

Reconstructing Water Mills in Late Ottoman Transjordan

For the early travelers to the East of Jordan, descriptions of abandoned structures served as the metaphor by which to contrast a past, implicitly pre-Islamic or at the very least pre-Ottoman, vitality with present desolation. Mills served this turn well; a derelict mill suggests acres of farmlands untilled. A functioning mill was noteworthy, the exception which proved the norm of derelict mills. Thompson wrote of Wādī Ḥisbān in the 1870s that "formerly there were several flour-mills along the banks of the stream... Now there is but a single dilapidated mill — a sure indication that the population of this region, even in modern times, was much greater than it is at present".¹

If derelict mills were a metaphor for the state's neglect of agriculture from the 1600s to the 1860s, it seems reasonable to view the reconstruction of ancient mills as a sign of administrative and agricultural regeneration thereafter. The administrative intervention came in 1867, with the creation of *qaḍā'* as-Salt and the establishment of a permanent bureaucratic and military presence in the district. The Ottoman presence enhanced security to such a degree as to encourage flows of goods, capital and persons which radically altered local society and economy.² For one, the area under cultivation expanded and grain harvests with it. For another, the population expanded rapidly, raising demand for flour, burghul, and animal fodder. Both the increasing grain yields and the expanding demand for milled grain served as incentives to put derelict mills back to work from the 1870s on.

Ownership of Mills

When considering the restoration of derelict infrastructure, one first question concerns the ownership of the mills — land, structure, canals, water rights.

TABLE 1 presents a survey drawn from Ottoman land

registers for as-Salt spanning the decade 1307-1317 *malī* (1892-1902), which reveal certain norms about mill ownership. For one, mills tended to be jointly owned by two or quite often many more partners. Eighteen of 29 mills registered with or sold through the Ottoman land registry were held in shares (*qirāt*, or fractions of 1/24), in partnership with others. The eleven mills under single owners were the exceptions which proved the rule; in each case, the owner was either a leading beduin shaykh or a wealthy merchant. Secondly, a transfer from local holders to newcomers, often merchants, may be discerned. Often, five or ten local men sold a mill to two or three men who, judging by their honorifics (*ḥājī*, *bey*), were wealthy outsiders. The data presented suggest that mills were expensive properties,³ which would have served both as an incentive to original holders to sell and a constraint on potential buyers.

The wide variation in gross prices of mills undoubtedly reflected differences in their conditions or locations. If derelict, the cost of restoration could prove substantial: Canals and pen stocks had to be cleaned and restored, mill houses had to be rebuilt or roofed, and the works had to be replaced — horizontal paddle-wheel, vertical axle and millstones. The magnitude of these expenses probably explains the tendency to own mills in partnership.

Expense of Restoration

Given that the majority of mill sites in al-Balqā' had fallen into disuse by the mid-nineteenth century, their potential value could only be realized through significant restoration. Disputes between masons and mill owners shed light on the materials used and expenses incurred to bring a mill back into operation. In one such dispute, a mason brought suit against the four owners of a mill he

¹ J. M. Thomson, *The Land and the Book*, vol. 3 (New York, 1886) pp. 666-667.

² Cf. E. L. Rogan, *Incorporating the Periphery: The Ottoman extension of direct rule over southeastern Syria (Transjordan), 1867-1914*. Ph.D. diss. Harvard University (1991).

³ In 1900, the pound sterling converted to 143 piasters in as-Salt and 'Ajlūn; thus mills cost between \$70-210 which was a sizable investment in 1900 terms. For comparison's sake, in 1313 a two-story 6-room house sold in central as-Salt for Pt5,000 (\$35), as did a 3,000-dunum plot of rainfed grain land. For currency conversion cf. *Suriye Vilayeti Salname 1318 Hijri* (1900), p. 377.

Table 1. Mill ownership as per Ottoman Land Registers, 1307 - 1317 Malī (1892-1902).

Date (Malī)	Location	Details of the transaction	Gross Price (piasters)
1307	'Ammān	4 mills registered to Shaykh Saṭṭām al-Fāyiz, each on a 2-dunum plot.	5,230.5 5,000 5,000 5,000
1310	'Ammān	4 additional mills registered to the now deceased Shaykh Saṭṭām al-Fāyiz of the Banī Ṣakhr tribe.	5,609.5 5,208 5,208 5,208
1312	'Ammān	6 qirāt shares in each of 3 mills sold from Qasṭūn Zurayq to Mirzā Waṣfī.	22,200 17,400 12,600
	Wādī as-Sir	Registered to 9; sold to 2.	15,200
	Wādī as-Sir	4 qirāt sold by 2 men.	9,480
	Wādī as-Sir	2 qirāt sold by 1 man.	10,800
1313	Wādī Shu'ayb	Registered to 5 men.	6,000
	Wādī Kharbar	Unspecified share of 2 mills registered to Fiyād Efendi Nabulsi.	3,000 1,500
	ar-Rumaymīn	Registered to 2 men.	1,710
	Wādī as-Sir	Sold by 6 beduin to 5 townsmen.	2,002
	Wādī Shu'ayb	10 qirāt registered and sold.	3,922
1314	Wādī Shu'ayb	3 qirāt.	4,800
	Wādī ar-Ramill	4 q. sold by beduin to townsman.	9,000
	Wādī as-Sir	2 3/4 qirāt share registered.	15,709
1316	Wādī as-Sir	16 qirāt sold by 2 men to 4.	6,776
1317	Wādī as-Salt	22 qirāt sold.	5,500
	Wādī as-Sir	12 qirāt sold.	7,600
	Wādī as-Salt	18 qirāt registered.	14,666.5
	Umm Rumāna	16 qirāt registered to 5 men.	9,576
	Ḥisbān	Reg'd to Sulṭān al-'Adwān.	30,000

Source: *Defter-i Hakkane* (Imperial Register), vols. 2-4. Department of Land Registration, as-Salt.

spent nine days rebuilding. In the course of the dispute, the judge asked the mason to detail the materials and expenses incurred to restore the mill, which he gave as follows:

— 608 "lintels" [<i>i'tāb</i>], at Pt3 each:	Pt	1824
— 520 loads of "dressed stone" [<i>muḥkam</i>], at Pt		1520
— 4300 " <i>rashiya'uqād</i> " [?], at Pt18 per 100		774
— 9 days' labor, at Pt15 per day		135
Total	Pt	3253

The integrity of the mason's figures is supported by the fact that the *qāḍī* awarded him the decision.⁴

In a dispute involving the reconstruction of another mill, the estimated costs of rebuilding were substantially

higher. The *qāḍī* summoned an architect [*mi'mārī*], who gave a maximum estimate of Pt17,800 to rebuild the mill, and two experts [*mu'allim*] who gave maximum estimates of Pt22,500 and Pt10,000 for the same job. The judge tended to the middle estimate, for a shareholder with a three-*qirāt* share was charged Pt2,100 towards the cost of restoration, making for a total bill of Pt16,800. The value of his share in the property before restoration was given as Pt665, which gives a total value of the mill before renovation at some Pt5,300. In this case, then, the owners spent roughly three times the value of the derelict mill to put it back in working order.⁵

Probably the most expensive single feature in a mill were its stones. Millstones in southern Syria were made of Ḥawrānī basalt, extracted and finished in the ancient lava flows of the Laja'. Buckingham described the mill stone quarries as the sole industry of the Laja'. Given an estimated diameter of some six feet and a thickness of six inches in the middle diminishing to four inches at the edge, the weight of each stone approached the limit of what a camel could carry.⁶

A good profit could be made off the resale of mill stones. Around 1898, two Christian merchants of as-Salt entered a partnership agreement to buy millstones directly from the producers. Each contributed 30 *riyāl majidi* (Pt 720), with which they bought 12 millstones. While the average price paid per stone was only Pt120, their resale value in the district of as-Salt ranged between Pt192 - 288, according to each stone's quality.⁷ From the mill owner's perspective, the pair of stones were a significant expense in the restoration of a mill, running between Pt400 - 550.

Revenues Generated by Mills

Given the high price of restoring mills it seems worth considering their profitability. The Buqūriya mill in Wādī Shu'ayb just mentioned earned 3,400 *ṣā'* of wheat (17,000 - 20,000 kilos) in three years' operation, or at Pt5 per *ṣā'*, a total of Pt17,000. Thus, it took three years for the investors to recoup their outlay for the restoration of the mill (the purchase price of the mill not included). Yet mill rents varied according to location — a remote

⁴ ICR as-Salt, vol. 6, Pp. 99-100, 2 Dhū al-Qi'da 1319 (10 February 1902). The mason was probably from Nāblus. The mill owners were Naqūlā Efendi Shalhūb, a Christian from Damascus and local treasury official; Dā'ūd Efendi Miḥyār, a Muslim merchant from Nāblus; Amin b. Aḥmad Nuwār, a Muslim of as-Salt who figures in other cases involving mills, and Ibrāhīm b. Khalil al-Fār, a Christian of as-Salt who was involved in a millstone deal described below. As a group they fit the pattern of elite joint ownership set out above.

⁵ ICR as-Salt, vol. 6, pp. 173-174, and 176, 30 Muḥarram 1320 (9 May 1902). Judging by the mill's name, al-Buqūriya, it had formerly belonged to members of the Buqūr branch of the 'Abbād tribe, as did the plaintiff in the case, Aḥmad b. Muḥammad b. Aḥmad al-Sa'āyda. He claimed to hold a three *qirāt* share of the mill, now restored by two residents of as-Salt whom he claimed had taken his share of the mill. The owners, al-ḥāj Ṣubḥī b. Aḥmad and Muḥammad b. Mubārak b. 'Abd al-Hādī, claimed to have obtained the beduin's permission to rebuild the mill, that his share of the restoration came

to Pt2100, against which they took his part in collateral. Having ample witnesses to swear by their case, the judge awarded the decision to the defendants. Here again, we see the transfer from an indigenous owner to Nābulsi merchants.

⁶ J. S. Buckingham, *Travels Among the Arab Tribes* (London, 1825) pp. 166-167 and 283-284. Buckingham estimated that Ḥawrānī mill stones cost five times the price of their equivalent in Britain due to the inefficiency of their extraction and the expense of transport.

⁷ ICR as-Salt, vol. 11, pp. 57-58, 28 Rajab 1321 (20 October 1903). The prices seem surprisingly close to those given by Buckingham in 1815. However, John Wright quoted a price of some 570 piasters per stone in Buṣayr in the Ḥawrān in 1873, presumably reflecting a difference in size. My thanks to Norman Lewis for this reference, which he found in a London magazine, *The Leisure Hour* (1874) p. 810.

mill was rented for only Pt840 while a mill nearer to as-Salt was rented for over Pt3,500 per year. However, with basic maintenance undertaken by the miller, and subsequent outlays limited to the periodic replacement of mill stones, a mill, once put into working order, provided interesting and regular rents. This conclusion should come as no surprise, for the notables who invested in mills were serious capitalists.

Being serious capitalists, mill owners tended not to operate the plant but rather leased it out to a professional miller, or *ṭāḥḥān*, described in al-Qāsimī's dictionary of professions as:

... one who rents mills in order to grind wheat and other grains. ... People of this profession rent [mills] from their owners. Some have their own mills which they operate on their own account. ... It is an important and amply profitable profession.⁸

Millers were a distinct profession with a strong corporate identity. Kāmil Shaḥāda, in his study of the mills of Ḥumṣ and Ḥamāh in the sixteenth century, found millers to be one of three related trades [*ḥirfa*] composing a distinct "industry" [*ṣinā'a*], each with its own guild [*ṭā'ifa ḥirafiyya*]: millers [*ṭāḥḥānīn*], bakers [*khabbāzīn*] and flour merchants [*daqqāqīn*]. He also notes that millers had a distinct vocabulary, and lists 75 terms and expressions which bore no relation to standard Arabic.⁹ In Transjordan, Gottlieb Schumacher found this corporate identity somewhat tinged with arrogance.

The millers consider themselves as of a superior race to the ordinary Fellahīn. We were lucky enough to find one of these *Malem et Tawahin* [*ma'alim aṭ-ṭawāḥīn*], or mill-masters, ready to serve us as a guide, and as far as this part of his duties was concerned, we had nothing to complain of. But the moment we approached a mill he became so insupportably proud and overbearing in his manner towards his companions, that on one occasion he received a good thrashing at their hands as a set-off for his insolence.¹⁰

According to al-Qāsimī, the fee charged by millers varied according to season. In winter and spring, when the water pressure was highest and thus the action of the mill fastest, the fee was 20-30 *para* per *mudd*; when the water was low, the rate per *mudd* could raise to two piasters, i.e. 3-4 times the price.¹¹ The productive capacity of tower mills varied according to the season, as sug-

gested above. Shaḥāda claimed the maximum daily production was about 400 kg, making such mills appropriate for small villages or town quarters.

Given the expansion of the town of as-Salt over the last decades of Ottoman rule, rising from some 3000-4000 at the time of the Ottoman installation in 1867 to nearly 15,000 by the outbreak of the first world war, and an analogous expansion of the population of the Balqā', the alimentary needs of a booming population were met in part by the restoration of mills. The influx of merchant capital from surrounding cities — Damascus, Jerusalem, and Nāblus most of all — which was encouraged by the Ottoman presence would seem to have covered the expense of putting ancient, derelict mill infrastructure back into working order. These developments were of fundamental significance in the socio-economic history of Ottoman Transjordan. I would argue that they also shed light on the mill networks of an earlier period.

Mill Infrastructure and State Investment

Mills that were reconstructed had to have been originally constructed at some point in the past, though no mill in Jordan has yet been positively dated. All of the mills considered in this conference (published in this volume) were tower mills such as are described in the contributions by A. McQuitty and J. Greene, and most of them would have been part of a valley-wide network of inter-linked canals and pen stocks. These were sophisticated networks running for hundreds of meters with junctions branching off to particular mills along a given water course, each canal progressively elevated to reach a tower which tended to be three to four meters above water level. All of this infrastructure had to be well built to survive the centuries, and indeed the contrast between the more ancient mill towers built of dressed stone and the roughly-built mill houses of the nineteenth century is striking.

By way of conclusion, the material on mill reconstruction will be examined for an *a posteriori* hypothesis on their original construction. If, as has been argued, the restoration of a mill was a substantial investment, one that took at least three years' rent to recoup the outlay, one that made even the wealthiest prefer to undertake the venture in partnership; and if such restoration amounted to no more than the purchase of millstones, the building of a *fallāḥī* mill house, and the clearing of water channels; then is it conceivable that individual investors would have had the means, let alone the incentives, to lay such costly infrastructure as the dressed-stone towers and canals? It seems unlikely that such networks as

⁸ Al-Qāsimī, *Qāmūs aṣ-ṣina'āt ash-shāmiya* (Damascus, 1988), p. 290.

⁹ K. Shaḥada, 'Ṭariq aṭ-ṭāḥūn ka-mu'assasa iqtisādiyya,' *Annales Archéologiques Arabes Syriennes* 23 (1973) pp. 241-273 and 24 (1974) pp. 109-123.

¹⁰ G. Schumacher, *Northern 'Ajlun 'Within the Decapolis'* (London, 1890), p. 42.

¹¹ The *mudd* of six Damascene *arṭāl* weighed approximately 17.4 kg. C. Is-sawi, *The Fertile Crescent, 1800-1914: A Documentary Economic History* (New York, 1988), pp. 477-478.

McQuitty describes in Wādī al-‘Arab, Wādī Ḥisbān, and Wādī Ibn Ḥammād could have been built by private investment. The most likely explanation would be state investment, and the most likely state would seem to be the Mamluk Empire.

There is much to recommend the Burji Mamluks for prime consideration in investigating the investment in mill infrastructure. They were a military regime for whom the expense of campaigns was always a central item of the budget. Provisioning that army in times of diminishing agricultural production (over the fourteenth and fifteenth centuries) would have encouraged Mamluk sultans to look to bread baskets beyond the Nile Valley, of which Transjordan, lying between its Egyptian, Syrian and Hijazi possessions, would have been a natural choice. There would have been no impediment to state investment, for as Carl Petry has observed, “the Mamluks...quite literally owned most of Egypt and Syria’s assets in real estate. They were steadily augmenting their control over the industrial and commercial capital of the empire.”¹² This was particularly the case from the reign of al-Ashraf Sayf ad-Dīn Barsbay (r. 1422-37), who inaugurated the policy of state monopolies over major forms of production which characterized Mamluk ec-

onomic policy thereafter until the fall of the empire.

One other consideration is the advanced level of masonry during the Mamluk period, and the empire’s high state of irrigation technology.¹³ Finally, the socioeconomic structure of the Mamluk regime would have been conducive to major investment in infrastructure; just as Ashtor found the Mamluk sugar industry (another major transformation industry) to be in the hands of “big trusts” with “the greatest sugar industrialists...the Mamluk amirs and the directors of the sultan’s financial administration,”¹⁴ so one could imagine “flour barons” with their interests protected by *iqṭā’* or appendages.

These observations are put forward to encourage further discussion of the subject. I can claim with some confidence that the reconstruction of mills in the late nineteenth century was a significant development, bringing together the influx of merchant capital and the growing alimentary demands of a rapidly-expanding population. I can only speculate on the anterior convergence of forces which produced the extensive infrastructure exploited by investors in the nineteenth century, though they too will reveal significant developments in the social and economic history of the Jordan region in the Islamic middle ages.

¹² C. Petry, *The Civilian Elite of Cairo in the Later Middle Ages* (Princeton, 1981), pp. 30-32.

¹³ Cf. H. Rabie, ‘Some Technical Aspects of Agriculture in Medieval Egypt,’ in A. L. Udovitch, ed, *The Islamic Middle East, 700-1900* (Princeton,

1981), pp. 59-90.

¹⁴ E. Ashtor, ‘Levantine Sugar Industry in the Late Middle Ages: A Case of Technological Decline,’ in Udovitch, *The Islamic Middle East*, pp. 91-137.