THE LIMITS OF SEPARATION: JAFFA AND TEL AVIV BEFORE 1948—THE UNDERGROUND STORY

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"*Polarized cities are not simply mirrors of larger nationalistic ethnic conflicts, but instead can be catalysts through which conflict is exacerbated or ameliorated.*"

Scott A. Bollens, *On Narrow Ground: Urban Policy and Ethnic Conflict in Jerusalem and Belfast* (Albany, NY, 2000), p. 326.

Abstract

This article describes the development of the underground infrastructure—chiefly the water and sewerage systems—of Tel Aviv and Jaffa from the time of the establishment of Tel Aviv (1909) to 1948. It examines the realization of the European-informed vision of Tel Aviv's founders in regard to these underground constructs in a basically non-European context. It adds another building block, however small and partial, to the growing number of studies that aspire to reconstruct that scantily researched area of relations between Jaffa and Tel Aviv before 1948. Finally, it revisits pre-1948 ethnic and national relations between the country's Jewish collective and its Palestinian Arab population through the prism of the introduction of a seemingly neutral technology into a dense urban setting, and the role played by a third party (here, mainly, the British authorities) in shaping these relations.

Models of Urban Relations in Pre-1948 Palestine

The urban history of pre-1948 Palestine has gained welcome momentum in recent years. Traditionally, mainstream Zionist and Palestinian historiographies concentrated mainly on the rural sector, which for both national communities symbolized a mythical attachment to the land. Along with the heroic figures of the Arab *fellah* and the Zionist "new Jew," this bucolic focus represents central elements of the core identities of the two rival

communities. The deconstruction of the old Zionist and Israeli meta-narrative on the one hand, and the effort to show the diversity as well as the modernization processes of pre-*nakba* Arab society on the other, has given new impetus to the study of the country's pre-1948 urban histories.[1]

From the point of view of ethnic/national relations, one can discern two main urban types that existed in pre-1948 Palestine: ethnically homogeneous cities or towns and heterogeneous ones. Significantly, most Jews and Arabs who resided in cities or towns before 1948 dwelled not in homogeneous urban environments but rather in heterogeneous ones, mainly Jerusalem, Jaffa-Tel Aviv, and Haifa, the main urban centers during the period at issue (1909–1948). These urban centers, along with Tiberias and Safed, were the main venues of regular encounters between Jews and Arabs at this time. Moreover, while most of the Arab population lived in rural areas during the period under discussion (around 70 percent in 1931 and 64 percent by 1946), the majority of Jews (around 75 percent at the end of the British Mandate) lived in urban centers. Primary among them was Tel Aviv, which by 1948 accommodated about one-third of the Yishuv (the pre-1948 Zionist community).[2]

Scholars of heterogeneous urban environments identify five main types of relational settings that exist among different ethnic/national groups that occupy one urban environment: (1) *mixed towns and cities*, where "a certain ethnic mix in housing zones, ongoing neighborly relations, socio-economic proximity and various modes of joint sociality" exist. Culturally, the mixed town or city serves as a "shared locus of memory, affiliation and self identification";[3] (2) *divided cities*, in which while the ethnic/national groups live in almost total cultural, economic, and geographic separation, "Conflicts in these divided cities are addressed within accepted political frameworks. Questions of what constitutes the public good are debated, but largely within a sanctioned framework."[4]

(3) *Polarized towns and cities*, in contrast, "host alternative and directly opposing cultures that are contestable. Such conflicts are 'ethnonational' wherein one group seeks autonomy or separation. In such a circumstance, a strong minority of the urban population may reject urban and societal institutions, making consensus regarding political power sharing impossible."[5] (4) *Partitioned cities* are an outcome of a polarized urban environment in which the goal of eliminating ethnic differences is pursued (Jerusalem from 1948 to 1967 and present-day Nicosia).[6] (5) *Colonial cities* are those that from their inception were built for the incoming colonial population. In the modern era, Europeans were the dominant colonial population.[7]

During the second half of the nineteenth century, the meeting of European influence and prevailing traditions gave rise to two modalities of urban administration and planning in the port cities of the Ottoman Empire and Morocco. One model was "inclusive"; it created a power-sharing mechanism in which not only Muslims but also local Jews and Christians and even foreigners were included. Michael Reimer's detailed study on Alexandria and other Egyptian cities, and that of Susan Gilson Miller on Tangier, are examples. The other model, a "separation" model, aspired to establish a European urban space that would be as distinct as possible from the local *medina*. Janet Abu-Lughod's study of Rabat is probably the best example of the separation-colonial model, which was associated with other Mediterranean cities as well.[8] Up to 1948, Haifa may be seen as an important example of the "inclusive/mixed cities" model, which however, as the conflict between Palestinian Arabs and Zionist Jews grew, came very close to be a "divided" model of urban co-existence. While scholars such as May Seikaly lament the lost hegemony of the Arabs in British Mandate Haifa, the picture that emerges from the works of Joseph Vashitz, Deborah Bernstein, Tamir Goren, and others is one of economic cooperation, social and cultural interaction, and actual and symbolic power sharing,

alongside the better known national and cultural differences which were accompanied from time to time with armed clashes as well.[9]

Jerusalem, on the other hand, a "mixed city" under the Ottomans, became a "divided" city during the early British Mandate and a "polarized" city by the mid-1930. Thus, whereas economic, social, and even political cooperation took place between the city's two main national groups at the beginning of the Mandate, by the early 1930s the continuous national tension between Zionist Jews and Palestinian Arabs in Jerusalem and in the country at large became dominant in the relations between the two national sectors in the Holy City until 1948. Concurrently, discussion of the possibility of partitioning of the city became prevalent as well.[10]

Curiously, relative to the growing number of studies on Jerusalem and especially on Haifa during that period, studies on Jaffa are surprisingly few. In cautiously trying to reconstruct a historical reality based on the limited research available, one may conclude that Ottoman Jaffa was a "mixed city." Jews represented a significant and growing minority of the city's population; most of them resided among the Arab population and had daily contact with it. The construction of Jewish neighborhoods north of Jaffa from 1887 onward seems to have been more closely related to the contemporaneous phenomenon of the new traditional and religious Jewish neighborhoods outside the Old City of Jerusalem than to a change toward the creation of an independent Jewish national space separate from Jaffa. That change came only upon the establishment of Ahuzat Bayit, the embryonic Tel Aviv, in 1909.

Under the British Mandate, Jews continued to reside in Jaffa itself and in new neighborhoods established within town limits. They sent representatives to the municipal council, their voice was heard in city hall, they continued to do business in town, and many of them maintained friendly relations with their Arab neighbors. As the national

conflict in the country escalated, however, many of the Jews who resided in Jaffa chose to move to the neighboring first Hebrew city. However, thousands of Jews continued to reside in the neighborhoods of Jaffa that bordered Tel Aviv (especially Florentin and Shapira) and in 1947 about 30 percent of Jaffa's population was Jewish. During the Mandate years, as Tel Aviv became the economic, social, and cultural center of the Yishuv, the dependence of the Jewish neighborhoods of Jaffa on municipal services supplied to them by Tel Aviv—chiefly in education and healthcare—grew concomitantly. Thus, a process of intra-urban ethnic and national division began to take place in Jaffa as in Jerusalem.[11]

The Vision of Separation

Tel Aviv was established as a neighborhood of Jaffa; in its first ten years and up to the British conquest of Palestine (1918), it was an integral part of the Arab city. Soon after the establishment of a civil administration in Palestine (1920), however, the British granted Tel Aviv autonomous municipal jurisdiction as a "township" (1921). In 1934, it received the status of a "municipal corporation," which signified its complete legal separation from Jaffa. Thus, Tel Aviv began its development as part of the "mixed city" of Jaffa and grew into a separate urban center. While the Ottomans had adamantly insisted that Tel Aviv be subordinated to Jaffa, the British, in apparent accord with the terms of the Mandate, quickly helped Tel Aviv to become legally and administratively apart from Jaffa. Defined borders and two legally recognized municipalities officially separated now Tel Aviv from Jaffa. Thus, my contention is that whereas during the British Mandate period Haifa fit the *divided* model and Jerusalem the *polarized* one, the combined urban area of Jaffa and Tel Aviv should be regarded as a *partitioned* urban zone.[12]

From its inception, Tel Aviv envisioned its character as something distinct from various "others"—distinct from the Jewish neighborhoods outside Jaffa, which

represented an extension of the "Old Yishuv" (pre-Zionist Jewish community), i.e., as yet another ethnic neighborhood among the mosaic of ethnic communities of the Ottoman Empire; distinct from Jaffa itself, which epitomized the "backward" "Orient" and its Arabs; and distinct from the Jewish Diaspora. The founders of Tel Aviv also envisioned their new neighborhood as a specifically Zionist entity. It was no coincidence that soon after its establishment Tel Aviv adopted Hebrew, the old-new language that symbolized the revival of Jewish nationalism, as its official language. No other Jewish neighborhood that preceded Tel Aviv had done so.

During the short five years from the establishment of Ahuzat Bayit in 1909 to the outbreak of World War I, Tel Aviv began to evolve into an important center for the Zionist communities in the Yishuv. Leading cultural, business, and political personalities in the young Zionist movement resided in the new "Hebrew" quarter. Significantly, the first Zionist educational institution, the Herzliya Gymnasium, originally founded in Jaffa, was reestablished on the highest spot in the new neighborhood. Economically, the Zionist colonies became Tel Aviv's hinterland, creating dynamic interrelations between the urban core and its agricultural ethnic/national periphery.[13]

Like the French quarter of Rabat and the British Empire cities, Tel Aviv was envisioned by its founders as a Western-modernist settlement situated in a non-European environment. The story of the founders' numerous meetings and detailed preparations for the implementation of their vision of constructing a European-style quarter in Jaffa is well documented. Every aspect in the planning of the future Zionist quarter was completely based on Western (mainly European) models and concepts.

An important part of this vision, repeatedly stressed by the founders and by future leaders and inhabitants of the city throughout this period, was the city as a site of cleanliness, especially in its air and water. Central in the implementation of this vision was

the disposal of sewage from the new neighborhood and the uninterrupted supply of clean water to its residents.[14]

The Sanitary Movement Comes to Tel Aviv

The modern roots of the vision of the city as a site of cleanliness and sanitary integrity date to the Sanitary Movement, which originated in England in the mid-nineteenth century. Public officials and reformers such as Edwin Chadwick who examined with great alarm the repeated outbreaks of diseases, especially cholera epidemics, among the fast-growing population of London and other industrial cities were convinced, after submitting these epidemics to thorough "scientific" examination, that their fundamental origin was "atmospheric impurities" caused by contaminated water and other sources of "bad smell" such as "decomposing animal and vegetable substances, damp and filth, and close and overcrowded dwellings."[15] "Bad air," or what it is now termed the Miasmatic Theory of Disease, was still the dominant scientific explanation for the causes of diseases at the time Tel Aviv was established. Moreover, even after the Germ Theory of Disease replaced the Miasmatic Theory as the leading paradigm for the cause of most illnesses, bad air and bad smell remained important and popular signs of a possible source of a threat to health.[16]

Like Chadwick, Tel Aviv's founders stressed the importance of keeping its air fresh and clean by applying various hygienic practices, chiefly supplying running water that would allow regular and frequent washing and bathing, keeping water sources and sewage safely apart, cleaning the streets, and removing any "smelly" nuisance from city limits.[17] Thus, pure air, running water, clean streets, and personal and public hygiene became integral and important parts of the vision of Tel Aviv's modernity. The vile aroma that wafted from the open gutters of the Old City of Jaffa, as well as from the cesspools of the newly established Jewish neighborhoods of Neve Shalom and even Neve Tzedek (the cultural center of the New Yishuv before 1909), was a recurrent theme in the Zionist

literature of the period and a symbolic statement about the difference between the "old" and the promise of the new and the modern.[18]

This vision was expressed time and again throughout the period. In 1933, for example, Tel Aviv Deputy Mayor Israel Rokach wrote in the municipality's organ, *Yedi'ot 'Iriyat Tel Aviv*, on the question of the township's sewage and its removal:

> Tel Aviv will not be a healthy and well maintained city until a sewerage system is installed there. It is well known that the installation of a sewerage system improves health conditions and reduces death rates. And the first condition for the resort and spa city that Tel Aviv aspires to become is well maintained sewerage [. . .]. With a structured financial plan, it would be possible to set Tel Aviv on a solid sanitary basis, so that no [other city] will be like her in the entire Middle East.[19]

A running-water system was installed in Ahuzat Bayit as the first houses in the new Zionist quarter were being built—the first to be constructed in either Jaffa or the Jewish neighborhoods that preceded Tel Aviv.[20] However, as in other European and American cities at the time, the growing availability of running water posed a constant challenge to Tel Aviv's leaders: how to find a cheap and efficient way of removing the increasing quantities of wastewater that were now pouring onto the new neighborhood's soil.

The founders of Tel Aviv aspired to adapt the models used in urban European centers to their non-European environment. Thus, references to the German term *Kanalisation*, which denotes a water-carriage sewerage system that removes sewage from urban areas, appear frequently in the writings of the Sanitary Committee of the Tel Aviv Municipality (hereinafter: TAM), which supervised sanitary conditions there until the outbreak of World War I. One report stated that:

> The best system for the removal of all sorts of faeces is the *kanalizatziya* [a Hebraization of *Kanalisation*] system, which is operating in several cities in Europe. Through the kanalizatziya sewers, all faeces along with wastewater are removed to a designated place where the material is processed as manure for the enhancement of the fields.[21]

Two obstacles prevented the implementation of the *Kanalisation* system before the British conquered Palestine in 1918. First, the town lacked the minimum amount of running water that was needed to make the system operative. More important, however, was the cost of installing a full-fledged sewerage system that would run under the city's streets and treat the sewage before dumping it as far as possible from city limits. Naturally, the leaders of the young Jewish neighborhood of Jaffa were well aware of this: "[*Kanalisation*] is indeed the best system but unfortunately it is beyond our means. Therefore, we will have to make do with an inferior system simply because it is cheaper."[22]

The system adopted was the one used in the other Jewish neighborhoods of Jaffa and certain quarters of Jaffa itself: the cesspool system, in which the soil functions as the sink. In that regard, Tel Aviv did not differ from the European and American cities of that period, which used the cesspool system before they were forced to install water-carriage systems due to the growing amounts of wastewater that they had to discharge.

During the nineteenth to the mid-twentieth centuries, the period in which cesspools were in vogue in Europe and the USA, the main health concern was that the sewage would reach nearby water sources. Keeping cesspools a safe distance from water sources and preventing cesspool overflow were the main tasks in that regard.[23] TAM established a Sanitary Committee, headed by the municipal physician, that regularly supervised sanitary conditions in the rapidly developing Jewish quarter. The committee inspected homes,

wrote reports, and enforced regulations pertaining to cleanliness. An essential part of its work was to check closely the sanitary conditions of the cesspools in every house in town. In addition, Tel Aviv's bylaws stipulated clearly how these cesspools should be constructed, maintained, and cleaned.[24] Fluids were absorbed in Tel Aviv's sandy soil; "solid residue" was cleaned out periodically by Arab workers from Jaffa or by Yemenite-Jewish laborers from nearby Jewish neighborhoods, who dumped it either in nearby fields or in the Mediterranean.[25]

Upon its inception, Tel Aviv was considered by its inhabitants and in the contemporary literature as a "neighborhood" or a "colony"; by 1914, only five years after its establishment, it was already referred to as a "city."[26] The change in terminology reflected the demographic growth of Tel Aviv, its population quintupling from about 300 to 1,500 during this short period.[27]

Tel Aviv grew not only due to the increase of its own population and built area but also because new Jewish neighborhoods in the vicinity, established after 1909, merged with and became integral parts of it. They included Nahalat Binyamin, Hevra Hadasha (concentrated along Allenby Street today), and the neighborhood built by the Anglo Palestine Company for its employees.[28] By the autumn of 1913, the Sanitary Committee sent a special report to the Tel Aviv Executive Committee (the official name of the neighborhood's active leadership at the time) recommending that the Executive Committee "begin the process of drawing up a technical scheme for a municipal *kanalizatziya* system."[29]

The Early Mandate Years

The establishment of civilian British rule in Palestine in the summer of 1920 brought about crucial political, economic, and organizational changes as well as an accelerated process of modernization.

It was the "township" status that the Mandate Government granted Tel Aviv in 1921 that triggered the annexation of many Jewish neighborhoods around the town, which until then had not merged with their stronger sister. However, most of the older neighborhoods, such as Neve Tzedek, Neve Shalom, and Kerem Hatemanim, were populated largely by Sephardi Jews who opposed the merger and resisted it for two years, even bringing their struggle to the courts. The controversy seems to have centered on issues of property rights, taxes, and preservation of the old neighborhoods' religious way of life. Tel Aviv, in turn, wanted to bring Jaffa's old Jewish neighborhoods under its European, nationalist, and secular clout. Indeed, the Mayor of Tel Aviv, Meir Dizengoff, described the controversy as a collision between a "European" way of life and an "Oriental passive" one.

In the end, however, most of the old neighborhoods merged with Tel Aviv, albeit only after Tel Aviv made some concessions on property rights and religious observance in the public domain. Even so, some neighborhoods elected not to merge with the Hebrew city and to remain part of the "mixed" city of Jaffa. These neighborhoods, along with new ones established after the 1923 merger (most prominently, Florentine and Shapira), became an in-between site that defied the notion of total separation.

Tel Aviv's attitude of separation expressed itself most clearly in the township's policy to set its new border with Jaffa so that "not even one house of a non-Jew or one dunam [tenth-hectare] of an orchard [owned in this area almost exclusively by Arabs—NK] will come under Tel Aviv's rule."[30] Little is known to date about the history of Jaffa during this period, including the attitude of its leadership toward the "loss" of its Jewish neighborhoods to Tel Aviv. Subsequent accounts by Dizengoff's successor, Israel Rokach, suggest that in the early 1920s Jaffa's leadership did not mount much opposition to the merger of its old Jewish neighborhoods with Tel Aviv. Concurrently, as we saw, Jaffa welcomed the decision of some of the neighborhoods to remain under its municipal

authority and accepted new Jewish neighborhoods that were later established inside its borders. In later years, as the national conflict between Jews and Arabs intensified, Jaffa resisted attempts to allow the Jewish neighborhoods to switch to the municipal authority of Tel Aviv.[31]

The merger of the old Jewish neighborhoods with Tel Aviv more than doubled the Hebrew township's population, adding 5,200 new residents to the 3,600 residents of pre-1921 Tel Aviv.[32] The newly established border with Jaffa prevented Tel Aviv from growing further to the south; thus, it continued to grow and develop along its natural growth trajectory—northward. By the end of the Mandate, Tel Aviv's population rose to approximately 248,000 souls, who inhabited an area that sprawled to the Yarqon River in the north and Wadi Musrara to the east.

Water Supply and the Cesspool System

Naturally, the efficient and uninterrupted supply of running water to the growing population of Tel Aviv was a main concern for the city's leadership. In 1948, Tel Aviv still received its water as it had in its Ahuzat Bayit days, from wells. Until the mid-1930s, the availability of abundant and high-quality groundwater only a short distance from the surface allowed the city to meet all water demand for both domestic use and for the city's growing industries. From then on, however, population increase forced the leadership to step up the exploitation of groundwater reserves by sinking more and more wells to meet the growing demand. As a result, seawater penetrated the geological stratum of the shallow groundwater, making some wells useless. This situation and the realization that Tel Aviv would need to develop additional water sources in the future prompted the municipal and Mandate authorities to invite an expert to formulate a comprehensive plan to supply Tel Aviv's growing demand for water.

The expert, selected by the Colonial Office in 1936, was the British water engineer Howard Humphreys. Humphreys chose the only available source of water other than existing groundwater: the Yarqon / Ras el ‘Ein (Rosh ha-‘Ayin) springs. By the end of the nineteenth century, a detailed plan for the exploitation of the Yarqon River as a main water source for Jaffa had already been put on the table.[33] Neither that scheme nor Humphrey’s was ever implemented; it was too costly relative to the alternative of keeping the existing system in operation and developing it.

The problem of salination of wells during the 1930s provoked an attempt by the Tel Aviv authorities to probe for deeper geological strata that might hold additional water. The search proved enormously successful; new and deeper wells were dug, supplying the city with more and better water than the existing wells were able to provide. By the end of the Mandate, twenty-seven wells were in operation in Tel Aviv, closely supervised by a central control system. In addition, Tel Aviv’s water was tested regularly for bacteria, in cooperation with and under the supervision of the Mandate health authorities. Chlorination was gradually introduced; by 1948, many of Tel Aviv’s wells were chlorinated. Furthermore, safe distances between cesspools and wells were strictly observed.[34]

In contrast to Tel Aviv, source material about Jaffa’s water system is scanty. The very limited sources available make it seem that by the end of 1935 the residents of the city’s Ajami quarter were getting their water from “private” suppliers. The British authorities took advantage of Humphreys’ presence in the area and asked him to devise a water-supply scheme for Jaffa as well. Significantly, he planned separate water supply systems for the two municipalities, probably in anticipation of the policy of partition that the British would adopt in the wake of the 1936 Arab “disturbances.” Unfortunately, the limited source material on this issue does not allow us to learn more about the development of Jaffa’s water supply system from 1937 to 1948.[35]

The municipality's preventive measures against water contamination were increasingly needed as the development of its sewerage system lagged behind progress in water supply.

In the meantime, Tel Aviv's cesspool system deteriorated steadily, ironically due to the fast and efficient growth of the city's running-water system itself. The phenomenon mirrored the development of sewerage systems in most Western cities during the nineteenth and mid-twentieth centuries. There, as in Tel Aviv, the high cost of installing water-carriage sewerage relative to that of installing and maintaining running water and cesspool systems constantly placed the existing sewage-disposal system, i.e., the cesspools, under excessive strain. Concurrently, per-capita water consumption was greater in Tel Aviv not only than other cities in Palestine such as Jerusalem, but also than in many Western cities at the time. In 1934, for example, per-capita water consumption in Jerusalem—which at this time still relied heavily on communal and private rainwater cisterns—was 45 liters a day. Corresponding figures for other cities were 164 liters in Alexandria, Egypt, 114 liters in London, 216 liters in Paris, and 230 liters per capita per day in Tel Aviv. By 1947, the differences grew, per-capita water consumption holding steady at 114 liters per day in London and climbing to 350 in Tel Aviv. Thus, apart from Tel Aviv's tremendous demographic growth during this period, its water consumption in total and per-capita terms grew even faster.[36]

Contemporary 1920s sources reveal that the TAM leaders were well aware that their town was not as clean as they had envisioned. In fact, it was squalid, as Anat Helman vividly describes.[37] The possibility of an epidemic outbreak due to drinking-water contamination was real one that served as a constant warning for the municipal authorities to find ways to improve the city's sewerage system. Thus, the notion of Tel Aviv as a modern city that should keep its air clean and its sanitary conditions at the highest

standards, like the most "progressive" cities in Europe, coupled with the real threat of epidemic, were two fundamental driving forces for both the city's leadership and its residents for the improvement of Tel Aviv's sewerage system.

Sewerage Systems in Tel Aviv and Jaffa up to the Peel Commission Report (1937)

In the wake of the 1923 merger with Jaffa's old Jewish neighborhoods, the growing legal and administrative separation from Jaffa, and the prospect of rapid population growth due to the Mandate regime's favorable policy toward Jewish immigration, the leaders of Tel Aviv decided to solicit technical schemes for the construction of a sewerage system for their township. Two such reports, a 1923 scheme from the Berlin-based firm Grove and a 1924 one devised by the township engineer, Uriel Avigdor, were reviewed. The sanitary engineer of the governmental Health Department rejected the Grove scheme as divorced from local conditions and too expensive. Concurrently, the Mandate authorities invited the drainage engineer of Alexandria to examine Avigdor's scheme. While the visiting expert had some reservations about the plan, he regarded it as a blueprint for the construction of a water-carriage sewerage system in Tel Aviv. As for Jaffa, the Avigdor scheme seems to have instigated some initial cooperation between the neighboring towns in the construction of Tel Aviv's main sewer, which was planned to cross Jaffa territory. Tellingly, the Alexandria drainage engineer saw this as an important outcome of the plan. The inter-municipal cooperation that it proposed, he said, "would tend to encourage the establishment of amicable relations of great value to the two communities." However, the Avigdor scheme was not implemented, most probably due to the costs involved.[38] Hence, new houses and even entire new neighborhoods were constructed with cesspools, which remained the chief method for removing sewage from the fast-growing Hebrew city.

By the end of the 1920s, the explosive growth of Tel Aviv's population—which was expected to continue at a similar rate—threatened to overburden the cesspool system.

Conditions were especially acute in the southern (and older) parts of the city, where the soil could hardly absorb any more wastewater. This time, the municipal leaders turned to the British authorities and solicited their assistance in constructing a sewerage system for Tel Aviv. Two closely interconnected factors prompted this appeal. First, since the cost of installing a complete sewerage system was beyond Tel Aviv's means, the municipality needed a substantial loan to finance the project. However, in keeping with their overall policy not to burden their taxpayers with expenses incurred in the colonies, the British supervised the finances of Palestine, including municipal finances, very closely.[39] Thus, Tel Aviv had to turn to the Mandate authorities if it wanted the loan to be approved. Second, the British numbered the construction of sewerage systems among the large "public works" that had to be approved according to their unique highly bureaucratic colonial procedures. This part of the story follows.

Crown Agents and the Consulting Engineers

Tel Aviv's financial constraints brought a third player, the British Government and its colonial administration, into the story of the binational sewerage systems of these neighboring cities in Palestine. The British colonial system defined major infrastructure projects (railroads, roads, ports, water systems, etc.) as "public works." Large public works in crown colonies—and in administrative terms Palestine was ruled like a crown colony—were not authorized or administrated by the local colonial authorities but, rather, by a special institution in London called the "Crown Agents for the Colonies."

Little was known about this peculiar institution until David Sunderland's recent comprehensive two-volume study about it. As their title suggests, the Crown Agents were the commercial and financial representatives of the crown colonies in the Empire's metropolis. However, as Sunderland clearly shows, in addition to their benevolent mission to help develop the colonies, the Crown Agents had the important objective of assuring

that the colonies would not burden the British budget and that, instead, the mother country would profit from the colonies as much as possible.

By authorizing the Crown Agents to take charge of large and lucrative public works, the Empire supervised and kept a check on the tendency of local colonial administrations to prioritize the well-being of local populations. The agents contracted out the planning and performance of these public works to a closely knit circle of "consulting engineers." Both the Crown Agents and the consultants whom they hired received a hefty fee for each contract, which made them interested in long-term, expensive, and extensive projects.[40]

In 1926, the Consulting Engineers John and David Watson were hired to devise detailed proposals for the construction of sewerage systems for Jerusalem, Haifa, Jaffa, and Tel Aviv. Their reports on Jerusalem and Haifa are beyond the scope of this paper. They attest, however, to a broader policy that the British Government envisioned regarding the development of infrastructure in Mandate Palestine. In 1927, a year after they visited Palestine, the Watson consulting engineers submitted their proposal, which found it better to construct a single unified sewerage system for both Tel Aviv and Jaffa and hence suggested that a main sewer for both municipalities should run through Salameh Road, the topographically lowest-level road between the two municipalities. Thus, the Salameh Road sewer was supposed to drain most of Tel Aviv, which in those days did not extend north of Bograshov Street. As for Jaffa, the consulting engineers suggested that both the commercial area (around Bustros Street up to the Old City) and the northern neighborhood of Manshiyya should be reticulated to the Salameh Road sewer. The southern Ajami quarter was not supposed to be drained by the common sewer; its residents would continue to rely on their existing cesspool system. A common outlet at the end of Salameh Road in the swamp area (the Bassa) would discharge the binational sewage into the Mediterranean. Provisions were also made for the future development of

Tel Aviv in the direction of the Yarqon River, but the main concern in the report was the more densely populated built area.[41]

Cooperation amid Separation

From its inception, Tel Aviv attempted to distance itself from Jaffa both physically and symbolically. Now, due to their common topography, modernization, and an imposing authority, it found itself having to merge its liquid waste with that of its "other."

The full story of the relationship between Tel Aviv and Jaffa has yet to be told. The inter-municipal cooperation in the decade between 1926 and the Arab Revolt of 1936 is but one facet of this little-told story that requires further research. A major obstacle to telling it is the fact that the Jaffa archives disappeared during the 1948 war. The limited sources at our disposal tell a complicated story of both tension and cooperation between the two cities on issues related to the sewerage system. This impression is compatible with the findings of other studies about relations between Jaffa and Tel Aviv, notably the work of Mark LeVine.[42]

By 1925, when township engineer Avigdor finished drawing up his Tel Aviv sewerage scheme, Jaffa and Tel Aviv had already established official contacts in regard to the implementation of the plan. Some reports hint at even broader cooperation between the municipalities, involving discussions related to town planning in both urban centers.[43] In the wake of the submission of the 1927 Watson plan, the cooperation between the two municipalities on their common sewerage system became formal. A Joint Drainage Committee was formed, headed by the two municipalities' town engineers. The committee maintained a continuous dialogue between Jaffa and Tel Aviv on planning, budget allocations, and performance and supervision of the plan. Both municipalities financed the construction of the Salameh sewer and the Bassa outlet, dividing the financial burden commensurate with each party's share in using the system. Thus, Tel Aviv financed about

60 percent of the joint venture. The Salameh sewer was constructed in the early 1930s; neighborhoods in southern Tel Aviv and the commercial district of Jaffa were connected to it by 1936. In addition to the Salameh sewer and the Bassa outfall, another sewer and its corresponding outlet were jointly devised and financed: this second sewer drained both the Tel Aviv neighborhood of Neve Shalom and parts of the Jaffa quarter of Manshiyya. Its corresponding outlet was constructed near the Feingold houses, which were situated inside Jaffa's city limits. Other neighborhoods in both towns were connected to other sewers that passed under the Arab neighborhood of Manshiyya and Tel Aviv's Ezra Street.[44]

The picture of cooperation is reported in a neutral, very technical, and laconic manner. This makes it difficult to determine the parties' emotional or ideological attitudes toward each other and toward the notion of cooperation. Especially limited is our ability at this time to reconstruct the attitude of the Jaffa municipality toward cooperation with Tel Aviv.[45] Despite these limitations, it seems possible to state that even as the two municipalities cooperated continuously, certain tension and mistrust underlined their relations. Each municipality, for example, occasionally questioned its counterpart's willingness to contribute its fair share to the financing of the joint projects. Moreover, in accordance with common perceptions and attitudes of the period, Tel Aviv's municipal engineer, Ya'akov Shiffman (Ben Sira), who succeeded Avigdor in this post in 1929, belittled the Jaffa municipality's technological and administrative ability to carry out complex technological projects. In 1938, Israel Rokach, the Mayor of Tel Aviv, portrayed the Jewish neighborhoods within Jaffa city limits as captives in an urban space of "cultural, economic, and social degeneration."[46] The municipal engineer of Jaffa, John Salah, on the other hand, apparently noticing the rapid growth of Tel Aviv, tried to secure for his city an urban space that could accommodate much larger numbers of residents than even the most optimistic growth outlooks had projected for Jaffa.[47]

Despite the tension, the two municipalities continued to cooperate where sewerage was concerned. By 1936, however, the Watson scheme remained on paper and the joint sewerage projects addressed only a small part of both municipalities' built area. Hence, most neighborhoods in both Jaffa and Tel Aviv still used cesspools. According to a detailed report by Jaffa's municipal engineer in 1935, residents of the Ajami quarter used cesspools for the disposal of their sewage and those in the Old City drained their wastewater straight into the sea via masonry conduits.[48]

A major obstacle to the implementation of the Watson plan was that the British procedure for approving a loan to help finance the scheme had not run its full course. In addition, regarding Tel Aviv, it seems that except for the southern area, for which some partial solutions were found, sanitary conditions in the other built areas were not alarming. Consequently, both the municipality and the British authorities felt under less pressure to replace the cesspools with a full-fledged water-carriage sewerage system.

Early in 1936, the Watsons were summoned again to submit another set of plans for the construction of sewerage infrastructure in Tel Aviv and Jaffa. About a month before the eruption of the 1936 Arab uprising, Tel Aviv's municipal engineer, Shiffman, met with one of the Watson brothers. In a detailed report to Mayor Dizengoff, in which Shiffman expressed his displeasure about the consulting engineers' involvement in what he considered his autonomous professional realm, he also reported the municipality's official stance on the cooperation with Jaffa:

> I then moved to discuss the cooperation with Jaffa; I explained to Mr. Watson that based on the records of the existing cooperation, and since this cooperation is undesirable for us in both its political and its technical-financial aspect, the Municipality wishes to reserve the right to decide on the

> extent of said cooperation and, in any event, it should be minimized as much as possible.[49]

There is no indication that an official Tel Aviv policy to "minimize" cooperation with Jaffa "as much as possible" played any decisive role in the Watsons' second sewerage scheme, which was submitted in early 1937, just a few months before the Palestine Royal Commission under the Rt. Hon. Earl Peel (the "Peel Commission") published its report.[50] In their new 1937 schemes for both Jaffa and Tel Aviv, however, the Watsons did elaborate on the difficulties that their survey party encountered when it tried to collect first-hand data "in the field" due to the 1936 "disturbances."

The new sewerage plans were diametrically opposed to the previous ones. If the previous report firmly supported a common sewerage system for Tel Aviv and Jaffa, the 1937 proposal advised that two completely separate systems should be constructed. The main reason given by the Watsons was that they needed to take into consideration plans concerning "the possible construction of a harbour" in the Bassa area. It is clear, however, that their schemes for both municipalities went to great lengths to ensure that the sewage of one municipality would not meet that of the other. Although there is no direct reference to the Palestine partition plan of 1937, it seems more than likely that the second Watson scheme deliberately reflected the colonial policy of the day.

According to the new scheme, the Bassa outlet, which the Watsons' 1927 scheme envisaged as drains the sewerage of both cities and, in consequence, inducing the two municipalities to cooperate, would now be eliminated. In its stead, it was proposed that Jaffa and Tel Aviv construct two separate sewage collectors that would carry each city's wastewater to opposing outfalls—one in the north, near Jabotinsky Street, for Tel Aviv, and the other in the south, in the Ajami quarter, for Jaffa. In addition, pumping stations along the Tel Aviv main and at the Ajami outfall were to pump each city's sewage in the

proper opposing directions. Thus, the declared purpose of the Ajami pumping station was to transfer the sewage of the Salameh quarter and Jaffa's commercial areas not to its topographically natural outlet at the Bassa but rather over the hill of Jaffa's Old City to the Ajami sea outfall.

The same reasoning guided the scheme for Tel Aviv. Instead of letting the wastewater flow along the topographical contours of the city—i.e., the southern neighborhoods' sewage would flow under Salameh Road to the Bassa and that of the central and northern neighborhoods to the northern part of Tel Aviv, near the Yarqon River—the second Watson scheme sought to force all Jewish sewage to head north. However, total separation was not possible because the Manshiyya quarter in Jaffa and the southern neighborhoods of Tel Aviv (especially Neve Shalom) were physically interconnected. Thus, the consulting engineers wrote:

> In some places it has been found advisable to locate short lengths of the Tel Aviv sewers within the Jaffa municipality and vice-versa, and where this has been done we have endeavoured so to arrange matters that an equivalent area of Tel Aviv will be served by Jaffa sewers. Thus, each of the two towns would deal with some 95 percent of its own sewage, the remaining 5 percent only being disposed of by the other municipality.[51]

Naturally, the 1937 Watson sewerage plan was enormously expensive. The estimate for to Tel Aviv was approximately two-thirds of a million British pounds—more than twice the entire annual municipal budget at the time—and that for Jaffa was £284,000, as against a 1936/37 municipal budget of only £56,000.[52] Suffice it to say that the commissions and fees that the Crown Agents and their consultants expected to earn were directly related to the size of the budgets of the public projects that they handled.

TAM objected to various aspects of the second Watson plan. It argued that the plan was not compatible with the local geological reality, that it would make more sense to manufacture the infrastructure components locally, and that the project should be supervised jointly by the local municipal engineer and by a representative of the Consulting Engineers, the Watson brothers, officially called "resident engineer." These suggestions, which would have reduced the cost of the system and the money earned and spent in England, were rejected by the Crown Agents. At the same time, TAM—which had a strained relationship with the British treasury—could not obtain a loan that would allow the second Watson plan to be implemented at all.[53]

1937–1948

At this point, the local British officials stationed in Palestine, who had developed a sense of local patriotism toward Tel Aviv, came to the rescue. The local British authorities helped TAM to obtain authorization from London to establish a fund that financed small temporary sewerage systems for those parts of the city that needed them most acutely. The principal was collected from homeowners, who were for the most part happy about the prospect of getting the cesspools out of their back yards once and for all. The main neighborhoods in which new sewerage was installed included the commercial center and parts of Neve Shaanan, Kerem Hatemanim, and the area from Trumpeldor Street south to Ezra Street. Neve Shalom's wastewater continued to be drained through the sewer that passed under the Arab quarter of Manshiyya and discharged at the Feingold sea outlet. Other areas, especially between the railroad tracks in the south to Balfour Street in the center of Tel Aviv, were connected to an outlet situated near the Hassan Bek mosque.

The commercial center and Neve Shaanan directed their wastewater to the Salameh Road sewer, which channeled it straight to the Bassa outfall. Although the second Watson scheme had recommended the elimination of this outfall, no such thing was done and Jaffa

and Tel Aviv continued to maintain both the sewer and the outlet jointly. Thus, despite the "Watson II" recommendation and actually much in contrast to it, Jaffa and Tel Aviv continued to cooperate with regard to the sewerage system that served their border neighborhoods.[54]

On the eve of World War II, only 28 percent (2,200) of the approximately 8,000 houses in Tel Aviv were reticulated to a water-carriage sewerage system. Of them, 66 percent (1,450) were served by the sewers that passed under Jaffa's municipal area and were connected to the Bassa, the Feingold, and the Hassan Bek outfalls; only 750 houses (34 percent) were connected to sewers that passed under Tel Aviv municipal areas.[55] The topographical structure of the two cities, the towns' successful experience in cooperation, the moderate approach of many leaders in Jaffa toward the Arab revolt, and pure financial considerations obviated the total separation of the two urban entities. Thus, as World War II loomed, six outlets discharged sewage from the Tel Aviv-Jaffa shore into the Mediterranean Sea, three of them in Jaffa (see Map 1).

[PLACE MAP 1 HERE]

During World War II, the tendency toward greater cooperation between the two national sectors in Palestine was also evident in relations between Tel Aviv and Jaffa.[56] Due to lack of funding, however, the sewerage system underwent no further development until 1945.

The breakthrough came after the war. Since the city had already reached the Yarqon River in the north and Wadi Musrara in the east, TAM's main concern was the central and northern areas. This time, in contrast to the pre-war period, the British authorities empowered the Municipality to plan and construct the sewer system on its own, albeit

demanding that the new system not contradict the general outlines for the northern part of the city in the 1937 Watson scheme. A main sewer for the central part of the city was constructed along the shore, next to Herbert Samuel Quay. Along with other smaller sewers and outlets, this new collector helped to reticulate the houses in central Tel Aviv. The northern part was designed to be served by a different collector that ran along Arba' ha-Aratzot and Jabotinsky streets. As in the second Watson scheme, a sea outfall for the northern part was constructed at the end of Jabotinsky Street, giving the city's northern areas a natural drainage vent.

By the end of 1947, about 5,300 of the 8,000 houses in Tel Aviv (66 percent) had been equipped with proper technology that would allow them to be reticulated to the expanded sewerage system. For financial and legal reasons, however, only 3,150 (39 percent) houses actually reticulated. Of these, it may be assumed that at least the 1,750 houses that in 1939 were connected to sewers and outfalls that crossed Jaffa were still connected to them nine years later. Thus, even as 1948 dawned, about 56 percent of Tel Aviv's houses that were reticulated to the city's sewerage were still attached to the city's important "other." Consequently, the cooperation with Jaffa , which persevered during World War II, continued in the years immediately following—albeit in an atmosphere that became very hostile as the events of 1948 approached.[57]

[PLACE MAP 2 HERE]

* * *

From its inception, Tel Aviv was envisioned and built as a separate European Zionist entity. The notions of clean air, running water, and excellent sanitary conditions were an integral part of this modernist vision. However, in contrast to this vision and like most Western urban centers in the nineteenth and twentieth centuries, both Jaffa and Tel Aviv

used cesspools to dispose of their sewage as long as this was economically and hygienically possible. In contrast, and in keeping with Zionist policy of the time, Tel Aviv's vision of separation was fundamental in shaping relations between it and Jaffa. A third party—the British administration in London and the Mandate Government—also played an important role in determining the level of cooperation between the two opposing national municipalities. More research on the pre-1948 *urban* Yishuv is needed before one can draw a sound conclusion from this experience as to whether the separation model offers a better solution for the achievement of peaceful co-existence in a contested urban matrix than the mixed-city model. The case discussed in this article, however, does tell us that the reality of the ethnic/national matrix in the Yishuv makes the aspirations for a complete ethnic/national separation unattainable. No matter how hard it tried, Tel Aviv could not insulate itself from its "other." Jaffa—like the Yiddish language and the Jewish Diaspora—was integral in the construction of Tel Aviv's identity. Without it, the first Hebrew city could not become itself.

NOTES

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Deborah Bernstein, *Constructing Boundaries: Jewish and Arab Workers in Mandatory Palestine* (Albany, NY, 2000); Tamir Goren, *Cooperation in the Shadow of Confrontation: Arabs and Jews in Local Government in Haifa during the British Mandate* (Ramat Gan, 2008) [Hebrew]; Yehoshua Ben-Aryeh (ed.), *Jerusalem and the British Mandate* (Jerusalem, 2003) [Hebrew].

[2] Jacob Metzer, *The Divided Economy of Mandatory Palestine* (Cambridge, UK, New York, 1998), p. 9; Ya'acov Shavit and Gideon Biger, *The History of Tel Aviv: vol. 2—From a City-State to a City in a State* (1936–1952) (Tel Aviv, 2007) [Hebrew], p. 22.

[3] Daniel Monterescu and Dan Rabinowitz, *Mixed Towns, Trapped Communities: Historical Narratives, Spatial Dynamics, Gender Relations and Cultural Encounters in Palestinian-Israeli Towns*, ed. Daniel Monterescu and Dan Rabinowitz (Aldershot, 2007), Introduction, p. 3.

[4] Scott A. Bollens, *On Narrow Ground: Urban Policy and Ethnic Conflict in Jerusalem and Belfast* (Albany, NY, 2000), p. 9.

[5] Ibid., p. 10.

[6] Ibid., p. 12.

[7] Janet L. Abu-Lughod, *Rabat: Urban Apartheid in Morocco* (Princeton, NJ, 1980); Leonard Thompson, *A History of South Africa* (New Haven and London, 2000), pp. 31–69; Thomas R. Metcalf, "Imperial Towns and Cities," in *The Cambridge Illustrated History of the British Empire*, ed. P. J. Marshall (Cambridge, 1996), pp. 224–253.

[8] Michael Reimer, "Urban Government and Administration in Egypt, 1805–1914," *Die Welt Des Islams: International Journal for the Study of Modern Islam*, 39.3 (1999), pp. 289–318; Susan Gilson Miller, "Watering the Garden of Tangier: Colonial Contestations in a Moroccan City," in *The Walled Arab City in Literature, Architecture and History: The Living Medina in the Maghrib*, ed. Susan Slymomovics (London, Portland, OR, 2001), pp. 25–50; Abu-Lughod, *Rabat.*

[9] Joseph Vashitz, "Social Transformations in Haifa's Arab Society: Merchants and other Entrepreneurs," in *Economy and Society in Mandatory Palestine, 1918–1948*. ed. Avi

Bareli and Nahum Karlinsky (Sede Boqer, 2003), pp. 393–438 [Hebrew]; Mahmud Yazbak, "Immigrants, Elites and Popular Organizations among the Arab Society of Haifa from the British Conquest to 1939," *ibid*., pp. 367–392; Seikaly, *Haifa*; Bernstein, *Constructing Boundaries*; Goren, *Cooperation in the Shadow of Confrontation*.

[10] Daniel Rubinstein, "The Jerusalem Municipality under the Ottomans, British and Jordanians," in *Jerusalem: Problems and Prospects*, ed. Joel Kraemer (New York, 1980) 72–99; Paul A. Alsberg, "The Conflict over the Mayoralty of Jerusalem during the Mandate Period," in *Jerusalem in the Modern Period*, ed. Eli Shaltiel (Jerusalem, 1981) [Hebrew], pp. 302–354; Yossi Katz, *A State in the Making: Zionist Plans for the Partition of Palestine and the Establishment of a Jewish State* (Jerusalem, 2000) [Hebrew].

[11] Yosef Eliyahu Chelouche, *Reminiscences of My Life, 1870–1930* (Tel Aviv, 1930–1931) [Hebrew]; Alter Druyanow, *Sefer Tel Aviv* (Tel Aviv, 1936) [Hebrew], pp. 31–253; Shavit and Biger, *The History of Tel Aviv: vol. 1—The Birth of a Town (1909–1936)* (Tel Aviv, 2001) [Hebrew], pp. 16–192; *ibid*., vol. 2, pp. 41–43, 139–146; LeVine, *Overthrowing Geography*; Bernstein, *Women on the Margins*.

[12] Arguably, the Mandate administration merely responded to a developmental path already set in motion by the founders and subsequent leadership of Tel Aviv. Viewed from the perspective of the Mandate's municipal conduct toward Jerusalem and Haifa, it seems that the British tried to adapt their municipal policy to local conditions. Hence their support of Tel Aviv's separation from Jaffa was not exceptional. See: Nahum Karlinsky, "Partitioned, Polarized, and Divided Cities in pre-1948 Palestine." Paper given at the Annual Conference of the Association for Israel Studies, University of Toronto, 10-12 May 2010.

[13] On ventures by the "Old Yishuv" (the pre-Zionist Jewish community) into what retroactively was regarded as "new," see Israel Bartal, "Old Yishuv and New Yishuv: Image and Reality," *The Jerusalem Cathedra,* 1 (1981), pp. 215–231; Druyanow, *Sefer Tel Aviv,* pp. 31–253; Hanna Ram, *The Jewish Community in Jaffa: From Sephardic Community to Zionist Center* (Jerusalem, 1996) [Hebrew]; Amiram Gonen, "The Emergence of a Geographical Heartland in Israel," in *Economy and Society*, ed. Bareli and Karlinsky, pp. 439–488.

[14] Tel Aviv 1910 bylaws in Druyanow, *Sefer Tel Aviv,* pp. 158–163; Anat Helman, "Cleanliness and Squalor in Inter-war Tel Aviv," *Urban History,* 31.1 (2004), pp. 72–99.

[15] (Edwin Chadwick), *Report to Her Majesty's Principal Secretary of State for the Home Department, from the Poor Law Commissioners on an Inquiry into the Sanitary Condition of the Labouring Population of Great Britain* (London, 1842), p. 369. On the Sanitary Movement, see Selwyn K. Troen, "The Diffusion of an Urban Social Science: France, England, and the United States in the Nineteenth Century," *Comparative Social Research,* 9 (1986), pp. 247–266; Joel A. Tarr, *The Search for the Ultimate Sink: Urban Pollution in Historical Perspective* (Akron, OH, 1996), pp. 1–35; Martin V. Melosi, *The Sanitary City: Urban Infrastructure in America from Colonial Times to the Present* (Baltimore and London, 2000), pp. 1–72.

[16] Hillel Yoffe, *A Generation of Ascenders: Memoirs, Letters and a Diary* (Jerusalem, 1971) [Hebrew], pp. 80–81; Melosi, *The Sanitary City,* pp. 110–116; *Yedi'ot 'Iriyat Tel Aviv,* 4.6 (1933) [Hebrew], p. 179 ("Air saturated with vapors from the soil is a source of diseases").

[17] Tel Aviv 1910 bylaws in Druyanow, *Sefer Tel Aviv,* pp. 158–163; Tel Aviv Municipal Historical Archives (hereinafter: TAMA), pp. 1–58.

[18] Zeev Smilansky, "The Jewish Community in Jaffa," *Ha-'omer,* 1–2 (1907) *Ha-'omer* supplement [Hebrew], pp. 1–108.

[19] Israel Rokach, "In Anticipation of the Construction of Sewerage and Storm-Water Drainage Systems in Tel Aviv," *Yedi'ot 'Iriyat Tel Aviv,* 4.4 (1933), p. 98.

[20] In 1879, a running-water system was installed in the German Templer colony of Sarona. Nahum Karlinsky, *California Dreaming: Ideology, Society, and Technology in the Citrus Industry of Palestine, 1890–1939* (Albany, 2005), p. 96.

[21] C. 1912–1914, TAMA, 1–58.

[22] Ibid.

[23] Tarr, *The Search for the Ultimate Sink,* pp. 1–35.

[24] TAMA, 1–58; Druyanow, *Sefer Tel Aviv,* pp. 158–163.

[25] TAMA, 1–58.

[26] TAMA, 1–40; 1–56a: November 1911 contract with the Municipality, in German; Hapoel Hatzair, Dec. 26, 1913, in Shavit and Biger, *The History of Tel Aviv,* vol. 1, p. 85.

[27] Shavit and Biger, *History of Tel Aviv,* vol. 1, p. 93.

[28] Ibid., pp. 83–86.

[29] TAMA, 1–58.

[30] Shavit and Biger, *History of Tel Aviv,* vol. 1, p. 161; the discussion here is based on *ibid*., pp. 159–164; Ilan Shchori, *The Dream Turned to a Metropolitan: The Birth and Growth of Tel Aviv, the First Hebrew City in the World* (Tel Aviv, 1990), pp. 145–170, 193–214 [Hebrew]; and H. Katznelson, "History of Tel Aviv's Constitution," *Yedi'ot 'Iriyat Tel Aviv,* 12 (1942) [supplement to the 1942 *Year Book*], pp. 13–18.

[31] Israel Rokach, "Tel Aviv's Current Issues," *Yedi'ot 'Iriyat Tel Aviv,* 9.3–4 (1938), pp. 55–56; *idem*., "Upon the Annexation of the Frontier Neighborhoods to Tel Aviv," *Yedi'ot 'Iriyat Tel Aviv,* 18 (1949), pp. 104, 116.

[32] Shavit and Biger, *History of Tel Aviv,* vol. 1, p. 91–93.

[33] Shmuel Avitsur, "The First Project for the Intensive Exploitation of the Yarkon Waters (The Frangija-Navon Scheme of 1893)," *Haaretz Museum Bulletin,* 6 (1964), pp. 80–88.

[34]. TAM, *Howard Humphreys & Sons, Report upon the Water Supply of Tel Aviv, August 1936*; David Smilansky, "A History of Tel Aviv's Water Supply System," *Yedi'ot 'Iriyat Tel Aviv,* 18.10–12 (1949), pp. 131–132; see also Smilansky's detailed report, October 1948, on the history and development of Tel Aviv's water-supply system, TAMA, 4-4490.

[35] Municipal Corporation of Jaffa, John S. Salah, Municipal Engineer, *Jaffa Drainage Scheme,* 18.6.1935; J. D. and D. M. Watson, *Jaffa Sewerage,* April 1937, UK National

Archives, CO 733/341/3 248609; 2 March 1937, TAMA, 4-2529; Humphreys, *Report upon the Water Supply of Tel Aviv*.

[36] On similar development in European and American cities, see Tarr, *The Search for the Ultimate Sink*, pp. 1–35; Melosi, *The Sanitary City*, pp. 1–135. On Tel Aviv and other cities' water consumption, see David Smilansky, "What is the Water Supply Situation in Tel Aviv?" *Yedi'ot 'Iriyat Tel Aviv*, 5.8–9 (1934) 348–9; TAMA, 4-1031.

[37] Helman, "Cleanliness and Squalor in Inter-war Tel Aviv."

[38] On the Grove and Avigdor schemes, see Israel State Archives (hereinafter: ISA), RG 10, File 22/3, Box 1546; TAMA, 3-104a; Ya'akov Shiffman, "The Sewerage and Storm-Water Drainage in Tel Aviv," *Yedi'ot 'Iriyat Tel Aviv*, 5.1 (1933) 7–9, p. 18. Drainage of storm runoff was part of the overall drainage issue in Tel Aviv. However, storm water did not pose the same critical health threat as the sewage; it was a problem mainly during the few heavy rainy days that occurred in the winter. In addition, storm runoff was much cheaper to deal with than sewage.

[39] Nachum T. Gross, "The Economic Policy of the Mandatory Government in Palestine," *Research in Economic History*, 9 (1984), pp. 143–185.

[40] David Sunderland, *Managing the British Empire: The Crown Agents, 1833–1914* (Suffolk, UK, 2004); idem., *Managing British Colonial and Post-Colonial Development: The Crown Agents, 1914–74* (Woodbridge, UK, 2007).

[41] Watson, *Tel Aviv Sewerage;* Watson, *Jaffa Sewerage*; see also related correspondence in TAMA, 4-2529; Rokach, "In Anticipation."

[42] LeVine, *Overthrowing Geography.*

[43] TAMA, 3-104a.

[44] "Joint Drainage Works for Jaffa and Tel Aviv: Report," (1933), TAMA, 14-274. See also TAMA files: 3-104a; 4-2512; 4-2514; 4-2532; letter from Ya'akov Shiffman to D. M. Watson, March 31, 1936, UK National Archives, CO 733/341/3 248609; Rokach, "In Anticipation."

[45] As noted, Jaffa's municipal archives disappeared in 1948. The author made a preliminary attempt to examine the leading Arabic-language newspaper in Jaffa, *Falastin*, in regard to the city's sewerage system. However, more research in that direction is needed.

[46] Rokach, "Tel Aviv's Current Issues," 35.

[47] Salah, *Jaffa Drainage Scheme*; Watson, *Jaffa Sewerage*; Ya'akov Shiffman, "The First Meeting with Mr. Watson, the Sewerage Expert," March 18, 1936, TAMA, 4-2513 [Hebrew].

[48] Salah, *Jaffa Drainage Scheme.*

[49] Shiffman, "First Meeting with Mr. Watson."

[50] The discussion that follows is based on Watson, *Tel Aviv Sewerage*, March 1937, and Watson, *Jaffa Sewerage*, April 1937.

[51] Watson, *Tel Aviv Sewerage*, p. 5.

[52] "Palestine's Municipal Finances," *Tel Aviv Year Book* 1937–38.

[53] Shiffman, "Report of the City Engineer's visit to London in Connection with the Main Drainage Scheme for Tel Aviv," October, 1939, TAMA, 4-2530; Israel Rokach, December 19, 1937, "Tel Aviv Main Drainage Scheme," TAMA, 4-2529. An internal Colonial Office memorandum of August 10, 1939, stated that before getting the loan "[the] municipality shall put its financial house in order." UK National Archives, CO 733/341/3 248609; see also other relevant correspondence and memoranda, ibid.

[54] "Records of the visit to the temporary sea outlets by Messrs. S. T. Colburn, Sanitary Engineer of the Health Dept. and Y. Shiffman, City Engineer, Tel Aviv, 11.2.1938," ISA, RG 10, 22/3/8; Se'adia Shoshani, "What Has Been Done about Sewerage in Tel Aviv in Five Years?" *Yedi'ot 'Iriyat Tel Aviv*, 12.5–6 (1942), pp. 55–56; "Minutes of Sewerage Committee Meeting, Dec. 21, 1938," TAMA, 4-2513.

[55] Ya'akov Shiffman, "Explanatory Notes on the Proposed Tel Aviv Town Center Interim Sewerage Scheme," Feb. 1940, TAMA, 4-2530.

[56] "Cooperation between the Large Municipalities [Jerusalem, Haifa, Jaffa, Tel Aviv—N.K.] in Regard to Food Supply," *Yedi'ot 'Iriyat Tel Aviv*, 12.1–2 (1941) 3; Zachary Lockman, *Comrades and Enemies: Arab and Jewish Workers in Palestine, 1906–1948* (Berkeley, 1996).

[57] On the ongoing cooperation with Jaffa, see TAMA, 4-2533; ISA, RG 10, File G/182/34, Box 208; Ya'akov Shiffman, *The Sewerage Scheme of the City, Dec. 7, 1945*, TAMA, 4-1119/2575; see also TAMA, 4-2515 (1945-46); Se'adia Shoshani, "The Role of the Sewerage System in the Building of Tel Aviv," *Yedi'ot 'Iriyat Tel Aviv*, 17.10–12 (1947–48), pp. 3–4.