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Irrigation in 3rd Millennium Southern Mesopotamia: Cuneiform Evidence from the Early Dynastic IIIb City-State of Lagash (2475–2315 BC)

Summary

Southern Mesopotamia was essentially agrarian and depended on artificial irrigation. The earliest cuneiform evidence for fully-developed irrigation networks stems from royal inscriptions and archival records from a temple archive from the city-state of Lagaš, ca. 2475–2315 BC. These sources testify to a four-level irrigation network, probably established upon the unification of the state by Urnanše and Eanatum. From the river, water flowed to primary canals with regulators, and from there branched off to secondary canals. Distributors regulated the water flow to the fields. The construction of primary canals and regulators was conducted by the ruler who drew on the *corvée* troops of the temples. The temples maintained the lower-level irrigation structures, such as the distributors and dikes in their fields.

Keywords: Sumerian city-state of Lagaš; ruler; temple; royal inscriptions; administrative texts; hydraulic installations; *corvée* work

Wirtschaft und Gesellschaft Südmesopotamiens basierten auf Bewässerungsfeldbau. Erste keilschriftliche Nachweise für vollentwickelte Bewässerungssysteme stammen aus dem sumerischen Staatsaat Lagaš (ca. 2475–2315 v. Chr.). Herrscherinschriften und Urkunden aus Tempelarchiven dokumentierten ein vierstufiges Bewässerungssystem, das Wasser aus den Flüssen über primäre Kanäle mit Regulatoren und sekundäre Kanäle mit Verteilern auf die Felder leitete und wahrscheinlich nach der Einigung des Staates durch Urnanše und Eanatum etabliert wurde. Die Anlage von primären Kanälen und Regulatoren oblag dem Herrscher, der auf die Arbeitskräfte der Tempel des Staates zugriff. Die Tempel hatten für die Instandhaltung der an ihren Feldern gelegenen Verteilern, Deichen usw. Sorge zu tragen.

Keywords: sumerischer Stadtstaat Lagaš; Herrscher; Tempel; Königsinschriften; Verwaltungsurkunden; Bewässerungsanlagen; Arbeitsdienst

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[1]

Beginning with the invention of cuneiform writing around 3300 BC,¹ the society and economy of Southern Mesopotamia – the alluvium between the Zagros Mountains in the east and the desert of Iraq in the west, south of modern Baghdad and stretching down to the gulf – are abundantly documented by thousands of cuneiform texts. The vast majority consist of administrative records from the archives of large, state-run economic households. These households held the property of almost all resources, such as arable land, orchards, reed-thickets, and livestock including cattle, swine, sheep and goats, and employed and provided for large parts of the population. Thousands of archival records testify to their activities in agriculture, horticulture, breeding, fishery, and crafts.² As early Mesopotamian societies were essentially agrarian, it is no surprise that administrative texts pertaining to agricultural production, such as records of field measurements, sowing, harvest, storage and distribution of crops, constitute a large part of all economic records.

[2]

Due to the climate, water regime and hydrological landscape of Southern Mesopotamia, agriculture was only possible by means of artificial irrigation.³ Firstly, the Southern Mesopotamian alluvium was below the 200 mm isohyet, and characterized by a desert climate with a hot, dry summer and a humid, cold winter. Thus, annual precipitation was insufficient for dry-farming.⁴ Secondly, the main rivers, the Euphrates and Tigris

- 1 The chronology used in the present paper follows Sallaberger and Schrakamp 2015a; Sallaberger and Schrakamp 2015b.
- 2 For general surveys of late 4th to mid-3rd millennium cuneiform sources, see Bauer 1998; Englund 1998; Krebernik 1998.
- 3 The following outline of the hydrological landscape

- and climate is based on the more recent descriptions by Charles 1988, 1–9; Hunt 1988, 190–192; Hruška 1995, 25–32, 43–52; Rost and Abdulmir 2011, 206–208; Wilkinson 2003, 71–99; Bagg 2012, 261–270; Wilkinson 2012, 35–46; Rost 2015, 25–35.
- 4 Charles 1988, 1–2; Bagg 2012, 261–262.

followed a flood pattern that did not match the needs of agriculture and were characterized by unpredictable fluctuations. Cereals were sown in October to November, grew during the winter months and were harvested in April or May when the rivers reached their highest level. As a result of the spring rains and the snowmelt from the highlands, water levels increased over the winter months and reached their maximum in April or May. This especially applies to the Euphrates, which is joined only by the Khabor River. The Tigris in contrast, is fed by four main tributaries from the Zagros Mountains, which have steep slopes, carry lots of erosion material and are subject to heavy rainfalls, and is therefore more violent and more unpredictable than the Euphrates.⁵ Moreover, the alluvial rivercourses of Southern Mesopotamia show a gentle gradient which can be as low as 5–10 cm per km, diminishing to as low as 3 cm per km in the delta region; therefore, both rivers tend to change their courses especially during the spring months.

In addition, the constant deposition of silts creates natural levees up to a height of a few meters which raise the riverbed and cause the river to flow above the level of the plain. These levees are the key element of the alluvial hydraulic landscape. They have a triangular cross-section, an average width of 2–5 km, elevate up to 3 m above the plain level, are well drained; and provide the agricultural ground of the Southern Mesopotamian alluvium. As their backslopes contribute a gradient normal to the riverbed that is significantly steeper than that of the plain, they provide ideal conditions for irrigation based on gravity flow, improving the drainage of agricultural land and helping avoid the risks of salinization through standing water.⁶ These levees promoted the development of shorter irrigation canals normal to the riverbed running down the backslopes. This led to development of so-called “herringbone patterns” of canals and fields,⁷ which are confirmed for the Ur III period (21st century) by field plans and have been reconstructed to a degree for the ED IIIb/Presargonic period as well.⁸

[3]

As Southern Mesopotamia was located beyond the dry-farming belt, Sumerian agriculture is often associated with water shortage. Though as water levels were low during the sowing in September to November, peaked immediately prior to harvest in April or May, and often brought unpredictable floods; control and protection were crucial for cultivating winter crops. Thus, the problem was rather to provide the required amount of water at a given time. These needs were met by means of water management, which

5 Charles 1988, 6–7; Bagg 2012, 262–263, 267; Wilkinson 2012, 38–39.

6 Instructive discussions of the levee system are found in Charles 1988, 8. 23–25; Hunt 1988, 193–195;

Postgate 1992, 174–176; Bagg 2012, 263; Wilkinson 2012, 35–36, 42–43; Rost 2015, 25–26.

7 Wilkinson, Rayne, and Jotheri 2015.

8 Liverani 1990, 171.

fulfilled four central functions, namely (1) supply, (2) storage, (3) protection, and (4) drainage, i.e. leaching.⁹

[4]

Before discussing the cuneiform evidence pertaining to irrigation systems in Southern Mesopotamian, a general description of irrigation systems is provided.¹⁰ First of all, open-surface irrigation systems include a facility like a head-gate that directs water from the rivercourse to the subsequent water management facility. Beyond the head-gate, water is distributed through a number of primary, secondary, tertiary, and field canals of different rank and length. The water flow within these canals is controlled by different hydraulic devices, the most important of which are inlets, outlets, distributors and regulators. Inlets are located at the heads of canals, sometimes provided with flexible gates, and control the amount of water directed into the subsequent section of the irrigation system. Outlets regulate the amount of water directed from field canals into the irrigated areas and can likewise be equipped with gates. Distributors regulate the water flow from one canal into two or more canals of a lower rank. While some distributors have a layout that allows for a proportional distribution of water, others are equipped with gates and allow for systematic distribution of water. Regulators control the water flow within an irrigation system, maintain the water level within specific canals, and can temporarily increase or dam up the water flow. Usually, regulators are constructed across a particular canal, are located slightly downstream from canal inlets, and their number in an irrigation system corresponds to the number of canals. It is exactly these elements that can be identified in the cuneiform texts.

[5]

Though administrative texts related to agriculture feature prominently in the earliest cuneiform records, evidence for water management in the earliest texts is virtually absent. The ca. 5000 so-called archaic texts from Uruk and Jemdet Nasr, datable to ca. 3300–2900 BC, refer to huge tracts of arable land and mention enormous amounts of grain, but direct mention of hydraulic installations is apparently absent. Surprisingly, irrigation is also only referred to once in Englund’s survey of the archaic texts. He assumes that the archaic pictograph GANA₂, which denotes areas of arable land, represents an “irrigated field defined on a long axis by two parallel canals, with feeder canals running between them”, and suggests a hypothetical reconstruction of an account of fields

⁹ Postgate 1992, 176–183; Bagg 2012, 269.

204–206.

¹⁰ This outline is based on Rost and Abdulmir 2011,

situated along a waterway.¹¹ The shape of the sign itself, notably, seems to indicate furrow irrigation. In addition, the archaic sign E_a, which is thought to correspond to later Sumerian eg₂ “dike, ditch”, has recently been interpreted by Monaco as “a pictographic representation of a dyke with two attached branches, as streams of water flowing out of it, to form ditches or channels for irrigation purposes”.¹² However, Pemberton, Postgate, and Smyth assumed that “the archaic sign for eg represents a canal with banks each side”,¹³ Steinkeller prefers an interpretation as a pictograph of the cross-section of “a broad earthen wall which accommodated a ditch or a small canal running along its top.” This will be translated as “dike” for convenience and discussed in more detail below (see below [18]).¹⁴ References to hydraulic installations are almost completely lacking in the ca. 450 archaic texts from Ur, tentatively dated to ca. 2700 BC. Only a fragmentary field list possibly mentions a field situated along a “dike” (eg₂, E, see below [18]) and perhaps a “dam” (durun_x, KU (?), see below [21]) (UET 2, 98 rev. ii 4 IN₁₄ IN₂₃ 3N₁ KU E ĠAL₂).¹⁵ The ca. 1000 administrative texts from Fara/Šuruppag, mostly datable towards the end of the Early Dynastic IIIa/Fara period ca. 2575–2475 BC,¹⁶ include a reference to “men who work at the dike” (lu₂ eg₂ a₃, WF 13 = WVDOG 143, 29 rev. ii 7, iv 8).¹⁷ An Early Dynastic IIIa/Fara period incantation from Fara/Šuruppag seemingly refers to the “water of the dike/ditch which fills the dike/ditch” (SF 54 = BFE 6 rev. iii 1–3 a-sur₃ sur₃ e-se₃-gen₇ a-eg₂ <eg₂> e-se₃-gen₇).¹⁸

To sum up, administrative texts from the late 4th to mid-3rd millennium hardly provide evidence for hydraulic installations. This agrees with late 4th to early 3rd millennium settlement patterns that are based on survey data and said to indicate that larger irrigation networks did not exist prior to ca. 2700, as recently pointed out by Nissen.¹⁹

[6]

However, it is probable that earlier cuneiform references to irrigation networks are masked behind the ambiguity of early cuneiform writing. It is known that the basic Sumerian term for both “river” and “major canal” (see below [13]) appears in its standard-orthographic writing i₇/id₂, a combination of the signs A plus ENGUR, as late as the Early Dynastic IIIb period in royal inscriptions of Eanatum of Lagaš around 2450 BC.

11 Englund and Grégoire 1991, 1–2; Englund 1998, 204 n. 457, 206–208 fig. 83.

12 Monaco 2014, 280.

13 Pemberton, Postgate, and Smyth 1988, 213.

14 Steinkeller 1988, 73.

15 Burrows 1935, 12. Whether KU or DUR₂ is an early defective writing for durun_x(KU.KU) remains unclear.

16 On the date of the texts from Fara/Šuruppag, see Sallaberger and Schrakamp 2015b.

17 Sjöberg 1998, 81; Steible and Yıldız 2015, 4, 49.

18 Krebernik 1984, 36–47, 382–383 (copy); Keetman 2015, 90.

19 Adams and Nissen 1972, 38; Nissen 2015.

Earlier sources simply write A, which basically means “water”. This interchange is observed most clearly in two royal inscriptions of Eanatum of Lagaš, which refer to the digging of a “new canal” (FAOS 5/1 Ean. 2 = RIM E1.9.3.5 v 16–17 $i_x/id_5(A)$ gibil mu-na-dun // FAOS 5/1 Ean. 3–4 = RIM E1.9.3.6 vi 8–9 $i_7/id_2(A.ENGUR)$ gibil mu-na-dun, see below [13]). Most scholars regard this interchange as a purely graphic phenomenon and consequently adopt the reading i_x/id_5 for the simplex A.²⁰ The same interchange is attested in the writing of the “inlet” of the “canal of the steppe” (ka i_x/i_7 eden) in Early Dynastic IIIb/Presargonic administrative texts from Umma/Zabala, which is often written with the older simplex i_x/id_5 (CUSAS 14, 123 obv. i 2; CUSAS 14, 237 obv. ii 3; CUSAS 33, 24 obv. i 2; CUSAS 33, 60 obv. i 2; CUSAS 33, 266 obv. i 1, etc.), but occasionally also with the later compound sign i_7 (CUSAS 14, 56 obv. i 2, cf. CUSAS 33, 284 rev. ii 3).²¹ An ED IIIa/Fara period list of waterways from Fara/Šuruppak, on the contrary, still employs the simplex A or i_x/id_5 instead of A.ENGUR or i_7/id_2 and seems to corroborate the above interpretation (SF 72). The simplex A is already attested in the earliest copy of this list of waterways from the late 4th or early 3rd millennium (ATU 3 pl. 91 W 20266,81, cf. ATU 3 pl. 79 W 20266,80).²²

In this connection, a late 4th or early 3rd millennium lexical list cited as *Tribute* or *Word List C*, a list of words arranged according to their meaning that was copied for educational purposes and is also known from the ED IIIa/Fara period (ca. 2575–2475 BC), merits discussion.²³ Unlike other archaic lists that cover only a single semantic field, *Word List C* is divided into seven subsections that cover various semantic fields, which correspond to the most important branches of archaic economy and their administrative bureaus, respectively.²⁴ The last subsection deals with agriculture and mentions terms for agricultural work and ploughing teams, refers to the spring flood and includes elements of the irrigation network.²⁵ While the late 4th or early 3rd millennium copies simply write A, the corresponding entries of ED IIIa/Fara period copies instead have pa_5 , which denotes “secondary canals”; and eg_2 , which denotes a “dike” and is considered also to designate a “ditch” by some scholars (see below [17], [18]). The significance of this important observation remains yet to be discussed. But it is probable that the several hundred attestations of A in late 4th and early 3rd millennium texts also include references to watercourses. It is also obvious that the more differentiated and less ambiguous

20 Behrens and Steible 1983, 3, 166–167 (with references); Bauer 1985, 2–3; Bauer 1998, 431; Krebernik 1998, 283 n. 525; Krebernik 2007, 41; Civil 2013, 45 n. 84; Nissen 2015, 93. – Occasionally, the interchange of A.ENGUR and A is observed in personal names mentioned in administrative texts from Lagaš from the reign of Urukagina, see Foxvog 2011, 95, though these may be scribal errors.

21 The correct reading of the CUSAS 14 references was

established by Marchesi 2015, 150 n. 119.

22 Krebernik 1998, 280 n. 490; 283 n. 525; 316 n. 761; Krebernik 2007, 41 n. 10.

23 Veldhuis 2006; Civil 2010, 215–228; Civil 2013; Veldhuis 2014, 79–81.

24 Veldhuis 2006, 190–195; Civil 2013, 19–22.

25 Veldhuis 2006, 192–193; Civil 2013, 42–46; Veldhuis 2014, 81.

irrigation terminology of *Word List C* – A or i_x/id_5 “river” or “major canal”, pa_5 “secondary canal”, and eg_2 “dike” or “ditch” (see below [13], [17]–[18]) – was a recent development of the ED IIIa/Fara period (ca. 2575–2475 BC).

[7]

Based on the interchange of A or i_x/id_5 and A.ENGUR or i_7/id_2 in ED IIIb/Presargonic texts from Lagaš referred to above, a similar conclusion has been put forward most recently by Nissen.²⁶ Instead of a purely orthographic phenomenon, Nissen assumed that “technical terms only become necessary when the object described becomes important enough to be addressed unambiguously”, and concluded that “only from late Early Dynastic times on [...] had canals and irrigation systems reached a level of complexity which needed an administration and professional terminology of its own”. In addition, he pointed out that the office of the gu_2 -gal, which is thought to have been related to the administration of irrigation systems and translated in German as “Deichgraf”, makes its appearance as late as the ED IIIa/Fara period (ca. 2575–2475 BC) in a lexical list of professions known as ED Lu₂ D from Fara/Šuruppak (SF 48 obv. iv 4). It should be added that the title gu_2 -gal appears for the first time as an element of personal names from Šuruppak, such as $lugal-gu_2$ -gal “the king is a gu_2 -gal”, $ereš-gu_2$ -gal “the queen is a gu_2 -gal”. These clearly refer to the king’s role as a provider of the irrigation network (e.g. TŠŠ 115 = WVDOG 143, 25 obv. i 8; WF 5 = WVDOG 143, 13 rev. ii 8; WF 35 obv. v 5).²⁷ Finally, Nissen emphasizes that both official inscriptions of ancient Near Eastern rulers that refer to the construction of canals and larger groups of administrative texts dealing with irrigation are attested as late as the the ED IIIb/Presargonic period, i.e. ca. 2475–2300 BC, though this might well be due to archival contexts and accidents of discovery.

[8]

The aforementioned ED IIIb/Presargonic texts provide the earliest cuneiform evidence for fully-developed irrigation networks and stem from the Sumerian city-state of Lagaš, which was situated in modern Southeast Iraq. Lagaš covered an area of approximately 3000 km² and was one of the most powerful ED IIIb/Presargonic city- or petty-states of Sumer.²⁸ It included the four major cities of Ġirsu, Lagaš, Niġen, and Guabba at the ancient coast of the Gulf, which were situated along a branch of the Tigris.²⁹

26 Nissen 2015, 93–94.

27 Cf. Andersson 2012, 178 n. 1063.

28 On the history of ED IIIb/Presargonic Lagaš, see Cooper 1983; Bauer 1998; Sallaberger and Schrakamp 2015b; Schrakamp 2015b.

29 This waterway was previously considered to be an eastern branch of the Euphrates, but identified as the Tigris, see most recently Heimpel 1990, 204–213; Steinkeller 2001.

[9]

The ED IIIb/Presargonic cuneiform sources from Lagaš are twofold. First, they include a corpus of ca. 190 so-called royal inscriptions dating from the reigns of Urnanše to Urukagina (i.e., eri-enim-ge-na),³⁰ i.e. ca. 2475–2315 BC. These sources report the accomplishments of the rulers of Lagaš, such as military campaigns, temple buildings, and the construction and enlargement of the irrigation network, and thus provide the historical, political, ideological, and geographical background.³¹ They are complemented by ca. 1800 administrative texts.³² These are dated, with a few exceptions, to the reigns of the last three rulers of Lagaš (Enentarzi, Lugalanda and Urukagina), i.e. ca. 2337–2315 BC, and derive from the household of the wife of the ruler, which was called the “woman’s quarter” (e₂-mi₂) under Enentarzi and Lugalanda and referred to as the “temple of (the goddess) Babu” (e₂ ^dba-bu₁₁) during the reign of Urukagina.³³ This institution was supervised by the queen, was surpassed in size only by the temple of Ningîrsu, Lagaš’s tutelary deity, and is currently regarded as a paradigm for ED IIIb/Presargonic Sumerian temple households. It possessed at least 9000 hectares of arable land, orchards, forests, cane-brakes, cattle, and livestock, and employed ca. 1200 people in agriculture, animal husbandry, fishery, and crafts. It provided for them through allotments of subsistence fields and allocations of barley, emmer, flour, oil and vegetables, as well as textiles and wool. The institution was largely self-sustaining, and its resources were regarded as the property of the gods. Above all, the temples were subservient to the palace, which interfered in the temple economies, was the center of royal power, and administered by the ruler (ensi₂), who acted as the earthly steward of the gods. This characterization likewise applies to other temple archives, such as the contemporary temple of Inanna of Zabala – a cultic center in the area of Lagaš’s northwestern neighbour Umma, from the time of Lugalzagesi – and slightly older administrative records from other households within the state of Umma.³⁴ The 3rd-millennium temples can therefore be described as redistributive households that managed subsistence agriculture and provided for a large part of the population.

30 On the reading eri-enim-ge-na, see Schrakamp 2015b, 304–310.

31 See the editions in Steible 1982; Cooper 1986; Frayne 2008 and the glossary in Behrens and Steible 1983.

32 For a list and a general description of these sources, see Selz 1995, 9–11; Beld 2002, 5–35; Foxvog 2011,

59 n. 2; Schrakamp 2013, 447; Schrakamp 2015b, 303–304 n. 1.

33 Schrakamp 2013; Schrakamp 2015b, 337–342. On the reading e₂-mi₂, see Schrakamp 2015b, 334–335 n. 248, on the reading ^dba-bu₁₁, see Rubio 2010, 35–39 and Keetman 2014, 458.

34 Schrakamp 2013, 452–454.

[10]

About 20 royal inscriptions dating from the reigns of Urnanše to Urukagina (ca. 2475–2315 BC) refer to royal irrigation projects, i.e. the digging, maintenance, and adjustment of canals and the construction and restoration of regulators.³⁵ The inclusion of these waterworks among the outstanding royal accomplishments underlines the importance of the irrigation network and demonstrates that its maintenance was both a royal obligation and prerogative, which contributed to the ruler's prestige. In addition, these inscriptions refer to the earliest-documented "interstate water war", a long-lasting border conflict between the state of Lagaš and its northwestern neighbor Umma, which was fought for the possession of the Guedena, a very fertile, irrigated area of land in the border region of both states.³⁶ In this context, the ED IIIb/Presargonic royal inscriptions include the earliest attestations to "hydraulic warfare", i.e. the strategic destruction of hydraulic installations and diversion of water, which was practiced in the Southern Mesopotamian alluvium in times of political fragmentation. Since Southern Mesopotamian society and economy depended on artificial irrigation, this form of warfare often had fatal results.³⁷

Fifty-seven administrative texts from the temple of Babu, corresponding to 3% of the whole archive, deal with the administration, organisation and maintenance of the irrigation network and, thus, constitute a sizable dossier.³⁸ These texts testify to the organisation of irrigation works by the chief administrator (nu-banda₃) of the temple household and document inspections of the irrigation network (gid₂, literally "to measure") or parts thereof, such as canals, dikes, and distributors, assignments (du₃) of work quotas to temple dependents, their acceptance (dab₃) and their completion (AK).³⁹ Thus, the administrative texts do not only convey data on the technical aspects of water management, such as the construction of different types of waterworks. As they stem from the archive of a well-documented institutional household, they also offer detailed data on social aspects of Southern Mesopotamian water management, such as the organisation of irrigation works, the social status of workers employed, the system of irrigation work obligations, and the like.

35 Laurito and Pers 2002.

36 Cooper 1983; Steiner 1986; Sallaberger and Schrakamp 2015b; Schrakamp 2015b.

37 The fatal results of hydraulic warfare are well documented for the Early Old Babylonian period. In 1889–1877 BC, Abisare and Sumuel of Larsa successfully diverted a branch of the Euphrates, which previously had supplied the rivalling city of Isin and won the long-standing conflict between both cities. Later, Sinmuballit of Babylon (1812–1793 BC) successfully applied methods of hydraulic warfare

against the city of Larsa. On hydraulic warfare during the Old Babylonian period, see Renger 1970, 75–76; Renger 1990, 36; Frayne 1989; Charpin 2002.

38 For a list of texts, see Maeda 1984; Steinkeller 1999, 540–541; Beld 2002, 25–26 n. 86. To these, DP 568 and MVN 3, 11 = AWAS 60 should be added. Some contemporary work assignments from the temple of Inanna at Zabala might likewise refer to irrigation work, see Schrakamp 2013, 452 with n. 41.

39 Maeda 1984, 33–39.

[11]

In 1984, Maeda published a basic study of ED IIIb/Presargonic irrigation practices which based on 34 administrative texts. He established their typology, demonstrating that they refer to surveys of canals, the assignment of work quotas to temple dependents, and the execution of irrigation work, and thus focused on the administrative aspects of water management. Aside from this, he devoted some space to a short discussion of the basic terminology of irrigation networks and some of the ruler's irrigation projects referred to in royal inscriptions.⁴⁰ These were basically studied in 1988 by Hruška, who focused on the technical terminology of water management in a broader sense.⁴¹ In the same year, Steinkeller discussed some key terms of mid- to late-3rd millennium irrigation terminology.⁴² Several aspects of mid- to late-3rd millennium irrigation practices were discussed, moreover, in 1994 by Civil in his edition of an early-2nd millennium educational poem – usually referred to as *Georgica Sumerica* or *The Farmer's Instructions* – that includes valuable data on irrigation.⁴³ These publications are complemented by several other contributions that focus, however, on late 3rd millennium irrigation terminology and practice,⁴⁴ and deal with the system of corvée obligations,⁴⁵ the hydrology of the Southern Mesopotamian alluvium,⁴⁶ and even hydraulic warfare.⁴⁷ Though it has been emphasized that these texts are “of prime importance for the reconstruction of irrigation techniques in southern Babylonia in Early Dynastic times;”⁴⁸ they have not yet been fully edited nor come under systematic study. The ongoing *Topoi* research project will, therefore, fill in this research gap. The present paper summarizes the most important results available. An edition of the administrative texts is in preparation.⁴⁹

[12]

Though the ED IIIb/Presargonic texts from Lagaš provide the earliest written evidence for full-fledged irrigation networks and the corresponding terminology, the meaning of the Sumerian terms designating the different elements of the irrigation network is often controversial, especially when their interpretation is based on 2nd and 1st-millennium

40 Maeda 1984.

41 Hruška 1988.

42 Steinkeller 1988.

43 Civil 1994, 109–140.

44 Sauren 1966; Salonen 1968; Bauer 1971; Bauer 1973; Kang 1973; Maekawa 1987; Lafont 1980; Hunt 1988; Pemberton, Postgate, and Smyth 1988; Waetzoldt 1990; Sallaberger 1991; Bauer 1992; Steinkeller 1999; Dight 1998; Dight 2002; Laurito and Pers 2002; Rost 2011; Rost and Abdulmir

2011; Lecompte 2012; Rost 2015; Steinkeller 2015.

45 Maekawa 1987.

46 Carroué 1986; Steinkeller 2001; Rost 2011; Studevent-Hickman 2011.

47 Ceccarelli 2015; Keetman 2015.

48 Steinkeller 1999, 540–541; cf. Steinkeller 1988, 73.

49 Note that the administrative texts published in Marzahn 1991 and Marzahn 1996 are transliterated in the unpublished works of Marzahn 1989 and Selz 1996.

bilingual lexical sources or etymology.⁵⁰ However, the way these terms are distributed in royal inscriptions, on the one hand, and administrative texts from the temple of the goddess Babu, on the other, perfectly reflects the position of the different elements of an irrigation network and, thus, assures their proper identification: While the construction of primary canals and regulators is almost exclusively attested in royal inscriptions (see below [13]–[16]), the administrative texts mostly refer to the construction and maintenance of distributors, canals, and dikes that were situated along the fields of the temple of Babu (see below [17]–[22]).⁵¹ This, in turn, indicates that royal inscriptions and administrative texts from the temple of Babu refer to different levels of responsibility and accountability in the construction and maintenance of the irrigation network, as illustrated in the following discussion (see below [23]–[26]). In order to avoid terminological ambiguity, the different components of the irrigation network will be addressed using the technical terminology outlined above (see above [4]).

[13]

The Sumerian term for “(primary) canal” is *i*₇, which basically means “river”,⁵² and refers to the largest category of canals. This terminological ambiguity is considered to result from the low gradient of the alluvium, due to which both rivers and primary canals run from the north to the south, with a tendency toward straightness.⁵³ Such a direction is attested, for example, for the LUMmagendu canal, whose direction of flow is indicated on a cuneiform map from the Sargonic period (2300–2181 BC) (RTC 159),⁵⁴ and the “canal which goes to Niĝen” (*i*₇ niĝen₆^(ki)(-še₃)-du), which was the most important waterway of the state of Lagaš, connected the main cities of the state of Lagaš on an axis from the northwest to southeast and had a length of almost 50 km, thus demonstrating that primary canals reached considerable lengths (see below [14]). Unlike other categories of waterways, almost all canals designated as *i*₇ bore proper names, with the single exception of the “canal of the Urindua field” (*i*₇ aša₃ urin-du₃-a), whose name derives from a field.⁵⁵ However, there are indications that *i*₇ is sporadically used as a generic term for all kinds of waterways, such as an administrative text summarizing *i*₇ waterways under the rubric pa₃ “secondary canal” (DP 648, see below [19]), and a scribal exercise probably dating from Eanatum or Enanatum I that combines the names of canals, deities, fishes, and snakes associated with specific cities (BiMes. 3, 26).⁵⁶

50 This approach was followed e.g. by Salonen 1968.

51 Cf. the methodological remarks in Sallaberger 1996, 39–41.

52 Sauren 1966, 35–40; Stol 1976–1980, 356; Maeda 1984, 39, 42–44; Hruška 1988, 61; Steinkeller 1988, 84–85; Hruška 1995, 54, 56; Laurito and Pers 2002,

311; Nissen 2015, 93–94.

53 Wilkinson 2012, 36.

54 Edzard, Farber, and Sollberger 1977, 220; Röllig 1980–1983, 464.

55 Maeda 1984, 42.

56 See the edition in Biggs 1973 and Bauer 1978.

Primary canals are mentioned both in royal inscriptions and administrative texts, but their construction is, notably, almost only referred to in royal inscriptions. The most numerous attestations are found in inscriptions of Urnanše, who united the cities of Ġirsu, Lagaš, Niġen, and Guabba into a single state.⁵⁷ Six inscriptions mention royal irrigation projects and report the “digging” (dun) of seven or eight distinct waterways (FAOS 5/1 Urn. 24 = RIM E1.9.1.17 ii 3–7; Urn. 26 = E.1.9.1.9 iii 7–v 4; Urn. 27 = E1.9.1.12 iii 2–4; Urn. 34 = E1.9.1.20 v 3–5; Urn. 51 = E1.9.1.6b v 10–vi 2).⁵⁸ Though only two of them, the i_x a-suġur and the i_x LAK175,⁵⁹ are explicitly referred to as “primary canals” (i_x), this classification most likely also applies to the remaining waterways: The nin-LAK175-ba-DU is thought to be the same as the i_x LAK175 and perhaps in some ways identical to the “canal which goes to Niġen” (see below [14]).⁶⁰ The sumur-du₇-gen₇-du canal appears as a “primary canal” (i_7 sumur-du₇-gen₇, i_7 sumur-du₇-du) in later administrative texts (DP 480 obv. ii 1; DP 637 rev. iv 1, see below),⁶¹ and ^den-lil_x(E₂)-pa₃-da-uš-gal is considered to be an earlier spelling for ^den-lil_x(E₂)-le-pa₃-da (VS 14, 72 = AWL 5 obv. ii 4) and i_7 ^den-lil_x(E₂)-le-pa₃ (VS 27, 23 obv. iii 4) in later archival sources.⁶² The pa₅-saman₃ is, to judge from its name, which includes the element pa₅, a “secondary canal” (see below [7]), but as it is certainly the same as the pa₅-^dsaman₃-kaš₄.DU, which is referred to as “primary canal” (i_7) in a scribal exercise (BiMes. 3, 26 obv. ii 6) and inscriptions of Urukagina, it is most probably a primary canal as well.⁶³ The ^dnin-ġir₂-su-pa₃-da(-)IL.MA.NI (?) and the eg₂-ter-sig are otherwise unattested.⁶⁴ As these waterways were likewise “dug” (dun), at least the former might be a primary canal as well. The latter, in contrast, is nominally referred to as “dike”, “embankment”, or possibly “ditch” (eg₂, see below [18]) and would, therefore, designate a smaller waterway. The fact that this waterway bore a proper name points to it being a larger canal. After Urnanše, the digging (dun) of primary canals is only attested in inscriptions of Urnanše’s grandson Eanatum, who dug (dun) a “new primary canal” (i_x/i_7 gibil) by the name of “LUMmagendu canal” (i_7 LUM-ma-gen₇-du₁₀) (FAOS 5/1 Ean. 2 = RIM E1.9.3.5 v 15–19, vii 3–6; Ean. 3 = E1.9.3.6 vi 6–9; Ean. 67 = E1.9.3.14 ii 2’–3’).⁶⁵ Later royal inscriptions, on the contrary, do not refer unambiguously to the “digging” (dun) of new primary canals. As all hydraulic installations created by Eanatum had names including the element LUMma, such as the LUMmagendu canal and its respective “regulator” (ġeš-keše₂-ra₂ i_7 LUM-ma-gen₇-du₁₀, see

57 Selz 1995, 295, 298; Schrakamp 2015b, 345–346.

58 Behrens and Steible 1983, 423–424; Laurito and Pers 2002, 276.

59 On the reading ^dnin-šaga_x, see Cavigneaux and Krebernik 1998–2001; Frayne 2008, 90.

60 Edzard, Farber, and Sollberger 1977, 223, 227; Selz 1995, 184–187, 209, 269.

61 Edzard, Farber, and Sollberger 1977, 228.

62 Edzard, Farber, and Sollberger 1977, 212; Selz 1995, 130.

63 Edzard, Farber, and Sollberger 1977, 229; Selz 1995, 234; Bauer 1998, 478.

64 Edzard, Farber, and Sollberger 1977, 223, 230; Selz 1995, 221, 257.

65 Behrens and Steible 1983, 423–424; Bauer 1998, 464; Laurito and Pers 2002, 276.

below [15]), and LUMma is conventionally considered to be Eanatum's second name,⁶⁶ it is assumed that the LUMmaġir_{nun}ta (i₇ LUM-ma-ġir₂-nun-ta) and the ŠedaLUMma canal (i₇ še-da-LUM-ma) were dug by this ruler as well.⁶⁷ Except for the constructions of regulators (ġeš-keše₂-ra₂), which are reported by Eanatum, Enanatum I, Enmetena, and Urukagina, which will be discussed later in this paper (see below [15]), only six inscriptions of Urukagina refer to royal irrigation projects executed on the three primary canals (FAOS 5/1 Ukg. 1 = RIM E1.9.9.2 iii 4'-7', 12'-15'; Ukg. 4/5 = E1.9.9.1 ii 7-13/ii 9-15, xii 29-45/xii 5-21; Ukg. 6 = E1.9.9.3 v 5-7; Ukg. 8 = E1.9.9.10 iii 3'-6'; Ukg. 14 = E1.9.9.4 i 1-2).⁶⁸ Urukagina does not report the "digging" (dun), but rather the "hoeing" (al - du₃) of the Pasamankas₄.DU canal (i₇ pa₅-^dsaman₃-kas₄.DU), the "little canal" (i₇ tur) that Urukagina renamed to Ningġirsunibrutanirġal (i₇ ^dnin-ġir₂-su-nibru^{ki}-ta-nir-ġal₂), and the "canal which goes to Niġen" (i₇ niġen^{ki}-du). As all of these canals are already mentioned prior to Urukagina's reign,⁶⁹ the "hoeing" (al - du₃) is interpreted as a designation for maintenance work, probably due to erosion and deposition of silt, in contrast to the "digging" (dun) of new waterways.⁷⁰

Seventeen of fifty-seven administrative texts dealing with irrigation, corresponding to 30% of the whole dossier, mention "primary canals" (i₇), providing 26 attestations in total (DP 628 obv. i 1, rev. i 2; DP 637 rev. iv 1; DP 640 obv. i 2; DP 641 rev. iv 1; DP 642 rev. i 2; DP 644 rev. iii 1; DP 646 rev. i 2, 3, ii 4; DP 647 obv. i 2; DP 648 obv. i 1, 2; DP 658 rev. ii 1; DP 659 rev. i 3, ii 1; Nik. 1, 8 = AWEL 8 rev. ii 3; TSA 23 rev. v 2; VS 14, 130 = AWL 2 obv. i 1; VS 25, 97 obv. i 5, ii 3, iv 3; VS 27, 23 obv. i 3, iii 4; VS 27, 36 obv. i 1, <i₇>^den-lil_x(E₂)-le-pa₃ (?); VS 27, 36 rev. iv 1). These refer to nine different primary canals, including the "canal which goes to Niġen" (i₇ niġen^{ki}-du), the Imah canal (i₇ maḥ), the LUMmagendu canal (i₇ LUM-ma-gen₇-du₁₀), the Ningġirsunibrutanirġal canal (i₇ ^dnin-ġir₂-su-nibru^{ki}-tanir-ġal₂), and the Sumurdu(gen) canal (i₇ sumur-du₇, i₇ sumur-du₇-gen), all of which are mentioned in royal inscriptions. The "canal of the Urindua field" (i₇ aša₅ urin-du₃-a), the Enlilepa canal (i₇ ^den-lil_x(E₂)-le-pa₃), the Enlilešumugi canal (i₇ ^den-lil_x(E₂)-šu-mu-ġi₄), the Nemur(gen) canal (i₇ nemur(-gen₇)), and the ŠedaLUMma canal (i₇ še-da-LUM-ma) only appear in archival records. However, seven texts mention primary canals merely as a point of reference for the location of dike work, in notations such as "this is the dike which runs from the Imah (canal) to the erected emblem of the goddess Nanše" (eg₂ i₇-maḥ-ta uri₃-du₃-a ^dnašše-še₃ ġal₂-la-am₆, VS 25, 97 obv. i 5-ii 1), or "from the durun_x of the Imah canal 120 m, it is (a stretch of) dike not to be done" (durun_x i₇-maḥ-ta 20

66 Marchesi 2006, 20-26.

67 Maeda 1984, 44.

68 Behrens and Steible 1983, 423-424; Laurito and Pers 2002, 277.

69 Carroué 1986, 14; Selz 1995, 47 n. 214; Schrakamp 2015b, 335-336 n. 258. Maeda 1984, 43, and Bauer

1998, 439, assume that this canal was constructed by Urukagina, but overlook the earliest reference in the scribal exercise BiMes. 3, 26 obv. i 1, tentatively dated to Eanatum or Enanatum I.

70 Hruška 1988, 65; Selz 1995, 47 n. 214; Attinger 2005, 269.

NIĜ₂.DU eg₂ nu-ke₃-dam, VS 14, 130 = AWL 2 obv. i 1; cf. DP 641 rev. iv 1–2; VS 25, 97 obv. iv 2–3; VS 27, 23 obv. i 3–ii 2; VS 27, 23 obv. iii 4–rev. i 2; VS 27, 23 rev. i 5–6).⁷¹ Others do not refer to the primary canals proper, but to their u₃, a term which is considered to denote their ancient course, spoilbanks, or the like (see below [22]), as is attested for the Imaḥ canal (u₃ i₇¹-maḥ, DP 568 obv. ii 1; u₃ i₇-maḥ-ta ša₃ aša₅-ga-še₃, DP 646 rev. ii 4–5; u₃ i₇¹(ENGUR)-maḥ-kam, DP 658 rev. ii 1). As the u₃ of the Imaḥ canal is variably also referred to as the u₃ of Daterabbar by one and the same work assignment, it is even uncertain whether the Imaḥ canal proper is meant here at all (cf. DP 647 obv. i 1–2 3 lu₂ o.2.o kiĝ₂-be₂ ½ eše₂ 5 ge kiĝ₂ du₃-a u₃ i₇-maḥ *versus* DP 647 rev. v 1 šu-niĝen₂ 3,10 NIĜ₂.DU 1c ge kuš₃ 3c kiĝ₃ du₃-a u₃ ter-abbar^{ki}-ka; VS 27, 36 rev. iv 1–2 u₃ i₇-maḥ da-ter-abbar^{ki} kiĝ₂ du₃-a ^dba-bu₁₁).⁷²

However, only nine texts, corresponding to 11.5%, testify to work on primary canals. Notably, the digging (dun) of new canals is never mentioned. Instead, the administrative texts testify to maintenance and repair and refer to the “hoeing” (al – du₃, see above) and “cleaning” of primary canals (šū-luḥ – ak),⁷³ or their respective beds (ša₃ i₇).⁷⁴ Some of them are related to a royal irrigation project of Urukagina. An assignment of work to temple dependents from Urukagina’s 2nd year records the hoeing of the “Ninĝirsuni-brutanirgal canal” on a stretch of 540 m, more precisely at its “outlet” (kuĝ₂) at the Ubur field ([gu₂-an]-še₃ [1,30] NIĜ₂.DU [šū-du₃]-a 2c šū-si 5c [ki]ĝ₂ du₃-a i₇¹ al du₃ [dⁿ]in-ĝir₂-su-[ni]bru^{ki}-[ta-nir]-ĝal₂, TSA 23 rev. v 1–2).⁷⁵ Notably, this assignment was not made by the “captain” of the temple, as usual, but by the king himself ([eri]-enim-ge-na [lu]gal lagas_x(NU₁₁.BUR)^{la.ki}-ke₄ kuĝ₂ aša₅ ubur₂-ra-ka en-ig-gal nu-banda₃ mu-na-du₃ 1., TSA 23 rev. v 3–vi 1, see below [23]–[26]). The historical background is known from Urukagina’s royal inscriptions. These report the hoeing of the “canal which goes to Niĝen,” the construction of its respective regulator (ĝeš-keše₂-ra₂), its renaming to “Canal ‘Ninĝirsu has authority from (the city of) Nippur’” (i₇^dnin-ĝir₂-su-nibru^{ki}-ta-nir-ĝal₂), and its subsequent junction with the “little canal which Ĝirsu had” (i₇ tur ĝir₂-su^{ki} i₃-tuku-a), on the occasion of Urukagina’s coronation as king in his 2nd regnal year (see below [14]).⁷⁶

71 Cf. Hruška 1991, 209.

72 Maeda 1984, 47.

73 Salonen 1968, 427; Steinkeller 1988, 75; Civil 1994, 115, 179; Hruška 1995, 57; Attinger 2005, 254.

74 Veldhuis 2006, 193; Civil 2013, 44–45.

75 Englund 1988, 177–178 n. 38, assumes that the length measurements do not refer to the horizontal extent of stretches of dike, but to the volume of earthwork moved and, thus, represent an earlier precursor of the Ur III period system of volume notations. However, this seems excluded: the survey texts DP 654 and VS 25, 97, describe stretches of

dike not only in terms of their length, but also of their width (daĝal-be₂) and height (sukud-be₂). In addition, VS 25, 100, records several work quotas in dike work in terms of their length and records some work quotas that were executed on the two banks (gu₂ 2c-be₂ ke₃-dam) of the dike. The fact that the individual work quotas are congruent with the summary in the subscript of the texts demonstrates that not volumes, but length measurements are recorded (see below [18]).

76 Schrakamp 2015b, 335–336.

Another text, datable to Urukagina's 1st or 2nd regnal year, records an assignment in canal work, undertaken on a 80.5 m stretch of the ŠedalUMma canal, which is otherwise unattested (š_u-niĝ_{en} 1,20 ½ lu₂ kiĝ₂-be₂ 1 eše₂ 7c ge kuš₃ 1c kiĝ₂ i₇ du₃-a še-da-LUM-ma, Nik. 1, 8 = AWEL 8 rev. ii 1-3). As this work assignment provides the only other reference to the Ubur field (aša₅ ubur₂-ra ĝal₂-la-am₆, Nik. 1, 8 = AWEL 8 rev. ii 3),⁷⁷ and mentions the same gangs of corvée workers (cf. the names in TSA 23 obv. i 1-v 4 and Nik. 1, 8 = AWEL 8 obv. i 1-rev. i 1),⁷⁸ it is obviously related to Urukagina's irrigation project as well. Thus ŠedalUMma has been considered to be the former name of the "little canal which the city of Ĝirsu had", before it was renamed and connected to the "canal which goes to Niĝen".⁷⁹ The type of work undertaken at the ŠedalUMma canal is not specified, but the corresponding gangs of corvée troops and their comparably low work loads lead to the assumption that hoeing is referred to (compare, e.g., TSA 23 obv. i 1-4 13 lu₂ lu₂ 1-še₃ kiĝ₂ kuš₃ 4c šu-du₃-a 2c šu-si 4c-ta i₃-ši-ti, kiĝ₂-be₂ [½] eše₂ kuš₃ 2c šu-du₃-a 2c [u]r-d.še₃ šer₇-da; Nik. 1, 8 = AWEL 8 obv. i 1-4 13 ½ lu₂ lu₂ 1-še₃ kiĝ₂ kuš₃ 2c-ta kiĝ₂-be₂ 4c ge kuš₃ 1c ur-d.še₃ šer₇-da). Two texts from Urukagina's 4th year confirm this assumption. While the first records the acceptance of an assignment in canal work at the Enlilešumugi canal with work quotas as low as 1 m per capita, adding up to 27 m in total (kiĝ₂ du₃-a i₇ d^{en}-lil_x(E₂)-le-šu¹-mu-gi₄-kam en-ig-gal NU-banda₃ lu₂ iĝi-niĝ_{en} deli-deli-e-ne e-dab₅ 3., DP 644 rev. iii 1-5), the other records an expenditure of "hoe blades" (gag al) at the otherwise unattested Enlilešumugi canal (š_u-niĝ_{en} 1,02 gag al i₇ d^{en}-lil_x(E₂)-le-šu¹-mu-gi₄-a en-ig-gal NU-banda₃ e-ne-ba 3., DP 572 rev. i 1-ii 2).⁸⁰ Moreover, a survey denoting "work" (kiĝ₂) on a 880 m stretch of the "canal which goes to Niĝen" could likewise be related to Urukagina's irrigation project (2,20 ½ eše₂ 4c ge kiĝ₂ i₇ niĝ_{en}^{ki}-du ĝal₂-la-am₆ aša₅ kuš₃ du₆-sir₂-ra-ka-kam en-ig-gal NU-banda₃ mu-gid₂ 2., DP 640 obv. i 2-ii 2). However, as its date formula only refers to the 2nd regnal year, but omits the ruler's name, this remains uncertain.⁸¹ Finally, an administrative text from Urukagina's early reign records the "acceptance" (dab₅) of work quotas in hoeing the LUMmagendu canal that add up to 30 m and were assigned to the "corvée troops" (sur_x) of the temple of Babu by its chief administrator (NU-banda₃) (š_u-niĝ_{en} ½ eše₂ kuš₃ 2c kiĝ₂ bala-am₆ sur_x-re₂ e-dab₅ i₇ al-du₃ kiĝ₂ u₂-rum d^{ba}-bu₁₁ i₇ LUM-ma-gen₇-du₁₀, DP 659 rev. i 1-ii 1).⁸² The same irrigation project is probably referred to in an assignment of work on the LUMmagendu canal from the year of Urukagina's accession (š_u-niĝ_{en} 5c ge kiĝ₂ du₃-a i₇ LUM-ma-gen₇-du₁₀ eri-enim-ge-na ensi₂ lagas_x(NU₁₁.BUR)^{la,ki}-ke₄ mu-du₃ 1.,

77 LaPlaca and Powell 1990, 92.

78 Cf. Maeda 1984, 43-44, 50-51; Maekawa 1987, 53-59.

79 Maeda 1984, 43-44; Carroué 1986, 19, with reservations.

80 Maeda 1984, 43; Selz 1995, 131.

81 Maeda 1984, 37.

82 Maeda 1984, 50 n. 5, presents prosopographical arguments for the dating to the early reign of Urukagina.

DP 628 rev. i 1-ii 1). As the per capita work load can be estimated at ca. 0.5 m, clearly the canal hoeing is referred to (e.g. DP 628 obv. i 1-4 kuš₃ 1c kiĝ₂ du₃-a i₇ LUM-ma-gen₇-du₁₀ ge-num, kuš₃ 1c lu₂ a kum₂).⁸³ The hoeing is most probably also attested for “canals” (i₇) at the Urindua field (DP 648 obv. i 1-3), but these are subsumed as “secondary canals” (DP 648 obv. i 3, ii 2) and will be discussed later (see below [17]).

As the “hoeing” of primary canals was important enough to deserve mention in royal inscriptions, it comes as no surprise that administrative texts likewise refer to the hoeing of canals as a means of dating. Two administrative texts from the first year of an unnamed ruler bear an unusual date formula that refers to “the month (of the) issue of the inlet of the primary canal” (iti niĝ₂ ka i₇-ka-kam, DP 165 rev. ii 4; iti niĝ₂ ka i₇-ka-ka, STH 1, 45 = AWAS 44 obv. ii 4). As one of them mentions the “hoeing” of a primary canal by the ruler (ensi₂ i₇ al¹ du₃ ¹-da mu-til₃-la-a, DP 165 obv. ii 2-4), it is tempting to correlate these texts with the construction of the “inlet” (ka) reported in Urukagina’s inscriptions (FAOS 5/1 Ukg. 4/5 = RIM Et.9.9.1 ii 7-13/ii 9-15, xii 29-45/xii 5-21), but a dating to Urukagina is not assured (see below [14]).⁸⁴ In addition, a delivery of timber includes the notion that the chief administrator of the temple “cleared it out when he blew the Sumurdu canal with the hoe” (en-ig-gal nu-banda₃ i₇ sumur-du₇-ra₂ al i₃-mi-du₃-a-a na i₃-mi-de₅, DP 480 obv. i 3-ii 3),⁸⁵ thus, reflecting his role in organizing the irrigation work performed by the dependents of the temple (see below [24]–[25]). As it dates from the 1st year of an unnamed ruler, it is tempting to correlate it with an assignment of work on the Sumurdu canal that is likewise dated to the 1st year of an unknown ruler, but this text refers to the cleaning of the bed of the Sumurdu canal, performed on a length of 120 m by the “men of the goddess Babu”, i.e. the dependents of the sanctuary (šu-niĝen₂ 20 niĝ₂.DU kiĝ₂ du₃-a ša₃ i₇ sumur-du₇-ka šu-luḥ ak lu₂ ^dba-bu₁₁-ke-ne, DP 637 rev. iv 1-v 1). The last work assignment (kiĝ₂ du₃-a) specifies that the bed of the canal of the Urindua field had to be cleaned at a length of 366 m (šu-niĝen₂ 1,00 niĝ₂.DU 2c ge kiĝ₂ du₃-a i₇ aša₅ urin-du₃-a ša₃ i₇-da šu-luḥ ke₃-dam, DP 646 rev. i 1-4), “from the U₃ of the Imaḥ canal to the midst of the Urindua field”, thus informing that the Urindua canal crossed the field itself (U₃ i₇-maḥ-ta ša₃ aša₃-ga-še₃, DP 646 rev. ii 4-5).⁸⁶ To sum up, administrative texts almost exclusively attest to the maintenance of primary canals, with the exception of documents directly related to Urukagina’s irrigation projects, undertaken on the “canal which goes to Niĝen” during his early reign. The fact that these irrigation projects were not only reported in royal inscriptions, but were also occasionally referred to in date formula, underlines their importance.

83 Cf. Hruška 1988, 63, with a different interpretation.

84 Carroué 1986, 20; Selz 1993b, 401; Schrakamp 2015b, 348 n. 354, with a discussion of earlier interpretations. The fact that the household of the wife

of the rulers is referred to as e₂-mi₂, “women’s quarter”, argues for a dating to Urukagina’s predecessor.

85 On na – de₅ “to clear out” see Sallaberger 2005.

86 Maeda 1984, 43, 47.

As mentioned above, 16 administrative texts mention primary canals as points of reference in surveys or in assignments of work on nearby installation, and, thus, are informative about the location of waterways in relation to other elements of the irrigation network, important buildings, fields, and orchards. First, these texts demonstrate that primary canals bordered on fields.

An already mentioned acceptance of work assignments states that the “canal of the Urindua field” (i_7 aša₅ urin-du₃-a) had to be cleaned “to the middle of the field” (ša₃ aša₅-ga-še₃, DP 646 rev. ii 5) and, thus, demonstrates that this canal crossed the eponymous Urindua field, as is also indicated by the name of the canal itself (cf. above [13]). A survey done by the chief administrator (nu-banda₃) of the temple of Babu records 140 rods $\frac{1}{2}$ rope 4 reeds or 882 m of “work which is on the canal which goes to Niġen” (2,20 $\frac{1}{2}$ eše₂ 4c ge kiġ₂ i₇ niġen^{ki}-du ġal₂-la-am₆, DP 640 obv. i 2–ii 1) and indicates that this waterway ran along the “field of the Dusira outlet” (aša₅ kuġ₂ du₆-sir₂-ra, DP 640 obv. ii 2). References to “outlets” (kuġ₂) in relation to fields are also found in two of the administrative texts concerning Urukagina’s irrigation project on the “canal which goes to Niġen” cited above (Nik. 1, 8 = AWEL 8; TSA 23).⁸⁷ Two surveys refer to “dikes which lie along the Nemur canal” (eg₂ i₇ nemur-da nu₂-a(-am₆), DP 642 rev. i 2; VS 25, 97 obv. ii 3). This notation most likely denotes the “dikes” or “embankments” that accommodated the primary canal on both sides. A survey mentions a “durun_x of the Imah canal” (durun_x i₇-maġ, VS 14, 130 = AWL 2 obv. i 1, see below [21]) as a point of reference, thus, indicating that primary canals included durun_x as well. Another survey mentions “the kab₂-tar distributor of the Enlilepa canal” (kab₂-tar^den-lil_x(E₂)-le-pa₃, VS 27, 36 obv. i 1) as a point of reference. This could indicate that the water flow from primary canals to waterways of lower rank was controlled by means of kab₂-tar distributors and could be confirmed by another survey of “dikes” or “embankments” at the Daterabbar field. It states that the Enlilepa canal included at least two kab₂-tar distributors that were eroded by the water (4c ge kab₂-tar 1c-am₆ 3c kab₂-tar 2c-kam-ma-am₆ <i₇>^den-lil_x(E₂)-le-pa₃-ta a e-de₆, VS 27, 23 rev. i 3–6), but additional indications, however, are lacking (see below [20]).

To sum up, “primary canals” are designated as i_7 . These are mentioned both in royal inscriptions and administrative texts, but the construction of new primary canals is only referred to in inscriptions of the rulers of Lagaš, whereas administrative texts merely testify to maintenance work, with the notable exception of a group of records related to Urukagina’s irrigation project conducted on the “canal which goes to Niġen”. In addition, the construction of new primary canals is almost exclusively reported in inscriptions of Urnanše and his grandson Eanatum. This probably reflects Urnanše’s attempt

87 Maeda 1984, 43; Carroué 1986, 50; LaPlaca and

Powell 1990, 98.

to establish a far-flung irrigation network upon the unification of the four main cities of Lagaš into a single state. This agrees with the evidence from the Ur III period, during which the excavation of (new) primary canals is almost never reported in the tens of thousands of administrative texts, but is referred to by Urnamma, after the unification of Babylonia proper.⁸⁸

[14]

A well-known primary canal, attested through ED IIIb/Presargonic to Ur III cuneiform texts, is the “canal which goes to Niĝen” ((i₇) niĝen^(ki)-(še₃-)du). As mentioned above, it might in part be the same waterway as the i_x LAKI75 and nin-LAKI75-ba-DU canals dug by Urnanše, but the basic data can be found in inscriptions of Urukagina, which are complemented by a handful of administrative texts.⁸⁹ Urukagina boasts that he built the Eninnu, the temple of the god Ningirsu in the city of Ĝirsu, at its “mouth” (ka), and the Esirara, the temple of the goddess Nanše in the city of Niĝen, at its “tail” (kuĝ₂), and extended it to the south as far as the sea. Moreover, Urukagina joined the “canal which goes to Niĝen” with the “little canal which Ĝirsu had”. According to his royal inscriptions, the project was accomplished when Urukagina received the kingship of Lagaš from the god Ningirsu. On this occasion, the “little canal” was given its new name, “canal ‘the god Ningirsu has authority from the city of Nippur’”; by the king (^dnašše i₇ niĝen^(ki)-du i₇ ki-aĝ₂-(ĝa₂)-ne₂ al mu-na-du₃ (...) ša₃ mu-ba-ka i₇ tur ĝir₂-su^{ki} i₃-tuku-a ^dnin-ĝir₂-su-ra al mu-na-du₃ mu u₄-be₂-ta-be₂ e-še₃-ĝar (i₇) ^dnin-ĝir₂-su nibru^{ki}-ta eri-enim-ge-na-ke₄ mu mu-na-se₂₁ i₇ niĝen^(ki)-du-a mu-na-ni-la₂, FAOS 5/1 Ukg. 4/5 = E1.9.9.1 ii 7-13/ii 9-15, xii 29-40/xii 5-16, cf. Ukg. 1 = RIM E1.9.9.2 iii 4'-11', see above [13]).⁹⁰ Two or three administrative texts of a corresponding date, discussed above, refer to irrigation work at this waterway (DP 640; Nik. 1, 8 = AWEL 8; TSA 23, see above [13]). Obviously, the “mouth” (ka) and “tail” (kuĝ₂) designate the “inlet” and the “outlet” of this

88 Civil 1994, 135; Wilkinson 2012, 38, 42; Rost 2015, 134-137, with references; cf. Jacobsen 1960.

89 Carroué 1986. For the reading (i₇) niĝen^(ki)-(še₃-)du and its variants see Bauer 1971, 148-151; Carroué 1986, 18; Keetman 2016, 9, for Ur III administrative texts, which are beyond the scope of the present paper, see also Rost 2011; Studevent-Hickman 2011. On the dating of Urukag-

ina's irrigation projects to the first two years of his reign see Schrakamp 2015b, 335-336, 347-350, for a list of administrative texts pertaining to his irrigation works see Maeda 1984, 51 and Beld 2002, 25-26 n. 86.

90 Carroué 1986, 18, 49 n. 40-43; Schrakamp 2015b, 347-350.

primary canal,⁹¹ with the “mouth” being its head gate.⁹² Thus, running on an axis from the northwest to the southeast, the “canal which goes to Niĝen” connected the cities of Ĝirsu, Lagaš, Niĝen and Guabba at the ancient coast and, with an estimated length of almost 50 km, was the longest canal of the state.⁹³ Carroué assumed that the “mouth” (ka) of the “canal which goes to Niĝen” referred to its head gate, which he consequently located within the city of Ĝirsu. In support of this conclusion, Carroué referred to later inscriptions of Gudea of Lagaš that locate various buildings and sanctuaries within the city of Ĝirsu, such as the “lapis lazuli quay of the Kasura” (kar za-gin₃ ka₂-sur-ra) and the Emaḥ (e₂-maḥ) “at the river/canal” (i₇-da). Thus, Carroué supposed the head gate of the “canal which goes to Niĝen” in the area of the thalweg dividing the northern part between the *Tells centraux* and the *Tells de l’Est*. Moreover, Carroué referred to a brick inscription which commemorates the construction of the ĝeš-keše₂-ra₂ of the “canal which goes to Niĝen” by Urukagina, which he translated as “digue”. As this was constructed of durable materials and its respective inscriptions stemmed from Ĝirsu, Carroué provisionally identified this ĝeš-keše₂-ra₂ as the inlet or head gate of the “canal which goes to Niĝen”, which he supposed was located in the thalweg referred to above (see below [15]).⁹⁴ Two administrative texts from the first year of an unnamed ruler bear an unusual date formula, that refers to “the month (of the) issue of the inlet of the primary canal” (iti niĝ₂ ka i₇-ka-kam, DP 165 rev. ii 4; iti niĝ₂ ka i₇-ka-ka, STH 1, 45 = AWAS 44 obv. ii 4). As one of them mentions the “hoeing” of a primary canal by the ruler (ensi₂ i₇ al ‘du₃ ‘da mu-til₃-la-a, DP 165 obv. ii 2–4), it is tempting to correlate these texts with the construction of the “inlet” (ka) reported in Urukagina’s inscriptions, but their dating to the reign of Urukagina is by no means assured.⁹⁵

While ancient levees discernible on modern satellite imagery are thought to represent the “canal which goes to Niĝen” and the abovementioned reconstruction of its course is generally accepted, the location of its head gate is not.⁹⁶ Rost considered the possibility that the canal drew its water directly from the ancient Tigris, which is located in the immediate vicinity (literally, “the banks”) of the city of Ĝirsu by an inscription of

91 On ka and kuĝ₂, see Sauren 1966, 49–50; Stol 1976–1980, 358; Maeda 1984, 39 n. 13, 44; Carroué 1986, 16, 18; Hruška 1988, 65; Laurito and Pers 2002, 279; Rost 2011, 227, 242; Nissen 2015, 93–94. Sauren, Stol and Nissen regard kuĝ₂ as an earlier spelling for kuĝ₂ zi-da, which is amply attested in Ur III administrative texts, but this interpretation does not agree with the context of Urukagina’s inscription, nor with the more recent interpretation of kuĝ₂ zi-da as “weir” or “barrage” by Steinkeller 1988, 74; Steinkeller 2001, 35 n. 46; cf. Waetzoldt 1990, 8–9.

92 Carroué 1986, 17–18.

93 Carroué 1986, 15 fig. 1; 23 fig. 2.

94 Carroué 1986, 16–18.

95 Carroué 1986, 20; Selz 1993b, 401; Schrakamp 2015b, 348 n. 354. The fact that the household of the wife of the rulers is referred to in one of these documents as e₂-mi₂, “women’s quarter”, instead of e₂ ‘ba-bu₁₁, “temple of Babu”, argues for a dating to Urukagina’s predecessor.

96 Rost 2011, 226 n. 14, refers to the unpublished dissertation of Pournelle 2003, 90–96, which is not available to the present author.

Enmetena (im-dub-ba ^dnin-ĝir₂-su-ka gu₂ i₇ idigna-še₃ ĝal₂-la gu₂-gu₂ ĝir₂-su^{ki}-ka, FAOS 5/1 Ent. 28 = RIM E1.9.5.1 iv 4–7) and is represented by an ancient levee system discernible on modern satellite imagery.⁹⁷ This, however, would contradict the inscriptions of Urukagina, which locate the head gate of the canal within the city of Ĝirsu. A possible solution that harmonizes epigraphic and archaeological evidence has been proposed by De Maaijer and Rost. They assumed that the “canal which goes to Niĝen” extended all the way to the ancient course of the Tigris, but presuppose that its northern part was referred to as “Ĝirsu canal”.⁹⁸ In this context, it needs to be recalled that Urukagina connected the “little canal which Ĝirsu had” with the “canal which goes to Niĝen” (see above [14]). Based on remote-sensing data, Rey identified the “canal which goes to Niĝen” with a major northeast-southeast waterway that flowed east of Ĝirsu. Unlike Carroué and Rost, he suggested that the “little canal (which Ĝirsu had)” was a “second-tier water-supply feature [which] flowed through part of the city” and proposed an identification with a large-scale wadi-like gully in the western part of the tell that was flanked by a linear levee.⁹⁹ This problem yet remains to be solved.

[15]

As mentioned above, the water level within a primary canal is normally controlled by means of a regulator at the head gate (see above [4]). In the cuneiform sources from ED IIIb/Presargonic Lagaš, such a regulator would be expected to be mentioned in royal inscriptions as a part of a “primary canal” (i₇). Therefore, the Sumerian term for regulator is most likely ĝeš-keše₂-ra₂, which only appears in royal inscriptions of Eanatum, Enanatum I, Enmetena, and Urukagina (FAOS 5/1 Ean. 2 = RIM E1.9.3.5 vii 10; En. I 33 = E1.9.4.9 v 8; Ent. 35 = E1.9.5.26 iv 2, vi 2, viii 4; Ukg. 7 = E1.9.9.8 iii 1’).

However, the interpretation of ĝeš-keše₂-ra₂ is subject to a long-standing debate. Jacobsen regarded the so-called ‘construction énigmatique’, a huge structure of baked bricks and bitumen excavated at Tello/Ĝirsu discussed later (see below [16]), as a “weir” and assumed that the ED IIIb/Presargonic ĝeš-keše₂-ra₂ mentioned by Eanatum and Enmetena denote comparable hydraulic installations.¹⁰⁰ Based mainly on 2nd- to 1st-millennium lexical texts which mention *irritum*, *irritum ša* i₇, *mihir* i₇, and *riksum* as its Akkadian equivalents, Sauren and Salonen interpreted ĝeš-keše₂-ra₂ as a barrage (“Kanalsperre”) that regulated the water flow at the inlets or outlets of canals.¹⁰¹ Kupper and Sollberger accepted Jacobsen’s proposal, pointing out that the area of the ‘construction énigmatique’ yielded an inscription of Piriĝme of Lagaš (late 22nd century

97 Rost 2011, 226–227 n. 14.

98 De Maaijer 1996, 62–64 fig. 1; Rost 2011, 226–227 n. 14.

99 Rey 2016, 31–35.

100 Jacobsen 1960, 182.

101 Sauren 1966, 51–52; Salonen 1968, 218–219.

BC) that commemorates the construction of a $\dot{g}\acute{e}š-keše_2-ra_2$, and proposed an identification with the ‘construction énigmatique’.¹⁰² Bauer reviewed the ED IIIb/Presargonic attestations from Lagaš. He suggested that these inscriptions describe the $\dot{g}\acute{e}š-keše_2-ra_2$ as “great mountains of baked bricks” ($kur-gal \dot{s}eg_{12} alur_x$) with a varying “storage capacity” ($ni\dot{g}in_2$, ENGUR) of more than 1050 hl, and suggested an interpretation as storage reservoir (“Staubecken”).¹⁰³ This was accepted by Maeda, Steinkeller, Civil (“dam”) and Hruška (“Stauwehr”).¹⁰⁴ Cooper, likewise, translated $\dot{g}\acute{e}š-keše_2-ra_2$ as “reservoir”, but argued that the ED IIIb/Presargonic inscriptions from Lagaš did not refer to the $\dot{g}\acute{e}š-keše_2-ra_2$ as “great mountains of baked bricks”, but to the number of baked bricks used for their construction, which added up to 432 000 (2 $\dot{s}ar_2-gal \dot{s}eg_{12} alur_x-ra$) and 648 000 bricks (3 $\dot{s}ar_2-gal \dot{s}eg_{12} alur_x-ra$), respectively. In addition, he argued that the subsequent capacity measures did not refer to the “storage capacity” ($ni\dot{g}en_2$, LAGAB) of the $\dot{g}\acute{e}š-keše_2-ra_2$, but to an amount of “bitumen” ($esir_2$, LAGAB \times HAL) used to caulk the brickwork, differently computed at 2592 hl, 2528 hl, and 2649.9 hl.¹⁰⁵ Carroué independently proposed the same interpretation for Urukagina’s inscription that commemorated the construction of the $\dot{g}\acute{e}š-keše_2-ra_2$ at the “canal which goes to Niġen”. As this $\dot{g}\acute{e}š-keše_2-ra_2$ was constructed of durable materials and its respective inscriptions stemmed from Ġirsu, Carroué provisionally identified this $\dot{g}\acute{e}š-keše_2-ra_2$ as the inlet or head gate of this waterway (see above [14]) and interpreted $\dot{g}\acute{e}š-keše_2-ra_2$ as dam (“digue”).¹⁰⁶ Hruška considered Carroué’s proposal possible, but assumed that the bitumen would be used as mortar instead of caulking.¹⁰⁷ Postgate and Pemberton, Postgate, and Smyth fully agreed with Jacobsen’s proposal and pointed out that the use of baked bricks and bitumen documented by the inscriptions of Eanatum, Enmetena, and Urukagina perfectly agrees with the ‘construction énigmatique’. Based on a comparison with more recent and modern regulators from Nahrawan and modern Yemen, they assumed that ancient Near Eastern specimens operated flexible flood gates of wood, as indicated by the element $\dot{g}\acute{e}š$ “wood” in the term itself.¹⁰⁸ This interpretation was essentially adopted by Dight, who discussed further possible textual attestations of regulators, as well as their mode of operation, and emphasized the difference between a regulator and a weir or dam, but, to complicate matters, interpreted kab_2-tar (see below [20]) as a designation for regulators, as well.¹⁰⁹ Rey, however, assumed that $\dot{g}\acute{e}š-keše_2-ra_2$ may also denote a “bridge”. He based this proposal on a recent reinterpretation of the ‘construction énigmatique’ that is discussed in the subsequent section (see below [16]).¹¹⁰

102 Kupper and Sollberger 1971, 119.

103 Bauer 1973, 9–11.

104 Maeda 1984, 43; Hruška 1988, 65; Steinkeller 1988, 74; Civil 1994, 130.

105 Cooper 1986, 42 n. 2; 81 n. 2.

106 Carroué 1986, 17–18.

107 Hruška 1988, 69 n. 29.

108 Postgate 1988, xi–xiii; Pemberton, Postgate, and Smyth 1988, 218–221; Postgate 1992, 177–178.

109 Dight 2002, 116–118.

110 Rey 2016, 32, 34.

A review of the evidence clearly demonstrates that $\hat{g}\acute{e}š-keše_2-ra_2$ denotes regulators that controlled the flow of water of “primary canals” (i_7). First of all, the distribution of textual references to $\hat{g}\acute{e}š-keše_2-ra_2$ is striking. While administrative texts never mention $\hat{g}\acute{e}š-keše_2-ra_2$, four royal inscriptions of Eanatum, Enanatum I, Enmetena, and Urukagina include seven attestations that refer to three, perhaps four, distinct $\hat{g}\acute{e}š-keše_2-ra_2$. These are, notably, only attested as part of “primary canals” (i_7) and constructed of durable materials, i.e. baked bricks and bitumen. The usage of these materials is also known from traditional Iraqi head regulators, indicates that $\hat{g}\acute{e}š-keše_2-ra_2$ were exposed to immense hydraulic stress and likewise argues for the abovementioned interpretation.¹¹¹ Eanatum “erected the $\hat{g}\acute{e}š-keše_2-ra_2$ of the LUMmagendu (canal) with 2.592 hl of bitumen” (d nin- $\hat{g}\acute{e}r_2$ -su-ra LUM-ma-gen $_7$ -du $_{10}$ mu-na-uš sa \hat{g} -eš $_2$ mu-ni-rig $_8$ e $_2$ -an-na-tum a $_x$ (DA) šum $_2$ -ma d nin- $\hat{g}\acute{e}r_2$ -su-ka-ke $_4$ $\hat{g}\acute{e}š-keše_2-ra_2$ LUM-ma-gen $_7$ -du $_{10}$ r esir $_2$!(LAGAB)¹ 60,00 gur 2-UL mu-ni-du $_3$, FAOS 5/1 Ean. 2 = RIM EI.9.3.5 vii 3–13). Though the sign denoting “bitumen” is, judging from the copy, slightly damaged, Bauer’s reading ni $\hat{g}\acute{e}n_2$ and its interpretation as “storage capacity”, is rather a guess based on the context, are virtually excluded. On the one hand, the corresponding description of the $\hat{g}\acute{e}š-keše_2-ra_2$ erected by Urukagina shows a clear instance of the sign esir $_2$ (LAGAB×HAL) “bitumen” instead of the very similar sign ni $\hat{g}\acute{e}n_2$ (LAGAB), as pointed out by Cooper and Carroué.¹¹² On the other hand, the element -ni- in the verb mu-na-ni-du $_3$ “he erected” can only refer to the material that the $\hat{g}\acute{e}š-keše_2-ra_2$ were made of and, thus, excludes the reading ni $\hat{g}\acute{e}n_2$ “storage capacity”.¹¹³ Enmetena, likewise, reports that “he erected the $\hat{g}\acute{e}š-keše_2-ra_2$ of the LUMmagendu (canal) with 648 000 baked bricks and 2649.6 hl (of bitumen)” ($\hat{g}\acute{e}š-keše_2-ra_2$ LUM-ma-gen $_7$ -du $_{10}$ 3 šar $_2$ -gal šeg $_{12}$ alur $_x$ -ra 30,40 gur-sa \hat{g} - $\hat{g}\acute{e}l_2$ en-me-te-na-ke $_4$ d nin- $\hat{g}\acute{e}r_2$ -su-ra mu-na-ni-du $_3$, FAOS 5/1 Ent. 35 = RIM EI.9.5.26 iv 2–8). As the amount of bitumen almost matches the figure given by Eanatum, Enmetena obviously restored the $\hat{g}\acute{e}š-keše_2-ra_2$ that was built by his predecessor. Unlike Eanatum, Enmetena used baked bricks (šeg $_{12}$ alur $_x$ -ra).¹¹⁴ Bauer translated “great mountain of baked bricks” (kur-gal šeg $_{12}$ BAHAR $_2$), but as Urukagina’s corresponding description of his $\hat{g}\acute{e}š-keše_2-ra_2$ unambiguously refers to a number of bricks instead of a “mountain” (2 šar $_2$ -gal šeg $_{12}$ alur $_x$ -ra), Cooper promoted the respective reading “648 000 baked bricks” (3 šar $_2$ -gal šeg $_{12}$ alur $_x$ -ra).¹¹⁵ In a later passage of this inscription, Enmetena boasts that he “erected the $\hat{g}\acute{e}š-keše_2-ra_2$ of the LUMma(gendu canal)(?) in the Guedena”, a fertile area in the border region between Lagaš and Umma (< $\hat{g}\acute{e}š$ >-keše $_2-ra_2$ LUM-ma<gen $_7$ -du $_{10}$ >(?)) gu $_2$ -eden-na-ka mu-na-ni-du $_3$, FAOS 5/1 Ent. 35 = RIM EI.9.5.26 vi 2–5). This could testify to the

111 Rost and Abdulmir 2011, 213–214.

112 Carroué 1986, 17–18; Cooper 1986, 80–81; cf. Stol 2012, 50.

113 On this usage of the prefix {ni} see Balke 2006, 47–48; Jagersma 2010, 176.

114 On šeg $_{12}$ alur $_x$ -ra “baked bricks” see Bauer 1973, 10 n. 8; Steinkeller 1978, 74 n. 6; Steinkeller 1987, 59; Heimpel 2009, 193.

115 Cooper 1986, 66–67.

construction of a second $\hat{g}\acute{e}s\text{-}k\acute{e}s\acute{e}_2\text{-}r\acute{a}_2$ at an otherwise unattested waterway in the Guedena area. That the $\hat{g}\acute{e}s\text{-}k\acute{e}s\acute{e}_2\text{-}r\acute{a}_2$ of the Lummagendu canal is again mentioned at the end of the inscription, and Enmetena refers to himself as “the one who erected (a) regulator(s)” ($\hat{g}\acute{e}s\text{-}k\acute{e}s\acute{e}_2\text{-}r\acute{a}_2$ du₃-a), might argue for the latter proposal.¹¹⁶ As the passage in question is badly preserved and seems to contain scribal mistakes, it might likewise refer to the $\hat{g}\acute{e}s\text{-}k\acute{e}s\acute{e}_2\text{-}r\acute{a}_2$ at the Lummagendu canal and indicate its location.¹¹⁷ The second well-attested $\hat{g}\acute{e}s\text{-}k\acute{e}s\acute{e}_2\text{-}r\acute{a}_2$ was constructed by Urukagina, who provided the “canal which goes to Niĝen” with a $\hat{g}\acute{e}s\text{-}k\acute{e}s\acute{e}_2\text{-}r\acute{a}_2$ of 216 000 baked bricks and 2620.8 hl of bitumen ([$\hat{g}\acute{e}s\text{-}k\acute{e}s\acute{e}_2\text{-}r\acute{a}_2$] i₇ niĝen^{ki}-du mu-na-du₃ 2 šar₂-ĝal šeg₁₂ alur_x-ra 30,20 gur-saĝ-ĝal esir₂ mu-na-ni-du₃, FAOS 5/1 Ukg. 7 = RIM E1.9.9.8 iii 1'-iv 5').¹¹⁸ This, most probably, took place when Urukagina connected the “little canal” with the “canal which goes to Niĝen” (see above [14]). Another reference to the construction of a $\hat{g}\acute{e}s\text{-}k\acute{e}s\acute{e}_2\text{-}r\acute{a}_2$ of baked bricks is found in an inscription of Enanatum I, Enatum’s successor, which is unfortunately badly preserved (en-an-na-tum₂-me ^dlugal-urub^{ki}-ra $\hat{g}\acute{e}s\text{-}k\acute{e}s\acute{e}_2\text{-}r\acute{a}_2$ [(x) ^dn]in-ĥur-saĝ-ĝa₂¹ [...] šeg₁₂ alur_x-ra mu-na-ni-du₃, FAOS 5/1 En. I 33 = RIM E1.9.4.9 v 6–11). Despite its bad preservation, it is clear that this $\hat{g}\acute{e}s\text{-}k\acute{e}s\acute{e}_2\text{-}r\acute{a}_2$ was dedicated to the god Lugalurub, whereas the aforementioned regulators were dedicated to Ningirsu. Consequently, Enanatum’s inscription testifies to the existence of a third $\hat{g}\acute{e}s\text{-}k\acute{e}s\acute{e}_2\text{-}r\acute{a}_2$. As the $\hat{g}\acute{e}s\text{-}k\acute{e}s\acute{e}_2\text{-}r\acute{a}_2$ constructed by Enatum, Enmetena, and Urukagina were located at “primary canals” (i₇), this is likely for Enanatum’s $\hat{g}\acute{e}s\text{-}k\acute{e}s\acute{e}_2\text{-}r\acute{a}_2$ as well.

To sum up, ED IIIb/Presargonic royal inscriptions testify to the existence of at least three $\hat{g}\acute{e}s\text{-}k\acute{e}s\acute{e}_2\text{-}r\acute{a}_2$. As these were part of as many primary canals, consisted of baked bricks and bitumen, and their construction deserved mention in royal inscriptions, $\hat{g}\acute{e}s\text{-}k\acute{e}s\acute{e}_2\text{-}r\acute{a}_2$ most likely denotes a regulator. Their construction with baked bricks and bitumen, moreover, parallels that of modern Iraqi dams.¹¹⁹ This also agrees with the etymology of $\hat{g}\acute{e}s\text{-}k\acute{e}s\acute{e}_2\text{-}r\acute{a}_2$, which literally means “wood which binds”.¹²⁰ The element $\hat{g}\acute{e}s$ “wood” certainly refers to a flexible wooden gate.¹²¹ This might likewise agree with an early 2nd-millennium lexical list which mentions the “mouth”, i.e. the inlet, of a $\hat{g}\acute{e}s\text{-}k\acute{e}s\acute{e}_2\text{-}r\acute{a}_2$ (ka $\hat{g}\acute{e}s\text{-}k\acute{e}s\acute{e}_2\text{-}r\acute{a}_2$ = *pi i-ir-ri-ti*, Saĝ A iii [MSL SS 1: 22] 45). Another list associates the “reed of the $\hat{g}\acute{e}s\text{-}k\acute{e}s\acute{e}_2\text{-}r\acute{a}_2$ ” (*ge* $\hat{g}\acute{e}s\text{-}k\acute{e}s\acute{e}_2\text{-}r\acute{a}_2$) with the “reed of the kuĝ₂-zi-da” (*ge* kuĝ₂-zi-da, OB Forerunner Hĥ VIII–IX [MSL 7: 195] 171–173), amply attested as a designation of barrages of reed and mudbrick in administrative texts from the Ur III period (21st century BC).¹²² The fact that among the ca. 8000 administrative texts from the Ur III period, only three refer to a “ $\hat{g}\acute{e}s\text{-}k\acute{e}s\acute{e}_2\text{-}r\acute{a}_2$ of the god Enlil” ($\hat{g}\acute{e}s\text{-}k\acute{e}s\acute{e}_2\text{-}r\acute{a}_2$)

116 Cf. the remarks of Bauer 1973, 11 n. 10; Selz 1995, 172.

117 Maeda 1984, 43.

118 For collations and restorations, see Cooper 1986, 80–81, and Frayne 2008, 282.

119 Rost and Abdulmir 2011, 209–211.

120 Cf. Bauer 1973, 9.

121 Pemberton, Postgate, and Smyth 1988, 220.

122 On kuĝ₂ zi-da, see above [14] n. 91.

^den-lil₂(-la₂) in the province of Lagaš, perfectly corresponds to the lack of attestations in the ED IIIb/Presargonic administrative texts,¹²³ though Ur III royal inscriptions, likewise, provide a single reference (cf. above [13] on “primary canals”).¹²⁴ Finally, it needs to be pointed out again that the inscription of Piriġme of Lagaš, mentioned above, likewise, associates a ġeš-keše₂-ra₂ with a primary canal (i₇). More importantly, it was found in the same area as the ‘construction énigmatique.’ Notably, this corresponds to the assumed location of the “inlet” (ka) or the head gate of the “canal which goes to Niġen”, which was provided with a ġeš-keše₂-ra₂ by Urukagina. The question whether such ġeš-keše₂-ra₂ could be represented by the ‘construction énigmatique’ will be discussed in the following section.

[16]

In 1929–1932, excavations at Ġirsu/Tello unearthed the remains of a huge structure of baked bricks and bitumen with a length of ca. 40 m, a width of ca. 20 m, and a preserved height of ca. 4 m between the *Tells centraux* and the *Tell de l’Est*.¹²⁵ As the excavators interpreted this structure as either a sanctuary of the ancestry cult, a place of jurisdiction, or a regulator, and its function is still the matter of a long-standing debate, it is often referred to as ‘construction énigmatique.’¹²⁶ As already mentioned, Jacobsen compared the structure with a Sasanian weir at the Naharwan canal near Sharhurwan-al-asfal, interpreted it as a regulator and considered it to be an archaeological instance of the ġeš-keše₂-ra₂ mentioned by Eanatum, Enmetena, and Urukagina (see above [15]).¹²⁷ Barrelet doubted that the ‘construction énigmatique’ could be compared with the Sasanian regulator because of its dimensions. Most importantly, she objected that ‘construction énigmatique’ was constructed on an altitude that excludes an interpretation as a regulator.¹²⁸ Kupper/Sollberger pointed out that the areal of the ‘construction énigmatique’ yielded the inscription of Piriġme of Lagaš which commemorates the building of a ġeš-keše₂-ra₂ (see above [15]) and regarded the ‘construction énigmatique’ as the regulator built by this ruler.¹²⁹ Pemberton, Postgate, and Smyth adopted Jacobsen’s interpretation

123 Maekawa 1992, 212–214, 223 n. 55; 243 no. 92 rev. ii 16; Sallaberger 1993/1994, 58 no. 5 rev. 1–2; 58–59 n. 10. Sauren 1966, 51–52 takes keše₂-ra₂ in Ur III administrative texts as an orthographic variant of ġeš-keše₂-ra₂, but in fact this term almost always occurs as ma₂-la₂ keše₂-ra₂, which refers to the plaiting of reeds into a raft, see Civil 1994, 139 n. 50 and Steinkeller 2001, 33 n. 21.

124 Laurito and Pers 2002, 280, 288.

125 See the archaeological documentation in Parrot 1948, 211–219; Barrelet 1965, 112–115; Margueron

2005, 67–81; Huh 2008, 206–214, and the photographs in Parrot 1948, 213; Planche XXIVb; Postgate 1992, 177 fig. 9. 2; Margueron 2005, 71–73, 89; Rey 2016, 32.

126 See the summary of earlier interpretations in Barrelet 1965; Margueron 2005, 65–67; Huh 2008, 214.

127 Jacobsen 1960, 182.

128 Barrelet 1965.

129 Kupper and Sollberger 1971, 119. On the find-spot of this inscription see Parrot 1948, 108 n. 39; Barrelet 1965, 108, 114; Huh 2008, 210, 213.

as a regulator, but added that the use of bitumen and baked bricks corresponds with the description of *ĝeš-keše₂-ra₂* in ED IIIb/Presargonic inscriptions (see above [15]), though they estimated the amount of bricks used for the ‘construction énigmatique’ at approximately 68 500 and, thus, considered it to be a smaller cousin of the ED IIIb/Presargonic *ĝeš-keše₂-ra₂*. Referring to modern regulators from Yemen, they assumed that the regulator operated by means of a movable barrier of wood, pointing out that according to the excavators a “cavité profonde était visible, ou l’on reconnaît volontiers un point précis d’attache pour une poutre du toit.”¹³⁰ Dight subscribed to this interpretation.¹³¹ Recently, Margueron published a thorough review of the archaeological data and earlier proposals. Most importantly, he demonstrated that the ‘construction énigmatique’ was erected at a much lower altitude than Barrelet had assumed. Moreover, he interpreted the thalweg between the central and eastern tells as the course of an ancient canal and regarded the use of bitumen in the ‘construction énigmatique’ as a clear indication of a waterway. However, Margueron argued that the remains of the ‘construction énigmatique’ show no traces of a beam slot used to fix a movable gate or barrage. As he, in addition, doubted that a regulator would be located within the city, he proposed a reconstruction of the ‘construction énigmatique’ as a bridge gapping a canal.¹³² This was subsequently accepted by Rey.¹³³

The interpretation of the ‘construction énigmatique’ is, thus, still a matter of debate. Though, a regulator is by no means excluded. On the one hand, Margueron demonstrated that the altitude of the structure did not exclude a regulator, and, on the other hand recent survey and geodata identified the thalweg between the *Tell de l’Est* and the *Tells centraux* as the course of an ancient canal, possibly to be identified with a section of the “canal which goes to Niĝen.” Moreover, the cuneiform evidence outlined above (see above [14]) demonstrates that the inlet or even the head gate of the “canal which goes to Niĝen” is expected in the same area as the ‘construction énigmatique’. In addition to this, the fact that both ED IIIb/Presargonic *ĝeš-keše₂-ra₂* and modern regulators from Iraq were built of baked bricks and bitumen could likewise indicate that the ‘construction énigmatique’ was a regulator. The fact that these are also used as bridges gapping canals could harmonize these data with Margueron’s proposal to interpret the structure as a bridge.¹³⁴

130 Pemberton, Postgate, and Smyth 1988, 218–221, with a reference to Parrot 1948, 216.

131 Dight 2002.

132 Margueron 2005.

133 Rey 2016, 32–33.

134 Rost and Abdulamir 2011, 211, 216.

[17]

It is generally agreed that the Sumerian designation for secondary canals and canals of lower rank is pa_5 , corresponding to Akkadian *atappu*, *palgu*, and *pattu*.¹³⁵ A notable exception to this interpretation was made by Jacobsen; he assumed that “ pa_5 often run along the top of artificial dykes (e[g_2]) to preserve desirable elevation?”¹³⁶

The pa_5 canals are attested first in the ED IIIa/Fara period (2575–2475 BC) copies of *Word List C*, where the sign pa_5 interchanges with the more archaic writing A (see above [6]). The sign pa_5 in its typical shape is a compound consisting of the sign E or eg_2 in which the sign PAP or pa_4 is inscribed (E × PAP). Two explanations have been suggested. Assuming that the denomination of a canal as pa_5 is not determined by its size, but “on the condition that canals of the same rank run parallel and cross or join each other”, Maeda analyzes pa_5 as a compound of E and PAP, i.e. “canal + cross”.¹³⁷ Steinkeller, in contrast, considered pa_5 to be a compound of eg_2 , which he interpreted as a pictograph of “the cross-section of two parallel ridges or levees, separated by a raised water channel” or “a broad earthen wall which accommodated a ditch or small canal running along its top”, and pa_4 , which he considered to represent “a profile of a ditch”.¹³⁸ This implies the existence of a more developed irrigation network. The pictographic value of these signs, however, is a matter of debate (see below [18]). ED IIIa/Fara period copies of *Word List C*, however, more often testify to the disjunct graphic variant PAP.E, instead of a compound E × PAP (see above [6]),¹³⁹ which is still used in an inscription of Urnašē.

The pa_5 are attested in ED IIIb/Presargonic royal inscriptions and administrative texts from Lagaš. Their distribution supports the interpretation of ‘secondary canal’. In the royal inscriptions, only four references to pa_5 are found, mostly in hydronyms.¹⁴⁰ Two are included in the name of the Pasaman or Pasamankas₄.DU canal, which is discussed above and denotes a primary canal, despite its name (see above [13]). The Paku canal (pa_5 -ku₃), a waterway mentioned by Enmetena, is said to be adjoined by fields (aša₅ abbar niĝen^{ki}-ka pa_5 -ku₃-ge us₂-sa, FAOS 5/1 Ent. 1 = RIM E1.9.5.17 v 3–4). In a historical inscription that reports the “water war” between Lagaš and Umma, Eanatum of Lagaš obliges the enemy ruler on oath not to invade Lagašite territory and not to alter “its dikes and ditches” (eg_2 pa_5 -be₂, FAOS 5/1 Ean. 1 = RIM E1.9.3.1 xvi 30 *et passim*). This provides the earliest attestation for the binominal expression eg_2 pa_5 “dike (and) canal”. It is also found in the ED IIIb/Presargonic personal name lugal- eg_2 - pa_5 -mah₃ (DP

135 Stol 1976–1980, 356; Maeda 1984, 39, 46; Hruška 1988, 61, 63, 65; Steinkeller 1988, 73; Civil 1994, 109–112. Hruška 1988, 65, assumes that pa_5 canals were also used for shipping traffic, but the sources he quotes do not support this assumption.

136 Jacobsen 1982, 62.

137 Maeda 1984, 46.

138 Steinkeller 1988, 73.

139 Civil 2013, 42.

140 Behrens and Steible 1983, 274, 423–424; Laurito and Pers 2002, 276–277, 282.

612 obv. iii 1), which clearly refers to the king's function as provider of the irrigation network,¹⁴¹ but is more amply attested in later sources and thought to refer to the whole of the irrigation network.¹⁴²

Surprisingly, only two, maybe three of fifty-seven administrative texts pertaining to irrigation mention pa₅ canals, providing four or five references in total (DP 648 obv. i 3, obv. ii 2; VS 27, 23 obv. iii 2–3; VS 27, 36 obv. ii 1). Attestations are also found in place names and hydronyms, such as pa₅ absu “pa₅ canal of Absu”, mentioned in a survey of waterworks at the u₃ of the Imaḥ canal at the Daterabbar field (VS 27, 36 obv. ii 1), and the toponyms pa₅-enku, pa₅-sir₂^(ki)-ra, and pa₅-še-muš which derive from waterways.¹⁴³ The most instructive references are found in an administrative text that mentions three waterways with lengths of 60 m, 360 m, and 870 m, respectively, states that “these are pa₅ canals of the Urindua field” (pa₅ aša₅ urin-du₃-a-kam, DP 648 obv. ii 2), and records their “hoeing” by the chief administrator of the Babu temple (en-ig-gal nu-banda₃ al bi₂-du₃ 4., DP 648 rev. i 1–3). This indicates that pa₅ canals were situated alongside fields. Notably, the shorter waterways with lengths of 60 m and 360 m are referred to as “straight i₇ canal” and “i₇ canal at its side”, respectively, but subsumed under the rubric “large pa₅ canals” (1,00 NIĜ₂.DU i₇ si-sa₂ 10 NIĜ₂.DU i₇ da-ba pa₅ gu-la-am₆, DP 648 obv. i 1–3). The longest waterway, on the contrary, is referred to as “pa₅ canal at the side of the wall” with a length of 870 m (2,20 NIĜ₂.DU ½ eše₂ pa₅ da bad₃-ka ġal₂-la-am₆, DP 648 obv. ii 1). Normally, i₇ denotes “primary canals”, but this apparent terminological deviation could easily be explained by the assumption that i₇ is used here in its generic meaning “canal (*par excellence*)” (see above [13] for a different proposal). The fact that an administrative text refers to an “i₇ canal of the Urindua field” (i₇ aša₅ urin-du₃-a, DP 646 rev. i 1–3), which is possibly the same as the “pa₅ canal of the Urindua field” (pa₅ aša₅ urin-du₃-a-kam, DP 648 obv. ii 2) could support this assumption.

In connection to this, a survey of “dikes at the Urindua field” (eg₂ aša₅ urin-du₃-a, DP 641 rev. v 5) deserves mentioning. It refers to a stretch of dike “from the wall of the temple of the goddess Babu to the temple of the goddess Našše, the tamarisk garden is its border” with a length of 840 m (bad₃ e₂-mi₂-ta e₂ d^{našše}-[še₃] 2,20 NIĜ₂.DU [eg₂ nu]-ke₃-dam ġešš^{en}eg sar-ra za₃-be₂, DP 641 obv. i 1–4) and goes on with the measurement of a stretch of dike extending “from the tamarisk garden to the temple of the goddess Nanše” of 390 m (ġešš^{en}eg sar-ra-ta e₂ d^{našše}-še₃ 1,00 NIĜ₂.DU ½ eše₂ eg₂ ke₃-dam, DP 641 obv. i 5–ii 2). Their combined length of 840 m + 390 m matches the total length of the aforementioned “straight i₇ canal” and “pa₅ canal at the side of the wall” with 870 m + 360 m, respectively. In consequence, the “pa₅ canal at the side of the wall” and the

141 On this name, see Foxvog 2011, 83; Andersson 2012, 132, 322.

143 See the references in Edzard, Farber, and Sollberger 1977, 135–137.

142 Foxvog 1986, 65; Civil 1994, 112.

“straight i_7 canal” hoed by the chief administrator of the temple of the goddess Babu (DP 648) correspond to the dikes extending “from the wall of the temple of the goddess Babu to the temple of the goddess Nanše” and those “from the tamarisk garden to the temple of the goddess Nanše” in the survey of dikes at the Urindua field (DP 641).¹⁴⁴ This means that the former text mentions the pa_5 canals themselves, whereas the latter refers to their “dikes” or “embankments” (eg_2) instead. As these are the most frequently-attested elements of the irrigation network in ED IIIb/Presargonic administrative texts from Lagaš, on the one hand, and are most often associated with fields, on the other (see below [18]), it is highly probable that many attestations of such “dikes” (eg_2) in fact refer to those of the pa_5 canals that irrigated fields. This assumption is confirmed by a survey of “dikes of the Daterabbar field” (eg_2 $a\check{s}a_5$ $da-ter-abbar^{ki}$ - $ka-kam$, VS 27, 23 rev. ii 4). It refers to two “(stretches of) dikes which will not be made” (eg_2 $nu-ke_3$ - dam , VS 27, 23 rev. i 2) that extend on a length of 600 and 540 m, respectively, and are said to lie alongside the $MURGU_2$ - pa_5 . Though its meaning is unclear, $MURGU_2$ - pa_5 apparently refers to a sort or a part of a pa_5 canal (1,40 $ni\hat{g}_2$.DU eg_2 $MURGU_2$ pa_5 - da nu_2 - a za_3 - be_2 1,30 $ni\hat{g}_2$.DU $MURGU_2$ pa_5 - $danu_2$ - $a-ta$ i_7 d $en-lil_x(E_2)$ - pa_3 za_3 - be_2 , VS 27, 23 obv. iii 1–rev. i 1). This assumption, likewise, agrees with the suggestion that pa_5 often run along the top of dikes (eg_2), is probably also supported by the close association of pa_5 and eg_2 in the binominal expression eg_2 pa_5 - $(-be_2)$ “dikes (and) ditches”, and is finally matched by the fact that fields are often associated with eg_2 (see below [18]). The last reference to pa_5 canals in the irrigation texts is found in a survey. It mentions a “ pa_5 canal of Abzu” (pa_5 $abzu$) and a “distributor of (the) Abzu (canal)” (kab_2 - tar $abzu$) (VS 27, 36 obv. i 3–ii 1). This indicates that pa_5 canals irrigated fields and most likely means that “distributors” (kab_2 - tar) regulated the water flow from the pa_5 canal to the furrows (see below [20]).¹⁴⁵ Administrative texts dealing with fields and orchards corroborate this conclusion. An allocation of subsistence fields ($a\check{s}a_5$ $\check{s}uku$) to temple dependents demonstrates that pa_5 canals were situated “at their side” ($a\check{s}a_5$ $ni\hat{g}_2$ - e_{11} - $\check{s}e_3$ $\hat{g}al_2$ - la pa_5 za_3 - be_2 , DP 607 obv. ii 3–4). Though further references in the ED IIIb/Presargonic texts from Lagaš are lacking, an ED IIIb/Presargonic legal document from the city Isin documenting sales of land mentions several fields that were located at pa_5 canals.¹⁴⁶ An account of timber from the “orchard of the goddess Babu” ($kiri_6$ d $ba-bu_{11}$) demonstrates that the woodlands of the temple, likewise, were irrigated by pa_5 canals and mentions, for example, that “the 3rd pa_5 canal” of an orchard “is located along the side of the bank of the (primary) canal” (pa_5 $3c$ - kam - ma - am_6 a_2 gu_2 i_7 - ka - $\check{s}e_3$ e - $\hat{g}al_2$, DP 419 obv. ii 1–2, see also DP 419 obv. i 3, 7,

144 Maeda 1984, 40–41, 46.

145 Maeda 1984, 45.

146 Wilcke 1996, 47–73 obv. 1–4, iii 3–5, etc.

ii 5, iii 2, 5, iv 2, rev. i 1, 5; DP 424 obv. i 3, ii 3, 5, rev. i 1, ii 4, ii 6, iii 2).¹⁴⁷ Another timber account refers to “tamarisks at the dikes of the Dakišeg field, which were counted where they grew” (^ḡēš^ššeneg eg₂ aša₅ da-kišeg₂-ka ki mu₂-a ba-šid-da, VS 27, 79 rev. i 1–2), and even mentions a near-by “distributor” (kab₂-tar) (kab₂-tar ur-^dnašše-na-silim-ma-ta eg₂ aša₅ ^dinnana-ka za₃-be₂, VS 27, 79 obv. iv 1–2).¹⁴⁸ The pa₅ canals irrigating orchards on top of the riverine levees would be expected to flow normal to the primary canal from which they drew their water,¹⁴⁹ as indicated by a Classic Sargonic or Post Sargonic/Late Akkadian map from Ġirsu (RTC 258). This is also true for orchards with vegetables (DP 387 obv. i 3, rev. i 2). Occasionally, “dikes” in gardens (eg₂ du₃-a kiri₆, eg₂ kiri₆ du₃-a) are mentioned (DP 655 obv. i 1–2, rev. ii 1; VS 14, 100 = AWL 1 obv. i 1–2, ii 5–6, see below [18]). Most likely, these refer to the embankments that accompanied the respective pa₅ canals. A section of such a pa₅ canal is possibly described in a document that records the survey and acceptance of “work at the Daterabbar field” (kiġ₂ aša₅ da-ter-abbar^{ki}-ka-kam, DP 654 rev. iii 1), which is discussed later (see below [20]).

To sum up, the term pa₅ is attested almost exclusively in administrative texts from the temple of Babu and designates “secondary canals.” These were fed by “primary canals” (i₇) and irrigated the fields and orchards of the temple that were situated along these waterways. The fact that the administrative texts include only very few references to pa₅ is conditioned by the fact that eg₂ often refer to the “dikes” or “embankments” that accompanied the secondary canals, in perfect agreement with the interpretation of eg₂ as “dike”, “embankment” proposed in the next section.

[18]

The most frequent term in the ED IIIb/Presargonic texts from Lagaš is e or eg₂, which corresponds to Akkadian *ikum*.¹⁵⁰ The earliest attestations are found in an Early Dynastic I/II administrative text from Ur that mentions a field located at an eg₂ and a list of “men who work at the eg₂” from Fara/Šuruppag dating from the subsequent Early Dynastic IIIa/Fara period (see above [5]). Copies of *Word List C*, datable to the same period, mention eg₂ along with other terms pertaining to the irrigation network (see above [6]). However, the meaning of eg₂ is debated. Thureau-Dangin referred to lexical lists which equate eg₂ si-ga with Akkadian *i-ku iš-pu-uk* and descriptions in terms of height and concluded that eg₂ means “levée de terre”.¹⁵¹ Edzard noted that Old Babylonian date formula

147 Civil 1994, 113. Note that RTC 151, a Sargonic period map depicting various canals, mentions a “(primary) canal” (i₇) by the name of ter-sikil “pure forest”, which might derive from a near-by forest, see Selz 2011, 214 n. 6.

148 Selz 2011, 222–224.

149 Wilkinson 2003, 92.

150 For the reading eg₂ instead of e see Civil 1994, 136 n. 2. Bauer 2009, 256, points to an interchange of eg₂ and a in eg₂ zi-^{du} and a zi-^{du}, respectively.

151 Thureau-Dangin 1932, 23–25.

refer to the construction of the Anepada canal, observed that eg_2 – $si.g$ correlates with i_7 – $ba-al$ “to dig a canal”; concluded that $si.g$ means “dredge” and that both date formula refer to successive stages in the construction.¹⁵² This interpretation was accepted by Sauren, who reviewed Ur III administrative texts and suggested that eg_2 has three meanings. Based on Edzard, he assumed that eg_2 meant a canal in an earlier stage than i_7 . In addition, he proposed that eg_2 denotes both a small canal, as well as a dike that accommodates a canal.¹⁵³ The latter interpretations were subsequently adopted by Salonen.¹⁵⁴ Most scholars accepted that eg_2 denotes a “ditch”, and Stol, resuming Edzard’s proposal $si.g$ = “dredge”, even stated “prinzipiell hieß jeder Kanal, der ein Feld umgab, ob klein oder groß, $e[g_2]$ (*ikum*).”¹⁵⁵ Jacobsen proposed a different solution. Interpreting pa_3 as a designation for “branch canals and feeders”, he assumed that these “run along the top of artificial dykes ($e[g_2]$) to preserve desirable elevation” and thus associated eg_2 with dikes, levées or bunds.¹⁵⁶ Foxvog independently pointed out that $saḥar$ – $si.g$ “to fill earth (upon/into) apparently refers to the raising up of an earthen levee, whether a dam or dike, or the walls of an irrigation ditch” and regarded pa_3 “as the proper ditch and eg_2 as its retaining wall.”¹⁵⁷ Based on Jacobsen and Foxvog, Steinkeller elaborated this proposal. He interpreted the sign E or eg_2 as a depiction of “the cross-section of two parallel ridges or levees, separated by a raised water channel” or “a broad earthen wall which accommodated a ditch or small canal running along its top”. In addition to this, he pointed out that eg_2 are never attested with verbs for “digging” or “dredging” (dun , $ba-al$), but with terms for “erecting, raising” (du_3), “piling up” ($si.g$), and “making” (AK) and described in terms of height ($sukud$), while id_2 have a “depth” (bur_3). Thus, he concluded that “what the eg amounted to, therefore, was two parallel ridges or levées, separated by a raised water channel” and referred to modern Iraqi *fāriq* and *umud* for comparison, argued that eg_2 never refers to a water channel and translated it as “dike” for convenience.¹⁵⁸ Pemberton, Postgate, and Smyth, in contrast, suggested the more neutral translation “bund”. First, they pointed out that later lexical lists mention “canal bunds”, “field bunds”, and “boundary bunds” ($eg_2 i_7-da = (iku) na-a-ru$, $eg_2 a-ša_3-ga = (iku) eq-li$, $eg_2 us_2-sa-du = (iku) i-te-e$). Thus, they saw no reason to associate the eg_2 mentioned in cuneiform texts with canals, and so interpreted eg_2 “as walls to contain and direct the flow of water”. Though they agreed with Jacobsen and Steinkeller in interpreting E or eg_2 as a depiction of a canal with banks each side, they considered the meanings “canal”, “canal-between-bunds”, and “bund” likewise possible. But as an Old Babylonian inscription of Rimsin of Larsa refers to a canal with “its two banks like mountain” ($eg_2 2-a-be_2$

152 Edzard 1957, 112 n. 567.

153 Sauren 1966, 40–42.

154 Salonen 1968, 216.

155 Nissen 1976, 25; Stol 1976–1980, 356; Maeda 1984,

39–42; Hruška 1988, 61, 65; Renger 1990, 32–33.

156 Jacobsen 1982, 62.

157 Foxvog 1986, 65.

158 Steinkeller 1988, 73–74.

hur-saĝ-gen₇), they concluded that each of the two ridges of a canal was a single eg₂ and referred to the binominal expression eg₂ pa₅ “bunds and canals” as a support. Finally, Pemberton, Postgate, and Smyth emphasized that this reinterpretation has significant implications. On the one hand, the long-running border dispute between Lagaš and Umma would have been fought for a border bund (eg₂) instead of a canal. On the other hand, the assumption that fields were usually surrounded by bunds would imply that basin irrigation was normal.¹⁵⁹ Similarly, Waetzoldt translated eg₂ as “Damm; Deich; Graben mit Dämmen” and “breiterer Wassergraben”, pointing out that only contextual data allows for a differentiation between dikes that accompanied waterways or canals on both sides, flood dikes and dikes which accommodated a canal, or the waterway itself.¹⁶⁰ Based on lexical, literary, and administrative texts mostly from the Ur III period, Civil provided a thorough review of prevalent interpretations. He pointed out that si.g does not mean “to dredge”, but “to pile up” and concluded that the abovementioned interpretations as “ditch”, “small canal”, and the like have no basis. As eg₂ and pa₅ are associated with si.g = *šapākum* “to pile up” and ba-al = *herūm* “to dig”, he argued that eg₂ refers to “embankments”. In support of this conclusion, he interpreted the binominal expression eg₂ pa₅ “levees and irrigation ditches” as a designation for the whole hydraulic system, which stands for the whole range of terms designating artificial watercourses, though admitting that textual sources referring to the “two sides” of a canal (a₂ 2-a-be₂) indicate that only one of the two embankments of a ditch is referred to. As corroboration, Civil discussed different types of work undertaken at eg₂ structures, such as “erecting” (du₃), “piling up” (si.g), or reinforcing of levees or banks with vegetable matter, such as reeds, rushes, and sand (u₂-saĝ₁₁).¹⁶¹ Based on a unique ED IIIb/Presargonic document that describes eg₂ in terms of “its two banks” (gu₂ 2c-be₂), Steinkeller translated eg₂ as “a small canal” and considered his previous interpretation as ascertained.¹⁶² Most recently, Monaco commented on the shape of the archaic correspondents of eg₂. He assumed that “[t]he sign, in its basic shape (E_a), most probably is a pictographic representation of a dyke with two branches attached, as streams of water flowing out of it, to form ditches or channels for irrigation purposes”, emphasizing that “the sign developed from the original four branches shape (Uruk IV) [ca. 3300–3000 BC] to the two branches shape (Uruk III/ED I and later periods) [ca. 3000–2700 BC], with an intermediate three branches shape.”¹⁶³

Whether the sign E or eg₂ depicts the profil of a dike with a channel on its top or a canal with ditches, thus, remains unclear, especially when taking into account that the earliest attestations for eg₂ “dike”, “embankment” are attested in an ED I/II administrative

159 Pemberton, Postgate, and Smyth 1988, 212–217.

160 Waetzoldt 1990, 1–3, 16–17.

161 Civil 1994, 109–140.

162 Steinkeller 1999, 543.

163 Monaco 2014, 280.

text from Ur (ca. 2700 BC) and ED IIIa/Fara period (2575–2475 BC) copies of *Word List C* (see above [5]–[6]). A review of ED IIIb/Presargonic textual references, however, demonstrates that *eg*₂ almost always refers to a “dike” or “embankment”.

Royal inscriptions, in contrast, include only two or three attestations that relate *eg*₂’s with major canals and their branch-offs, such as the inscriptions of Enmetena that report the extension of the *eg*₂ of the Imah₃ canal (FAOS 5/1 Ent. 41 = E1.9.5.2); these rather refer to earthen embankments piled up to serve as border demarcations (*e*₂-*an*-*tum*₂ *ens*₂ *lagas*_x(*NU*₁₁.*BUR*)^{la.ki} *pa*-*bil*₃-*ga* *en*-*mete*-*na* *ens*₂ *lagas*_x(*NU*₁₁.*BUR*)^{la.ki}-*ke*₄ *en*-*a*₂-*kal*-*le* *ens*₂ *umma*^{ki}-*da* *ki* *e*-*da*-*sur* *eg*₂-*be*₂ *i*₇ *nun*-*ta* *gu*₂-*eden*-*na*-*še*₃ *eb*₂-*ta*-*ni*-*e*₃ (...) *eg*₂-*ba* *na*-*ru*₂-*a* *e*-*me*-*sar*-*sar* *na*-*ru*₂-*a* *me*-*SILIM*-*ma* *ki*-*be*₂ *bi*₂-*gi*₄ *eden* *umma*^{ki}-*še*₃ *nu*-*dib*, FAOS 5/1 Ent. 28/29 = RIM E1.9.5.1 i 32–ii 10/ii 1–27).¹⁶⁴ Urnāšē reports the “digging” (*dun*) of several primary canals (*i*_x) as well as a waterway by the name of *eg*₂-*ter*-*sig*, which is clearly identified as a canal by the verb *dun* “to dig” (*eg*₂-*ter*-*sig* *mu*-*dun*, FAOS 5/1 Urn. 26 = RIM E1.9.1.9 iv 1–2, see above [13]). The fact that it bears a proper name suggests a primary canal, but this is a notable exception. Instead, royal inscriptions mention *eg*₂ that were “erected” (*du*₃), such as the *eg*₂ *da*-*ša*₂ (*eg*₂ *da*-*ša*₂ *mar*-*du*₂ *mu*-*du*₃, FAOS 5/1 Urn. 40 = RIM E1.9.1.31 ii 1–3), which is known as the “dike of the Dasal field” from later archival records (*ki*₂ aka *eg*₂ *da*-*ša*₂-*ka*-*kam*, DP 636 rev. ii 1; on the field cf. Nik. 1, 80 = AWEL 80 obv. i 3; VS 14, 85 = AWL 12 rev. i 2; VS 14, 167 = AWL 15 obv. ii 3), or “made” (*AK*), such as the “exalted border dike/embankment of Ninġirsu” (*eg*₂ *ma*₃ ^d*nin*-*ġir*₂-*su*-*ka*, FAOS 5/1 Ent. 41 = RIM E1.9.5.2 v 1–4). Others rather seem to refer to embankments piled up to demarcate the border between Lagaš and its northwestern neighbor Umma, such as “the border embankments of Ninġirsu and the border embankments of Našše” (*eg*₂ *ki*-*sur*-*ra* ^d*nin*-*ġir*₂-*su*-*ka* *eg*₂ *ki*-*sur*-*ra* ^d*našše*). This is obviously indicated by an inscription of Eanatum obligating the ruler of Umma not to transgress “its *eg*₂ and *pa*₅ canals” (*eg*₂ *pa*₅-*be*₂, FAOS 5/1 Ean. 1 = RIM E1.9.3.1 obv. xvi 25–31 *et passim*), which supports the assumption that *eg*₂ almost exclusively denotes dikes or embankments (cf. FAOS 5/1 Ean. 1 = RIM E1.9.3.1 rev. v 12–13, 37–38; En. I 29 = RIM E1.9.4.2 viii 2–4; Ent. 28/29 = RIM E1.9.5.1 iii 2–4/iii 28–30, vi 9–20/vi 21–32). However, Enmetena reports that the rulers of Umma “had the water go out” (*a*-*e* *i*₃-*mi*-*e*₃) the border embankments of Ninġirsu and the border embankments of Našše (*ur*-*LUM*-*ma* *ens*₂ *umma*^{ki}-*ke*₄ *eg*₂ *ki*-*sur*-*ra* ^d*nin*-*ġir*₂-*su*-*ka* *eg*₂ *ki*-*sur*-*ra* ^d*našše* *a*-*e* *i*₃-*mi*-*e*₃, FAOS 5/1 Ent. 28/29 = RIM E1.9.5.1 ii 28–35/iii 12–19; cf. iii 34/iv 24–iv 10/iv 38).¹⁶⁵ This supports the assumption that *eg*₂ occasionally also denotes “a small canal” referred

164 Behrens and Steible 1983, 95; Steiner 1986, 220, 222–223; Pemberton, Postgate, and Smyth 1988, 212, 214, 216; Laurito and Pers 2002, 276–285.

165 On this much-debated passage, cf. Ceccarelli 2015; Keetman 2015.

to above, as indicated by a ED IIIa/Fara period incantation (SF 54 = BFE 6, see above [5]).

While royal inscriptions hardly contain a handful of references, thirty-nine of fifty-seven administrative texts, corresponding to 68.5% of the total, refer to *eg₂*, providing 100 attestations in total (DP 614 rev. i 1; DP 615 rev. ii 1; DP 616 obv. i 1, rev. ii 1; DP 617 obv. i 1, rev. iii 1; DP 622 obv. v 8, rev. iii 2, iv 2, iv 3; DP 623 obv. iii 7, 9, v 4, rev. i 2, v 2; DP 624 rev. i 1; DP 625 rev. ii 2; DP 626 obv. i 1, rev. i 1; DP 627 obv. i 1, rev. i 1; DP 630 obv. i 1, iv 4, rev. i 6, ii 1, 2; DP 634 rev. iii 3; DP 636 rev. ii 1; DP 638 rev. ii 2; DP 639 obv. i 1; DP 641 obv. i 3, ii 1, 4, 6, rev. iii 1, 5, 9, iv 1, 2, v 2, 3, 5; DP 642 obv. i 1, 2, ii 1, 3, rev. i 2, 3, ii 4; DP 645 obv. ii 7; DP 652 rev. i 2; DP 653 rev. ii 1; DP 654 rev. i 2; DP 655 obv. i 1, rev. i 1; DP 656 obv. i 1; DP 657 obv. i 1, rev. ii 1; TSA 24 rev. i 3; VS 14, 100 = AWL 1 rev. i 1; VS 14, 130 = AWL 2 obv. i 1, 2, ii 2, 3, iii 1, rev. i 1, ii 1, iii 1; VS 25, 74 rev. v 2; VS 25, 77 obv. i 2, rev. i 2; VS 25, 83 obv. i 1, rev. ii 1; VS 25, 84 rev. iii 1; VS 25, 86 rev. iii 2; VS 25, 97 obv. i 5, ii 3, iv 1, rev. i 1, 3, ii 2, 4, iii 2, 4, iv 2; VS 25, 100 rev. iii 1, 3, iv 2; VS 25, 103 obv. i 2, rev. ii 1; VS 25, 105 rev. ii 2; VS 27, 23 obv. i 1, 2, ii 3, iii 2, rev. i 2, ii 2, 3, 4, iii 3; VS 27, 96 rev. iii 2). Thus, *eg₂* is the most frequently-mentioned irrigational term. The observation that most Ur III text pertaining to irrigation testify to the construction and maintenance of dikes or embankments likewise applies to the ED IIIb/Presargonic texts from Lagaš.¹⁶⁶

As the precise meaning of *eg₂* is controversial, the most important physical characteristics will be addressed first. Most references to *eg₂* are found in survey texts and work assignments that describe *eg₂* in terms of their length, such as “from the *durun_x* of the *Imaḥ* (canal): 20 rods. This is (a section of) dike not to be done (*durun_x i₇-maḥ-ta 20 niĝ₂.DU eg₂ nu-ke₃-dam*, VS 14, 130 = AWL 2 obv. i 1–2), “total: 70 rods (is the section of) dike of the *ušgal* field” (*šū-niĝen₂ 1,10 niĝ₂.DU eg₂ aša₅ uš-gal-kam*, DP 622 obv. v 7–8), and the like. A handful of references, however, include more detailed data and support the meaning of “dike” or “embankment”. Occasionally, dikes are summarized as “dikes, among them small and large ones” (*eg₂ tur maḥ-ba*, VS 14, 100 = AWL 1 rev. i 1) or referred to as “small dikes” (*eg₂ tur-tur*, DP 641 rev. iii 5). Such general qualification may perhaps be compared to the “exalted border dikes/embankments” mentioned in an inscription of Enanatum I (*eg₂ maḥ ki sur-ra*, FAOS 5/1 Ent. 41 = RIM E1.9.5.1 ii 4, v 2). The most instructive text is a survey of dikes at fields of the wife of the ruler (*eg₂ aša₅ u₂-rum para₁₀-nam-tar-ra dam lugal-AN-da ensi₂ lagaš_x(NU₁₁.BUR)^{la,ki}-ka*, VS 25, 97 rev. iv 2–6). The first section denotes the lengths of dikes at the *Urindua* field, adding up to 1140 rods ½ rope 1 reed or 6.840 m (*šū-niĝen₂ 20,00 la₂ 1,00 ½ eše '1c' ge niĝ₂.DU eg₂ 'aša₅ urin-du₃-a-kam*, VS 25, 97 obv. iv 4-rev. i 1). Notably, this text also denotes their “height” (*sukud*), and includes notations such as “40 rods [= 240 m] 3 reeds [= 9 m] (is

166 Hunt 1988, 193; Civil 1994, 110, 134.

their length), 2 cubits [= 1 m] is their height, these are (the dikes) at the side of the wall” (VS 25, 97 obv. i 1–2 40 NIĜ₂.DU 3c ge sukud-be₂ kuš₃ 2c da bad₃-kam), “80 rods [= 480 m] (is their length), 2 cubits [= 1 m] is their height, 20 rods [= 120 m] (is their length), 3 cubits [= 1.5 m] is their height, these are the dikes that run from the Imaḥ canal to the erected emblem of the goddess Nanše” (1,20 NIĜ₂.DU sukud-be₂ kuš₃ 2c 20 NIĜ₂.DU sukud-be₂ kuš₃ 3c eg₂ i₇ maḥ-ta urin-du₃-a^d našše-še₃ ḡal₂-la-am₆, VS 25, 97 obv. i 3–ii 1). This indicates that eg₂ denotes “dikes” with a height varying of 1 m, 1.5 m (see above), 2 m (3,40 NIĜ₂.DU 8c ge sukud-be₂ kuš₃ 4c, VS 25, 97 obv. ii 2), and 2.5 m (4,00 NIĜ₂.DU sukud-be₂ kuš₃ 5c, VS 25, 97 obv. ii 4). Another administrative text that records a survey and acceptance of a work quota, likewise, describes kab₂-tar distributors in terms of height and includes notations such as “(its length is) ½ rope, its width is 2 reeds, its height is 3 cubits. (Its length) is 4 reeds, its width is 2 reeds, its height is 1 reed, it is that of the kab₂-tar distributor of Damu” (½ eše₂ 2c ge daḡal-be₂ 2c ge-am₆ sukud-be₂ kuš₃ 3c 4c ge daḡal-be₂ 2c ge sukud-be₂ 1c ge kab₂-tar da-mu-ka-kam, DP 654 obv. i 1–ii 1, cf. also DP 654 obv. ii 3–5, iii 3–5).¹⁶⁷ That these figures denote the length, width and height of “dikes” that constituted kab₂-tar distributors is clear from a work assignment that lists work several quotas on “dikes of the Ašatur (field)” (eg₂ aša₅ tur, DP 639 obv. i 1–ii 5), but subsumes these as “dikes at/of the kab₂-tar distributor of the Ašatur (field) of the Guedena” (kab₂-tar aša₅ tur gu₂-eden-na-ka-kam, DP 639 rev. i 1–2). Similar notations specifying the length (gid₂), width (daḡal), and height (sukud) of eg₂ are also found in Ur III texts that record the construction of dikes and calculate the volume of earthwork moved.¹⁶⁸ Waetzoldt argued that sukud “height” merely denotes vertical extent and could likewise refer to the depth of a “ditch” (eg₂), otherwise referred to as bur₃ “depth”,¹⁶⁹ but indications that this also applies to the ED IIIb/Presargonic texts from Lagaš are lacking. On the contrary, the fact that precisely the same waterways at the Urindua field are referred to as pa₅ in one survey text (DP 648 obv. i 1, ii 1–2), while another reference to the same waterway mentions their eg₂ instead (DP 641 obv. i 1–ii 1), demonstrates that eg₂, here, denotes the “dikes” of the same waterway that was referred to as pa₅ before (see above [17]). This agrees with the assumption that the binominal expression eg₂ pa₅(-be₂) refers to the whole of the irrigation network (see above [17]). Analogous to this, it is likewise possible that eg₂ aša₅ urin-du₃-a refers to the dikes or embankments of i₇ aša₅ urin-du₃-a. In connection with this, it should be noted that Maeda argued for an identification of the i₇ aša₅ urin-du₃-a (DP 646 rev. i 2, see above [13]) with eg₂ aša₅ urin-du₃-a, which he however, likewise, interpreted as a “canal”.¹⁷⁰ This could explain the remarkable lengths of the eg₂ associated with the Urindua field,

167 See the edition in Steinkeller 1988, 79–81.

168 Waetzoldt 1990, 1–4; Civil 1994, 116, 124.

169 Waetzoldt 1990, 1–2, 16–17.

170 Maeda 1984, 43.

which amount to 6.870 m in a single survey text (š_u-niĝ_{en}₂ 20,00 la₂ 1 ½ eše₂ NIĜ₂.DU eg₂ ʾaša₅ urin-du₃-a-kam¹, VS 25, 97 obv. iv 4–rev. i 1, see above [18]).

An assignment of work on “dikes at/of the Ašatur (field) of the Guedena” (eg₂ aša₅ tur gu₂-eden-na-ka) provides additional data on the physical characteristics of eg₂ (VS 25, 100 rev. iv 1). This text records assignments of work to 77 corvée troops, organized in six gangs under as many overseers, with a work quota of 9 m per capita (lu₂ 1-še₃ kiĝ₂ 3c ge-ta, VS 25, 100 obv. i 2–3). Four of six assignments record that “their work ... will be done on its two banks” (kiĝ₂-be₂ ... gu₂ 2c-be₂ ke₃-dam, VS 25, 100 obv. ii 1, 6, iii 3, rev. ii 1). The fact that an eg₂ thus had “two banks” (gu₂ 2c-be₂) corroborates that eg₂ denotes “two parallel ridges or levées, separated by a raised water channel” as suggested by Steinkeller and Pemberton, Postgate, and Smyth,¹⁷¹ or even “a small canal.”¹⁷² In addition, some gangs of corvée troops are assigned a work quota on stretches of dike which are qualified as u₂ a-egir₄-ra nu-tuku, literally “(stretch of dike which) has no brushwood on its *water-back*” (VS 25, 100 rev. i 5–ii 4 6 lu₂ kiĝ₂-be₂ 7c ge 2c-be₂ ke₃-dam 4c ge u₂ a-egir₄-ra nu-tuku lu₂-kur-re₂-bi₂-gi₄, see also obv. i 1–5, iii 2–4, rev. ii 2–4, iii 3–4). The meaning of a-egir₄, “water-back”, and its obvious antonym a-igi, “water-front”, are controversial.

Based on an acceptance by corvée troops (sur_x) of a work quota of 27 and 24 m on the a-egir₄ and a-igi of a durun_x, Maeda translated the above as “water behind” and “water in front”, though without explanation.¹⁷³ Steinkeller translated them as “water at the back (of the reservoir)” and “water at the front (of the reservoir)” and suggested an interpretation of “back (upper) and front (lower) weirs closing the dam (durun_x)” (DP 654 rev. ii 3–5 ½ eše₂ la₂ 1c ge a igi 8c ge a egir₄ durun_x ki-mah).¹⁷⁴ Steinkeller’s interpretation was widely accepted.¹⁷⁵ But as a survey of dikes at the Daterabbar field mentions a-igi and a-egir₄, with a length of 2100 and 180 m, respectively (ʾ6,00¹ la₂ 10 NIĜ₂.DU a-igi 30 NIĜ₂.DU a-egir₄, VS 25, 77 obv. ii 3–4), Steinkeller revised his former proposal in favor of “(water) downstream” and “(water) upstream.”¹⁷⁶ However, since neither proposal appears likely in the context of the description of dikes as a-egir₄-ra nu-tuku, a-igi and a-egir₄ most likely denote the water-side or interior slope and the air-side or exterior slope of the embankment, respectively, with (eg₂) u₂ a-egir₄-ra nu-tuku referring to a “(stretch of dike) which has no brushwood on its air-side/exterior slope.” The planting of slopes with brushwood, as a means of reinforcing embankments against erosion, is well-documented in Ur III administrative texts, though usually written

171 Pemberton, Postgate, and Smyth 1988, 216; Steinkeller 1988, 73; Steinkeller 1999, 543.

172 On this important reference, see Steinkeller 1999, 543.

173 Maeda 1984, 47.

174 Steinkeller 1988, 79–81.

175 Maekawa 1992, 214, 223 n. 52; Dight 2002, 118–119; Bagg 2011–2013, 122; cf. Maeda 1984, 46–47; Bauer 1995, 294.

176 Steinkeller 1999, 543.

differently, as u_2 -saga₁₁.¹⁷⁷ Additional attestations are possibly found in another tablet, that refers to “dikes of the Urindua field” (eg_2 aša₅ urin-du₃-a, DP 641 rev. v 5). This probably reads “60 rods ½ rope [= 390 m] is (the length of a stretch of) dike which is not reinforced with brushwood” (6,00 ½ eše₂ niĜ₂.DU eg_2 u_2 nu-ta₃-ga-am₆, DP 641 rev. v 3). u_2 SA.SA-dam, said of “small dikes” (eg_2 tur-tur) in connection with the acceptance of a work quota, probably also denotes a type of work for which “brushwood” (u_2) was used, but for the lack of parallels this is a guess based on the context (2,00 niĜ₂.DU la₂ 4c ge eg_2 tur-tur-am₆ u_2 SA-SA-dam ru-lugal-ke₄-ne e-dab₃, DP 641 rev. iii 5–8).

A handful of administrative texts demonstrate that eg_2 were susceptible to erosion and, thus, likewise support the interpretation as a “dike” or “embankment”. One text summarizes stretches of dike with a combined length of 100 rods or 600 m, ½ rope 1 reed or 33 m of which were “eaten by the water” (a-e gu₇-a) (1,40 4c ge eg_2 tur-maḥ-ba ½ 1c ge a-e gu₇-a, VS 14, 100 = AWL 1 rev. i 1–2).¹⁷⁸ Clearly, this refers to the erosion of embankments.¹⁷⁹ Though only rarely attested in ED IIIb/Presargonic texts from Lagaš (cf. also VS 27, 23 obv. ii 1 5,00 niĜ₂.DU aša₅ še-da-šU.NIĜEN₂-ta a ¹e₃-a¹ i₃-¹gu₇-gu₇¹ (?)),¹⁸⁰ erosion of embankments is frequently referred to in Ur III administrative texts. The fact that eg_2 “eaten by the water” (a-e gu₇-a) were maintained by heaping up earth again supports the assumption that eg_2 means “dike” or “embankment”.¹⁸¹ Two stretches of dike with a length of 12 m and 9 m, which were part of two “distributors” (kab₂-tar, see below [20]) at the Daterabbar field, were “carried away by the water” (a e-de₆) (4c ge kab₂-tar 1c-am₆ 3c ge kab₂-tar 2c-kam-ma-am₆ <i₇> ^den-lil_x(E₂)-le-pa₃-ta, ¹a e¹-de₆, VS 27, 23 rev. i 3–6). This might refer to more severe damage and could denote that stretches of dike were flushed away.¹⁸²

The abovementioned references clearly demonstrate that eg_2 mostly denotes dikes or embankments. In fact, most texts associate eg_2 with fields. Almost all of these references are found in notations such as eg_2 aša₅ da-ter-abbar^{ki}-ka “dikes of the Daterabbar field” (VS 25, 77 rev. i 2), eg_2 aša₅ gibil-tur “dikes of the Gibiltur field” (DP 614 rev. i 1), and the like (DP 614 rev. i 1; DP 615 rev. ii 1; DP 616 rev. ii 1; DP 617 obv. i 1, rev. iii 1–2; DP 622 obv. v 8, rev. iii 2, iv 2–3; DP 623 obv. iii 7, 9, v 4; DP 625 rev. ii 2; DP 626 obv. i 1, rev. i 1; DP 627 obv. i 1, rev. i 1; DP 630 obv. i 1, iv 1, rev. i 6, ii 1, 2; DP 634 rev. iii 3; DP 636 rev. ii 1; DP 638 rev. ii 2; DP 639 obv. i 1; DP 641 rev. v 5; DP 642 obv. ii 1, 3, rev. i 3, ii 4; DP 645 obv. ii 7 (?); DP 652 rev. i 2; DP 657 obv. i 1, rev. ii 1; TSA 24 rev. i 3; VS 14, 130 = AWL 2 rev. iii 1; VS 25, 74 rev. v 2; VS 25, 77 obv. i 2, rev. i 2; VS 25, 83

177 Waetzoldt 1990, 3; Civil 1994, 70, 121–124; cf. Selz 1996.

178 Lecompte 2012.

179 Bauer 1972, 56; Stol 1976–1980, 358; Civil 1994, 126, 139 n. 39; Wilcke 1999a, 316.

180 Selz 1996, with collation.

181 Wilcke 1999a, 306–320; Wilcke 1999b.

182 Cf. the discussion of references in Ur III administrative text in Salonen 1968, 334, 401; Waetzoldt 1990, 10; Civil 1994, 126, 139 n. 39; Wilcke 1999a, 306–308.

obv. i 1, rev. ii 1; VS 25, 84 rev. iii 1–2; VS 25, 86 rev. iii 2; VS 25, 97 rev. i 1, ii 2, 4, iii 2, 4, iv 2; VS 25, 100 rev. iv 2; VS 25, 103 obv. i 2, rev. ii 1; VS 25, 105 rev. ii 2; VS 27, 23 rev. ii 4, iii 3; VS 27, 96 rev. iii 2). Their lengths are as low as 15 m (VS 25, 84 rev. iii 1–2) or 36 m (DP 639), but lengths of ca. 100 m (DP 616; DP 626), up to 200–300 m or even 600 m (DP 634; DP 638; VS 25, 77; VS 25, 101) are by no means exceptional. While some dikes are only attested once, others are repeatedly referred to and always have almost the same length, such as the “dike of the Garamud field” (eg₂ aša₅ gara₂-mud), which is calculated at 185.5 m or 186 m (š_u-niĝ₂ 30 NIĜ₂.DU 1C ge kuš₃ 3C eg₂ aša₅ gara₂-mud, DP 623 obv. iii 7; š_u-niĝ₂ 30 NIĜ₂.DU 2 ge eg₂ aša₅ gara₂-mud, DP 652 rev. i 1–2; š_u-niĝ₂ 30 NIĜ₂.DU 1C ge kuš₃ 3C eg₂ aša₅ gara₂-mud, VS 25, 86 rev. iii 1–2) or the “dike of the Abbar field (eg₂ aša₅ abbar) with a length of 90–126 m (DP 616; DP 626; DP 627; DP 645; DP 657). It has been suggested that these figures refer to the total length of their respective irrigation ditches,¹⁸³ but definite proof is still lacking. The longest stretch of dike is attested in the above-mentioned survey recording “(stretches of) dike at/of the Urindua field”, with a height varying between 1 m and 2.5 m, and a total length of 1140 rods ½ rope, corresponding to 6870 m (š_u-niĝ₂ 20,00 la₂ 1 ½ eše₂ NIĜ₂.DU eg₂ 1 aša₅ urin-du₃-a-kam¹, VS 25, 97 obv. iv 4-rev. i 1, see above [18]). According to the reconstruction of Marzahn, this figure refers to the total length of dikes that enclosed the Urindua field on three sides, while the fourth side was adjacent to the Imah primary canal.¹⁸⁴ Though mostly denoting “dikes” or “embankments”, eg₂ could, thus, reach enormous lengths. The longest eg₂ is attested for the “dike of the Daterabbar field” (eg₂ aša₅ da-ter-abbar^{ki}); based on several administrative texts recording the maintenance of “dikes” or “embankments” (eg₂), their combined length has been calculated at more than 10 600 m (VS 14, 130 = AWL 2; VS 27, 23; VS 27, 36).¹⁸⁵

In this context, it is also important to recall the abovementioned proposal of Pemberton, Postgate, and Smyth, who assumed that eg₂ denotes “bunds” that enclosed the fields. If fields were regularly placed between bunds, they assume that basin irrigation was the norm in the southern alluvium.¹⁸⁶ It is also important to remember that fields were located on the slopes of riverine levees that extended 2–3 km on both sides of the river or primary canal (see above [2]). Thus, the length of eg₂ recorded in the aforementioned texts would conform with this proposal, which would imply that notations such as eg₂ aša₅ da-ter-abbar^{ki}-ka “dikes of the Daterabbar field” (VS 25, 77 rev. i 2) would denote “bunds”. However, some observations contradict rather than support this proposal. First, it has already been mentioned (see above [17], [18]) that there is one clear example where eg₂ denotes the “dikes” or “embankments” that enclosed a pa₅ waterway instead

183 Maeda 1984, 41–42.

184 Marzahn 1989, (2) 47; see also Hruška 1991, 209; Selz 1996, 667.

185 Maeda 1984, 41; see also Hruška 1991, 209 and Selz 1996, 678.

186 Pemberton, Postgate, and Smyth 1988, 216.

of bunds. This interpretation corresponds to the binominal expression $eg_2 pa_5(-be_2)$, “dikes (and) canals”. Secondly, two surveys mention “dikes which lie alongside the Nemurgen canal” ($eg_2 i_7 nemur-gen_7-da nu_2-a$, DP 642 rev. i 2; $eg_2 i_7 nemur-da nu_2-a-am_6$, VS 25, 97 obv. ii 3). Thirdly, one of these texts mentions “dikes which are adjacent to the field of Ningirsu” ($eg_2 a_5a_5 dnin-gir_2-su-ka-ke_4 us_2-sa-am_6$, VS 25, 97 rev. ii 2) as well as “dikes which lie alongside the side of the ušgal field” ($eg_2 a_2 a_5a_3 uš-gal-še_3 ghal_2-la-am_6$, VS 25, 97 rev. ii 4, see also rev. iii 2). In addition, the other survey refers to “dikes which lie alongside the Aḡeštin field” (7,10 niĠ₂.DU $eg_2 a_5a_3 a-gheštin-ka-da nu_2-a$, DP 642 obv. ii 2–3). The precise significance of these locations remains to be elucidated, but it seems improbable that notations such as $eg_2 a_5a_3 da-ter-abbar^{ki}-ka$ “dikes of the Daterabbar field” (VS 25, 77 rev. i 2) denote “bunds” enclosing fields for basin irrigation.

Two largely parallel administrative texts provide another argument against a general interpretation as “bund”. These mention stretches of “(assigned/erected) (stretches of) dike of the orchards of the Galamaḥ” (1 ½ e_2e_2 6c ge kiri₆ gala maḥ, VS 14, 100 = AWL 1 obv. i 1–2; 2 e_2e_2 8c ge kuš₃ 4c šu-du₃-a 2c $eg_2 du_3-a kiri_6$ gala-maḥ, DP 655 obv. i 1–2) and other stretches of dike, summarizing them as “dikes, among the large and small ones” (1,40 4c ge tur maḥ-ba, VS 14, 100 = AWL 1 rev. i 1) or “assigned/erected dikes of orchards” (šu-niġen₂ 1,40 ½c e_2e_2 5c ge $eg_2 kiri_6 du_3-a-kam$, DP 655 rev. ii 1; cf. DP 656), in context with damages caused by erosion (20c ½c ge a-e gu₇-a, see above [18]). It is most likely that these refer to the eg_2 of pa_5 canals that served the irrigation of orchards, as argued above (see above [17]).

In addition, dikes are referred to as a part of other elements of the irrigation network. An administrative text records work quotas assigned to individual temple dependents. While the first entry refers to “dikes of the small field” (3c $eg_2 a_5a$ tur, DP 639 obv. i 1), the subscript summarizes them as “(dikes of) the distributor in the small field of Guedena”, thus indicating at the same time that kab_2 -tar distributors basically consisted of eg_2 dikes (šu-niġen₂ ½ e_2e_2 2c ge kab_2 -tar a_5a_3 tur gu₂-eden-na-ka-kam, DP 639 rev. i 1–2). This is confirmed by another survey that summarizes stretches of dike that were part of a kab_2 -tar distributor at the “small field of Guedena” (1 e_2e_2 2c ge kab_2 -tar gu₂ 2c-be₂ ke₃-dam $eg_2 a_5a_3$ tur gu₂-eden₂-na-ka, VS 25, 100 rev. iv 1–2, see above [18], see below [20]). At the same time, these references indicate that kab_2 -tar distributors were situated alongside fields and indicate that they shared embankments with the canals or irrigation ditches (cf. DP 654 obv. i 1-rev. i 1; see below [20]).¹⁸⁷ Finally, it should be highlighted that eg_2 are also mentioned as parts of $durun_x$ ($eg_2 durun_x$ -na-am₆, DP 654 rev. i 2, cf. DP 623 rev. v 2; DP 624 rev. i 1; DP 642 rev. ii 1–2; DP 653 rev. ii 1, see below [21]). This, likewise, supports the meaning being “dike” or “embankment”.

187 Maeda 1984, 44; Steinkeller 1988, 89 n. 23; Civil

1994, 133.

As already mentioned, a large number of references to eg_2 are found in assignments of work, to be performed at “dikes” or “embankments” associated with fields, or their respective acceptance by temple dependents. Often, these texts denote the name and/or the occupation of a person responsible to do irrigation work and include notations such as “1 reed: Malgasu” (1c ma-al-ga-su₃, DP 616 obv. iii 5), “40 rods erected/assigned dike: Damdiġirġu” (40 eg_2 du₃-a niġ₂.DU dam-diġir-ġu₁₀, DP 617 obv. i 1–2). While some entries in fact denote the work quota of single people, others refer to groups of people from certain occupational groups and merely mention their respective overseer by his name. This is evident from some administrative texts that parallel each other, but include varying notations. Two records from the 3rd year of Lugalanda refer to work performed at dikes of the Daterabbar field. While the first records a work assignment of “six reeds: Ġirunkidu, the coachman” (DP 623 obv. ii 2–3 6c ge ġir₂-nun-ki-du₁₀ gab₂-kas₄), the second includes the more detailed notation “six men, their work six reeds, (under) Ġir-nun, the coachman” ([6 lu₂] kiġ₂-be₂ 6c ge ġir₂-nun gab₂-kas₄, VS 25, 86 obv. ii 6–iii 2). Numerous parallels are extant (e.g. DP 653 obv. i 1 1 eše₂ sipa ama šagan_x(GAN)^{ša} and VS 25, 101 obv. i 1–4 4 lu₂ lu₂ 1-še₃ kiġ₂ 5c ge-ta kiġ₂-be₂ 1 eše₂ sipa ama šagan_x(GAN)^{ša}). In the case of the members of the most numerous and most high-ranking corvée troops, the “dependents of the king” (RU-lugal),¹⁸⁸ the texts always mention the number of men in each gang, as well as the per capita work quota, including notations such as “15 men: with three cubits of wok for one man, they took over. Their work (is) seven reed three cubits (under) Uršerda” (15 lu₂ lu₂ 1-še₃ kiġ₂ kuš₃ 3c-ta e-dab₃ kiġ₂-be₂ 7c ge kuš₃ 3c ur-d.še₃šer₇-da, VS 25, 86 obv. i 1–ii 1; cf. TSA 23 obv. iii 5–9; VS 14, 187 = AWL 3 obv. i 1–5). Similar, but mostly abbreviated, notations are, likewise, attested (DP 622 obv. i 1–4; DP 623 obv. i 1–5; DP 625 obv. i 1–4; DP 634 obv. i 1–4; DP 652 obv. i 1–4; TSA 24 obv. i 1–4; VS 25, 84 obv. i 1–4; VS 25, 100 obv. i 1–5; VS 25, 101 obv. i 1–4).¹⁸⁹ Though these texts only record the length of the respective work quotas, but not the volume nor the time-span during which the work would be performed, some observations are possible. The per capita work load for dike work at the ušgal field is computed at 5 reeds or 15 m (DP 622 obv. i 1–4; DP 625 obv. i 1–4; TSA 24 obv. i 1–4). This figure corresponds to the per capita work load attested once for work at the durun_x at the Daterabbar field (VS 25, 101 obv. i 1–4, cf. DP 653 obv. i 1, see below [21]). A work load of 3 reeds or 9 m is attested for dikes at the small field in the Guedena (VS 25, 100 obv. i 1–5), 1 reed 1 cubit or 3.5 m at the Manumanu field (DP 634 obv. i 1–4), 1 reed or 3 m (DP 652 obv. i 1–4) and 3 cubits or 1.5 m, respectively, at the Garamud field (DP 623 obv. i 1–4; VS 25, 86 obv. i 1–ii 1). The lowest figures occur in a text concerning dike work at the Ugeg field, which records a per capita work load of “7 ½ thumbs”; corresponding

188 Schrakamp 2014.

189 Cf. Jagersma 2010, 188.

to a mere $\frac{1}{2}$ span or 12.5 cm (22 lu₂ lu₂ 1-še₃ kiġ₂ šu-si 7c $\frac{1}{2}$ -ta kiġ₂-be₂ kuš₃ 5c zipaġ₂ 1c ses-lu₂-du₁₀, VS 25, 84 obv. i 1-4). Comparably low work quotas are otherwise only attested in assignments of work on “primary canals” (i₇) (see above [13]), but the best parallel is another assignment of dike work at the Ugeg field, which records per capita work quota of 1 cubit or 0.5 m, to be executed on an eg₂ zi-DU, which means some sort of strengthened dike (see below [19]). The remarkably low work quota might indicate that we here, likewise, deal with an assignment of work on a eg₂ zi-DU, and, thus, implies that eg₂ is used here with a more general meaning.

The review of the ED IIIb/Presargonic royal inscriptions and administrative texts from Lagaš confirms that eg₂ basically denotes “two parallel ridges or levées, separated by a raised water channel” or “a broad earthen wall which accommodated a ditch or canal running along its top” and describes “both the ditches and the two ridges of earth”, as suggested by Steinkeller and Pemberton, Postgate, and Smyth.¹⁹⁰ Mostly, it can be translated as “dike” or “embankment”, which can be part of a “secondary canal” (pa₅) or other elements of the irrigation network, such as “distributors” (kab₂-tar), durun_x, and the like. The majority of attestations refers to eg₂ associated with fields. Most likely, these refer to the “dikes” or “embankments” that accommodated the pa₅ canals irrigating the fields on their two banks. A translation, in the sense of “a small canal”, however, can only be applied in very few cases, as an inscription of Enmetena or a ED IIIa/Fara period incantation.

[19]

A designation of a special type of “dike” or “embankment” is eg₂ zi-DU, a rather infrequently attested compound of eg₂ plus zi-DU, though this has recently been questioned.¹⁹¹ A general meaning of “dike” or “embankment” is indicated by the fact that this term only appears in two of fifty-seven Presargonic administrative texts from Lagaš, but not in royal inscriptions. This also applies to the Ur III sources.

The reading and the meaning of eg₂ zi-DU are controversial. Oppenheim, discussing Ur III references, assumed an etymology with zi-da = šaqû “to elevate” and kuġ₂ zi-da “weir”, “barrage” and translated eg₂ zi-DU as “providing canals with weirs”.¹⁹² This was accepted by Sauren and Salonen, who assumed that eg₂ zi-DU denotes “erhöhen” of a dam or dike.¹⁹³ Preferring an etymology with zi.d “to prepare”, Bauer translated it as “Deichverstärkungen”.¹⁹⁴ Maeda pointed out that ED IIIb/Presargonic texts from Lagaš

190 Steinkeller 1988, 73; Steinkeller 1999, 543; Pemberton, Postgate, and Smyth 1988, 216.

191 See Bauer 2009, 256, who refers to the variant a zi-DU in the Ur III administrative text MVN 14, 312

obv. 2.

192 Oppenheim 1948, 40.

193 Sauren 1966, 41; Salonen 1968, 216, 432.

194 Bauer 1972, 67–68, 73.

associate *eg₂ zi-DU* with the toponym *abbar^{ki}*, which derives from *abbar* “marshes” and, therefore, considered “drainage canal”, likewise, possible.¹⁹⁵ Waetzoldt, in contrast, interpreted *eg₂ zi-DU* as “breiter Wassergraben”, pointing out that the volumes of earth moved hardly allow for an interpretation as a “Damm”.¹⁹⁶ Nissen/Damerow/Englund and LaPlaca/Powell preferred the more general translations “Deichaufbau” and “dike”, respectively.¹⁹⁷ Civil also took into account Old Babylonian lexical evidence, according to which *ge zi-DU*, *ge ġeš-keše₂-da*, *ge kuġ-zi-da* correspond to Akkadian *mibru* “weir” or “dam” (Old Babylonian Forerunner *ĤĤ VIII–IX* [MSL 7, 195] 171–173, cf. *ĤĤ IX* [MSL 7, 52] 315–318 *ge kuġ-zi-da = qa-an mi-iĥ-ri*, *ge keše₂-da = qa-an mi-iĥ-ri*, *ge ġeš-keše₂-da = qa-an mi-iĥ-ri*, *ge ġeš-keše₂-da = qa-an er-re-ti*). As ED IIIb/Presargonic and Ur III texts relate *eg₂ zi-DU* with *kab₂-tar* distributors, mention lengths up to 150 m and refer to earth work performed at *eg₂ zi-DU*, he concluded that “*eg₂ zi-DU* is not a simple dam thrown across a canal to divert its waters” and argued that “[i]f it means a dam or barrage, it has to be an embankment closing a relatively wide reservoir”. As suggested by the aforementioned authors, Civil connected the element *zi-DU* with *zi-da* in *kuġ-zi-da*, however, leaving its precise meaning open to question.¹⁹⁸ Selz translated ED IIIb/Presargonic *eg₂ zi-DU* as “Kanal-damm-Barriere”.¹⁹⁹ Most recently, Rost discussed references from Ur III Umma. As *eg₂ zi-DU* consisted of clay and earth and were located alongside the rivers and primary canals, agricultural domains and drainage ponds (*a-ga-am*), she interpreted *eg₂ zi-DU* as “flood dikes”.²⁰⁰

Only two of fifty-seven ED IIIb/Presargonic administrative texts from Lagaš mention *eg₂ zi-DU*.²⁰¹ The first records an assignment of work on “the *eg₂ zi-DU* of the Ugeg field of the temple of the goddess Nintu”, which adds up to a length of 32 m (*š-u-niġen₂ ½ eše₂ kuš₃ 4c kiġ₂ du₃-a eg₂ zi-DU aša₃ u₃-ge₁₇ e₂ dⁿⁱⁿ-dur₁₁-ka*, VS 14, 187 = AWL 3 rev. ii 1–2). This demonstrates that *eg₂ zi-DU* were located at fields and excludes an interpretation as a dam thrown across a canal. The fact that the corvée workers are assigned a per capita work quota of only one cubit or 0.5 m indicates that work on *eg₂ zi-DU* was more labor-intensive than that performed on simple *eg₂* and indicates that *eg₂ zi-DU* were more compact than “simple” *eg₂* (11 *lu₂ lu₂ 1-še₃ kiġ₂ kuš₃ 1c-ta i₃-ši-ti kiġ₂-be₂ 1c ge kuš₃ 5c ur^{d.še₃}šer₇-da*, VS 14, 187 = AWL 3 obv. i 1–5, see above [18]).²⁰² This, in turn, would agree with the interpretation as “barrage embankment” or “flood dike” mentioned above. Assuming that *eg₂* could be used as a generic term referring to several kinds of “dikes” or “embankments”, it could well be true that a work assignment with a

195 Maeda 1984, 39, 42, 50 n. 12.

196 Waetzoldt 1990, 4.

197 Nissen, Damerow, and Englund 1990, 124–125; LaPlaca and Powell 1990, 102.

198 Civil 1994, 129–130. – For some suggestions regarding its etymology see Civil 1994, 139 n. 48.

199 Selz 1996, 671.

200 Rost 2015, 170–176.

201 Bauer 1972, 73; Maeda 1984, 39, 42; Nissen, Damerow, and Englund 1990, 124–125; Civil 1994, 130; Selz 1996, 671.

202 Civil 1994, 130.

comparably low work quota performed on “simple” eg_2 dikes or embankments likewise refers to eg_2 *zi-DU* (VS 25, 84, see above [18]). Another survey text informs that a kab_2 -*tar* distributor was located at an eg_2 *zi-DU* and associates an eg_2 *zi-DU* with the toponym $abbar^{ki}$ (3,30 $NI\hat{G}_2.DU$ kab_2 -*tar-ta* eg_2 *zi-DU* $abbar^{ki}$ $\hat{g}al_2$ -*la*, VS 27, 23 obv. ii 2).²⁰³ Maeda considered the possibility that $abbar^{ki}$ refers to “marshland” and took this as an indication for the meaning “drainage canal”.²⁰⁴ However, eg_2 $abbar^{(ki)}$ -*ra* is also attested as a shorthand writing for eg_2 $a\check{s}a_5$ $abbar^{ki}$ -*ka* “dikes of the Abbar field”, as demonstrated by the interchange of eg_2 $abbar$ -*ra* and the more detailed writing eg_2 $a\check{s}a_5$ $abbar^{(ki)}$ -*ka* (DP 616 obv. i 1, rev. ii 1; DP 627 obv. i 1, rev. i 1; cf. DP 645 obv. ii 7).²⁰⁵ eg_2 *zi-DU* $abbar^{ki}$ $\hat{g}al_2$ -*la* could, therefore, likewise refer to a “flood dike” located at the settlement of Abbar. A unique reference to “dikes/embankments of Urub” (eg_2 $urub^{ki}$ -*kam*, DP 623 rev. i 2) could be a possible parallel.

To sum up, eg_2 *zi-DU* is sporadically attested in ED IIIb/Presargonic administrative texts from Lagaš, is associated with a fields once, with a toponym once, and obviously denotes some sort of reinforced dike or embankment. The later lexical evidence cited above could support an interpretation as “flood dike”, or the like, but though certainly to be conceived as a compound with eg_2 , its etymology and precise meaning remains uncertain.

[20]

One of the most frequently-mentioned and most important elements of the irrigation network is written $NA\hat{G}.TAR$, which is attested from the ED IIIb/Presargonic to the Ur III period and most probably to be read kab_2 -*tar*. The kab_2 -*tar* are referred to in eight of fifty-seven ED IIIb/Presargonic or 14% of the administrative texts pertaining to irrigation work, providing twenty-three attestations in total (DP 639 rev. i 1; DP 642 obv. i 3; DP 654 obv. ii 1, 5, iii 5; VS 14, 130 = AWL 2 obv. i 2, 3, ii 1, 3, 4, iii 1, rev. ii 2; VS 25, 99 obv. iii 7, rev. i 4, iii 4, 6, 8, iv 1; VS 27, 23 obv. ii 2, rev. i 3, 4; VS 27, 36 obv. i 1, 3). Following eg_2 , it is, therefore, the most frequent element of the irrigation system in the administrative texts. ED IIIb/Presargonic Royal inscriptions from Lagaš, in contrast, do not mention kab_2 -*tar*. This distribution corresponds to that of the Ur III sources, on the one hand,²⁰⁶ and indicates that kab_2 -*tar* operated on a level of the irrigation network comparable to that of eg_2 , on the other.

However, different interpretations have been suggested. Before these are presented, it needs to be mentioned that most scholars, such as Oppenheim and Gelb, entertained

203 Note, however, that “210 rods from the kab_2 -*tar* distributor which is located at the eg_2 *zi-DU* of Abbar” should be written 3,30 $NI\hat{G}_2.DU$ kab_2 -*tar* eg_2 *zi-DU* $abbar^{ki}$ -*ra* $\hat{g}al_2$ -*la-ta*.

204 Maeda 1984, 42.

205 Cf. Maeda 1984, 39–40.

206 Steinkeller 1988, 74.

the reading $na\hat{g}-ku_5$, but their arguments were based on misinterpretations or obsolete due to more recent collations.²⁰⁷ Assuming that the term in question denotes a “distributor” (see below [20]), Steinkeller likewise argued for the reading $na\hat{g}-ku_5$, but based his argument on lexical and etymological evidence. He pointed out that Aa III/5 [MSL 14, 344] 29–32 equate $ku-u_5$ with Akkadian *pe-tu-u ša₂* A.MEŠ, MIN *ša₂ me-e*, MIN *ša₂ butuq-tum*, *batāqu ša₂* A.MEŠ; proposed the reading $na\hat{g}-ku_5$, and translated it as “that which divides/diverts irrigation water.”²⁰⁸ Sallaberger accepted the reading ku_5 , but he pointed out that Ur III administrative texts occasionally write $na\hat{g}^{ab_2}-ku_5$ instead of $na\hat{g}-ku_5$ and thus, established the reading ka_2-ku_5 .²⁰⁹ Bauer likewise preferred ka_2- over $na\hat{g}-$, but based this conclusion on an Ur III letter with an envelope that testifies to an interchange of *ka-tar* and *ka₂-tar-ra*. Based on the latter spelling, Bauer postulated the reading *ka₂-tar-ra* instead of *ka₂-ku₅*.²¹⁰ Civil pointed out that copies of the literary letter allegedly of Ur III dating include the writing $na\hat{g}-ku$ as a variant of $na\hat{g}-ku_5$ and considered $na\hat{g}-ku_5$ to be the correct reading.²¹¹ However, as Civil referred to an early second millennium variant, on the one hand, and did not refer to Sallaberger and Bauer, on the other, the reading ka_2-tar will be adopted in the present paper.

Oppenheim interpreted ka_2-tar as, “long-stretched reservoir leading the stored water of the canals deep into the territory which is to be irrigated and where from the fields are ‘drinking’ [...] when it is opened.”²¹² This was likewise adopted in subsequent discussions that mostly focused on Ur III administrative texts from Umma. Sauren regarded the ka_2-tar as long rectangular storage reservoirs (“Wasserreservoirs [...] flache, rechteckige Becken”) at the banks of the canals that regulated the water flow to the fields.²¹³ Kang assumed that $na\hat{g}-ku_5$ denotes “settling-reservoirs” that washed out sediments.²¹⁴ Gelb, in contrast, connected ka_2-tar with $\hat{g}^{cs}ka_2-ku$, a designation for a container used for storing onions, and concluded that it denotes “not a reservoir or channel, but a trough attached to a channel [...] for draining water.”²¹⁵ Salonen tried to harmonize Oppenheim’s and Gelb’s interpretations, suggesting that $na\hat{g}-ku_5$ were flat, rectangular, trough-like water basins of wooden planks that irrigated fields (“flaches, rechteckiges, trogförmiges Wasserbecken mit den dazu gehörigen Wasserleitungstrogen, die aus zwei Seiten bildenden senkrechten und einem Boden bildenden waagrechte bzw. aus

207 Oppenheim 1948, 113 n. 117 and Gelb 1965, 59, see the remarks of Steinkeller 1988, 89 n. 22.

208 See the discussion in Steinkeller 1988, 78, 89 n. 22.

209 Sallaberger 1991, referring e. g. to TPTS 1, 477 obv. 4. It should be noted that Selz 1993a, 37 n. 48, likewise proposed the reading ka_2-ku_5 , but based his proposal on the assumption that ka_2-ku_5 represents a frozen verbal form of the pattern gab_2-il_2 . This, however, was explicitly excluded by Sallaberger, who assumed a nominal element ka_2- .

210 Bauer 1992, citing DAS 24, letter and envelope. Sallaberger 1991, n. 1, however, objects that ka could likewise be considered as a simplification of $ka_2(ka \times A)$, such as $ka'(ka)$.

211 Civil 1994, 182–183.

212 Oppenheim 1948, 113 n. 117.

213 Sauren 1966, 54–55.

214 Kang 1973, 429–438.

215 Gelb 1965, 58–59. The correct reading of this container, ka_2-ku , was established by Sallaberger 1991.

zwei schräg gegeneinander gestellten Brettern hergestellt und an beide Enden offen und geneigt aufgestellt sind, so dass das Wasser aus dem Wasserreservoir gut ablaufen kann, um das Feld zu bewässern“).²¹⁶ Maeda was the first to discuss the *naĝ-ku₅* in ED IIIb/Presargonic administrative texts from Lagaš. Maeda, likewise, thought the translation “reservoir” plausible, and argued that *naĝ-ku₅* were considered part of the canals they were attached to, noting that fields were watered by several *naĝ-ku₅* with lengths up to 72 m, and added that orchards were likewise irrigated by *naĝ-ku₅*.²¹⁷ Hruška translated *naĝ-ku₅* in various ways as “Wasserbecken”, “Wasserreservoir”, “Wasserbecken mit Schleuse”, and “[z]um Fischfang an das Kanalsystem angeknüpfte Teiche”; “Stauschleuse” and did not clearly differentiate the term from *ĝeš-keše₂-ra₂*.²¹⁸ The most detailed discussion of ED IIIb/Presargonic to Ur III *kab₂-tar* was provided by Steinkeller. In contrast to the aforementioned scholars, he interpreted *kab₂-tar* as a “divisor” or distributor instead of a reservoir. First, he emphasized that *kab₂-tar* was one of the most frequent and, thus, most important elements of third-millennium irrigation networks. Then, he demonstrated that Old Babylonian lexical and first millennium bilingual texts refer to *naĝ-ku₅* in context with *a-e₃-a* “sluice” and *i-zi^{a-ĝu₂}* “water flow” (Proto-Izi I [MSL 13, 29] 366–368 *a-e₃-a*, *kab₂-tar*, *i-zi^{a-ĝu₂}*) and equate *kab₂-tar* with Akkadian *butuqtu* “sluice”. Based on Ur III documents, he pointed out that *kab₂-tar* had a “sluice” (*a-e₃-a*), consisted of piled-up earth, reed, brushwood, and logs of wood and concluded that *kab₂-tar* were, structurally, but a variety of *eg₂* “dike” that were “dug” (*ba-al*) and “cleaned” (*šu-luĥ* – *AK*) and operated by “opening” (*bad*), “closing” (*keše₂*), and “diverting” (*ku₅*). In addition to this, Steinkeller demonstrated that *naĝ-ku₅* were rectangular structures with a length of 12 m to 72 m and a width of 1 m to 12 m. As their width often corresponded to that of the canals or channels they were attached to, he concluded that *kab₂-tar* were an integral part of the canal or channel they were attached to, instead of a separate basin next to it. Based on these data, he concluded that “the *primary* function of the *nag-kud* was to distribute water;” admitting that this “does not exclude the possibility that water storage was *nag-kud*’s [= *kab₂-tar*] *secondary* objective;” and likewise concluded that the *kab₂-tar* was a “reinforced section of the canal, provided with one or more sluices, whose function was to direct and to regulate the flow of water from the main channel into smaller off-takes and irrigation ditches.” In support of his conclusion, he promoted the reading of *naĝ-ku₅* “that which divides (water)” on the basis of lexical evidence, analogous to Spanish and Syrian flood-divisors or distributors known by the names of *mezzaz*, *almazem*, and *partidor*.²¹⁹ Hunt subsequently supported Steinkeller’s conclusion, pointing out that the comparatively small dimensions of *naĝ-ku₅* mentioned in ED IIIb/Presargonic to Ur III administrative texts rather support an interpretation as a distributor instead of a storage

216 Salonen 1968, 225.

217 Maeda 1984, 44–45.

218 Hruška 1988, 61, 63, 68 n. 28, 70.

219 Steinkeller 1988, 74–79; cf. Steinkeller 1999, 543.

reservoir.²²⁰ Pemberton, Postgate, and Smyth likewise supported Steinkeller's proposal. Estimating that *kab₂-tar* had a height or depth, respectively, of 1 to 3.5 m, they pointed out that a storage reservoir could hardly have been practical in view of the high rate of evaporation during the summer months and the marginal size attested for *kab₂-tar*.²²¹ Waetzoldt, on the contrary, disagreed with Steinkeller. Based on Ur III administrative texts from Umma with month datings, he interpreted *kab₂-tar* as retention basins/flood basins and storage reservoirs ("Flutbecken/Reservoir") that served the diverted excess water from the canal network, on the one hand, and stored water for field irrigation, on the other. As a retention/flood basin necessarily cannot be part of the canal network proper, he likewise disagreed with Steinkeller's conclusion that *kab₂-tar* were part of the canals or channels themselves, in favor of an interpretation of them as lateral basins.²²² Independently, Civil, likewise, assumed that *kab₂-tar* were "diversion ponds", i.e. lateral flood basins. He based this conclusion on an Ur III letter in which the sender informs the military authorities that the Euphrates overflowed near Tummal, and that troops are constructing a huge *kab₂-tar*, in order to divert and dam up an excess of flood water. Taking into account ED IIIb/Presargonic and Ur III administrative texts, he doubted Steinkeller's conclusion that *kab₂-tar* were an integral part of the canals or channels, suggesting that they may merely have shared a bank with these waterways. Finally, Civil argued for a reinterpretation of *butuqtu*, which is attested as the Akkadian equivalent of *kab₂-tar*, arguing that *butuqta batāqu* rather means "to divert water" in the context of a first millennium inscription.²²³ Hruška, in turn, largely subscribed to Oppenheim and Steinkeller, interpreting *kab₂-tar* as "water tank, literally water distributor", assuming "tanks retained and stored flood water [...] drew water from the main sources such as rivers or major canals and functioned as a water-storage facility in individual downstream basins".²²⁴ Dight, in turn, again adopted Steinkeller's interpretation, specifying that *kab₂-tar* regulated the water flow for canals or channels of lower level and fields.²²⁵

A review of the administrative texts from the ED IIIb/Presargonic references indicates that *kab₂-tar* denotes a "distributor" that regulated the flow of water from the canal to the fields (see above [4]). A few texts shed light on of the physical characteristics of *kab₂-tar*. First of all, an assignment of work demonstrates that *kab₂-tar* consisted of stretches of "dikes" or embankments (eg₂). While its first entry records an assignment of work on "dikes of the Ašatur (field)" (3c ge eg₂ aša₅ tur, DP 639 obv. i 1), the subscript records "total: ½ rope 2 reeds [= 36 m] is the *kab₂-tar* of the Ašatur (field) of the

220 Hunt 1988, 194–195.

221 Pemberton, Postgate, and Smyth 1988, 217–218.

222 Waetzoldt 1990, 4–7.

223 Civil 1994, 132–135, 182–183.

224 Hruška 1995, 55.

225 Dight 2002, 115, 121–122.

Guedena” (šu-niġen₂ ½ eše₂ 2c ge kab₂-tar aša₃ tur gu₂-eden-na-ka-kam, DP 639 rev. i 1–2),²²⁶ that indicates that kab₂-tar basically consisted of “dikes” or “embankments.”²²⁷ As mentioned before (see above [18]), eg₂ were occasionally described in terms of length, width and height. A survey describing various sections of a canal at the Daterabbar field shows that this also applies to kab₂-tar (DP 654).²²⁸ The first section describes a stretch of dike or canal with a length of ½ rope or 30 m, a width of 2 reeds or 6 m and a height of 3 cubits or 1.5 m (½ eše₂ 2c ge daġal-be₂ 2c ge-am₆ sukad-be₂ kuš₃ 3c, DP 654 obv. i 1–2, see above [18]). The subsequent sections describe three kab₂-tar. The length, width and height of “that of the kab₂-tar of Damu” are computed at 4 reeds or 12 m, 2 reeds or 6 m and 1 reed or 3 m (4c ge daġal-be₂ 2c ge sukad-be₂ 1c ge kab₂-tar da-mu-ka-kam, DP 654 obv. i 3–ii 1), the length, width and height of the second kab₂-tar are computed at 4 reed or 12 m, 2 reeds or 6 m, and 1 cubit or 0.5 m (4c ge daġal-be₂ 2c ge sukad-be₂ 1c ge kab₂-tar [...-ka-kam], DP 654 obv. ii 3–5), and the length, width and height of the “kab₂-tar of the middle boundary ridge” are computed at ½ rope 5 reeds or 45 m, 2 reeds or 6 m, and 4 cubits or 2 m, respectively (½ eše₂ 5c ge daġal-be₂ 2c ge sukad-be₂ kuš₃ 4c kab₂-tar im-nun mu₅-ru₃-ka-kam, DP 654 obv. iii 3-rev. i 1). While Maeda assumed that the first section of the text likewise describes a kab₂-tar,²²⁹ Steinkeller instead assumed that the first section refers to a stretch of dike (cf. above [18]) and observed that the first to fourth section record an identical width of 2 reeds or 6 m. Thus, he concluded that the kab₂-tar was “an integral part of the canal or channel, and not a separate basin, situated next to it”, and assumed that the document in question describes “six sections of what appears to have been a continuous dike.”²³⁰ An assignment of work on “dikes of the Ašatur (field) of Guedena” (eg₂ aša₃ tur gu₂-eden-na-ka, VS 25, 100 rev. iv 2) supports this. It includes six sections. The first five sections refer to eg₂ and demonstrate that these eg₂ had two banks (gu₂ 2c-be₂, VS 25, 100 obv. i 1–rev. ii 3, see above [18]). The sixth section records a work quota with a length of 1 rope 2 reeds or 36 m to be executed on a kab₂-tar, more precisely “its two banks” (1 eše₂ 2c ge kab₂-tar gu₂ 2c-be₂ ke₃-dam, VS 25, 100 rev. iv 1).²³¹ It is possible that this kab₂-tar at the “Ašatur (field) of Guedena” (aša₃ tur gu₂-eden-na-ka, VS 25, 100 rev. iv 2) is the same as the kab₂-tar at the same field described as eg₂ in a work assignment cited above (kab₂-tar aša₃ tur gu₂-eden-na-ka-kam, DP 639 rev. i 1–2, see above [18], [20]). More importantly, it seems to confirm Steinkeller’s assumption that kab₂-tar were “an integral part of the canal or channel”, especially if one considers that eg₂ does not only refer to the “dike” or “embankment” of a canal, but to the whole of the canal itself.²³² Given that kab₂-tar are

226 Maeda 1984, 44.

227 Steinkeller 1988, 75; Civil 1994, 133.

228 See the edition and discussion in Steinkeller 1988, 74–81. Cf. also Maeda 1984, 44–45; Dight 2002, 115, 121–122.

229 Maeda 1984, 44–45.

230 Steinkeller 1988, 77.

231 Cf. Steinkeller 1999, 543.

232 Cf. VS 25, 100 obv. i 1–rev. ii 3, see above [18].

described in terms of length, width and height (DP 654, see above [20]), it also implies that they had a rectangular outline. The conclusion that *kab₂-tar* were a structure consisting of *eg₂*, on the one hand, and were at the same time part of the canals themselves, finds support in a survey of dikes or embankments (*eg₂*) at the Daterabbar field. One of its entries mentions stretches of dike (*eg₂*), with lengths of 4 reeds or 12 m and 3 reeds or 9 m respectively, of the Enlilepa canal which were “carried away by the water” (4c *ge kab₂-tar 1c-am₆ 3c kab₂-tar 2c-kam-ma-am₆ ^den-lil_x(E₂)-le-pa₃-ta a e-de₆, VS 27, 23 rev. i 3–6, see above [18]). However, Civil doubted that *kab₂-tar* shared any of its banks with their respective canals and preferred an interpretation as lateral pond instead (see above [20]).²³³ Several surveys denote that *kab₂-tar* were located at the side (*za₃-be₂*, literally “at its side”) of waterways or their respective dikes (*eg₂ nu-aka-ta 40 ½ eše₂ kab₂-tar za₃-be₂ eg₂ aka-am₆, VS 14, 130 = AWL 2 obv. i 2; eg₂ še-a₂-[ta] 40 kab₂-tar [x]-ma za₃-be₂, VS 14, 130 = AWL 2 obv. ii 3–4; 6c *ge kiĝ₂ nu-aka kab₂-tar za₃-be₂, VS 27, 36 obv. i 2–3*).²³⁴ The fact that buildings situated along the waterways are likewise said to be located at the side (*za₃-be₂*) of canals supports Civil’s proposal (e.g. *kiĝ₂ <engar>-re₂-ne-ta 1,20 niĝ₂.DU 4c ge durun_x ki-maḥ e₂ nin-maḥ ter-ku₃-ka za₃-be₂ e₂ nin-maḥ-ta 1,30 ½ 4c ge kiĝ₂ ke₃-dam e₂ nin-maḥ za₃-be₂, VS 27, 36 obv. ii 4–iii 1*). Finally, the fact that the subscript of one of the survey texts referred to above summarizes the quota of work on “dikes” (*eg₂*) and those on *kab₂-tar* in distinct entries could perhaps corroborate this conclusion (VS 14, 130 = AWL 2 rev. ii 1–3, see below).**

Various administrative texts record the lengths of *kab₂-tar*. The highest figure is found in a work assignment that records stretches of dike (*eg₂*) and *kab₂-tar* at the Daterabbar field of the goddess Babu. It totals 360 rods ½ rope 4 reeds of dikes or 2382 m and 20 rods minus 4 reeds or 108 m of *kab₂-tar* where work was performed (*aka-am₆*), as well as 20 rods or 120 m of dike where no work had to be done (*šu-niĝen₂ 6,30 niĝ₂.DU ½ eše₂ 4c ge eg₂ aka-am₆ 20 niĝ₂.DU la₂ 4c ge kab₂-tar aka-am₆ 20 niĝ₂.DU eg₂ nu-ke₃-dam eg₂ aša₅ da-ter-abbar^{ki} aša₅ u₂-rum ^dba-bu₁₁, VS 14, 130 = AWL 2 rev. ii 1–iii 3*). This corresponds to the combined length of a first *kab₂-tar* with a length of 1 rope 4 reeds or 72 m (1 *eše₂ 4c ge kab₂-tar, VS 14, 130 = AWL 2 obv. i 3*) and a second one with a length of ½ rope 2 reeds or 36 m (½ *2c ge kab₂-tar 2c-kam-ma-am₆, VS 14, 130 = AWL 2 obv. ii 4*).²³⁵ The *kab₂-tar* of the middle boundary ridge had a length of ½ rope 5 reeds or 45 m (½ *eše₂ 5c ge daġal-be₂ 2c ge sukud-be₂ kuš₃ 4c kab₂-tar im-nun mu₅-ru₅-ka-kam, DP 654 obv. iii 3-rev. i 1*). These are the highest figures in terms of length for *kab₂-tar* in the administrative texts from Lagaš. The *kab₂-tar* of Damu and a third *kab₂-tar* mentioned each had a length of 12 m (4c *ge daġal-be₂ 2c ge sukud-be₂ 1c ge kab₂-tar da-mu-ka-kam, DP 654 obv. ii 3-5; 4c ge daġal-be₂ 2c ge sukud-be₂ 1c ge kab₂-tar [...], DP 654 obv. i 3–ii*

233 Civil 1994, 133.

234 Cf. the translation in Bauer 1972, 57.

235 On these lengths cf. Maeda 1984, 44; Steinkeller 1988, 76.

1). A length of 36 m is attested for a “kab₂-tar of the small field of Guedena” (šu-niġen₂ ½ eše₂ 2c ge kab₂-tar aša₅ tur gu₂-eden-na-ka-kam, DP 639 rev. i 1–2). The smallest figure attested is 4 reeds or 12 m (4c ge kab₂-tar eg₂ a-ġeštīn-na aša₅ urin-du₃-a, DP 642 obv. i 3–ii 1). Similar lengths of 4 reeds or 12 m and 3 reeds or 9 m, respectively, are mentioned for two kab₂-tar at the Enlilepa canal which were damaged by erosion, but whether these figures refer to the total length of these two kab₂-tar remains unknown (4c ge kab₂-tar 1-am₆ 3c ge kab₂-tar 2c-kam-ma-am₆ <i>₇>^den-lil_x(E₂)-le-pa₃-ta a-e de₆, VS 27, 23 rev. i 3–6, see above [18], [20]).²³⁶ Comparably low figures for lengths are also recorded in a list of work quotas at the “new field” (aša₅ gibil-am₆, VS 25, 99 rev. iv 1). Most work quotas are not specified and obviously refer to stretches of dike (eg₂). A handful of entries, however, denotes quotas of work at kab₂-tar with varying lengths of 7 reed or 21 m (7c ge kab₂-tar ur-saġ, VS 25, 99 rev. i 4–5), 2 reeds of 6 m (2c ge kab₂-tar aša₅ niġen₂-na DI.UTU, VS 25, 99 rev. iii 4–5), 5 reeds or 15 m (5c ge kab₂-tar aša₅ niġen₂-na ur-e₂-muš₃, VS 25, 99 rev. iii 6–7), and again 5 reeds or 15 m (5c ge kab₂-tar aša₅ niġen₂-na ur-saġ, VS 25, 99 rev. iii 8–9).²³⁷ Indications that these figures correspond to the total length of the kab₂-tar are lacking, but the work quotas assigned on the various kab₂-tar or stretches of kab₂-tar have similar lengths as the remaining work quotas. The fact that these were most likely performed on “simple” stretches of dike (eg₂) again indicates that kab₂-tar basically likewise consisted of “dikes” (eg₂). The above data thus demonstrates that kab₂-tar consisted of “dikes” (eg₂) with a height of 1 to 2.5 m, were rectangular in shape, measured 12 to 72 m in length, 6 m in width and were most probably located at the side of the waterways which they were attached to.²³⁸

In addition to this, work assignments and survey texts contain data concerning the localization of kab₂-tar in relation to other elements of the irrigation network. A survey mentions a “kab₂-tar of the Enlilepa (canal)” (kab₂-tar^den-lil_x(E₂)-le-pa₃, VS 27, 36 obv. i 1) as a point of reference for dike work. This could perhaps indicate that the water flow from primary canals to waterways of lower rank was controlled by means of kab₂-tar distributors. In addition to that, it refers to a “pa₅ canal of Abzu” (pa₅ abzu) and a “kab₂-tar of (the) Abzu (canal)” (kab₂-tar abzu) (VS 27, 36 obv. i 3–ii 1), thus indicating that kab₂-tar were attached to pa₅ canals (see above [17]).²³⁹ In addition to this, one of the above-mentioned assignments of work on “dikes” (eg₂) at the small field of Guedena” records in its subscript that the work was executed on “kab₂-tar of the small field of

236 Note that Maeda 1984, 44, includes these references, whereas Steinkeller 1988, 76, omits them.

237 The reading kab₂(SAG×A¹)-tar, a compound of SAĠ×DIŠ or SAĠ with a simplified A inscribed, is clearly visible on the photograph (CDLI-no.

PO20305), in contrast to the copy VS 25, 99, which only shows SAĠ/KA.

238 Cf. the remarks in Waetzoldt 1990, 7.

239 Maeda 1984, 45.

Guedena (š_u-niġen₂ ½ eše₂ 2c ge kab₂-tar aša₅-tur gu₂-eden-na-ka-kam, DP 639 rev. i 1–2, see above [18], [20]). This clearly shows that kab₂-tar adjoined the fields, clearly in order to irrigate them.

Maeda made the important observation that fields normally seem to have been irrigated by several kab₂-tar. Two surveys enumerate several kab₂-tar at the Daterabbar field, one of them describing the installations in terms of length, width and height (DP 654, see above [20]). Another survey clearly describes “(stretches of) dike of the Daterabbar field” (eg₂ aša₅ da-ter-abbar^{ki}, VS 14, 130 = AWL 2 rev. iii 1) and mentions the “durun_x of the Imaḥ (canal)” as a point of reference (durun_x i₇-maḥ-ta, VS 14, 130 = AWL 2 obv. i 1). A first kab₂-tar is located at a distance of 60 rods ½ rope or 390 m from the durun_x (durun_x i₇-maḥ-ta 20 niġ₂.DU eg₂ nu-ke₃-dam eg₂ nu-aka-ta 40 ½ kab₂-tar za₃-be₂ eg₂ aka-am₆). This kab₂-tar had a length of 1 rope and 4 reeds or 72 m which it probably shared with the dike of the canal or channel (1 eše₂ 4c ge kab₂-tar, VS 14, 130 = AWL 2 obv. 3). From there, a stretch of dike with a length of 70 rods and 3 reeds or 429 m (kab₂-tar-ta 1,10 3c ge eg₂ še-a₂ en-an-na-tum₂-gen₇ ^{ġeš-tu⁹} ġeštu a-ba ġa₂-ġa₂ za₃-be₂, VS 14, 130 = AWL 2 obv. ii 1–2), another stretch of dike with a length of 40 rods or 240 m, and a kab₂-tar at its side were reworked (eg₂ še-a₂-[ta] 40 kab₂-tar [x]-ma za₃-be₂, VS 14, 130 = AWL 2 obv. ii 3),²⁴⁰ its length being computed at ½ rope and 2 reeds or 36 m (½ 4c ge kab₂-tar, VS 14, 130 = AWL 2 obv. ii 4). The kab₂-tar mentioned here could be the same as those in another survey of “dikes of the Daterabbar field” (eg₂ aša₅ da-ter-abbar^{ki}-ka-kam, VS 27, 23 rev. ii 4), which refers to a kab₂-tar at the “flood dike of Abbar” (kab₂-tar-ta eg₂ zi-DU abbar^{ki} ġal₂-la, VS 27, 23 obv. ii 2) as well as and a “first” and “second kab₂-tar” (kab₂-tar 1c-am₆ kab₂-tar 2c-kam-ma-am₆, VS 27, 23 rev. i 3–4). Though the outline of this stretch of dike at the Daterabbar field is not entirely clear,²⁴¹ it is obvious that this field was irrigated by at least three kab₂-tar. An Ur III text from Lagaš records several sections of dike with lengths up to 2100 m, each interspersed with two kab₂-tar, and confirms this pattern,²⁴² in agreement with the fact that canals irrigating the fields ran along the backslope of the levées.

Finally, some administrative texts that do not belong to the irrigation dossier include some noteworthy references to kab₂-tar. A handful of texts concern the harvest of onions “from the onion grounds of the Ugeg field which is at the kab₂-tar of (the god) Lugaliribar” (ki šum₂-ma aša₅ u₃-ge₁₇-ka kab₂-tar ^dlugal-iri-bar-ka-ka ġal₂-la-ta, DP 383

240 According to the photograph (CDLI-no. Po20129), VS 14, 130 = AWL 2 obv. ii 3–4 read eg₂ še-a₂-[ta] 40 kab₂-tar [x]¹-ma za₃-be ½ 2c ge kab₂-tar 2c-kam-ma-am₆. VS 14, 130 = AWL 2 obv. ii 3 probably included a scribal mistake to be emended to kab₂-tar [x]¹-am₆,¹ cf. the sequence kab₂-tar 1c-am₆ kab₂-tar 2c-kam-ma-am₆ in VS 27, 23 rev. i 3–4.

241 Cf. Maeda 1984, 45, who computes the distance from the durun_x dam of the Imaḥ (canal) to the first kab₂-tar at 130 reeds or 390 m, the second kab₂-tar at a distance of 223 reeds or 669 m from the first, and the third 900 reeds or 2700 m from the Imaḥ canal.

242 Steinkeller 1988, 77, who refers to RTC 412.

rev. iii 1-2; cf. DP 408 rev. iv 5-7 and Nik. 1, 49 = AWEL 49 rev. iii 1-3). This indicates that onion grounds were irrigated by kab₂-tar.²⁴³ A unique document records large amounts of fish caught from three different kab₂-tar (5 sa z1:z1-a agargara^{ku6} kab₂-tar uda_x-a kiri₆ šuš₃-ka-kam (?), Nik. 1, 277 = AWEL 277 obv. i 1-2; cf. obv. i 3-ii 1, ii 2-4). This probably supports the assumption that kab₂-tar were lateral basins of considerable size.²⁴⁴ A delivery of woods mentions tamarisk wood for kab₂-tar that was clearly used for its construction, be it as a means of reinforcement or as a part of a sluice (20 la₂ 3 ġeš-tu⁹šeneg kab₂-tar ġeš-ti, DP 469 obv. i 2).²⁴⁵ Finally, it should be pointed out that an inventory of wood mentions a kab₂-tar at the side of a field that is associated with a personal name, but the significance of this remains to be discussed (kab₂-tar ur-^dnašše-na-silim-ma-ta eg₂ aša₅ ^dinnana za₃-be₂, VS 27, 79 obv. iv 1-2; cf. perhaps kab₂-tar da-mu-ka-kam, DP 654 obv. ii 1).²⁴⁶

To sum up, kab₂-tar most probably denotes “distributors” that regulated water flow from pa₅ canals to the fields. These consisted of “dikes” (eg₂) with a height of up to 2.5 m, had a rectangular outline, a variable length up to 72 m and a width of at least 6 m. It is likely that these basins were attached to the side of the canal from which they drew the water. Given their size and their usage as fishing ponds, kab₂-tar probably also had small storage capacity that depended on their size.²⁴⁷ Thus, the function of kab₂-tar was probably comparable to that of the ġeš-keše₂-ra₂ (see above [15]). But as kab₂-tar are only attested in administrative texts and almost always associated with fields, however, both operated on different levels of the irrigation network.

[21]

Another element of the irrigation network is written KU.KU or DUR₂.DUR₂, most likely to be read durun_x. With the possible exception of a list of fields from archaic Ur (see above [4]), durun_x is exclusively attested in ED IIIb/Presargonic Lagaš. Both its meaning and reading are controversial. Bauer referred to the equation KU.KU-ru = ka-lu-u ša₂ me-e “retaining of water” (SIG₇.ALAN = *Nabnitu* IX [MSL 16, 122] 254) as well as Akkadian *kālû* “dam”, or “weir”, and, thus, proposed the reading dur₂-dur₂-ru and translated it as “dam” (“Staudamm”).²⁴⁸ Maeda discussed references in ED IIIb/Presargonic administrative texts from Lagaš, but left both the meaning and reading of the term open to

243 Cf. Maeda 1984, 45.

244 Cf. Bauer 1972, 58-59; Hruška 1988, 68 n. 28.

245 On the usage of wood for the construction of kab₂-tar in Ur III texts, see Kang 1973, 432-433; Steinkeller 1988, 75, 86 n. 26.

246 For Ur III references for kab₂-tar associated with

personal names, see Rost 2015, 140.

247 Another, or other, designation for retention basins in Ur III administrative texts is probably illu(A.KAL), see Waetzoldt 1990, 7; Hruška 1995, 53; Maekawa 1995, 197 and cf. RTC 258, cited by Waetzoldt 1990.

248 Bauer 1972, 58.

question. However, he identified a durun_x ki-maḥ and another “ durun_x of the Daterabbar field” (durun_x aša_5 $\text{da-ter-abbar}^{\text{ki-ka}}$) that had a length of ca. 300 m. Most importantly, he interpreted the sequence ku eg_2 ku-na-am_6 (DP 654 rev. i 2) as ku eg_2 durun-na-am_6 as “ ku which is set up on a canal” and concluded “that ku-ku was a reservoir-like canal and provided a source of water for the irrigation of the Dater-Ambar field.”²⁴⁹ Steinkeller, in contrast, adopted Bauer’s suggestion, thus translating “dam”. Based on the 1st millennium gloss dur_2 - ru-un for ku.ku as the plural stem of tuš “to sit” (NBGT II [MSL 4: 148–149] 11–12, cf. also writings such as inda_3 durun_x - na “oven-bread”, u_2 - durun_x - na “combustive brushwood”, BiMes. 3, 15 obv. ii 4; DP 368 obv. i 1 etc.) and the writing ku.ku-na-am_6 , he proposed the reading durun_x .²⁵⁰ Hruška pointed out that $\text{ku.ku}/\text{DUR}_2$. DUR_2 reached lengths of ca. 300 m and, therefore, regarded the interpretation as “dam”, impossible. Instead, he assumed that ku.ku or durun_x denotes a “dike” (“Deich”), “dam, fortified dam”, or even “junction canal (?)”:²⁵¹ The interpretation “dam” was nevertheless adopted by Selz and Bagg (“Wehr”).²⁵²

The distribution of references is remarkable. Eight of fifty-seven administrative texts pertaining to irrigation work, corresponding to 14% of that group, mention durun_x , including a total of twelve attestations (DP 623 rev. v 2; DP 624 rev. i 1; DP 642 rev. ii 1, 2; DP 653 rev. ii 1; DP 654 rev. i 2, ii 5; DP 658 rev. i 2 (?); VS 14, 130 = AWL 2 obv. i 1; VS 25, 101 rev. ii 1; VS 27, 36 obv. ii 4, rev. i 3). The fact that royal inscriptions, in contrast, never refer to durun_x points at an element that operated on the lower level of the irrigation network. The following review of the administrative texts corroborates this assumption.

A survey of “dikes of the Daterabbar field” (eg_2 aša_5 $\text{da-ter-abbar}^{\text{ki}}$, VS 14, 130 = AWL 2 rev. iii 1) mentions the “ durun_x of the Imaḥ canal” as a point of reference (durun_x i_7 - maḥ-ta , VS 14, 130 = AWL 2 obv. i 1). This could mean that “primary canals” (i_7) were provided with durun_x and therefore support the interpretation “dam”.²⁵³ In addition to this, a “ durun_x of the u_3 of the Imaḥ canal” is attested (1,00 la_2 5c ge durun_x u_3 i_7^1 (ENGUR)- maḥ-kam , DP 658 rev. i 2–ii 1).²⁵⁴ But as another work assignment refers to this structure

249 Maeda 1984, 39, 46–47.

250 Steinkeller 1988, 74, 77, 79, 81. Cf. also Steinkeller 1999, 543, who transliterates durun_x (tuš.tuš) instead of ku.ku . Cf. also Civil 1994, 139 n. 44.

251 Hruška 1988, 70; Hruška 1995, 54. – Note that the differentiation between durun_x (tuš.tuš) “dam, fortified dam” and ku.ku “a junction canal (?)” in Hruška 1995, 54, has obviously no basis, see Jagersma 1997, 512.

252 Selz 1996, 677; Bagg 2011–2013, 122.

253 Cf. Steinkeller 1988, 81.

254 The reading durun_x u_3 i_7^1 (ENGUR)- maḥ-kam was likewise suggested by Maeda 1984, 48, and Steinkeller 1988, 81. Note that the interpretation of ku.ku in DP 658 rev. i 2 as durun_x is not beyond doubt, since all of the previous entries combine the length of a workload and a personal name or name of profession. Thus, 1.00 la_2 5c ge ku.ku could likewise mean “60 rods minus 5 reeds: ku.ku [= personal name]”. For an interpretation of ku.ku or ku-ku as a personal name, see Foxvog 2011, 92.

as “the U_3 of the Imaḥ (canal)” in the first entry (3 lu₂ 0.2.0 kiġ₂-be₂ ½ eše₂ 5 ge kiġ₂ du₃-a u₃ i₇-maḥ, DP 647 obv. i 1–2), however, and as “the U_3 -ter of Abbar” in the subscript (šū-niġen₂ 3,10 NIĠ₂.DU 1c ge kuš₃ 3c kiġ₃ du₃-a u₃-ter abbar^{ki}-ka, DP 647 rev. v 1), it is rather uncertain that the Imaḥ canal itself is referred to. Another administrative text records a workload of 60 rods minus 5 reeds or 345 m at “the durun_x of the U_3 of the Imaḥ canal” (1,00 la₂ 5c ge durun_x u₃ i₇[!](ENGUR)-maḥ-kam, DP 658 rev. i 2–ii 1, see above [13]). The fact that this largely corresponds to the length of the durun_x of the Daterabbar field supports this interpretation; the respective textual data will be discussed below. In addition to this, “dams” or “weirs” of primary canals were designated as ġeš-keše₂-ra₂ (see above [17]). Finally, it deserves to be mentioned that all of the remaining references associate durun_x with fields. This in turn indicates that durun_x operated on a lower level of the irrigation system.

This assumption finds support in a memo which locates “a first durun_x” of 53 rods or 318 m and “a second durun_x” of 30 rods or 180 m length at the Daterabbar field (53 NIĠ₂.DU durun_x 1c-am₆ 30 NIĠ₂.DU durun_x 2c-kam-ma aša₅ da-ter-abbar^{ki}, DP 642 rev. ii 1–3). These durun_x are clearly also mentioned in another survey, one with a length of 50 rods and 5 reeds or 315 m (50 4c ge kiġ₂ durun_x-am₆, VS 27, 36 rev. i 3) and another one referred to as “durun_x of the ki-maḥ” with a length of 80 rods and 4 reeds or 492 m (1,20 NIĠ₂.DU 4c ge durun_x ki-maḥ, VS 27, 36 obv. ii 4). These two durun_x, finally, also co-occur in an administrative text recording the survey and acceptance of irrigation work at a continuous (?) stretch of a waterway (or its respective dikes or embankments) at the Daterabbar field by corvée troops (sur_x-re₂ e-dab, kiġ₂ aša₅ da-ter-abbar^{ki}, DP 654 rev. ii 6–iii 1, see above [18], [20]).²⁵⁵ While its first four sections refer to a stretch of dike and three different kab₂-tar distributors (DP 654 obv. i 1–rev. i 1, see above [18], [20]), the following sections mention two durun_x. The one with a length of 300 m will be discussed first. Maeda translated “50 rods (long) (is) the ku which is set up on the canal” and concluded that “ku-ku was a reservoir-like canal and provided a source of water for the irrigation of the Datir-Ambar field”.²⁵⁶ However, Steinkeller and Civil demonstrated that this was based on the misreading of ku eg₂ durun-na-am₆ and that the passage in question reads “600 cubits (long) is the dike of the dam” (50 NIĠ₂.DU eg₂ durun_x-na-am₆, DP 654 rev. i 2).²⁵⁷ Thus, Maeda’s suggestion that durun_x denotes “a reservoir-like canal” has no basis. Instead, it demonstrates that the durun_x was a structure consisting of “dikes” or “embankments” (eg₂) with a length of 50 rods or 300 m. A number of administrative texts clearly refer to the same structure and corroborate this conclusion. A work assignment records 50 rods minus 6 reeds or 282 m work at “dikes of the durun_x

255 On the assumption that this text records “six sections of what appears to have been a continuous dike”; see Steinkeller 1988, 77.

256 Maeda 1984, 46–48.

257 Steinkeller 1988, 77, 79–80; Civil 1994, 139 n. 44.

of Daterabbar” (šū-niĝen₂ 50 NIĜ₂.DU la₂ 6c ge eg₂ durun_x da-ter-abbar^{ki}-ka, DP 623 rev. v 2–3). The respective acceptance of this work assignment records work at “dikes of the durun_x of the Daterabbar field” that add up to a length of “40 rods ½ rope 5 reeds” or 285 m according to the subscript (šū-niĝen₂ 40 NIĜ₂.DU ½ eše₂ 5c ge eg₂ durun_x aša₅ da-ter-abbar^{ki}-ka, DP 624 rev. i 1–2), or 288 m according to the total of the per capita work quota (DP 624 obv. i 1–v 8). A third text records work on “dikes of the durun_x of Daterabbar” with a total length of 267 m (eg₂ durun_x da-ter-abbar^[ki], DP 653 rev. ii 1). A prosopographically parallel assignment testifies to “50 rods minus 5 reeds”, or 285 m, “assigned work at the durun_x of the Daterabbar field” ([šū]-niĝen₂ 50 NIĜ₂.DU la₂ 5c ge kiĝ₂ du₃-a durun_x aša₅ da-ter-abbar^{ki}-ka, VS 25, 101 rev. ii 1–2). The similar lengths, prosopographical parallels, and localizations demonstrate that the “dike of the durun_x of Daterabbar” (eg₂ durun_x da-ter-abbar^{ki}-ka), “dike of the durun_x of the Daterabbar field” (eg₂ durun_x aša₅ da-ter-abbar^{ki}-ka), “dike of the durun_x of Daterabbar” (eg₂ durun_x da-ter-abbar^[ki]), and “durun_x of the Daterabbar field” (durun_x aša₅ da-ter-abbar^{ki}-ka) refer to the same construction.²⁵⁸ A “durun_x of the u₃ of the Imaḥ canal” with a length of 60 rods minus 5 reeds or 345 m is finally referred to in another administrative text (1.00 la₂ 5c ge durun_x u₃ i₇¹(ENGUR)-maḥ-kam, DP 658 rev. i 2–ii 1, but see above [21]). These lengths indicate that the “durun_x of the Daterabbar field” is the same as the “durun_x of the u₃ of the Imaḥ canal”. Notably, the last-mentioned work assignment computes the work load assigned to the temple dependents at 5 reeds or 15 m per capita (4 lu₂ lu₂ 1-še₃ kiĝ₂ 5c ge-ta kiĝ₂-be₂ 1 eše₂ sipa ama šagan_x(GAN)^{ša}, VS 25, 101 obv. i 1–4). This corresponds to the highest per capita workload attested for work on “dikes” or “embankments” (eg₂) at canals for field irrigation (see above [13], [18]) and is significantly higher than the per capita work quota for the “cleaning” (šū-luḥ – AK) and “hoeing” of “primary canals” (i₇, see above [13]). The “dikes” or “embankments” of a durun_x therefore, did not differ from those accompanying the “secondary canals” (pa₅) at the fields.

This is finally indicated in the last part of the abovementioned record concerning the survey and acceptance of work at Daterabbar field by the corvée troops. It does not only refer to work on the “dikes of a durun_x” (50 NIĜ₂.DU eg₂ durun_x-na-am₆, DP 654 rev. i 2, see above [21]), but also to work on the durun_x ki-maḥ, the second durun_x at the Daterabbar field (40 ½ 2c ge u₃-ter a dab₅-ba aša₅ naĝ-a naĝ-be₂ 6c ge daĝal-be₂ 1c ge u₃ ter-kam ½ eše₂ la₂ 1c a-igi 8c ge a-egir₄ durun_x ki-maḥ, DP 654 rev. i 3–ii 5). The interpretation of this passage is highly controversial. Maeda translated “40 gar-du [= NIĜ₂.DU] ½ šè [= rope] 2 gi [= reeds] long (it is) ù-tir which stores water to irrigate fields. The nag [= naĝ] (is) 6 gi [= reeds] in length and 1 gi [= reed] in breath [i.e. width]. (These are) in ù-tir [= u₃-ter]. 9 gi [= reeds] long (it is) water in front [= a-igi]. 8 gi [= reeds]

258 Cf. Maeda 1984, 41, 46; Steinkeller 1988, 81.

long (it is) water behind [= a-egir₄].²⁵⁹ Thus, Maeda concluded that u₃-ter had a naġ and served the irrigation of the Daterabbar field. Steinkeller, in contrast, translated “552 cubits (long) [= 40 nġ₂.DU ½ rope 2 reeds] (is the reservoir) at the Tir-bridge [= u₃-ter] (?); it stores water (and) irrigates the field; its sluice [= naġ] (is) 36 cubits (long), its (i.e. of the sluice) width (is) 6 cubits – (this) is (the reservoir) at the Tir-bridge [= u₃-ter] (?). 54 cubits (is the width of) water at the back [= a-egir₄] (of the reservoir), 48 cubits (is the width of) water at the front [= a-igi] (of the reservoir), (this is) the Kimah-dam.”²⁶⁰ In this context, it needs to be recalled that Maeda considered durun_x to denote “a reservoir-like canal [...] for the irrigation of the Dater-Ambar field”, whereas Steinkeller suggested “a type of dam [...] provided with a sluice which probably led directly into the field.”²⁶¹ Based on Steinkeller’s translation, Dight proposed a reconstruction of the irrigation device referred to.²⁶²

Though both translations differ, it is clear that a construction “which stores water (and) irrigates fields” (a dab₅-ba aša₅ naġ-a) and “its sluice” (naġ-be₂) are mentioned, but whether this really describes the durun_x ki-maḥ is uncertain. As already mentioned, Steinkeller assumed that the whole document included six sections that describe a continuous dike and argued that the first four sections describe a stretch of dike and three different kab₂-tar distributors. The fifth section, according to Steinkeller, refers to a stretch of dike which measures 300 m and a durun_x (50 nġ₂.DU eg₂ durun_x, DP 654 rev. i 2, see above [21]).²⁶³ According to Steinkeller’s interpretation, the sixth section describes a stretch of dike 276 m in length at u₃-ter and described as “dam of Kimah” (durun_x ki-maḥ). This, Steinkeller argued, was 27 m at its back (a-egir₄), 24 m at its front (a-igi), provided with a sluice (naġ-be₂) 18 m in length, and 3 m in width and served “to store water and to irrigate the field” (a dab₅-ba aša₅ naġ-a).²⁶⁴ This interpretation, however, is problematic since Steinkeller’s subdivision of the passage in question is probably wrong. This is obvious from the fact that each of the first five sections ends with an enclitic copula -am₆ “it is” that denotes the installation on which work was performed.²⁶⁵ The first section thus ends “[...] is (a stretch of dike)” (DP 654 obv. i 1 ...-am₆), the second, third and fourth section end with “[...] is the kab₂-tar distributor of ...” (DP 654 obv. ii 1 kab₂-tar da-mu-ka-kam, obv. ii 5 kab₂-tar [...-ka-kam], obv. iii 5-rev. i 1 kab₂-tar im-nun mu₅-ru₅-ka-kam), and the fifth section ends with “.. (stretch of) dike is the durun_x” (DP 654 rev. i 2 ... eg₂ durun_x-am₆). As it is logical to assume that the sixth section likewise ends with an enclitic copula, this section reads “40 rods ½ rope

259 Maeda 1984, 47–48.

260 Steinkeller 1988, 79–80.

261 Maeda 1984, 47; Steinkeller 1988, 75, 77.

262 Dight 2002, 115, 121–122.

263 Steinkeller 1988, 77.

264 Steinkeller 1988, 77.

265 Note that copular clauses also appear in ED IIIb/Presargonic administrative texts from Lagaš, such as ration lists, as a means of structuring an asyntactical list, cf. Sallaberger 2000.

2 reeds, u_3 -ter which stores water (and) irrigates fields, its *sluice* (is) 6 reeds, its width (is) 1 reed, it is u_3 -ter” (40 ½ 2c ge u_3 -ter a dab₅-ba aša₅ naĝ-a naĝ-be₂ 6c ge daĝal-be₂ 1c ge u_3 -ter-kam, DP 654 rev. i 3–ii 2, see below [22]). The subsequent lines that record work performed on the $durun_x$ ki-maḥ must, therefore, belong to a seventh subsection. This one records that work was executed on a length of ½ rope minus 1 reed or 27 m on its a-igi and on a length of 8 reeds or 24 m on its a-egir₄ (½ eše₂ la₂ 1c ge a-igi 8c ge a-egir₄ $durun_x$ ki-maḥ, DP 654 rev. ii 3–5). Steinkeller assumed that a-igi and a-egir₄ “seem to describe respectively the back (upper) and front (lower) weirs closing the dam ($durun_x$)”.²⁶⁶ However, as argued above, a-igi and a-egir₄ instead describe the inner and outer slope of a “dike” or “embankment” (eg₂) accommodating a canal (see above [18]). This agrees with the abovementioned observation that $durun_x$ were structures of “dikes” or “embankments” (eg₂, see above [21]). If the reinterpretation of the text is correct, the interpretation of $durun_x$ as “dam” has no basis. At the same time, “which stores water (and) irrigates fields” (a dab₅-ba aša₅ naĝ-a, DP 654 rev. i 3) must refer to the function of the u_3 -ter mentioned in the preceding section which is discussed below (see below [22]).

To sum up, $durun_x$ denotes an element of the irrigation network which was closely associated with fields and consisted of “dikes” or “embankments” (eg₂) similar to those of “secondary canals” (pa₅). Two $durun_x$, one with a length of ca. 300 m and another one measuring as much as 492 m, were associated with the Daterabbar field and the u_3 of the Imah canal, respectively. Notably, the interpretation as “dam” merely rests on a single survey texts and can hardly be substantiated. As the fact that $durun_x$ are not attested after the ED IIIb/Presargonic period makes its interpretation especially difficult, the precise nature of $durun_x$ remains unclear.

[22]

The last element of the irrigation network to be discussed is u_3 which is attested in ED IIIb/Presargonic to Ur III administrative texts. Besides the simplex u_3 , it seems to occur in u_3 -ter, which is possibly a genitival compound (cf. u_3 -ter-kam, DP 654 rev. ii 2, see above [21]). These occur in six of fifty-seven administrative texts pertaining to irrigation work, with eight references in total (DP 568 obv. ii 1; DP 646 rev. ii 4; DP 647 obv. i 2, rev. v 1; DP 654 rev. i 3, ii 2; DP 658 rev. ii 1; VS 27, 36 rev. iv 1). As, again, references in royal inscriptions are lacking, the distribution in ED IIIb/Presargonic texts from Lagaš corresponds to that of the Ur III texts. The meaning and reading of u_3 , however, are controversial.

Sauren identified u_3 as an element of the irrigation network that appears in context with the Tigris, primary canals, and lagoons or drainage ponds (a-ga-am) in Ur III administrative texts from Umma, but left it untranslated.²⁶⁷ Discussing ED IIIb/Presargonic administrative texts from Lagaš, Maeda pointed out that u_3 almost exclusively occurs in “ u_3 of the Imaḥ canal” (u_3 i₇-maḥ) and “ u_3 of the Daterabbar field” (u_3 da-ter-abbar^{ki}). As the u_3 i₇-maḥ was distinct from the i₇-maḥ proper and measured more than 20 000 m in length, he considered it to represent the former course of the i₇-maḥ canal, pointing out that the spelling u_3 which also denotes *libir* “old” could reflect this meaning. Moreover, he assumed that u_3 -ter denotes parts of u_3 planted with trees as a reinforcement against erosion.²⁶⁸ Steinkeller observed that u_3 co-occurs with other elements of irrigation system, such as kuḡ₂ zi-da u_3 šumun₂ “dam of the old u_3 ,” or toponyms like u_3 du₆-tur-ra. Different from Maeda, he proposed the reading *duru_x* and the meaning “bridge”. His argument based on the observation that an ED IIIa/Fara period geographical list (MEE 3, 234, 126) renders the same place name once as ḠEŠ. u_3 .ku-kul-ab^{ki} and once as ḠEŠ. u_3 -gul-la^{ki}. Assuming that this represents the same toponym as the Old Babylonian *BAD₃-u₃-gul-la₂^{ki}* and *tu-ur^d-u₃-gul-la₂^{ki}*, respectively, he suggested the readings ḠEŠ*duru_x*(u_3)^{dur₂}-kul-ab^{ki} and ḠEŠ*duru_x*(u_3)-gu-la^{ki}, respectively, and thus proposed the reading *duru_x* for u_3 and assumed an etymology with *e₂-du^{ru}-du₅^{ki}* = *titūrum*, *titurru* “bridge”, and its variants *a-dur₂* and *addir*.²⁶⁹ Civil discussed u_3 mainly on the basis of Ur III administrative texts. He pointed out that u_3 is usually followed by hydronyms, but also dikes, groves, fields, and meadows. In addition, he pointed out that u_3 were susceptible to erosion, occasionally planted with trees, and accommodated fields and orchards. Referring to unorthographic writings such as ḠEŠ ma_2 ma_2 -laḥ₅-be₂ i₃-ib₂- u_3 and interchanges of u_3 and u_5 , such as orthographic variants including *du₆-lugal- u_3* , *du₆-lugal- u_5* or *a- u_3 -ba* and *a- u_5 -ba* = *mīl kiššati* “high tide” and “floodwater”, Civil considered u_3 to represent an unorthographic writing for u_5 = *rakābum* “to ride” connected the latter with ^{u₂} u_5 (HU.SI) = *ši-ip-[ku]^{be-pi}*, ^{u₂} u_5 (HU.SI) = *i-ku i-ku- u_2* “levee”, “embankment” (Aa II/6 iii [MSL 14, 292–293] A 14', B iii 11'). Thus, he concluded that u_3 denotes “high ground, perhaps old levees or even islands, near the river or canal banks” or “banks or islands created by the changes of the river beds resulting from yearly floods”, respectively, and translated “ u_3 grounds” for convenience.²⁷⁰ Hruška assumed that u_3 and u_3 -ter denote “canal banks” that were sometimes “fortified with shrubs”.²⁷¹ Selz considered Maeda’s proposal convincing, translating ED IIIb/Presargonic u_3 i₇-maḥ da-ter-abbar^{ki} as “Deichverstärkungen am Imaḥ an der Waldseite von Ambar”.²⁷² Mander/Notizia, in contrast, adopted

267 Sauren 1966, 65.

268 Maeda 1984, 39, 47–48.

269 Steinkeller 1988, 81.

270 Civil 1994, 131–132.

271 Hruška 1995, 56.

272 Selz 1996, 676–677.

Civil's suggestion ("una amasso di terra, forse un vecchio argine o addirittura una piccola isola, venutasi acreeare a seguito delle piene annuali, e non un 'ponte'").²⁷³ In his edition of assignments of work at the "canal which goes to Niĝen", Studevent-Hickman provided a thorough discussion of u_3 . Referring to field names like a-ša₃ u_3 gu₂ i₇-da^dba-bu₁₁-ĥe₂-ĝal₂, he argued that u_3 were located at the banks of canals, were delimited by "dikes" or "embankments" according to notations like u_3 bar-ra "outer u_3 " or eg₂ u_3 i₇ ^dsul-ge-piriĝ, accommodated fields and orchards, and reached lengths of up to 80 danna or 28.8 km, perhaps as much as 400 danna or 144 km. Pointing out that earth excavated in irrigation work is traditionally deposited at the banks, he interpreted the u_3 of the "canal which goes to Niĝen" as an earthen structure located alongside the banks of the canal and translated it as "spoil bank". As spoil banks principally kept water at bay and provided a path for land traffic, he considered the translation "bund" or "causeway", thus, harmonizing his interpretation with Steinkeller's translation as "bridge".²⁷⁴ Subsequently, Steinkeller adopted Studevent-Hickman's proposal and translated u_3 as "causeway".²⁷⁵ Most recently, Rost discussed u_3 in Ur III administrative texts from Umma. She argued that " u_3 might have been a managed opening in the river levee that allowed water to be delivered into nearby depressions or wetlands if needed" or "a specific location in/at the Tigris levee that allowed for diverting water as a flood prevention measure".²⁷⁶

The interpretation of the ED IIIb/Presargonic evidence of u_3 is difficult. Most attestations of u_3 mention the " u_3 of the Imaĥ canal" (u_3 i₇-maĥ, DP 568 obv. ii 1; DP 646 rev. ii 4; DP 647 obv. i 2; DP 658 rev. ii 1). An additional reference is found for an " u_3 -ter of Abbar" or " u_3 of Terabbar" (u_3 -ter abbar^{ki}-ka or u_3 ter-abbar^{ki}-ka, DP 647 rev. v 1). This is either an abbreviated spelling or a scribal mistake for u_3 da-ter-abbar^{ki}-ka or a reference to an u_3 -ter, a writing which is attested twice without being associated to a toponym (u_3 -ter, u_3 -ter-kam, DP 654 rev i 3, ii 2).²⁷⁷ One of these references to u_3 -ter is found in the subscript of an administrative text concerning "assigned work at the u_3 -ter of Abbar" (kiĝ₂ du₃-a u_3 -ter abbar^{ki}-ka, DP 647 rev. v 1). As the first entry of this text instead records "assigned work at the u_3 of the Imaĥ canal" (kiĝ₂ du₃-a u_3 i₇-maĥ, DP 647 obv. i 2), the u_3 i₇-maĥ and the u_3 -ter abbar^{ki}-ka obviously denote the same structure. Finally, the fact that a third survey mentions the " u_3 of the Imaĥ of Daterabbar" corroborates this assumption (u_3 i₇-maĥ da-ter-abbar^{ki}, VS 27, 36 rev. iv 1). In addition to this, a survey text records the inspection of several stretches of dike, kab₂-tar distributors and two durun_x constructions, the subscript summarizing them as "assigned work of (the goddess) Babu" at "the u_3 of the Imaĥ of Daterabbar" (u_3 i₇-maĥ da-ter-abbar^{ki} kiĝ₂ du₃-a^dba-bu₁₁, VS 27, 36 rev. iv 1-2). Thus it is clear that u_3 i₇-maĥ and u_3 ter-abbar^{ki}-ka

273 Mander and Notizia 2009, 239–240.

274 Studevent-Hickman 2011, 43–47.

275 Steinkeller 2011, 387.

276 Rost 2015, 108–109 with n. 77.

277 Cf. Maeda 1984, 47.

or U_3 -ter abbar^{ki}-ka denote the same structure. This is also corroborated by the fact that the same survey mentions a $durun_x$ 50 rods minus 4 reeds or 312 m in length (50 4c ge kiĝ₂ $durun_x$ -am₆, VS 27, 36 rev. i 3, see above [21]) that resembles that of the $durun_x$ U_3 i_7 -maḥ, with a length of 60 rods minus 5 reeds or 345 m (1,00 la₂ 5c ge ge $durun_x$ U_3 i_7 ¹(ENGUR)-maḥ, DP 658 rev. i 2–ii 1, see above [21]).²⁷⁸

This same document includes seven entries, each probably denoting the length of a work assignment (16,40 ½ eše₂ lu₂-kur 20,00 la₂ 1,00 saĝ-du₅ 3,00 la₂ 10 nam-maḥ 7,40 ur-igi 11,40 lu₂-^dba-bu₁₁ 1,00 la₂ 5c ge $durun_x$ U_3 i_7 ¹(ENGUR)-maḥ-kam, DP 658 obv. i 1–rev. ii 1). According to Maeda’s interpretation, these lengths add up to a total of 7.065 reeds or 21 195 m. Maeda argued that this length excludes a man-made structure and concluded that U_3 i_7 -maḥ denotes the former course of the Imaḥ canal, pointing out that the sign U_3 also has the reading libir “old” in support of his proposal. A comparatively high workload is recorded in an assignment of work to temple dependents of the goddess Babu on the U_3 i_7 -maḥ, adding up to 720 rods 1 rope or 4350 m. After the reference to the U_3 i_7 -maḥ, the text inserts a last figure of 420 rods and 1 rope or 2580 m. Assuming that this was inserted as an afterthought that also refers to work on the U_3 i_7 -maḥ, the total length of the work on the U_3 i_7 -maḥ would then add up to 6930 m (6,00 1 eše₂ lugal-pa-e₃ 3,00 lugal-mas-su 1,00 *puzur*₄-ma-ma 2,00 la₂ 1 eše₂ ur-dam U_3 i_7 -maḥ lu₂ ^dba-bu₁₁-me 7,00 1 eše₂ ur-^digi-ama-še₃ NU-banda₃, DP 568 obv. i 1–ii 4). In any case, this document corroborates Maeda’s assumption that the U_3 i_7 -maḥ was a huge structure. These figures are reminiscent of the length of the “canal which goes to Niĝen” (i_7 niĝen₆^{ki}-du), which can be estimated at ca. 50 km (see above [14]). A number of Ur III work assignments record work on the U_3 of the “canal which goes to Niĝen” that demonstrate that the U_3 of this waterway likewise had an enormous length,²⁷⁹ a fact that explains why U_3 is associated with “primary canals” (i_7) alone. A survey informs us that work on the U_3 of the Imaḥ canal at the Daterabbar (field) had to be performed on a length of 650 rods and 7 reeds or 3935 m, while a section of 70 rods ½ rope and 4 reeds or 402 m would not be reworked (š_u-niĝen₂ 10,50 NIĜ₂.DU 7c ge kiĝ₂ ke₃-dam 1,10 ½ 4c ge kiĝ₂ nu-ke₃-dam U_3 i_7 -maḥ da-ter-abbar^{ki} kiĝ₂ du₃-a ^dba-bu₁₁, VS 27, 36 rev. iii 1–iv 2). Though these are by far the highest figures attested for irrigation work, the remaining texts, likewise, mention remarkably high figures, such as “total: 190 rods 1 reed 3 cubits [= 1144.5 m] assigned work on the U_3 -ter of Abbar” (š_u-niĝen₂ 3,10 NIĜ₂.DU 1c ge kuš₃ 3c kiĝ₂ du₃-a U_3 -ter abbar^{ki}-ka, DP 647 rev. v 1). The per capita workload assigned to a small gang of three members of the corvée troops is computed at ½ rope 5 reeds or 15

278 See the edition in Maeda 1984, 47–48. On the emendation i_7 ¹(ENGUR) cf. also Steinkeller 1988, 81.

279 BM 93831 and HSM 6485, see the editions and dis-

cussions in Maekawa 1997, 128–130, 142–143; Mander and Notizia 2009, 239–249; Rost 2011, 211–269; Studevent-Hickman 2011.

m, corresponding to the highest per capita figures for work on simple “dikes” or “embankments” (eg₂) (3 lu₂ 0.2.0 kiĝ₂-be₂ ½ eše₂ 5c ge kiĝ₂ du₃-a u₃ i₇-maḥ, DP 647 obv. i 1–2). Finally, an assignment of “canal cleaning” (i₇ šu-luḥ – AK) seems to compute the distance “from the u₃ of the Imah canal to the middle of the field”, thus indicating the distance from the u₃ of the Imah canal to the Urindua field (u₃ i₇-maḥ-ta ša₃ aša₅-ga-še₃, DP 646 rev. ii 4–5) at 60 rods 2 reeds or 366 m (šu-niĝen₂ 1,00 niĝ₂.DU 2c ge kiĝ₂ du₃-a i₇ aša₅ urin-du₃-a ša₃ i₇-da šu-luḥ ke₃-dam, DP 646 rev. i 1–4, see above [13]). These figures demonstrate that u₃ denotes a huge structure. Finally, the abovementioned survey and acceptance of work at the Daterabbar field by the corvée troops illustrates the function of an u₃, more precisely an u₃-ter at the Daterabbar field. As already mentioned, the first sections of this document refer to a stretch of dike, three different kab₂-tar distributors, and two durun_x, (see above [18], [20], [21]). The sixth section relates to an u₃-ter, reading “40 rods ½ rope 2 reeds (is its length), u₃-ter which stores water (and) irrigates fields, its sluice (is) 6 reeds (in length), its width (is) 1 reed, it is (that of(?)) u₃-ter” (40 ½ 2c ge u₃-ter a dab₅-ba aša₅ naĝ₅-a naĝ₅-be₂ 6c ge daĝal-be₂ 1c ge u₃-ter-kam, DP 654 rev. i 3–ii 2, see above [21]). As explicit mention is made of the irrigation of fields (aša₅ naĝ₅-a), Maeda and Steinkeller convincingly translated a – dab₅ as “to store water”.²⁸⁰ In addition, Ur III administrative texts from Umma that record work performed at the “u₃ of the Tigris” (u₃ i₇ idigna-ka) refer to the “seizing of flood water” (a zi-ga dab₅-ba) as a means of flood control through water diversion and could provide a possible parallel.²⁸¹

To sum up, u₃ denotes an earthen structure of huge dimensions that was related to the Imah canal on the one hand, and to the Daterabbar field, on the other. This agrees with the evidence of the Ur III administrative texts that have more amply been discussed. Its precise function, however, is hardly elucidated on the basis of the ED IIIb/Presargonic administrative texts, but a survey indicates that it had an important function in the storage and distribution of irrigation water.

[23]

The discussion of the basic irrigation terminology in ED IIIb/Presargonic royal inscriptions and administrative texts from Lagaš testifies to the existence of a four-level irrigation network:²⁸² From the river, water flowed to the “primary canals” (i₇) that were regulated through “regulators” (ĝeš-keše₂-ra₂), and branched off to “secondary canals” (pa₅) that are mostly referred to indirectly through mention of their respective “dikes” or “embankments” (eg₂). “Distributors” (kab₂-tar) regulated the water flow from the canals

280 Maeda 1984, 48; Steinkeller 1988, 80.

Steinkeller 2011, 387.

281 Rost 2015, 108–109 with n. 78, citing MVN 21, 101; UTI 3, 1807; UTI 4, 2926. On these texts, see

282 Cf. Steinkeller 1988, 73–74.

to the field. The most important additional elements of the irrigation network include eg_2 *zi-DU*, which denotes some sort of strengthened dike, $durun_x$ and u_3 , which played a role in the storage and distribution of irrigation water. Notably, the distribution of these elements in royal inscriptions and administrative texts perfectly reflects their position within the irrigation network. While the construction of “primary canals” (i_7) and “regulators” ($\hat{g}e\check{s}-ke\check{s}_2-ra_2$) – devices operating on the highest level of the irrigation network – are amply reported in royal inscriptions, they are only rarely referred to in the administrative texts. These texts, instead, mainly testify to the maintenance and construction of “dikes” (eg_2) at the field and their respective canals (pa_5), “distributors” (kab_2-tar) that served their irrigation, and $durun_x$. In addition, the complementary distribution of irrigation devices in royal inscriptions and administrative texts demonstrates that construction and maintenance of the irrigation network were organized on two levels, as will be clear from the following examples of administrative texts documenting the assignment and acceptance of works by temple dependents.

[24]

As a rule, administrative texts consist of two parts.²⁸³ The first is a list of persons, groups of persons or occupational groups that are assigned a specific workload, such as “1 reed (of work): Nammaḥne, the maltser, 1 rope (of work): Urdumuzi, the goat-herd,” ([1c ge] *nam-maḥ-ne₂ munu₄-mu₂ 1 eše₂ ur^d-dumu-zi sipa ud₅, DP 615 obv. i 1-rev. i 1*). The second part, the so-called subscript, usually indicates the total work load and the place where it was executed, e.g. “total: 40 (rods) ½ rope dike of the Dugara field. Subur, the captain, *assigned* it. Year 3” (*šu-niḡen₂ 40 ½ eše₂ eg₂ aša₅ du₆-gara₂ subur nu-banda₃ mu-du₃ 3., DP 615 rev. ii 1–4*). Occasionally, the texts denote both the acceptance of work quotas by the temple dependents and their assignment by the captain of the temple. Thus, one instance of such a subscript reads “total: 60 rods 2 reeds, *assigned* work of the canal of the Urindua field. The canal bed is to be cleaned. The *farmers in service* took it over. Eniggal, the captain assigned it to them from the u_3 of the Imaḥ (canal) to the middle of the field. Year 4” (*šu-niḡen₂ 1,00 niḡ₂.DU 2c ge kiḡ₂ du₃-a i₇ aša₅ urin-du₃-a ša₃ i₇-da šu-luḥ ke₃-dam engar ki-gub-ke₄-ne e-dab₅ en-ig-gal nu-banda₃ u₃ i₇-maḥ-ta ša₃ aša₅-ga-še₃ mu-ne-du₃ 4., DP 646 rev. i 1–ii 6, see above [13], [22]). Though there are many variations in the formulation, it is clear that assignments of work and their respective acceptance were supervised by the “captain” (*nu-banda₃*), the chief administrator of the temple, who was likewise responsible for surveying the irrigation network in order*

283 On the layout of the ED IIIb/Presargonic adminis-

trative texts from Lagaš, see Sallaberger 2000.

to determine which parts were to be worked on.²⁸⁴ The archival context indicates that irrigation work was primarily conducted on parts of the irrigation network that adjoined the fields of the temple of Babu. This is corroborated by occasional annotations that classify the fields as the property of Babu, or her temple, respectively (aša₅ u₂-rum^dba-bu₁₁, VS 25, 74 rev. v 3; šu-niĝen₂ 30 niĝ₂.DU kiĝ₂ du₃-a eg₂ aša₅ da-ter-ra [a]bbar^{ki}-ka aša₅^dba-bu₁₁-ka, VS 25, 105 rev. ii 1–4). Occasionally, the texts refer to fields and orchards of the household of the wife of the ruler (e₂-mi₂, VS 14, 100 = AWL 1 obv. i 5; eg₂ aša₅ da-ter-abbar^{ki}-ka-kam aša₅ e₂-mi₂-kam, VS 27, 23 rev. ii 4–iii 2). Only very rarely, fields belonging to other households are mentioned; these include the temple of Nintu (aša₅ u₃-ge₁₇ e₂^dnin-dur₁₁-ka, VS 14, 187 = AWL 3 rev. ii 2) and the temple of Ninĝirsu (eg₂ ĝeš-AN.TUR aša₅^dnin-ĝir₂-su-ka-kam, VS 27, 23 rev. iii 3–4).²⁸⁵ Thus, the administrative texts document a very local level of the irrigation network that was related to the temple of Babu, as already indicated by the fact that administrative texts mostly refer to “dikes” or “embankments” (eg₂) and “distributors” (kab₂-tar) (see above [18], [24]).

[25]

At the same time, it is clear that the people drafted for irrigation work, likewise, belonged to the Babu temple. The identification of the workers is more difficult and only possible by means of systematic observations on personal names, abbreviated name-forms, co-occurrences and cluster of names and professions, and so on. However, the fact that almost all texts refer to the well-known “captains” (nu-banda₃) of the household of the ruler’s wife (e₂-mi₂), or the temple of the goddess Babu (e₂^dba-bu₁₁) respectively, indicates that the gangs drafted for irrigation work likewise were recruited from the dependents of this household.²⁸⁶ Occasionally, the texts refer to work “to the men of the goddess Babu” (lu₂^dba-bu₁₁-ke₄-ne, DP 637 rev. iv 3, cf. lu₂^dba-bu₁₁(?), DP 658 rev. i 1), “completed work of the men of the goddess Babu” (kiĝ₂ aka lu₂^dba-bu₁₁-ka, DP 636 rev. i 1), or simply “own work of the goddess Babu” (kiĝ₂ u₂-rum^dba-bu₁₁, DP 659 rev. i 4–5) and, thus, confirm this. As prosopography corroborates this assumption,²⁸⁷ it is sufficient to say that those obliged to carry out irrigation work can mostly be identified as the “men who have received a subsistence field” (lu₂ šuku dab₅-ba) or “corvée troops” (sur_x) of the temple that are well-known from ration lists.²⁸⁸ Occasionally, gangs

284 Cf. Bauer 1998, 534.

285 A list of fields attested in administrative text is provided by LaPlaca and Powell 1990, for a discussion of fields belonging to this temple, see Selz 1995, 41–45.

286 Schrakamp 2014.

287 On the criteria for prosopographical identification, see Selz 2003, 500–501; Foxvog 2011, 60; Schrakamp 2015a, 19–20.

288 Schrakamp 2010, 65–66.

of workers are explicitly referred to as “corvée troops”, e.g. in an assignment and acceptance of work in “canal hoeing” (i_7 al du_3) on the LUMmagendu canal ($\dot{s}u$ -niġen₂ ½ eše₂ kuš₃ 2c kiġ₂ bala-am₆ sur_x-re₂ e-dab₅ i_7 al du_3 kiġ₂ u₂-rum ^dba-bu₁₁, DP 659 rev. i 1–5, see above [13]; see also DP 622 rev. iii 4; DP 654 rev. ii 6; VS 25, 77 rev. i 1).

The “men who have received a subsistence field” (lu_2 šuku dab₅-ba) or “corvée troops” (sur_x) constituted a bi-partite class of temple dependents.²⁸⁹ Among them, the “subordinates of the king (?)” (RU-lugal) and the “followers” (aga_3 -us₂), i.e. the militia, enjoyed the highest status and income and were the first to be drafted for public work and military service.²⁹⁰ Thus, some texts show that these groups were drafted for irrigation work alone (DP 614; DP 634; DP 652; Nik. 1, 8 = AWEL 8; VS 25, 100), while others refer to them in the first place, assigning them the highest workloads (DP 622 obv. i 1–4; DP 623 obv. i 1–ii 9; DP 625 obv. i 1–4; DP 630 obv. i 1–3; DP 637 obv. i 1–6). The second subgroup of the corvée troops consisted of “farmers” (engar, engar ki-gub), various groups of shepherds, and herdsmen in charge of sheep, goats, swine, and mares ($sipa$, $sipa$ ama šagan_x(GAN)^{ša}, $sipa$ u₅, $sipa$ uda_x siki-ka, $sipa$ šaġa, unu₃), “fishermen” (šukud₂) as well as the different groups of “craftsmen” (ġeš-kiġ₂-ti), such as “carpenters” (naġar), “leatherworkers” (ašgab), “reedworkers” (^{ad}adgub), “felters” (tu₈-du₈), “foresters” (lu_2 -ter), “potters” (baġar₂), and others. Notably, these were exactly the same groups that were called for public work, such as harvest or temple building, and military service. In addition, irrigation work was also compulsory for “scribes” (dub-sar), high-ranking court personnel, such as “cupbearers” (sagi), “cooks” (muġaldim), “cleaners” (azlag, gab₂-tan₆), “brewers” (lu_2 -BABIR₃), and cult personnel that likewise held allotments of subsistence fields, but were exempt from military duty. These rather high-ranking temple dependents were subsumed as “men who look around” (lu_2 igi-niġen₂) and, thus, differentiated from the bulk of the corvée troops, as in a work assignment recording “work taken over by *the men who look around*. The corvée troops took over its rest” (kiġ₂ lu_2 igi-niġen₂-ne dab₅-ba-am₆ eger₄-be₂ sur_x zu₂ keše₂-ra₂ e-dab₅, DP 622 rev. iii 3–4).²⁹¹ Lower-ranking groups that were not entitled to receive fields for subsistence, on the contrary, were not obliged to perform irrigation work. Therefore, irrigation work could also be considered some sort of “labor tax”.²⁹² The fact that administrative texts mention an irrigation tax ($maš$ ki-duru₅, $maš$ aša₅-ga, še gub-ba $maš$ ga-be₂) that was due for prebends from fields of the goddess Babu or the ruler’s family, respectively supports this assumption ($aša_5$ u₂-rum ^dba-bu₁₁ $aša_5$ u₂-rum lugal-AN-da ensi₂ lagas_x(NU₁₁.BUR)^{la.ki}-ka, $aša_5$ u₂-rum para₁₀-nam-tar-ra dam lugal-AN-da ensi₂ lagas_x(NU₁₁.BUR)^{la.ki}-ka, RTC 75;

289 See the discussion in Schrakamp 2010, 61–95, esp. 63–66.

290 Schrakamp 2010, 170–190; Schrakamp 2014.

291 On lu_2 igi-niġen₂, see Selz 1995, 74; Beld 2002, 129–

130; Schrakamp 2014, 720–721; on the reading, see Bauer 2003; Sjöberg 2003, 259–260.

292 Cf. Paoletti and Schrakamp 2011–2013, 161.

Nik. 1, 170 = AWEL 170; VS 14, 170 = AWL 7).²⁹³ This could mean that temple dependents were obliged to participate in irrigation work on canals, dikes, and the like that adjoined the fields they held prebends on, and in fact a handful of correspondences between irrigation texts and field allotments can be observed. An assignment of work on the “dikes of the Dugara field” (eg₂ aša₅ du₆-gara₂, DP 615 rev. ii 1), datable to the 3rd year of Enentarzi, records a work quota of 1 rope or 30 m for the “goat-herd” Urdumuzi (1 eše₂ ur^d-dumu-zi sipa ud₅, DP 615 obv. i 4–5) and 5 reeds or 15 m for Ningirsutešĝu, a high-ranking “cupbearer” (sagi) (5c^d nin-ĝir₂-su-teš₂-ĝu₁₀, DP 615 obv. ii 6).²⁹⁴ Both appear as subsistence holders in a field allotment from Enentarzi’s reign (0.1.2 GANA₂ še mu₂-a^d nin-ĝir₂-su-teš₂-ĝu₁₀, Nik. 1, 30 = AWEL 30 obv. i 1–2; 0.0.3 GANA₂ 0.0.2 4c i₃-šub ur^d-dumuzi sipa ud₅ aša₅ du₆-gara₂-kam, Nik. 1, 30 = AWEL 30 obv. ii 8–iii 3).²⁹⁵ Though this could mean that temple dependents were drafted for irrigation work at those fields where their subsistence plots were located, it has been considered more likely that irrigation work was performed *en masse*.²⁹⁶ A ratio between the size of their fields and their respective work quotas is not conceivable,²⁹⁷ and as Urdumuzi is assigned a comparatively high work load of 30 m (see above [18]), it is most likely that he acted as the overseer of a gang of several persons. Several parallel work assignments demonstrate that some texts only denote the total work load of an occupational group by reference to its overseer, whereas others include more detailed notations specifying the number of their subordinates. This attested, e.g., for the gangs of “subordinates of the king (?)” (ru-lugal) and the “followers” (aga₃-us₂) (see above [25]), the “herders of the mares” (sipa ama šagan_x(GAN)^{ša}), or the workers under the “coachman” (gab₂-kas₄) Ĝirnunkidu (6c ge ĝir₂-nun-ki-du₁₀ gab₂-kas₄, DP 623 obv. ii 2–3; [6 lu₂] kiĝ₂-be₂ 6c ge ĝir₂-nun, VS 25, 86 obv. ii 6–iii 2; 3 lu₂ 0.2.0 kiĝ₂-be₂ ½ eše₂ 5c ge kiĝ₂ du₃-a u₃ i₇-mah ĝir₂-nun gab₂-kas₄, DP 647 obv. i 1–4). What is clear, however, is that the allocations of subsistence fields obliged the prebend holders to partake in irrigation work.

A unique document records the assignment of work on “dikes of the Daterabbar field, the field of the goddess Babu, to the men who have leased fields” by the captain and indicates that this also holds true for the lease of land (eg₂ aša₅ da-ter-ra [a]bbar^{ki}-ka aša₅ ^dba-bu₁₁-ka en-ig-gal nu-banda₃ lu₂ aša₅ apin-la₂-ke₄-ne mu-ne-du₃, VS 25, 105 rev. ii 2–iii 3).²⁹⁸ In all, eleven lessees are mentioned. Only one, a “herder of the mares of the goddess Babu” by the name of Enku (en-ku₄ sipa ama šagan_x(GAN)^{ša} ^dba-bu₁₁, VS 25, 105 obv. ii 1–3) is known as a dependent of the Babu temple and also attested in other administrative texts pertaining to irrigation (DP 617 obv. i 3–4; DP 622 obv. iv 9–10;

293 Steinkeller 1981; Selz 1989, 322–323, 394–395; Waetzoldt 1990, 11; Paoletti and Schrakamp 2011–2013, 162.

294 On the dating, see Maeda 1984, 49 n. 5.

295 Visicato 1996, n. 6.

296 Steinkeller 1999, 303, 320 n. 52.

297 Cf. Maekawa 1987, 53–60.

298 On lu₂ aša₅ apin-la₂, see Marzahn 1989, (1) 42–43; Marzahn 1991, 15; Bauer 1993, 180; Selz 1996, 704.

VS 25, 83 obv. iii 1–2; VS 25, 105 obv. ii 1–2, probably also DP 623 rev. iv 5; DP 624 obv. iv 5; DP 637 obv. iv 2; DP 647 obv. ii 7; DP 653 obv. i 1; DP 657 rev. i 3; TSA 23 obv. vi 10; VS 14, 187 = AWL 3 rev. i 2; VS 25, 74 obv. v 5; VS 25, 84 rev. i 1–2). A field allotment includes him among the holders of parcels of subsistence and leased land at the Daterabbar field (0.0.4 GANA₂ su₃-la en-ku₄ sipa [ama šagan_x(GAN)^{ša}] d^dnin-ġir₂-su, DP 592 obv. iv 6–rev. i 1). This field allotment also mentions another lessee, the high-ranking “boatman” Kišigabituš (kišig₂-a-bi₂-tuš ma₂ gal-gal, VS 25, 101 obv. iii 5–6), as a holder of leased land on the Daterabbar field (0.0.4 ½ ¼ GANA₂ su₃-la kišig₂-a-bi₂-tuš ma₂ gal-gal, DP 592 obv. iv 3–5). In view of these correspondences, it is reasonable to identify a third lessee, a “follower” by the name of Diutu (4c di-utu aga₃-us₂, VS 25, 101 obv. ii 8–9), with a namesake holder of parcels of land in the same field allotment (0.0.3 ½ ¼ GANA₂ šuku di-utu, DP 592 rev. ii 6–7). This evidence indicates that lessees of fields had to partake in irrigation work at exactly those fields where their parcels were located. In this connection, an administrative text that refers to the completion of “dike work at the Daterabbar field” needs to be mentioned (kiġ₂ eg₂ aša₃ da-ter-abbar^{ki}-ka ur-dam engar [e]-a₅, VS 25, 103 rev. ii 1–3). It refers to a number of persons who belonged to households other than the temple of the goddess Babu, including Lugaluma from the Ebabbar temple, Urdu, the lamentation priest of the Ebabbar temple, and another person from the same sanctuary (VS 25, 103 obv. ii 6–9, rev. i 2–3). A lamentation singer from the Igiġal (gala igi-ġal₂) is also referred to (DP 637 rev. ii 7). Whether these persons likewise held parcels of leased land or were drafted for irrigation work for other reasons, however, remains unknown.

Thus, it can be stated that the usufruct of subsistence fields, as well as the lease of land were intrinsically connected to the obligation to conduct irrigation work. Both, however, remained a prerogative of those occupational groups that enjoyed a higher status.

[26]

As already mentioned, the subscripts of almost all work assignments demonstrate that normally the “captain” (nu-banda₃) of the temple of Babu assigned the work quota to the temple dependents and included notations such as “Suburtur, the captain, assigned it to them [i.e. the temple dependents]” (subur-tur nu-banda₃ mu-ne-du₃, VS 25, 83 rev. ii 3–5), “Eniggal, the captain, *assigned* it to the ses tuš-a/ša₄ corvée troops” (en-ig-gal nu-banda₃ ses tuš-a/ša₄ e-ma-du₃, DP 652 rev. i 3–ii 1 and Nik. 1, 8 = AWEL 8 rev. iii 1–4), and the like.²⁹⁹ This demonstrates that the organisation and planning of irrigation work at

299 On ses tuš-a/ša₄ and ses gub-ba, see Maeda 1983; Maekawa 1987, 55–57; Selz 1989, 100; Bauer 1993,

178; Maeda 1993, 293–294; Selz 1993b, 308–309;

the temple level was the responsibility of its chief administrator.³⁰⁰ Three work assignments, however, are an exception and record that the ruler (*ensi*₂, *lugal*) assigned the work to the captain of the temple,³⁰¹ thus, including notations such as “Enentarzi, the ruler of Lagaš, assigned it to Subur, the captain” (*en-en₃-tar-zi ensi₂ lagas_x(NU₁₁.BUR)^{la.ki}-ke₄ subur NU-banda₃ mu-na-du₃*, DP 614 rev. i 2–ii 2), “total: 5 reeds assigned work (at the Lummagendu canal, Urukagina, the ruler of Lagaš, assigned it [= the work]” (*šu-niĝen₂ 5c ge kiĝ₂ du₃-a i₇ LUM-ma-gen₇-du₁₀ eri-enim-ge-na ensi₂ lagas_x(NU₁₁.BUR)^{la.ki}-ke₄ mu-du₃*, DP 628 rev. i 1–ii 1), and “Urukagina, the king of Lagaš assigned it [= the work] at the outlet at the Ubur field to Eniggal, the captain [of the temple]” (*[(eri)-nim-ge-na [lu]gal lagas_x(NU₁₁.BUR)^{la.ki}-ke₄ kuĝ₂ aša₅ ubur₂-ra-ka en-ig-gal NU-banda₃ mu-na-du₃ 1₁*, TSA 23 rev. v 3–vi 1). These last two work assignments can confidently be related to the royal irrigation projects that Urukagina conducted during his first two or three years of reign (see above [13]). Thus, they demonstrate that the temple had to recruit the corvée troops for royal irrigation projects. A perfect parallel is provided by a group of perforated clay bullae that, unlike the vast majority of the ED IIIb/Presargonic texts from Lagaš, derive from the archive of the palace, i.e. the ruler. They demonstrate that the king mustered the corvée troops recruited from various temples for military service (FAOS 5/1 Ukg. 17–33),³⁰² on the one hand, and can be related to muster lists from the Babu temple itself, on the other (e.g., DP 135; DP 136; Nik. 1, 3 = AWEL 3; Wengler 2 = Deimel 1926: 39–40).³⁰³

[27]

Southern Mesopotamian societies were essentially agrarian and therefore depended on artificial irrigation (see above [1]–[4]). Though evidence for water management in the earliest cuneiform records (ca. 3300–2575 BC) is virtually absent, it is probable that references are masked behind the ambiguities of early orthography (see above [5]–[7]). The first evidence for fully-developed irrigation networks, however, stems from the Sumerian city-state of Lagaš (ca. 2475–2315 BC) and includes royal inscriptions and administrative texts (see above [8]–[12]). The Early Dynastic state of Lagaš maintained a four-level irrigation network that was operated on two levels (see above [23]). Large irrigation projects, such as the excavation of “(major) canals” (*i₇*) or the construction of “regulators” (*ĝeš-keše₂-ra₂*), are almost exclusively reported in royal inscriptions and were, there-

Bauer 1998, 534. Civil 1994, 128, assumes that *ses tuš-a/ša₄* and *ses gub-ba* (“*šeš gub-ba*”, “*šeš dur₂-ra*”) designate types of dike, but overlooks the arguments of Bauer 1993 and Maeda 1993.

300 See Maeda 1984, 34, 51 pl. 3 for additional references; Bauer 1998, 534.

301 Maeda 1984, 34, 51 pl. 3.

302 Schrakamp 2010, 285–295; Schrakamp 2013, 450–451.

303 See the editions in Schrakamp 2010, 255–285, 297–308; cf. Schrakamp 2013, 450–451.

fore, conducted by the ruler, who drew on the contingents of *corvée* troops mobilized by the temples of the state (see above [13]–[16], [23], [26]). These institutions, however, were primarily responsible for the maintenance of lower-level irrigation structures (see above [24]–[25]). These included “dikes” (eg_2) and canals (pa_5) located on their landed property, distributors regulating water flow on the fields (kab_2 -tar), strengthened dikes (eg_2 zi-DU), as well as $durun_x$ and u_3 , which played a role in the storage and distribution of irrigation water (see above [17]–[22]). Thus, the irrigation texts testify to a bipartite administrative and economic structure that was typical of the entire state (see above [26]). Moreover, the fact that the construction of new primary canals is almost exclusively reported in the inscriptions of Urnanše and his grandson Eanatum probably reflects their attempt to establish a four-level irrigation network upon the unification of the cities of Lagaš into a single state (see above [13]).

Bibliography

- ATU 3
 See Englund and Nissen 1993.
 AWAB
 See Selz 1996.
 AWAS
 See Selz 1993b.
 AWEL
 See Selz 1989.
 AWL
 See Bauer 1972.
 BFE
 See Krebernik 1984.
 BiMes. 3
 See Biggs 1976.
 BM
 British Museum London.
 CDLI
 Cuneiform Digital Library Initiative.
 <<http://cdli.ucla.edu/>>.
 CUSAS 14
 See Monaco 2011.
 CUSAS 33
 See Notizia and Visicato 2016.
 DAS
 See Lafont 1985.
 DP
 See Fuÿe 1908–1920.
 FAOS 5
 See Steible 1982.
 HSM
 Harvard Semitic Museum.
 MEE 3
 See Pettinato 1981.
 MSL 4
 See Landsberger et al. 1956.
 MSL 7
 See Landsberger 1959.
 MSL 13
 See Civil, Güterbock, et al. 1971.
 MSL 14
 See Civil, Green, and Lambert 1979.
 MSL 16
 See Finkel and Civil 1982.
 MSL SS 1
 See Civil, Gurney, and Kennedy 1986.
 MSVO 1
 See Englund and Grégoire 1991.
 MVN 3
 See Owen 1975.
 MVN 14
 See Yıldız, Waetzoldt, and Renner 1988.
 MVN 21
 See Koslova 2000.
 Nik. 1
 See Nikolskij 1908.
 RIM E1
 See Frayne 2008.
 RTC
 See Thureau-Dangin 1903.
 SF
 See Deimel 1923.
 STH 1
 See Hussey 1912.
 TPTS 1
 See Sigrist 1990.
 TSA
 See de Genouillac 1909.
 TSS
 See Jestin 1937.
 UET 2
 See Burrows 1935.
 UTI 3
 See Gomi and Yıldız 1993.
 UTI 4
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