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Mega-cities & Mega-sites
The Archaeology of Consumption & Disposal
Landscape, Transport & Communication

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Cover illustration: Lions depicted on the Assyrian palace reliefs of Assurbanipal, 7th century BC, from Nineveh, Iraq.

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WATER FOR ASSYRIA

HARTMUT KÜHNE[1]

Abstract

Water has played a marginal role in traditional evaluations of Assyrian civilization. Considerations of this issue, moreover, have focused on the 'heartland' of Assyria only, and there primarily on the irrigation works of king Sennacherib (704-681 BC), which provided water for the royal gardens of Nineveh. Only recently has the economic dimension of irrigation caught the attention of Assyrian scholars. In this paper it is argued that the homeland of Assyria includes the Jazira and that major Assyrian canal constructions took place in the Lower Habur region as early as the Middle-Assyrian period (13th century BC). These canals were dug to improve agricultural output, facilitate the transportation of goods and people, and supply fresh water to settlements, whose increase formed part of a deliberate strategy of the Assyrian empire in this region.

Empire and Hydrology

Assyria developed from a city state to the pristine empire of the Old World, controlling a vast territory between the Caucasus and Egypt, Anatolia and Iran. Traditionally, scholars have highlighted the political ability, the military potential, and the ideological strength of Assyria (van de Mieroop 2004). However, the consideration and admiration of its economic and administrative accomplishments, which allowed Assyria to enlarge and maintain this empire over three hundred years, is often reduced to the unquenchable demand for luxury and prestige goods by the royal family and the elites of the empire (Lamprichs 1995). The same scholars are also aware of the fact that the core region of Assyria is a poor country, lacking mineral resources and other raw materials such as wood. Despite these difficult environmental and also climatic conditions in the Assyrian heartland, it has been assumed for many years that irrigation 'has never been of great economic importance' (Oates 1972, 799) and that consequently the Assyrians were illiterate in hydraulic technology (Garfinkel

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2007: 53-54). According to Wittfogel, the hydraulic society of Assyria belongs to the category 'loose 1' (out of 2) as opposed to ancient Egypt and southern Mesopotamia, which correspond to categories 'compact 1 and 2' respectively. The category 'loose' means that irrigation agriculture does not generate economic predominance but confers nevertheless hegemony to those who control it (Wittfogel 1962: 219-220). If this were the case, then how did the Assyrians manage to develop the capability and the capacity to run the world's first superpower? How could they have improved this barren region so it could sustain the growing population of an imperial core region?

The Core Region of Assyria

This core region is usually referred to as Assyria's 'heartland'. It designates a region on either side of the Tigris that stretched from the capital of Ashur in the south to Sharif Han in the north, and from Tell Afar / Tell Rimah in the west to Irbil in the east, and covered the immediate territories of the other three Assyrian capitals, Kalakh, Dur-Sharukin, and Ninua. This region roughly takes the shape of a heart, as illustrated on the map B IV 10 of the *Tübinger Atlas des Vorderen Orients* (Kessler 1987). The designation 'heartland' is also used to differentiate between a central and a provincial region, or between a centre and a periphery with associated theoretical implications. However, it must be emphasised that this 'heartland of Assyria' is a construct of modern research which is not reflected in Assyrian sources. The main Assyrian administrative unit was the province, and no particular distinction was made between provinces in the heartland and those in other parts of the empire. Provinces in the core, however, were more numerous and smaller (Radner 2006-2008: 45), and far off regions such as Que or Magiddu, which were transformed into provinces under the kings Tiglath-Pileser III (744-727 BC) and Shalmaneser V (726-722 BC) respectively, cannot be considered part of the core region of Assyria. Nicholas Postgate refers to this traditional core region as the 'home provinces' and defines them as 'those [provinces] which constituted the country known as māt Aššur before the reign of Tiglath-pileser III' (Postgate 1995: 1; Radner 2006-2008: 45-53).

Thus, the western extension of the core area of Assyria is the modern region of the Jazira (Kühne 2009: 19-23), which is located between the Euphrates and the Tigris. Divided by the Habur into an eastern and a western half, the Jazira is framed by the mountain chains of the Jabal Abd al-Aziz and Sinjar to the north and extends beyond them into the piedmont of the Taurus and Zagros mountains, forming an upper and lower part. The Euphrates valley constitutes a more flexible border to the southeast (Fig. 1). Most of the Jazira receives less than 300 mm precipitation per annum, temperatures average at 18-19° C, and the climate is arid (Ergenzinger 1991: 37; Frey and Kürschner 1991: 89). The vegetation once consisted mostly of dwarf-shrublands of the class *artemisiae herbae albae mesopotamica* but they are today almost completely degraded save for the mountains, where remnants of woodland

of the class *Junipero-Pistacietea* prevail (Frey and Kürschner 1991: 87). The soils are of an unfavourable and permeable gypso-ferrous type (Smettan 2008: 26). The resulting landscape is a steppe environment populated in the past by lions, ostriches, elephants and gazelle (Becker 2008). Subsistence activities in the past centred – and still do so today – on animal husbandry and irrigation agriculture adapting to the changing environment caused predominantly by anthropogenic interference (Kühne 2008: 220).

Water and Environment

The supply of water is vital for these activities. The natural conditions provide numerous dendrite run off situations due to the water sheds between the Tigris and the Wadi Tharthar, the Wadi Tharthar and the Wadi Ajij, the Wadi Ajij and the Habur, the Habur and the Balih, and the Balih and Euphrates (Bucher and Nippes 1988). The steppe, which has often been described as gently undulating, is marked by prominent elevations, which produce said watersheds, but also by sharp incisions of the Wadis which are difficult to cross (Kühne 2009). These are the environmental variables that constitute the natural potential of the western part of the core region of Assyria. The capital city of Ashur, located on the west bank of the Tigris, overlooked this countryside. Situated on the edge of the (present-day) dry-farming belt, the site experienced the same environmental conditions. East of the Tigris, precipitation was richer and vegetation more abundant; it is in this easterly region that the Neo-Assyrian kings built their political capitals Nimrud, Dur-Sharukin, and Niniveh.

There is evidence to suggest that water was more abundant in the Jazira during the Iron Age than it is today (Kühne 2008: 216-217), which would require precipitation levels to have been higher than previously assumed. In any case, however, the natural water supply to the Lower Jazira would not have been sufficient to secure regular harvests. The provision of water for the Assyrian home provinces, Isana, Nemed-Ishtar, Rasappa, Hattallu, Laqe, Halzi-adbari, and even for the province of the mar sharri (Radner 2006-2008: Karte 2), must have been a great challenge as well as a tantalising task. These provinces were subject to several Assyrian colonisation programmes, the best known of which was carried out by Adad-Nirari III (810-783 BC). In the course of this programme, large stretches of land were cultivated for the first time, new settlements were founded and existing ones enlarged and entirely new settlement systems created (Kühne 2010). This prompted an urbanisation process including a growing population (Kühne 1994). Supplying Assyria with water, required technological knowhow and innovation in hydraulic engineering, substantial financial investment, and last, but not least, extensive administrative oversight and organisation.

Hydraulic Achievements

When did the Assyrians start to work on this formidable undertaking? Altaweel (2008: 121) writes: 'In fact, the Neo-Assyrian period, could have been the first period when major irrigation activity occurred in the Assyrian heartland, …. Clearly earlier canals existed, as stated in textual sources; however, many of these irrigation features may have been relatively minor projects.' It seems though that the efforts of king Tukulti Ninurta I (1243-1207 BC) to provide water for his newly founded residence at Kar Tukulti Ninurta were not 'minor projects' (Bagg 2000b: 306-311). Moreover, it has been suggested that a large regional irrigation system was put in place in the eastern Jazira at the same time (13th century BC) (Kühne 1990a). Assyrian enthusiasm for this project, however, was curbed severely by a continuous drought that lasted from the 11th to the first half of the 10th century BC when climatic conditions improved again according to the annals of king Ashurdan II (935-912 BC) (Grayson 1991: 134 lines 60-67; Neumann and Parpola 1987: 181).

Despite Bagg's (2000a: 283; 2000b: 303) major study of Assyrian hydraulic technology, Assyria's achievements with regard to water management and irrigation techniques are still rather underestimated. It has been maintained that the introduction of large-scale irrigation only occurred during the reign of king Sennacherib (704-681 BC), primarily because he boasts of his engineering skills and technologies borrowed from other cultures. Pioneering (Oates 1968; Reade 1978) and more recent research (Bagg 2000a; Bagg 2000b; Dalley 2001-2002; Ur 2005; Wilkinson *et al.* 2005; Altaweel 2008) have focused on the hydraulic works of the Assyrian 'heartland' (see above). 'The [Neo-Assyrian] canals of Nineveh and Nimrud were labor-intensive projects carried out by the state, with irrigation primarily focused on enhancing the royal parks and gardens.' (Altaweel 2008: 121); in other words, according to Altaweel and others they were not primarily aimed at improving the region's economic viability. This view has recently been challenged by Wilkinson (Wilkinson *et al*. 2005: 29) and Ur (Ur 2005: 317, 341 ff.).

The Case of Dur-Katlimmu

In the following case study I want to demonstrate that the Assyrians were better hydraulic engineers than their historiographic reputation and self-assessment would suggest. The Habur canals are situated outside the 'heartland' of Assyria but within the Assyrian 'home provinces'. In 1982 and 1983, a regional canal system on both banks of the Lower Habur was discovered in the course of the 'Lower Habur Archaeological Project'. Aerial photographs and large-scale maps (1:25,000 and 1:5,000) were used to map canal traces, which were partially ground-truthed. The results of this survey were published in 1991 (Ergenzinger and Kühne 1991: Abb. 119). The architectural uniformity of the canals is remarkable, with a top width of 10 m and bottom widths

between 6 and 7 m (Ergenzinger and Kühne 1991: Abb. 127). The canal remains were well preserved in many places (Ergenzinger and Kühne 1991: Abb. 125, 128, 132) and appear to have belonged to a two hundred kilometres-long canal system branching out to either sides of the Habur. The western canal appears to have been fed by the Upper Habur while the eastern canal extended east of the Vulcan Kaukab and received its water from the main tributary of the Habur, the Jaghjagh.

The dating of the eastern canal was provided by surface shards and by excavated pottery from an L-shaped test trench near Tell Sheikh Hamad/Dur-Katlimmu (Ergenzinger and Kühne 1991: 179-180), a well-preserved section of the canal (GORS 1996: 59). The recovered pottery ranged from the Middle Assyrian to the Roman period. From the regional canal near Tell Sheikh Hamad/Dur-Katlimmu, a well-preserved feeder branched off to bring water to this Assyrian city. It was 2.5 kilometres long and without doubt functioned to irrigate fields and supply the city with fresh water (Fig. 2). It has been observed that the ancient canal was three times more efficient than modern Diesel pumps (Kühne 1990b: 203-4; Altaweel 2008: 117).

During the seasons of 1999 through 2003, the entire settlement of Dur-Katlimmu was surveyed geophysically. The results showed a prominent linear black anomaly crossing the central Lower Town II in an east-west direction; smaller parallel lines were detected further to the south. Another large feature skirted the town wall in northeast-southwest direction (Fig. 2). Initially these features were interpreted as water conduits, but excavations in 2004 and 2006 demonstrated that they were in fact streets. In 2008, however, a canal was discovered underneath the oldest outdoor occupation level immediately to the north of the 'Neo-Assyrian Residences', which corresponded to the street excavated in 2004 and 2006. Sealed off by the construction of the street and the associated structures of the Neo-Assyrian Residences, the canal clearly predates the Residences (Pucci 2010).

The building level which precedes the Neo-Assyrian Residences and during which the canal must have been in use is unfortunately poorly preserved. Its buildings were levelled during the construction of the Residences. In an artificial depression on the floor of one of the rooms of these earlier structures, a jar stopper was discovered, whose burnished surface had been impressed with a cylinder seal carrying an inscription. The seal could be identified as belonging to Ishme-ilu, Eunuch of Nergal-eresh (Kühne and Radner 2008). Nergal-eresh is the well-known governor of the province of Rasappa who was in office from 803 to 775 BC. Found in a sealed stratified context, this jar stopper provides an important *terminus ante quem* for the construction and use of the town canal. The building level in which the stopper was found must be contemporary or older than Nergal-eresh. The level above, i.e. the Neo-Assyrian Residences, must belong to the time after Nergal-eresh. This means that the town canal went out of use around the end of Nergal-eresh's reign around 775 or slightly later. There is no indication of a gap in occupation. Following from that, the canal itself must have been built much earlier than this, sometime during the ninth century or earlier still.

Preliminary typological analyses of the pottery from the sediments of the town canal suggest an earlier Neo-Assyrian date, but they await more thorough examination.

The dimensions of this town canal (or moat) with a width of 6.5 m at the bottom and *c*. 9 m at the top are readily comparable to the regional canal, which runs 2.5 km to the east of the site. Moreover, a branch of the regional canal was found heading towards the town of Dur-Katlimmu, indicating that the two canals formed part of the same hydraulic system (Fig. 2). This would imply that the regional canal too was constructed during the ninth century BC or earlier, and in turn would require to raise the traditional date for any major Assyrian hydraulic achievement by almost 200 years. This archaeological evidence is supported by local and regional cuneiform sources.

The Neo-Assyrian tablets from Dur-Katlimmu have been fully published by Karen Radner (Radner 2002, 2010). They indicate clearly that the fields were watered through irrigation but they lack any mentions of canals (Radner 2002: 7-9). In contrast to this indirect evidence, a Middle-Assyrian letter from Tell Sheikh Hamad appears to refer directly to the town canal (or moat) (see already Ergenzinger and Kühne 1991: 177). The letter DeZ 3293 is rather fragmentary but its contents could nevertheless be reconstructed. While addressee and sender are not preserved, the letter talks of carpenters who are supposed to construct boats and soldiers who are about to lay siege to a town, which apparently involved water supply for the canals to be cut off from a great distance. The most important passage reads like this: 'Within five days, huradu troops will be near Dur-Katlimmu. Then I shall cut off the water there also, be it the water of the town moat or of the naqquru-canal, everything is then less.' (Cancik-Kirschbaum 1996: 129-139; translation from German by the author). The Middle-Assyrian term used for canal is 'palgu' which according to Bagg does not indicate a regional but rather a smaller canal (Bagg 2000a: 88). The text dates to the reign of Tukulti-Ninurta I (1243-1207 BC). The implication is that there must have been a regional canal and that there was a town moat. This corresponds to the above mentioned archaeological evidence by which the earliest manifestation of the regional canal dates back to the Middle Assyrian period which in turn would imply that – archaeologically speaking – also the town canal (or moat) must date back to that period. However, this requires further corroboration.

Further textual evidence for early canal constructions comes from the cylinder of Bel-eresh, a well-known text which was recently restudied by Grayson (1991: 126-128). Bel-eresh was shangu-priest of Shadikanni, modern Tell Ajaja, during the reign of the kings Ashur-rabi II (1013-972 BC) and Ashur-reh-ishi II (972-967 BC). The text reports on the restoration of an abandoned canal. He uses the term atappu for canal which according to Bagg (2000a: 59) designates a navigable, regional canal. It is clear from the cylinder text that the canal, which Bel-eresh was rebuilding, had been constructed much earlier than the kings he refers to, so that a Middle Assyrian date of the 13th or 12th century for the construction of this canal seems plausible.

Conclusion

In conclusion, the evidence presented in this paper clearly indicates that the Assyrians undertook major water engineering projects prior to Sennacherib's canals for Nineveh. The Habur canals – whether fully or in part only remains to be seen – date back to the Middle-Assyrian period, that is the 13th century BC, and remained in use until the end of the Assyrian empire and beyond. Even though Altaweel discusses at some length the benefit of the Habur canals (Altaweel 2008: 117-118), he postulates that 'The Neo-Assyrian state … invested heavily in their central governing areas in contrast to their peripheral regions' (Altaweel 2008: 123). A little further on he reiterates his focus on the 'heartland': 'One can, therefore, say that the Neo-Assyrian remains … represent a signature of an ancient empire's policy as well as the implementation of that policy toward its *central* provinces.' (Altaweel 2008: 123; my emphasis). Both quotations betray a bias of the 'centre-periphery' theory. It seems, however, that the Assyrians were not the exploiters as this theory implies and as they are often described. I hope to have demonstrated with the example of the Habur canals that Assyria also invested heavily in the improvement of the economic infrastructure of their home provinces. Canals of these dimensions were so far associated with the engineering skills of king Sennacherib (704-681 BC), but appear now to have been constructed more than five hundred years prior to his reign. The hydraulic component of Assyrian society was therefore deeper rooted than so far anticipated. The canals were designed to irrigate the fields, be used for transportation, and to conduct fresh water to settlements. In this way they accelerated population growth and encouraged urbanisation in the Habur region (Kühne 1994). In the light of the Habur evidence, we may expect to find similar constructions in other parts of the home provinces. This prelude in the investment of imperial infrastructure was the foundation on which the first world power was built beginning in the late 10th century BC and lasting for over three hundred years. Much future research, however, is necessary to fully appreciate this and other achievements – some still to be discovered – which formed part of a conscious political strategy to provide water for Assyria.

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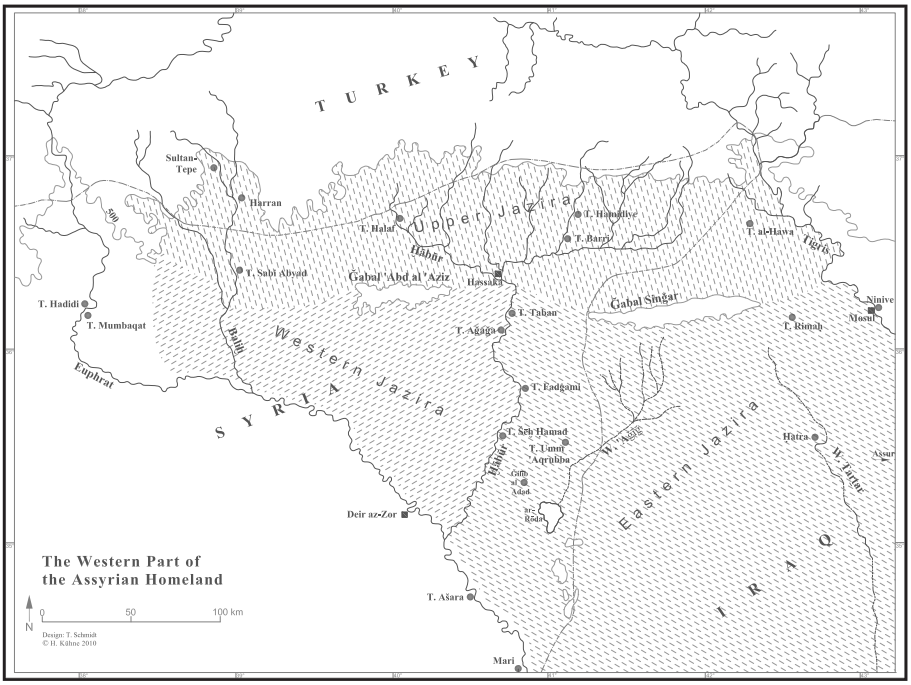

Fig. 1: The western part of the Assyrian homeland.

Fig. 2: The Neo-Assyrian town of Dur-Katlimmu and the town canal in relation to the regional canal.
Basic layer: Satellite Image of Google Earth 2010.