quarter, i.e. at the west corner of the present harbour; the site is now called 'Ancient Haifa'. W of it at a distance of 3 km. lay Sykaminon on a short blunt land-projection from which the coastline on both sides gently recedes. The site of Sykaminon had more of the prerequisites of an ancient port than the site of ancient Haifa. The small Tell es-Samak rising to a height of 14.5 m. marks its site. Neither Sykaminon nor Haifa had any importance compared with Acre; especially Haifa is known to have been a place existing mainly on fishing and processing of purple snails. Nor did they even enjoy the advantages of land-bound traffic, for they lay off the main route leading from Mesopotamia and Syria to Egypt through the coastal plain of Palestine. This route traversed the Carmel further to the SE through the 'Iron and Yoqne'am valleys respectively.

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<sup>32</sup> Ibrahim Pasha who took Acre for Mohammed Ali of Egypt (1832) began with the construction of a fosse, that would separate completely the little promontory from the mainland and turn it into a sort of island, thus greatly increasing its defensive strength. This undertaking was not finished for various reasons, mainly political. Cf. Thomson, p. 310.

There are no records of Sykaminon after the Byzantine period.<sup>33</sup> Ancient Haifa continued to exist as a very unimportant place until the middle of the 18th century. It appears in records and old geographical descriptions and maps of the Holy Land as Caiphaz, Cayphas, Caiffa and so on. About the year 1761 it was destroyed by Dhahr el-'Amr, a powerful sheikh who set up a semi-independent state of his own in Galilee and Acre. He built in 1785 a town not far from the one he had destroyed and this inherited the name of Haifa. New Haifa in the beginning was greatly overshadowed by Acre, whose fortunes were once again in the ascendant after many vicissitudes; it was now the most important port of North Palestine. However, the prominence of Acre made it a major strategic object in wars and feuds and resulted in repeated material and economic damage to the town.<sup>34</sup> On the other side the importance of Acre as a sea-fortress and garrison-town implied many Turkish prohibitions and restrictions upon settlement, trade and traffic there.<sup>35</sup> For instance it was forbidden to build houses within a radius of 3 km. from its walls. For all these reasons Haifa very soon began to compete with Acre and before long outstripped it as a port. Furthermore with the coming of the steamship there developed the need for greater harbour-space and adequate deep-water conditions. In addition, the attraction of the Carmel for a growing number of European residents in the second half of the nineteenth century should not be overlooked. The Carmel is the only mountain in Palestine bordering directly the sea, and the resulting climate and relatively rich vegetation including woods had a strong appeal.

The growing preponderance of Haifa over Acre is reflected in the fact that the former rather than its ancient and famous neighbour was chosen to be the head of a feeder-line of the Hejaz Railway in 1905.<sup>36</sup> This led to the wheat from Hauran being exported through Haifa instead of Acre as hitherto. This export involved a considerable volume as compared with the conditions of Levant trade in those days, viz. 4000-5000 camel-loads (ca. 1000 tons) per day during the two months after the harvest.<sup>37</sup>

Harbour-construction began on a small scale in 1908 (until then there existed only a little mole of 420 m. length).<sup>38</sup> This sealed the final transference of har-

<sup>33</sup> For a comprehensive history of Haifa, cf. Vilnai.

<sup>34</sup> Acre suffered great damage during the siege of Napoleon (1799) and when recaptured by the Turks from Ibrahim Pasha with British and Austrian help (1840). <sup>35</sup> Thomson, p. 310.

<sup>36</sup> The main purpose of this feeder-line was to transport pilgrims from North Africa to the holy places around Mecca. <sup>37</sup> Fischer, p. 91.

<sup>38</sup> A little jetty was constructed by the German colony of Haifa on the occasion of a visit of the Emperor Wilhelm II to this town.

bourage from Acre to Haifa as far as larger seagoing vessels were concerned. At the same time it meant the beginning of competition with the neighbouring harbours of Jaffa and Beirut. A decisive step in Haifa's development was the building of a modern port in 1933 and the completion in 1934 of the 1500 km. long branch of the pipeline from the oil-fields of Iraq which turned Haifa into the most important oil-port of the whole Mediterranean area.

The new port of Haifa was from the outset a serious competitor to Beirut.<sup>39</sup> Already in 1908 Haifa was berthing more than 600 steamers and about 700 sailing vessels. She subsequently began to outstrip her northern neighbour and approach the annual tonnage handled by the port of Alexandria. Whereas in 1913 the tonnage of ships arriving at Haifa was about 800,000, that of Beirut 1,700,000 and that of Alexandria 3,780,000 (i.e. with Haifa's tonnage as a unit, the proportion was 1 : 2 : 4.7) the data for 1935 show a complete change. Haifa with a tonnage of arriving ships amounting to about 5,000,000 surpassed Beirut (2,700,000) and drew near to Alexandria (6,100,000). Again using Haifa's 1913-tonnage as unit we find that the proportion in 1935 was 6.25 : 3.4 : 7.6.

As for Jaffa, Haifa was from the start her most dangerous competitor. Whereas the tonnage of ships loading and unloading at Jaffa was about the same from 1920 to 1930 ( about 900,000 p.a. ), after the construction of the new port in 1936 the tonnage of ships anchoring at Haifa rose to about 5,000,000 as against 1,000,000 at Jaffa.<sup>40</sup>

At present, owing to the peculiar political conditions, Haifa serves only the State of Israel, handling most of its import and export. It furthermore is almost the sole maritime gateway for the tremendous immigration which has doubled the population of Israel in the five years 1948-1953.<sup>41</sup>

<sup>39</sup> de Monicault, p. 110.

<sup>40</sup> Data derived from various official statistical publications listed in the Bibliography. Cf. Wydra, p. 195.

<sup>41</sup> The number of vessels that arrived in Haifa in the period 1.6.1951-1.6.1952 amounted to 1135, as against 1222 for the same period in the preceding year. The number of passengers which arrived in this period at Haifa amounted to 80,855 (1950-51: 125,956). About 80 per cent of them were immigrants. The cargo unloaded in Haifa port in the same period was 1,301,583 tons whilst 193,132 tons were loaded. This reduction in cargo handled as compared with the years previous to the establishment of the State of Israel is mainly due to the stoppage of oil shipments from Haifa.—

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