SOME REMARKS ON THE TERMINOLOGY OF IRRIGATION
PRACTICES AND HYDRAULIC CONSTRUCTION
IN THE EASTERN ARAB AND IRANIAN WORLD
IN THE 3RD-5TH/9TH-11TH CENTURIES

C. E. Bosworth

Manchester University

I. Introduction

The Arabs and Persians of the mediaeval Islamic period inevitably fell heirs to the extensive and complex irrigation systems of their pre-Islamic predecessors; immediately preceding them in Iraq the Aramaic-speaking population whom the Arabs called an-Nabat; but beyond these the Akkadian-speaking Assyrians and Babylonians and ultimately the Sumerians; and immediately preceding them in Persia and Transoxania (the mā warā‘ an-nabr of the Arabs) the Persians of the Sasanid period, the Soghdians and the Khwarazmians, and beyond these the ancient Iranians of Achaemenid times and earlier. Areas like Mesopotamia (the Tigris-Euphrates basin), Ahwāz or Hūzistān (the basin of the Kārūn river and its affluents) and the river basins of the Oxus, Zarafshan and Jaxartes, with such oases as those of Hurasān, Marw, Buḥara, Samargand, etc., in northeastern Persia and Central Asia, exhibit the hydrological phenomena and their attendant political and social institutions of what the American sinologist Karl A. Wittfogel has called “hydraulic societies”¹. The researches of such scholars as the Russian archaeologist S. P. Tolstov in Hwārazm (in the modern Uzbekistan and Turkmenistan)² and the American one R. Mc C. Adam in the Tigris-

¹ See his Oriental despotism, a comparative study of total power, New Haven and London 1957.
² See his Auf den Spuren der altchoresischen Kultur, Berlin 1953.
Diyala rivers plains to the northeast of Baghdad\(^3\), have shown the essential continuity of land utilisation and irrigation practices there from pre-Christian up to Islamic times. Not surprisingly, the language of Islamic times of the technical terminology of practices in these regions of highly-organised, irrigated agricultural exploitation goes back frequently to such more ancient tongues as Aramaic, Middle and Old Iranian, Akkadian, Sumerian and perhaps Elamitic.

A considerable part of this terminology is known to us from certain early Islamic writers, such as the mathematician in Persia and Iraq Abū l-Wafā’ Muḥammad b. Muḥammad al-Būzaḡānī (d. 388/998 or in the preceding year)\(^4\); Abū ‘Abdallāh Muḥammad b. Ahmad al-Hwārāzmī (floruit in the second half of the 4th/10th century), secretary in the bureaucracy of the Sāmānīd amīrs of Buhara and author of a pioneer encyclopaedia of the sciences, the Kitāb mafāṭīh al-ʿulūm, which has valuable information on the terminology of irrigation practices in the oases of Ḥurasān and Transoxania\(^5\); and the unknown author of a mathematical treatise, probably written in the second quarter of the 5th/11th century under the last Būyids as a guide for the use of financial officials in Iraq, the Kitāb al-Ḥāwī li-l-ʿaʿmāl as-sultānīyya wa-rūsūm al-ḥisāb ad-dīwānīyya\(^6\).

---

\(^3\) See his *Land behind Baghdad, a history of settlement on the Diyala plain*, Chicago and London 1965.


II. *The Terms*

As a preliminary, one may note that many of the basic Arabic terms relating to agriculture, the processes of cultivation, sowing and harvesting, and the names of plants and crops, seem to have originated – not surprisingly – in the well-watered region of Mesopotamia, where the terrain and climate were so suitable to growth, and go back to the pre-Islamic Semitic society there or even beyond that to the preceding Sumerian civilisation. Thus Arabic *akkār* “peasant, cultivator” goes back, probably via Aramaic *akkāra* (Hebrew *ikkār*) to Akkadian *ikkāru* (root *h - k - r*) and Sumerian *engar*. Arab *ḥaraṭa* “to plough, till the ground” (Ugaritic *hrt*; Hebr. *ḥaraš*; Ethiopic *harasa*) goes back to Akk. *erēsu*. Ar. *ḍaraʿa* “to sow seed” (Ug. *dr*; Hebr. *zāra*; Aram. *d-ra* or *z-ra*; Eth. *zar-a*, i.e. with glottal stop for the third radical ‘ayn here in South Semitic, as in the Arabic also) goes back to Akk. *zarū*. Ar. *ḥinta* “wheat” (Ug. *ḥt*; Hebr. *ḥiṭṭa*; Aram. *ḥınta* “wheat”; Eth. *beṭṭat* “grain”) goes back to Akk. *uṭṭa-etu* “corn, barley (the word for the latter cereal in Arabic, *ša‘ir*, coming from a West Semitic form, Ug. *šrm*; Hebr. *š-erā*; Aram. *š-erata*). Ar. *sunbula* “ear of corn” is from a common Semitic origin (Hebr. *šibbolet*; Aram. *š’altā*; Syrian *šebītā*; Eth, *sabl*), with its oldest form seen in Akk. *šuultum, šumbultu*), whilst Ar. *ḥaql* “field” is likewise common Semitic, Hebr. *ḥeleq* “share”; Aram. *ḥaqālā* and Akk. *eqlu* “field”.

---


10 *Loc. cit.*


What now follows is only a brief selection of words dealing with irrigation, canals and the control of river waters; an exhaustive examination of the topic would certainly need a complete book.

1. Ma‘ṣir. This is defined by al-Hwârazilmî as “a chain or cable which is fastened right across a river and which prevents boats from getting past”\(^\text{13}\), and more specifically by Ibn Rusta in the geographical section of his al-A‘lâq an-nâfîsa as a barrier across the Tigris at Ḥawâništ near Dayr al-‘Aqîl consisting of a cable stretched between two ships at each side of the river, preventing ships passing by night (and thus evading the tolls levied by the official traffic and toll-house regulators, the asḥâb as-sayyâra wa-l-ma‘ṣir\(^\text{14}\). Then from being a barrier across the river to halt shipping, it soon acquired the meaning of “customs house where tolls (mukûs, ma‘âwîn) were collected” and then the actual tolls themselves, so that in the caliphate of al-Mu’tadid (279-289/892-902) one hears of a body of officials attached to the šurṭa or police of Baghdad called the ma‘ṣiriyûn, who collected tolls from river traffic on the Tigris.\(^\text{15}\)

The Arabic root ṣ-r “to confine, constrict; to attach a tent to the ground by means of a short rope, isr or asr” (Lisân al-‘arab V, 80-82) gives some clue to the word’s general meaning of a barrier preventing river traffic, but the actual form may go back to Akk. maṣāru “to delimit, fix a boundary”, musṣuru “to set a border line”, maṣṣartu “watchman, guard, watch house”\(^\text{16}\).

---

\(^{13}\) Masâtîh al-‘ulûm, ed. G. van Vloten, Leiden 1895, 70, Eng. tr. in Bosworth, “Abû ‘Abdallâh al-Khwârazilmî on the technical terms of the secretary’s art”, 155.


2. Musannāt, this is dismissed by al-Hwārazmī as being well-known and thus requiring no elucidation\textsuperscript{17}. It denotes, in fact, a dam or embankment with sluices or gaps to let the water through in a controlled flow, and is mentioned quite often in early Islamic sources on the conquest and history of Iraq. The great Umayyad governor al-Haǧǧaǧ b. Yūsuf constructed musannayāt in the lands of Mesopotamia under his charge\textsuperscript{18}. al-Ya'qūbī describes the Round City of Baghdad constructed by al-Manṣūr as having a fore- or outer wall (faṣih) with towers, beyond which lay a strong rampart, musannāt, made from fired brick bonded together by quicklime mortar (al-ṭārīr wa-s-sārūq), and then a trench (bandaq) filled with water led in from the Karhāyah Canal\textsuperscript{19}. The Qur’ān commentators and authorities on the lore of the ancient Arabs explain the South Arabian term al-ʿarim, used in Qur’ān, 34. 15, in connection with the story of the breaking of the Dam of Mārib, as a musannāt or strongly-constructed barrage\textsuperscript{20}. The Arabic plural form must be via Aram. mısann'yāt; in Judaeo Aramaic we have məšōnītā, used in the Mishna to mean “dam”. The ultimate origin of the term is Akkadian; in late Babylonian documents and letters it is fairly common, with the meaning “embankment, barrage” for mušannita/mušennita\textsuperscript{21}.

3. Bazand. This is defined by al-Hwārazmī as a garden (bustān), which must be merely a stab in the dark\textsuperscript{22}. The word does not appear in any of the native dictionaries and is frequently mis-written, with

\textsuperscript{17} Mafāṭīḥ al-ʿulūm, 70, tr. in Bosworth, op. cit., 154.

\textsuperscript{18} al-Balāǧurī, Futūḥ al-buldān, Cairo 1959, 290-291.


\textsuperscript{22} Mafāṭīḥ al-ʿulūm, 70, tr. in Bosworth, op. cit., 154, cf. 164.
displacement of consonantal dots, as barīd, yazīd, etc., by e.g. authors like al-Balādūrī, Abū Yūsuf, Yahyā b. Ādam, but is clearly written in the manuscripts of Qudāma b. Ǧa'far’s Kitāb al-hārāq. It is often associated with sukūr “weirs” and buṭūq “diversions from a river in order to feed water into a canal”\textsuperscript{23}, and its meaning emerges plainly from the Kitāb al-hāwī as denoting an embankment of brushwood, reeds and packed-together earth used to block up a breach in the banks of an irrigation canal. Although given an Arabic plural as bazandāt, the word looks basically Iranian and may date from the period of Sasanid domination in Iraq during the centuries before the Arab conquest\textsuperscript{24}.

4. Mallāh. This well-known word is defined, obviously, by al-Hwārazmī, as sāhib as-safīna “sailor, man connected with boats”, and less obviously as muta’āhbid al-mā “one who frequents the waterways”\textsuperscript{25}. In early Islamic times, and assuming that al-Hwārazmī’s two definitions are not synonymous, this last seems to have denoted a person responsible for maintaining the river banks, keeping the channels clear of débris and obstructions, etc., a meaning found in some of the native dictionaries (e.g. Tāg al-‘arūs, II, 229: muta’āhbid an-nahr). The word is ultimately from Akkadian (as is, indeed, the common Arabic word for

\textsuperscript{23} On baṣq/baṣq, see the comments on the word’s use by Abū Yūsuf given by E. Wiedemann, “Beiträge zur Geschichte der Naturwissenschaften. X. Zur Technik bei den Arabern”, in Aufsätze zur arabischen Wissenschaftsgeschichte, ed. W. Fischer, Hildesheim 1970, I, 279-280. The same word or its root would appear to lie behind the name of the river channel or canal in the neighbourhood of Wāṣīt mentioned by al-Balādūrī, Futūh al-bul-dān, 289, as al-B.ṣaq, in the local Aramaic speech, al-B.ṣaq.


\textsuperscript{25} Mafātiḥ al-‘ulūm, 69, tr. in Bosworth, op. cit., 153.

5. Ṣādūrwān. This is defined by al-Hwārazmī as a constructional work (*asās*) which protects and strengthens the foundations of a bridge (*qantara*) 28. Ahwāz, in particular, was the region where Ṣādūrwāns were used extensively, and the great Ṣādūrwān or weir across the Duğayl at Tustar built by the Sāsānīd Emperor Šāpūr I was regarded by the Muslims as one of the wonders of the world 29. al-Maqdisi describes in considerable detail the Ṣādūrwāns on the river of Ahwāz, i.e. the Kārūn, barriers which divide up the waters dammed up behind them and direct them into channels for irrigation, also at the same time relieving the pressure of accumulated waters in winter and spring when snow and rain in the Zagros Mountains to the north swelled the rivers of the plains below 30.

The word has clearly a wide range of meanings, in Arabic usage alone, some of which are enumerated by Dozy, such as a basin for ablutions; a fountain with jets of water; a raised platform; a pipe or conduit conveying water to a tank or basin; and the base on which the


30 *Aḥsan at-ʿaqāṣim*, ed. de Goeje, Leiden 1906, 411; Wiedemann, op. cit., 322-327.
Ka'ba at Mecca stands\(^{31}\). It is this last meaning which seems to come nearest to al-Hwārzmi‘s definition of šādurwān as a revetment or supporting course of masonry, etc., round the base of the pierre of a bridge or some other hydraulic construction. The etymology of the term was extensively investigated by the French Iranist E. Benveniste. He showed that this obviously Iranian word was probably Parthian in origin, i.e. stemming from pre-Sāsānīd Iran, and spreading into the languages of neighbouring countries such as Armenia and into the Semitic Mandaean language of southern Iraq, where it seems to denote a large sheet of water, on which boats can sail, in a basin. The basic meaning is apparently that of a raised platform or dais (which might be covered with carpets or such coverings, hence the word’s sense in Armenian and in Middle and New Persian), which was extended to constructions with walls and embankments to raise the level of water in basins, and thence to various other hydraulic devices for raising or directing the flow of water for fountains, to weirs, to dams with sluices, to streams canalised between brick and stone embankments, etc\(^{32}\).

6. Tawf. This is explained by the Arabic lexica (see Lane, s.v.) as a raft constructed either from inflated goat or water skins lashed together with ropes or palm fibres or else from wooden spars similarly fastened together. In the first sense, it is obviously identical with the well-known kelek used especially on the Tigris above Baghdad and its tributaries like the Great and Little Zab, mentioned as in use till modern times by Western travellers in that region. The use of such rafts of inflated skins must be ancient in Mesopotamia, for Arabic-Turkish kelek goes back to

---


Akkadian (Old Babylonian), the kalakku being depicted also on Assyrian reliefs, and ultimately to Sumerian kalād.\(^{33}\)

The term was used in 'Abbāsid times, for when the general al-Afṣīn planned his clandestine escape from arrest by the Caliph al-Mu'tasim in 225/839-40, he got ready materials for constructing atwāsī in his palace at Sāmarra, with the intention of crossing the Little Zab and fleeing northwards.\(^{34}\) Also, an anonymous, mid-4th/10th century work written in early Būyid times and very probably in Iraq, dealing with various categories of officials and somewhat misleadingly entitled Siyāsat al-mulūk, as if it were one of the familiar “Mirrors for Princes” genre, speaks in its section concerning the duties of the muhtasib or market inspector about the tā'if (= tawfī), and in as much as this construction was clearly used also as a means of controlling river traffic as well as for transportation, consideration of the tawfī/tā'if is appropriate here. The unknown author says:

“It is necessary for the muhtasib to place in the river a tā'if which is chained up with the skiffs (zawraqs), and [the ensemble of these] prevents anything from passing along the river by night except with a licence (gawāz). The muhtasib should appoint at each docking-place (furda) a supervisory official ('arif) who can act as an arbitrator of disputes between the boatmen (al-mallāhib) and deal with each of them in turn (? yunāwību baynahum), who will not treat them inequitably and who will prevent them from demanding excessively high rates of hire (i.e. for transporting goods).\(^{35}\)


\(^{34}\) at-Ṭabarī, *Ta'rih*, ed. Leiden, III, 1305-1306.

\(^{35}\) J. Sadan, *Une nouvelle source sur l'époque būyide. Étude preliminaire, Hadāra, texts and studies in the civilization of Islam*, Dept. of Arabic Language and Literature and Dept. of Middle Eastern and Islamic History, Tel Aviv University, Tel Aviv n.d. [ca. 1981], Arabic text, 22.
From this passage it emerges that *atwāf* were also used in the composition of a static barrier of boats plus inflated pontoons or rafts placed across a navigable river, fulfilling the same function as a *maṣīr* (see 1. above).

The etymology of *tawf* is, however, somewhat obscure. In Biblical Hebrew the root *š·w·f* means “to float on the water”, and Fraenkel adduces Aramaic and Judaeo-Arabic *t.f*, requiring Arabic *ʿz·w.f.*. Arabic *z·w.f* does actually exist, see Lane s.v., with the general meaning of “to get hold of someone by the scruff of the neck, by the hair hanging down at the back of the neck, the *ṣūf raqabatibī*”, but apart from the vague connotation of such hair with the hair of the goat skins used in the construction of a *tawf*, this is not of any help. The indigenous Arabic root *t·w·f* “to go round, circumambulate (e.g. a ritual object) does not help here either, although Arabic *ṭufsān* “flood, the Deluge”, Rabbinical Hebrew *ṭ fête*, has the requisite connection with water. It does not seem possible to trace *t.w.f* any further back, and the exact origin of *tawf* must remain obscure.

---
