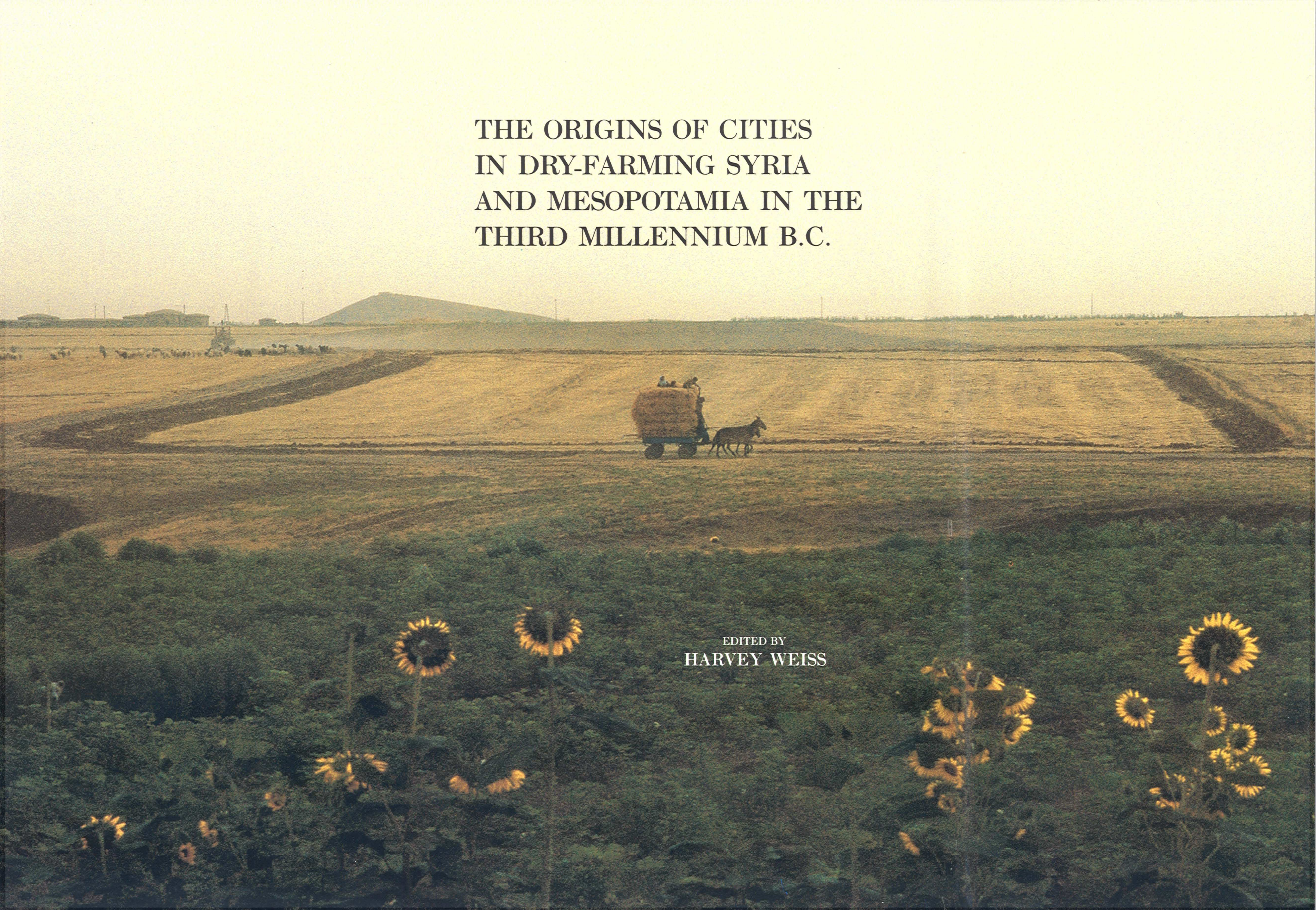
THE ORIGINS OF CITIES IN DRY-FARMING SYRIA AND MESOPOTAMIA IN THE THIRD MILLENNIUM B.C.

EDITED BY

HARVEY WEISS



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The mid-third millennium is marked by unprecedented urban growth from Egypt and the Levantine coast to the Iranian plateau and the Indus valley. Although urbanization in the southern Mesopotamian alluvium is reasonably well understood, details of the emergence of cities in other regions remain sketchy.

When did cities first appear on the dry-farming plains of Syria and Mesopotamia and what accounts for their development? How might northern urbanization be a response to southern Mesopotamian developments or in what ways might urbanization in the two regions reflect independent social and economic processes?

Recent excavations provide new data that force reconsideration of ancient urbanization within the dry-farming zone along the interior of the Zagros-Taurus arc in Syria and Iraq. The essays in this volume, which grew out of a symposium hosted by the American Schools of Oriental Research in Chicago in December 1984, specifically treat third-millennium urbanization in the dry-farming zones of Syria and Iraq. The contrast of north and south informs each essay, and this focus points to additional issues and problems likely to dominate future archaeological research agendas.

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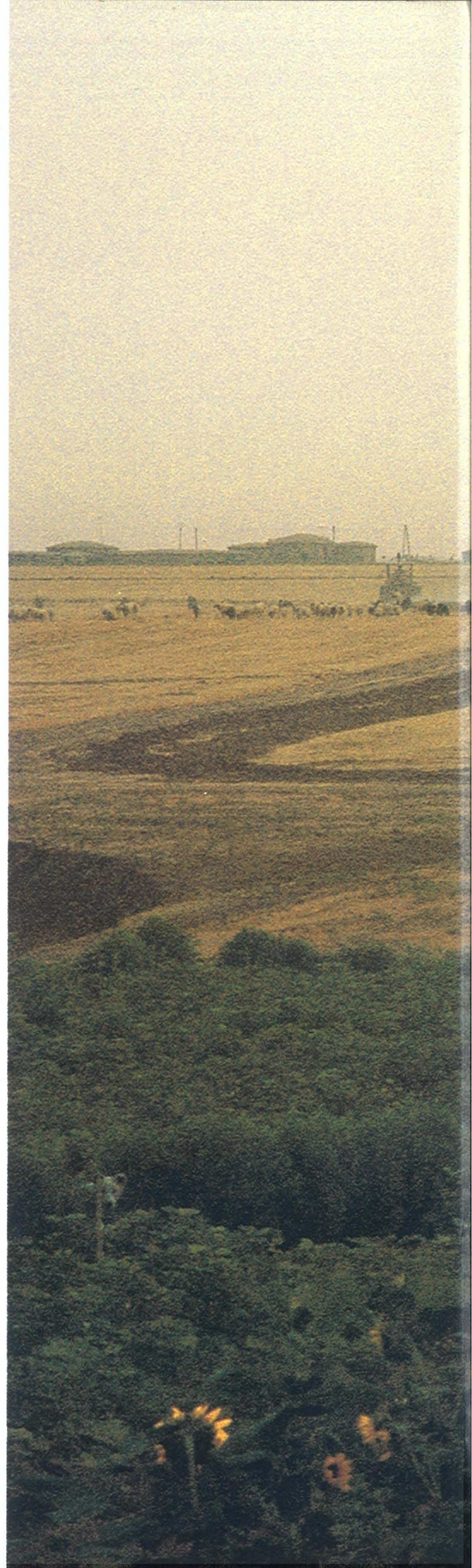


F·I·V·E

THE ORIGINS OF TELL LEILAN AND THE CONQUEST OF SPACE IN THIRD MILLENNIUM MESOPOTAMIA

Harvey Weiss

"I caused plows to be hitched up all over Assyria and thereby piled up more barley than my forefathers."
Tiglath-pileser I, 1114–1076 B.C.
(Grayson 1976:16).

"Space may produce new Worlds."
Paradise Lost I: 650

Modern and Ancient Land Use

The developmental history of the pre-classical Near East marks the third millennium B.C. as the apogee of southern Mesopotamian urbanism (Adams 1982: 138). As a long-term agricultural system these large irrigation agriculture cities literally sowed the seeds of their own destruction (Jacobsen 1982). Within shorter spans of time, however, our understanding of social and economic developments is quite limited. The rise and collapse of the Sargonic dynasty, its organizational rearrangements within southern Mesopotamia (Weiss 1975; Foster 1982), its challenges to distant, dry-farming cities, and the response that these alterations induced, all await explanation in terms of its agricultural mode of production. The subsequent hegemony of the Third Dynasty of Ur already provides documentation for a regional rearrangement of agricultural production, probably a specialization of micro-region production engendered by changes in micro-region fertility, the continued need for high output cereal production, and consequently bulk, water-borne, intercity cereal transport (Sauren 1966; Jones 1976; Steinkeller n.d.).

Thereafter, southern Mesopotamian dominance of lowland Mesopotamia was checked by an increasingly inefficient agricultural system.

The southern kings of the Isin-Larsa and Old Babylonian periods rarely controlled territory beyond the domains of a few cities. Hammurabi of Babylon and a few of the Diyala basin kings are only exceptions to this, while the regional powers of this period seem already to be the fully sedentarized Amorite rulers of the dry-farming northern and northwestern cities, briefly Shubat Enlil, and for at least two hundred years, Yamkhad. By the fifteenth century B.C., the dispersed Hurrian city-states of the Habur Plains had recovered from Hammurabi's conquest and were centralized once again into a dry-farming imperial realm.

The domination of the lowland southern plains by the dry-farming Assyrian coalitions of the north thus continues into the first millennium one of the persistent historical patterns of pre-classical Mesopotamia. Although we have few contemporary measures, the magnitude and potential of ancient dry-farming is suggested by the modern agricultural data for the northern plains. Some of these data have been used to illustrate the fundamental difference between irrigation agriculture and dry-farming today: the limited areas brought under irrigation agriculture, the extensive areas brought under dry-farming cultivation, the one and a half to two times greater yields per unit under irrigation, and the linear correlation between aggregate yield and cultivated area that accounts for the far greater aggregate production of the dry-farming north over the irrigation-agriculture south (Weiss 1983a).[1]

A more detailed look at modern cereal production, including the Habur Plains of northeastern Syria (Qamishli *mantika*), is provided in Figure 1. These data document the high yields and high aggregate productivity of the Habur Plains within the dry-farming plains of northern Mesopotamia, as well as the aggregate yield limitations of southern Mesopotamian irrigation agriculture.[2]

The modern data, however, reflect not only the fundamental relationships of climate, topography, and dry versus irrigation agriculture, but, as well, the economic and technological innovations of the twentieth century. In the south, for instance, we should note the relative amounts of irrigable land dedicated to date palm as opposed to cereal cultivation (Dowson 1921; Great Britain 1944: 457–59), the introduction of cement-lined, self-scouring canals (Buringh 1960; Wirth 1962), reclamation efforts

1 · Quite similar relationships are also known for central Iran where dry-farm wheat production varies between 290 and 360 kg/ha as compared with 850 to 1,900 kg/ha on irrigated land (Bowne-Jones 1968: 571).

2 · Average modern U.S. yields are 1,880 kg/ha for wheat and 2,050 kg/ha for barley (Boyer 1982: 444).

Figure 1: WHEAT AND BARLEY PRODUCTION (1968): NORTHEAST SYRIA, NORTHERN IRAQ, SOUTHERN IRAQ

		WHEAT				BARLEY				WHEAT + BARLEY	
DISTRICT (MANTIKA, QADHA)	AREA (SQ. KMS.)	NET AREA (HAS.)	CULT./AREA (%)	YIELD (10 TONS)	YIELD/HA. (KGS.)	NET AREA (HAS.)	CULT./AREA (%)	YIELD (10 TONS)	YIELD/HA. (KGS.)	NET AREA (HAS.)	YIELD/HA. (KGS.)
DRY FARMING:											
Kamichli	4002	51370	12.8	5353	1042.1	98884	24.7	12749	1289.2	150254	2331.3
Mosul	3504	127875	36.5	10895	852.0	72850	20.7	8223	1128.8	200725	1980.8
Tel Afar	4702	168250	35.8	15196	903.2	63500	13.5	6718	1058.0	231750	1961.2
Sinjar	3961	108275	27.3	8532	797.2	51900	13.1	5410	1041.0	160175	1838.2
Arbil	2955	70475	23.8	6774	961.2	19550	6.6	1972	1008.8	90025	1970.0
Kirkuk	5112	50725	9.9	2713	534.8	17250	3.4	1005	582.4	67975	1117.2
RANGE	3000-5100	51000-168000			535-1042	17000-99000			582-1289	68000-231800	1117-2331
IRRIGATION:											
Massayib	1183	5300	4.5	808	1524.0	10800	9.1	1770	1638.8	16100	3162.8
Hilla	659	12550	19.0	2126	1694.0	16625	25.2	2754	1656.8	29175	2350.8
Diwaniyah	2201	33525	15.2	5363	1599.6	11550	5.2	1821	1576.8	45075	3176.4
RANGE	660-2200	5000-34000			1500-1700	11000-17000			1600-1700	16100-45075	2350-3176

data: 1979 *Syrian Agriculture Sector Assessment Project, Land Use Information Report, Appendix B: Crop Use of Land, Winter Crops, 1968 to 1977*. (United States Department of Agriculture and Michigan State University, Comprehensive Resource Inventory and Evaluation System Project; Washington: U.S.D.A.); 1968 *Annual Abstract of Statistics*. (Republic of Iraq, Ministry of Planning, Central Statistical Organization; Baghdad: al-Zahra Press.)

through canal dredging, the leaching and draining of *sabakh* soils (Buringh 1960), and recent land and marketing reforms (Fernea 1970; Poyck 1962).

In northeastern Syria and northern Iraq similarly recent and obvious alterations of the traditional agricultural landscape include the extension of settlement into the dry-farming Jezireh in the latter half of the nineteenth century (Lewis 1955), the transfer of tractor-plowing and summer pump-irrigation technology to the region under the French and British sponsored intensifications of cash crop (wheat and cotton) production (Haider 1942: 548; Gibert and Fevret 1953; de Vaumas 1956), and speculative tractor-plowed barley cultivation in marginal dry-farming zones (Thalen 1979; Mehner 1983; Weiss 1985b: LANDSAT centerfold).

Indeed, a careful study of agricultural production in Iraq, Iran, and Syria over the past twenty years documents the tractor-generated increase in cultivated land in Iraq as nine-fold, in Iran as seven-fold, and in Syria as three-fold. In spite of this expansion, however, and in spite of the introduction of high-yield hybrid seed, only relatively slim increases in yields per unit have emerged, particularly in dry-farming regions, although in the case of Syria, wheat and barley yields per unit have increased by 70% since 1975 through increased mechanization (Mehner 1983). Suggestive or provocative as these modern agricultural production data may be, therefore, they remain suspect as a source of information about ancient and late prehistoric conditions.

Somewhat more useful are the population estimates and regional agricultural statistics available for pre-modern, late Ottoman agriculture and settlement in the studies of Cuinet (1890–94). The utility of these figures for Anatolia has been generally confirmed, but their reliability for southern Mesopotamia has now been questioned (McCarthy 1979; 1982; 1983). The most useful agricultural data for northern and southern Mesopotamia in the pre-modern period seem to be the Ottoman *sal-names* (McCarthy 1981; 1982). Figure 2 presents, therefore, *vilayet* data for wheat and barley production within dry-farming and irrigation-agriculture regions of Syro-Mesopotamia for the year 1909-10. The plains immediately south of the Taurus, including Qamishli and the dry-farming portions of the Habur Plains, were part of the Diyarbakir *vilayet*; these generated the highest aggregate cereal dry-farming figures while irrigation agriculture presents yield-per-unit figures twice as large. Prior, therefore, to twentieth-century marketing and technological innovations, the dry-farming plains of northern Mesopotamia could have generated aggregate yields considerably greater than those of southern Mesopotamia.

The actual use of the northern plains during the past five thousand years has, however, fluctuated widely. In the mid-nineteenth century, for instance, lands now under tractor-plowed cereal dry-farming were extensive grazing lands for nomadic flocks or pasture lands for town-based

Figure 2

WHEAT AND BARLEY PRODUCTION (1909–1910):
NORTHERN SYRIA, NORTHERN IRAQ, SOUTHERN IRAQ

	WHEAT				BARLEY				WHEAT + BARLEY	
VILAYET	SOWN LAND (DONUMS)	PRODUCTION (KILES)	WGT/KILE (KIYYES)	YIELD/HA. (KGS.)	SOWN LAND (DONUMS)	PRODUCTION (KILES)	WGT/KILE (KIYYES)	YIELD/HA. (KGS.)	NET AREA (HAS.)	YIELD/HA. (KGS.)
DRY FARMING:										
Diyarbakir	1,608,000	7,668,000	24	1594	468,150	2,267,750	18	1214	190,861.2	2808
Mosul	1,295,215	4,784,515	24	1235	744,900	2,787,660	18	938	187,548.5	2173
Aleppo	1,698,747	6,091,483	23	1149	771,516	3,143,493	17	965	227,092.1	2114
IRRIGATION:										
Basra	129,020	284,260	21	2843	78,170	1,026,800	16	2927	19,047.1	5770
Baghdad	118,864	54,974	23	1486	181,063	1,345,638	18	1863	27,572.4	3349

data: McCarthy, Justin, 1982 *The Arab World, Turkey and the Balkans (1878–1914): A Handbook of Historical Statistics*, Boston: Hall. Tables XIV.4, XIV.6

transport animals (Layard 1853: 241–44). In the mid-nineteenth century B.C., much as today, extensive cultivated tracts under urban control were seasonally utilized by nomadic herdsmen from the Euphrates (Kupper 1957; Matthews 1978; Wirth 1971: Karte 11).

A third variation on northern land use is exemplified by the fourth through seventh century experience on the Habur plains when Nisibin, which linked Edessa and Adiabene on the silk route, marked the *limes* between Roman and Sassanian territory (Morony 1984: 130, fig. 5; Segal 1070: 143–45). Christian control of "Beit Arbayeh," the area including Nisibin, Sinjarat, and Balat, was centered around the monastery of Mar Mattai near Nineveh and the monasteries near Nisibin. The countryside around Nisibin was, however, dominated by nomads to the extent that it was labelled "Nisibin of Arabia" (Sturm 1936: 756). By the seventh century, the almost continuous frontier warfare had turned control of the countryside over to at least three groups of nomadic pastoralists: firstly, the "petit parcours" Qadishayeh nomads, with their centers around Sinjar, who worshipped the martyr Abd al-Masih; secondly, the Tayyaye, or Arab Christians of the Syriac literature, who camped around Nisibin in the summer and returned south in the fall-winter, and thirdly, the Tou'aye, Arab Christians occupying the plains south of the Tur Abdin. During this period dry-farming crop failure due to inter-annual rain variability could deprive pastoralists of post-harvest grazing lands, force them to prey upon village supplies, and even cause the bishop of Nisibin to refrain from departing for a religious convocation:

> "... car voici deux années successives que nous sommes affligés d'une disette de pluie et d'un manque des choses necessaires. La foule des tribus du Sud s'y est rassemblée, et, à cause de la multitude de ces gens et de leur bêtes, ils ont detruit et devasté les villages de la plaine et de la montagne; ils ont osé piller et capturer bêtes et gens, même dans la territoire des Roums. Une nombreuse armée des roums s'assembla et vint sur la frontière avec les Tayyaye leur sujets; ils demandaient satisfaction pour ce qu'avaient fait dans leur pays les Tou'aye, sujets des Perses. . . . À ce sujet et à cause de cela, le roi des rois a ordonné au roi des Tayyaya et au *marzaban* du Beit Aramaye de venir ici; et le chef des Roums, avec tous leur soldats et leur Tayyaye sont fixés sur la frontière . . . " (Charles 1936: 72–75).

Modern and late antique conditions aside, however, it remains to be determined to what extent, if any, irrigation agriculture might have been utilized in late prehistoric and early historic times on the lowland plains of Mesopotamia where dry-farming is possible, perhaps even as "supplemental" irrigation (van Laere 1980). There is still, in fact, considerable ambiguity as to the actual rainfall values, mean and variance, that allow for dry-farming on the northern plains (cf. Oates and Oates 1976). Figure 3

Figure 3
MODERN RAINFALL DATA

CITY	MEAN ANNUAL RAINFALL	INTERANNUAL VARIABILITY (%)	NUMBER OF YEARS' DATA
Aleppo	364[1,2]	35[1]	1937–1967[2]
Hama	358[1]; 343[2]	28[1]	1937–1967[2]
Qamishli	430[1]; 435[2]	34[1]	1931–1960[1]; 1952–1966[2]
Mosul	394[1]; 390[3]; 382[5]	29[1]	1941–1970[3]; 1937–1952[5]
Sinjar	403[3]	30[1]	1941–1970[3]
Tel Afar	337[4]		1939–1958[4]
Erbil	444[1]; 494[4]; 518[5]	29[1]	1935–1958[4]; 1937–1952[5]
Kirkuk	377[1]; 374[3]	43[1]	1941–1970[3]
Baghdad	151[1]; 147[3]; 149[4]	52[1]	1941–1970[3]
Diwaniyah	127[1]; 119[3]; 116[4]	46[1]	1941–1970[3]; 1929–1958[4]
Nasariyah	126[1]; 112[3]; 121[4]	40[1]	1941–1970[3]; 1940–1958[4]

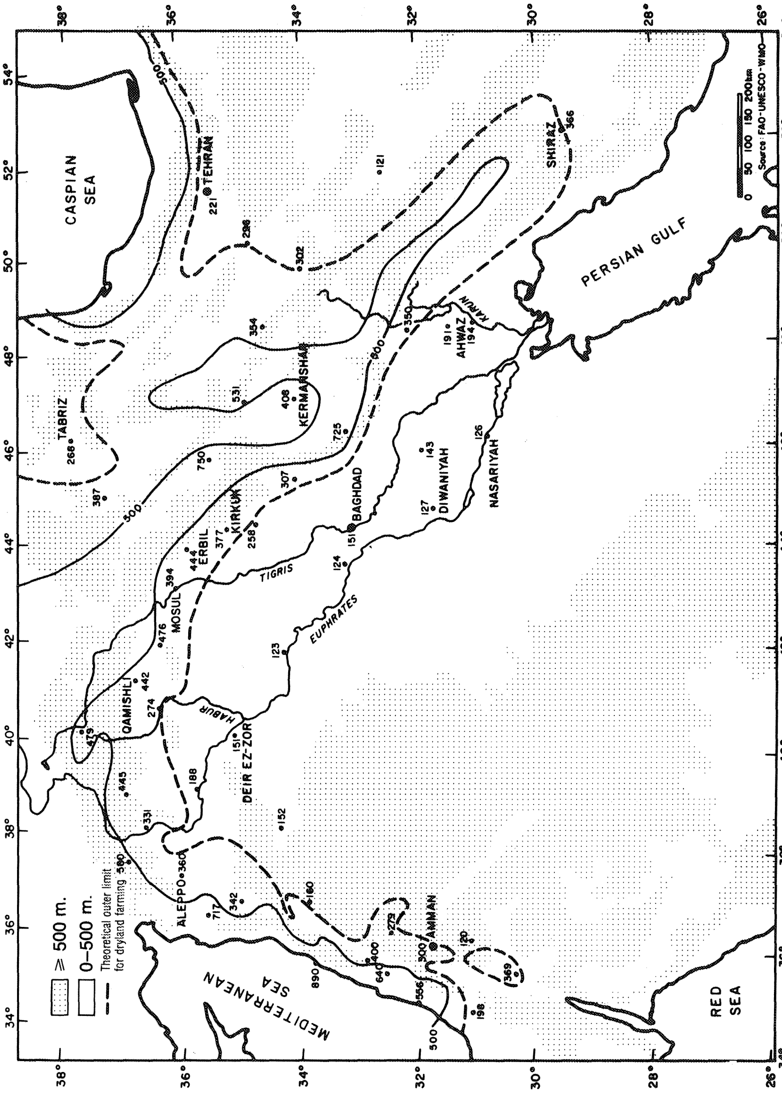
[1]de Brichambaut and Wallén: 36. [2]Wirth 1971: 451. [3]UNESCO 1975: 20. [4]Oates and Oates 1976: 110. [5]Buringh 1960: 44.

presents a selection of modern rainfall data, while Figures 4 and 5 illustrate the region-wide limits to dry-farming and the range of inter-annual rainfall variability as plotted in de Brichambaut and Wallén 1963: figures 1 and 2. The following summary statement is a useful guideline:

> "... it seems possible to conclude, by entering a curve which separates stations where dry-land farming is possible from those where it is not, that an amount of 240 mm of mean annual rainfall with a relative inter-annual variability of 37 per cent would be the normal minimum requirement for regular dry-land farming in the region.... In the semi-arid parts of northern Iraq—on the slopes of the Zagros—the variability is much higher than the normal which means that a considerably higher annual rainfall is necessary in these regions to allow for regular dry-land farming than in more normal regions, such as in the relatively homogenous region (called the "Fertile Cresent") stretching from Hama in the west to the Mosul area in the east or in Azerbaidjan. Allowing for failure of the yield due to insufficient rain in two years out of ten, and by studying the probability conditions for receiving various amounts of rainfall in individual years in relation to the average conditions, it was found that the minimum amount possible in an individual year to allow for dry-land farming is different in various parts of the region ... 180 mm in the area of regular rainfall in Jordan, south-western Syria and the "Fertile Cresent," ... northern and central Iraq and south of the "Fertile Cresent" ... 180 mm despite the higher evapotranspiration, because the winter crop season is shorter.... " (de Brichambaut and Wallén 1963: 10).

Assuming an essentially stable post-Pleistocene climate throughout the region, the questions that remain about agricultural practices relate then

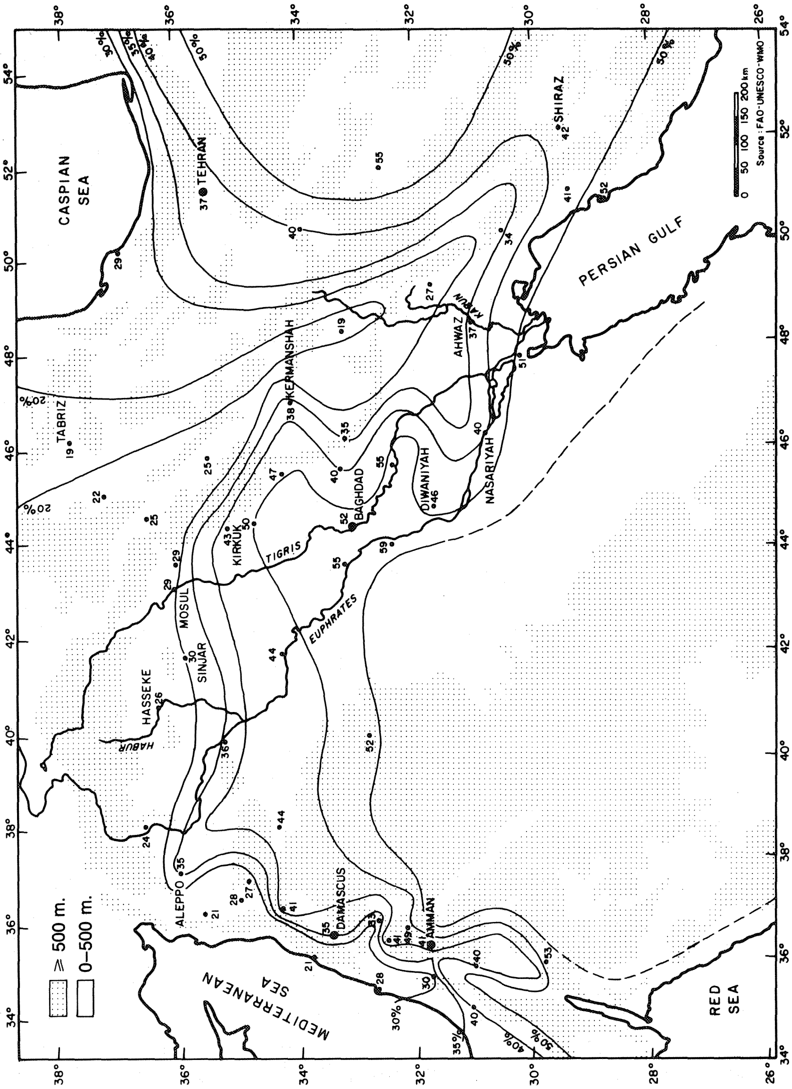
Figure 4: MEAN ANNUAL RAINFALL
AND LIMITS FOR REGULAR DRYLAND FARMING



not to the natural constraints on dry farming, but to the cultural practice itself. Under what conditions, if any, might more labor-intensive practices, such as irrigation agriculture, have been employed to generate still larger yields?

Only a few years ago we might have turned to the archaeo-botanical

Figure 5: RELATIVE INTERANNUAL VARIABILITY
OF ANNUAL RAINFALL



remains themselves for part of the answers to such questions, but the floral species as well as their metric characteristics that might discriminate rain-fed from irrigation agriculture still remain to be determined for the semi-arid Near East (Weiss 1977). Although it is often assumed that irrigation was practiced in, for instance, Khuzistan as early as the Ubaid period, one region where archaeological research has been concentrated over the past twenty years, it remains to be determined just when, if ever, prior to the Old Babylonian period (Stol 1980: 361), irrigation was used there. The early analysis by Adams (1962) marked the introduction of irrigation in the middle of the Susiana sequence by the apparent linear alignment of village sites; but the more recent chronological readjustments of previously vague ceramic indicators makes this seem less likely, while we now know that dry-farming across the northern Khuzistan plain, which receives between 300 and 400 mm. rainfall, has certainly been the traditional practice (Ehlers 1975; Goodell 1975). South of Susa, and prior to the Sassanian period, the downcut Karkheh River could hardly have been used for irrigation; only within the past fifty years have gas-driven pumps been able to lift the water from the river, while gravity-flow irrigation has only been possible since the completion of the Susangird dam in 1954 (Ridder 1973; Kirkby 1977).

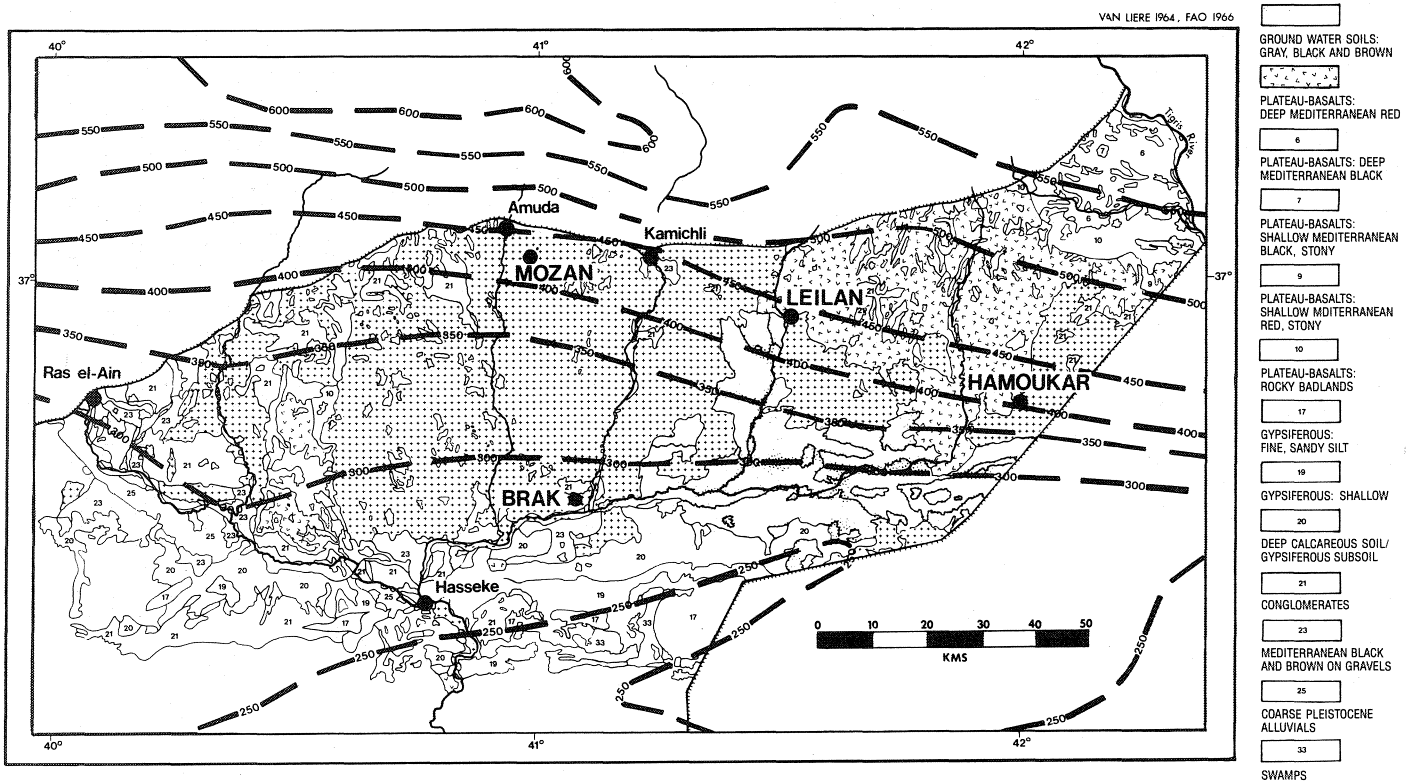
Irrigation Agriculture in Northern Mesopotamia

In the absence of reliable archaeological data, we can search the documentary record for evidence of irrigation use within regions "theoretically" available for dry farming. The earliest evidence for northern Mesopotamia may be Ilushuma's deployment of spring sources for city and field use at Aššur, which receives only 250 mm of rainfall per annum (Simonet 1977). There is no evidence earlier than the first millennium for the irrigation of the Mosul and Erbil plains (Laessoe 1966; Reade 1978).

Some uncertainty, however, surrounds the agroclimatic data from Tell al-Rimah and its early second millennium occupation. Rimah is situated 15 km south of Tel Afar, capital of the largest dry-farming region in Iraq, the region with the highest aggregate dry-farming cereal production, and the region whose cereal yield per unit is, with Mosul and Erbil, the highest for Iraqi dry-farming (Weiss 1983a: fig. 3). The region, however, has been described as agriculturally marginal (Oates 1976: xvi; Dalley 1984: 22). On one map the site is situated between the 200 and 300 mm isohyets (J. Oates 1982: fig. 18.7), but on others it is placed within the 300–400 mm isohyet (J. Oates 1982: fig. 18.8) Oates and Oates (1976: 10) list a mean of 337 mm for nineteen years of rainfall at Tel Afar, while el-Fakhry (1980: 69) lists its rainfall as 411 mm.

The essence of the matter here, apparently, is the amount of interannual variability at Tel Afar and Tell al-Rimah. The Oates "have observed a partial crop failure in the land southwest of the town in two out of five years. Approaching the steppe, agricultural activity may be even more precarious, although yields may be outstanding in a wet year" (Oates and

Figure 6: SOIL TYPES AND MEAN ANNUAL RAINFALL
HABUR RIVER DRAINAGE



Oates 1976: 111). Precise station records from which to determine interannual variability, by any method (UNESCO 1975: 25–29), are not available to me for Tell Afar, but Tell Afar suffered no more than Mosul from the limited precipitation in 1964 and 1966.

From the Rimah archive of the Old Babylonian period four letters suggest that some kind of irrigation was occasionally practiced in this region (Dalley et al. 1976: letters 291, 295, 296, 297). There is no mention within the archive of canals (*muballitum, ḫirītu*), canal workers, dikes, or barrages (*erretu*) such as appear, for instance, in the contemporary Mari archive, nor is there any record of the annual spring swelling and overflow of a river or streams (e.g., *mīlu ša Habur*, *ARM* XIV 12–15, 18). This may be a function of sample size: Mari has yielded more that 20,000 tablets, Rimah "ca. 200 letters and administrative records" (Dalley 1984: 26). The likely explanation, however, is contained within Rimah letter 16, referring to sacrifices made to deities to obtain rain, and suggesting that rainfall remained the critical agricultural variable (Gallery 1981: 348). Such irrigation as there was around second millennium Rimah may only have been run-off from adjacent wadis, and the springs and streams that accounted for the luxuriance of the region in the mid-nineteenth century A.D. (Layard 1853: 241–44).

The only "canal" known for the Habur Plains during this period is the *ḫirītu* at Kahat, which featured the desirable *giritu* fish (*ARM* I: 139; Salvini 1983: 33). That the "big fish" of Shubat Enlil, Ekallatum, Mari, and Babylon were favored at Rimah (letter 42) suggests that the Kahat canal was a relatively small pond or moat fed off the Jagjagh.

The available data, therefore, suggest that in the second millennium B.C. the potentially dry-farming regions practiced dry-farming. The farming is not likely to have varied much from contemporary traditional practices, although, of course, the social organization of production was totally different in late prehistoric and early historic times.

Dry-farming on the Habur Plains today is most productive above the 300 mm isohyet across "Mediterranean" brown and red soils: calcareous "self-mulching" montmorillonite clays, sticky when wet and forming wide, deep cracks when dry. Figure 6 indicates the distribution of soil types and mean annual rainfall across the Habur Plains. Rotations on non-irrigated land are basically wheat/bare fallow/wheat/bare fallow, to insure high production (see Figure 7). The cereals are local bread wheats, some Mexican varieties, barley and occasionally durum wheats. Farm size is less than 100 hectares per working male. Large flocks of sheep are brought into the region from the southern steppe after the early summer cereal harvest and remain until the remaining stubble is plowed, or burned (van Liere 1964; FAO 1966; Gallacher 1980: 51; and personal observations).

Figure 7
CROP ROTATION EXPERIMENT AT QAMISHLI 1966–1968
(MEAN RAINFALL DURING EXPERIMENT 445 MM.)

CROP	3-YEAR MEAN, KG/HA
wheat, continuous	780
wheat after fallow	1540
wheat after lentils	1510
wheat after vetches	1740
lentils after wheat	1240

Source: Loizides 1980: table 16.

Third Millennium Urbanization on the Habur Plains

Excavations at Tell Leilan in 1979, 1980, and 1982, have shown that the early second millennium city was preceded by a 90 hectare settlement whose city wall was constructed ca. 2500 B.C. The date for the initial expansion of settlement at Tell Leilan from a town of no more than 15 hectares to a 90-hectare, walled city is derived from the relative chronology of ceramic assemblages from Leilan Operations 1, 57F02 and 2, Tell Taya and Tell Brak, as well as Tell Leilan radiocarbon dates (see Figure 8; Weiss 1981/2, 1983a, 1985b; Schwartz 1982).

Walled cities of the same date also appear on the dry-farming Habur and Sinjar plains at such sites as Tell Mozan, Hamoukar, Khoshi, Hadhail, and Taya (Weiss 1985a). The vaulted tombs of Nineveh, too well-preserved to have been surface structures, were buried into late Uruk period deposits, therefore probably date to the early or mid-third millennium, and suggest a walled city at Nineveh for this period (Campbell Thompson and Hamilton: plate xc; Perkins 1949: 179; Weiss 1985c). The existence of a Sargonic garrison at Nuzi also suggests the prior existence of local powers. It seems quite likely, in fact, that each of the extensive north Mesopotamian plains that receive more than 300 millimeters of rain per annum were dominated by large, walled cities in the mid-third millennium B.C. Further to the west, in the marginal dry-farming areas of the northern Balikh and Habur drainages, Tell Chuera and a line of smaller, walled cities defined a broad arc of third millennium settlement (van Liere 1963) that culminated in the high-rainfall, *terra rosa* plains of Aleppo and the Orontes River (van Liere 1960/61: 26–34). In the mid-third millennium, Ebla was clearly a capital city for the Aleppo region while large cities flourished along the Orontes at Hama and quite possibly Qatna. In the second millennium, this rich agricultural district was controlled by the kingdom of Yamkhad from Halab.

Figure 8
CHRONOLOGICAL RELATIONSHIPS:
TELL LEILAN, TELL BRAK, AND TELL TAYA

B.C. ca.	TELL LEILAN					TELL BRAK	TELL TAYA
	Pd.	Op 1	Acrop NE	57F02	Op 2	CH, ST and other soundings	Acropolis
1700							
1800	I	1–12	BL I–III	1–3	1–2	Habur ware	III–IV
1900							
2000		?	?	?	?	1 "Ur III"	V–VI
2100		13		4	3	2 "interregnum"	VII
2200	II	14				3–4 Naram-Sin + Late Agade	destruction
2300		15				5 reconstruction	VIII
2400						destruction, levelling	destruction
2500	——city wall——16——9 city wall					6 "late ED III" bldg	IX
2600	gap [= ? Moh. Arab M-R]				virgin soil		
2700							
2800	IIIc	16–20				[levelling]	Ninevite V
2900							[surface]
3000	IIIb	21–34					
3100							
3200	IIIa	35–40				Ninevite V	
3300							
3400	IV	41–44				Late Uruk	
3500							
3600							
3700		45					
3800	V					Early Uruk	
3900							
4000		52					
4100							
4200		52a					
4300	VIb						
4400		57					
4500							
4600		58					
4700	VIa						
4800		61				Ubaid	
4900		·					
5000		·					
5100		·					
5200		·					
5300		·					
5400		·				Halaf	
5500		·					
		·					

Only the eastern Balikh drainage area (Tell Chuera) and the western Habur drainage area are distinctive because of their location in a region where dry-farming is quite difficult, but nevertheless practiced, today. The situation of these settlements led van Liere (1963: 114–15) to suggest that perhaps they were not densely occupied cities, but rather large, walled, protective, encampments for pastoralists and their flocks. This notion seems inherently difficult to accept, although there is no lack of examples of large, walled cities only partially occupied in the early or mid-third millennium (e.g., Malyan, Sumner 1985). Nevertheless, it is clear from the detailed survey of the exceptional surface remains at Tell Taya that the walled cities of the dry-farming north were occupied cities (Reade 1968). The more recent suggestion that these cities were only extensive sheepfolds, like those in the drier, eastern Balikh/western Habur drainage (Oates 1976: xvi), is hardly compelling (Weiss 1985a). In any case, arguments for the amount of settlement within the walls of Tell al-Rimah, which are founded upon the topography of its lower town area, should derive from more detail than Lloyd's 1938 sketch map of the site.

In his brilliant discussion of Mesopotamian urbanism, Oppenheim (1977: 130–33) had already called attention to the poorly known cities of the north, with their lower towns (*adaššu*) and citadels (*kerḫu*). This documentation does not suggest the use of these settlements as protective pastoral encampments. Additionally, as Oppenheim noted, the term *kerḫu*, of non-Akkadian, possibly Hurrian origin, hints at a third millennium origin for these settlements, just as the second millennium "langraum" temple at Leilan may harken back to third millennium exemplars in the region (Weiss 1983b).

Large, walled, occupied cities were, it seems, distributed across the rain-fed plains of northern Mesopotamia by ca. 2500 B.C. The problem of their origins remains to be treated.

Eannatum and Subir

The date of the circumvallation of Tell Leilan, and the date of the contemporaneous ceramic assemblages and settlements at other large sites (Mozan, Hamoukar, Nineveh, Taya, Hadhail, Khoshi) is crucial evidence for understanding their emergence as cities. If these cities antedate the well-documented Sargonic incursions into this region, it is possible to understand their development, at least in part, as an endogenous process. If, however, these cities did not appear until after the start of mid-third-millennium incursions into the region, then these cities might represent the agglomeration and circumvallation of regional populations as a protective or defensive effort against southern attacks.

In the immediately pre-Sargonic period, Eannatum of "Lagash" recorded in one case the defeat of "Elam, Subir, and . . . " and in another case the defeat of "Elam, Subir, and Urua." These two inscriptions, previously designated *Ean.* 1 (rev. 6: 10–11) and *Ean.* 2 (6: 17–18) have now been reedited (Steible 1982: 143, 150), and contrary to previous understandings (e.g., Gadd 1971: 117; Sollberger and Kupper 1971: 55, 59) "describe the defeat of enemies who invaded the territory of Lagash and not expeditions of the Sumerian king to foreign territories" (P. Michalowski, this volume).

If Subir is the Habur Plains, as the term has been understood for the past fifty years, then Eannatum's inscriptions, which are contemporary monumental records, suggest that in the late Early Dynastic period Subir may have been as centralized, powerful, and capable of deploying an army at great distance as Elam and Mari, the two territorial states with which the Habur Plains alternated allegiances in the second millennium. Apart from the circumvallation of Leilan and other sites on the Habur Plains during this period, the "late ED III" "public" building at Tell Brak, the southern "gateway" onto the Habur Plains, makes such an expedition quite credible (Oates 1982). The Early Dynastic equivalence of Subarian and "slave" also provides a historical context for these activities (Gelb 1982).

In the Sargonic period, Naram-Sin's fortress at Brak, built upon and against the "late ED III" building, attests to the reality of southern involvement with the Plains. This building, however, provides no evidence for the identification of the region with the Subir that Naram-Sin describes as under the leadership of *ensi*s (P. Michalowski, this volume, footnote 9).

The earliest indication that Subir is or includes the Habur Plains is the Naram-Sin year date recently published by Foster (1982). Contemporaneous documentation for Subarian ration workers, probably prisoners-of-war, appears at Nippur (Westenholz 1975: 64). Probably only slightly later, are the inscriptions of Atal-shen of Urkish and Tish-atal of Urkish and Nawar (Wilhelm 1982: 12–16) Accepting the long-standing equation of Hurrian with Subarian, the indisputable location of Urkish on the Habur Plains places at least part of the Hurrian rule of Subir in the same place.

In the Ur III period, the same locus for Subir is more probable than a "trans-Tigridian" location. Simurrum "in/of Subir" remains unlocated, not necessarily a trans-Tigridian toponym, while most other "foreign" cities associated with Hurrian rulership during the Ur III period are located on or around the Habur Plains (Mardaman, Nawar, Urkish, possibly Simanum), Mosul (Nineveh), and Erbil (Urbilum).

In the Old Babylonian period the term Subartu refers to the Habur Plains, the "upper country," of the Mari archive (Finkelstein 1955), just as the year dates of the Hammurabi dynasty also refer to the Habur Plains, e.g., Hammurabi 32, the campaigns of Hammurabi himself upon the destruction of Mari and cities of Subartu (Weiss 1985b).[3]

3 · See Birot 1978: 188–89 for Mari period Subareans, and Anbar 1978: 210 for Rimah letter 18.

Read in this fashion, the historical references to Subir/Subartu have a very specific geopolitical referent, just as references to the Ur III *ensis* of the territory, e.g., Zinnum, were real personages to whom gifts were dispatched (Owen 1981: 268; Whiting n.d.). Subir and Subartu could serve as metaphors in literary contexts because they were real, much as Shakespeare could write of Aleppo, which few of his countrymen had seen, which some had heard of indirectly and which most only understood to be "foreign."[4]

Eannatum's Subir is then a Habur Plains and/or Mosul and Erbil Plains power that emerged to challenge late Early Dynastic Lagash. The possibility therefore exists that urbanization on the Habur Plains antedates the dry-farming urbanization at Ebla (Archi 1981: 183).

With these hints at an endogenous process available from the southern record, it remains to explore the possible sources for such developments, the range of variables that defined the social and economic, apart from geographic, arena within which they engendered "dry-farming cities," and the range of possible values that may eventually be defined or refined to permit additional clarifications of these processes.

Preliminary Survey of the Tell Leilan Sustaining Area

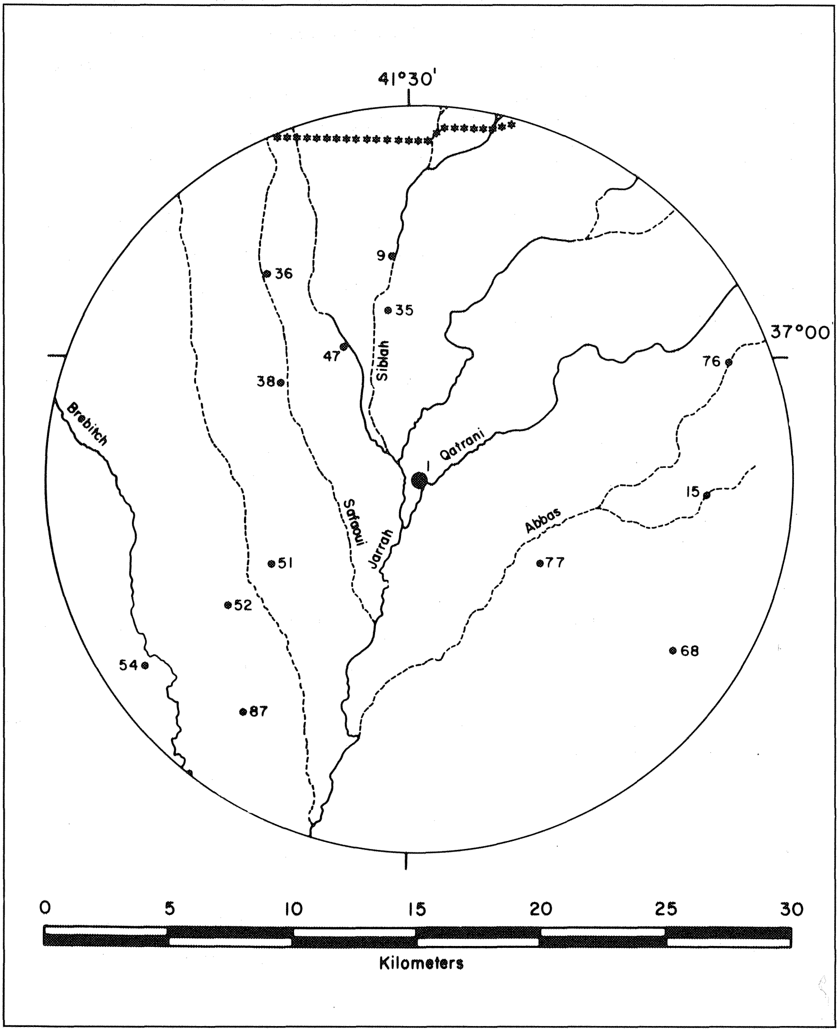
A survey of the immediate sustaining area of Tell Leilan was undertaken in 1984.[5] For preliminary purposes the survey area was restricted to the 707 square kilometer region defined by a circle with a radius of 15 kilometers.

Within this region surface evidence is available for occupation from at least as early as the Halaf period and through the remainder of the sequence already defined at Tell Leilan Operation 1 (Schwartz 1982). The pattern of settlement for Leilan periods III (ca. 3300–2500 B.C.), II (ca. 2500–1900 B.C.), and I (ca. 1900–1750 B.C.) will be examined here from a

4 · "Her husband's to Aleppo gone, master o' th' Tiger;
But in a sieve I'll thither sail,
And, like a rat without a tail,
I'll do, I'll do, and I'll do." *Macbeth* I.iii. 7–10.
cf. *Othello* V.ii. 352.

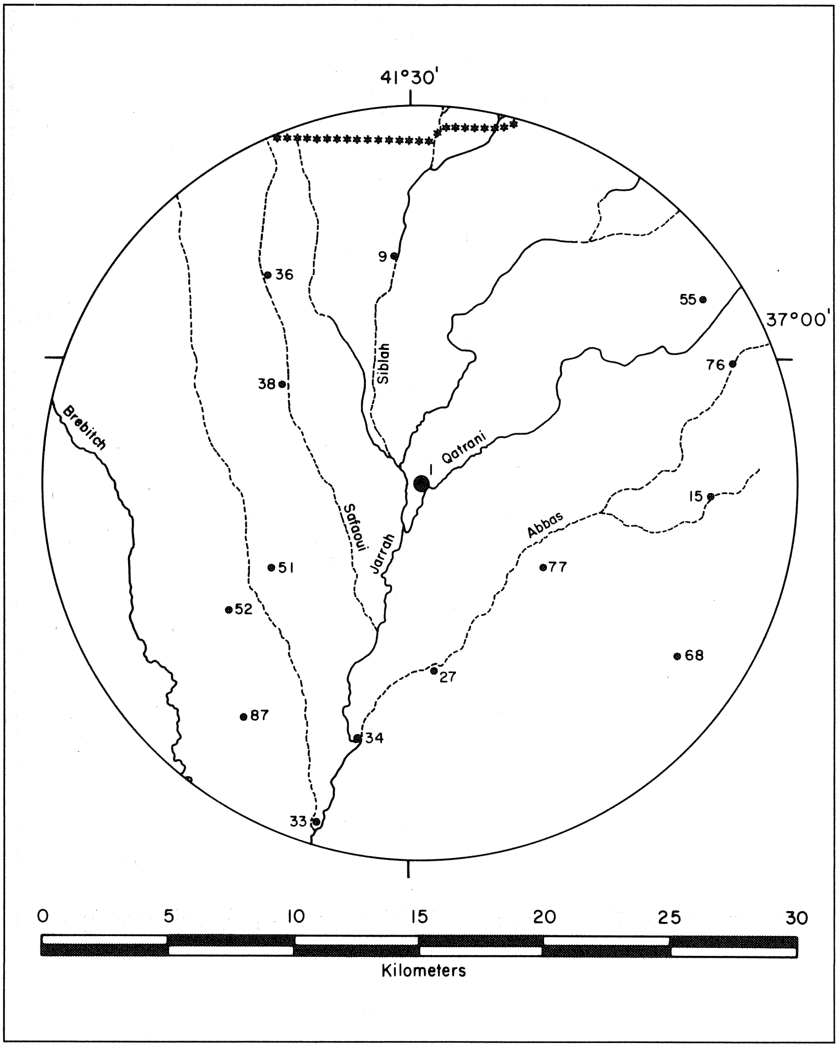
5 · The survey was conducted from July 4–July 23. Participants were the author, Mohammed Muslim of the Directorate-General of Antiquities, Aleppo, and Charles Forrest, III. Sites were located visually, by driving all passable tracks and then walking to sites, assisted by the very useful earlier survey of the region by Diederik Meijer (1984), the United States Defense Mapping Agency maps at 1:250,000 (December 1974), which are of poor

Figure 9: TELL LEILAN SURVEY 1984
Leilan Period III



quality, and the French Institut Géographique National (1950) Levant 1:200,000 Qamichliye-Sinjar sheet, which locates most visible sites. Site sizes were estimated by pacing. Sherd pick-up was "grab," "comprehensive," and not probabilistic. Funding was provided by Yale University and The Metropolitan Museum of Art, New York. The collections are now stored in the Tell Leilan Project Laboratory, Yale University. The cooperation and gracious assistance provided by the Directorate-General of Antiquities, Damascus, is warmly acknowledged.

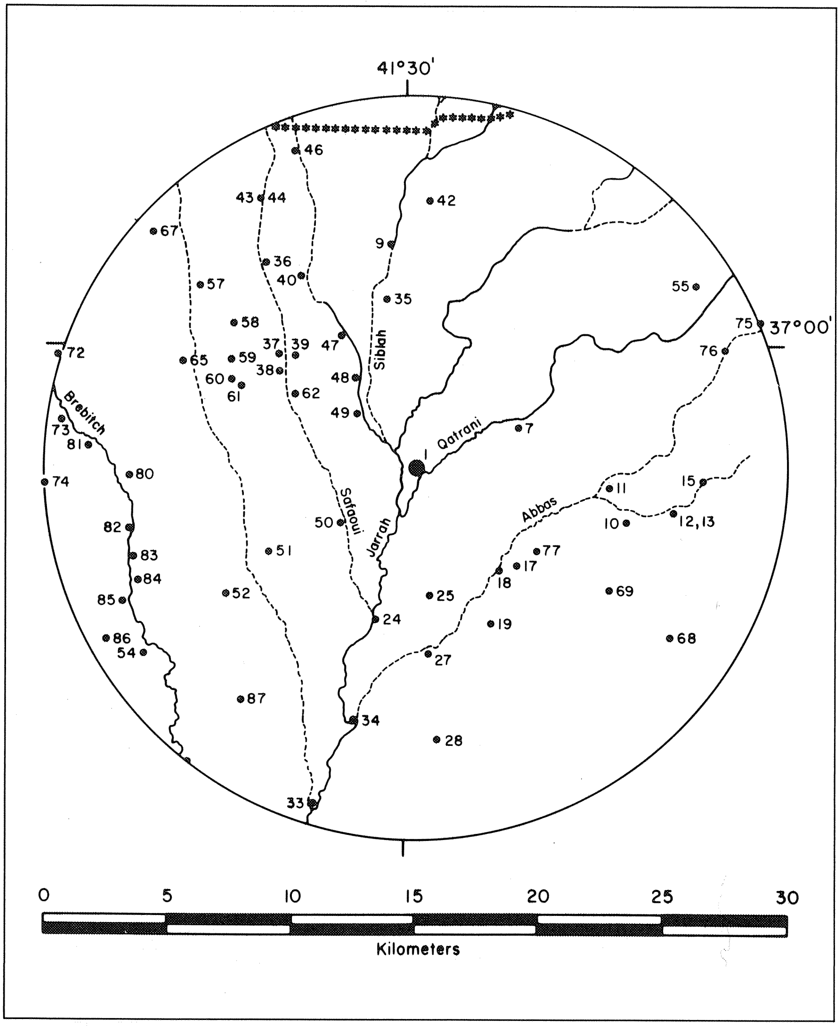
Figure 10: TELL LEILAN SURVEY 1984
Leilan Period II



few basic perspectives in an attempt to understand more of the processes whereby Tell Leilan attained urban stature.

On each of the three distributional maps, Figures 9, 10, 11, the persistent location of settlements adjacent to modern water courses is immediately apparent. These modern courses are deeply cut wadis and streams, many recently blocked by a Turkish dam creating irrigated fields along the Turkish side of the border (Weiss 1985b: LANDSAT centerfold).

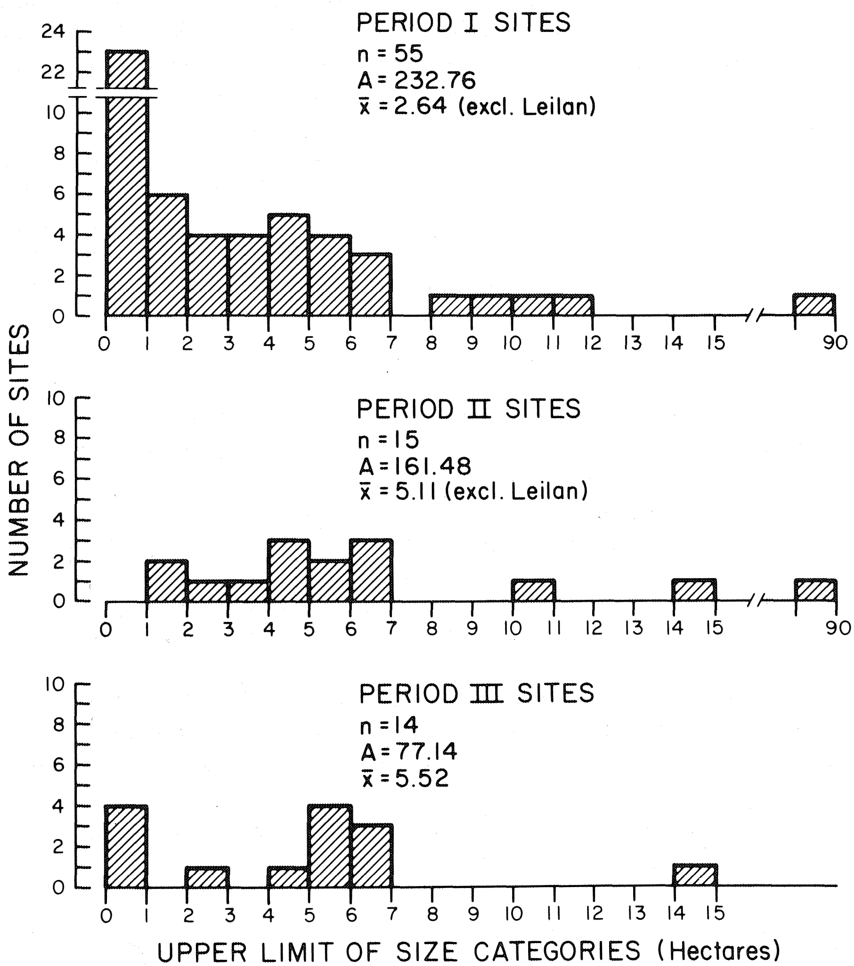
Figure 11: TELL LEILAN SURVEY 1984
Leilan Period I



These courses have, apparently, not altered much at all over the past four thousand years, an observation also made by Kate Fielden in her survey of sites along the Jagjagh (1981). In spite of the annual rainfall, settlements favored a river or stream location during the fifth through second millennia B.C.

Figure 12 presents the distribution of site sizes and frequencies for Periods III–I. Note that for Periods III and II the distributions are appreciably similar; that is, an explanation for Leilan's six-fold growth

Figure 12: TELL LEILAN SURVEY 1984



from Period III to Period II is not available from a simple examination of site frequencies or cumulative hectares of settlement. There is nothing immediately apparent within this data that argues for an in-migration into the region, for the redistribution of a pre-existent population, or for any pattern other than the low rate of pre-industrial population growth that is often masked by the well-known ambiguities of Near Eastern archaeological settlement pattern data (Weiss 1975; 1977; Adams 1982: 47–51). Neither do the data allow for the conclusion that Leilan "grew at the expense of the surrounding countryside," like fourth-third millennium

Warka (Adams and Nissen 1971: 17) or sixteenth century A.D. Konya (Faroqhi 1984: 216). In the case of the Leilan data, however, we are still, of course, dealing in a preliminary fashion with ceramic periods that are in some cases of both varying and considerable length. The survey data will need to be supplemented prior to any attempt to assign sites or site components to stratigraphically defined sub-periods.

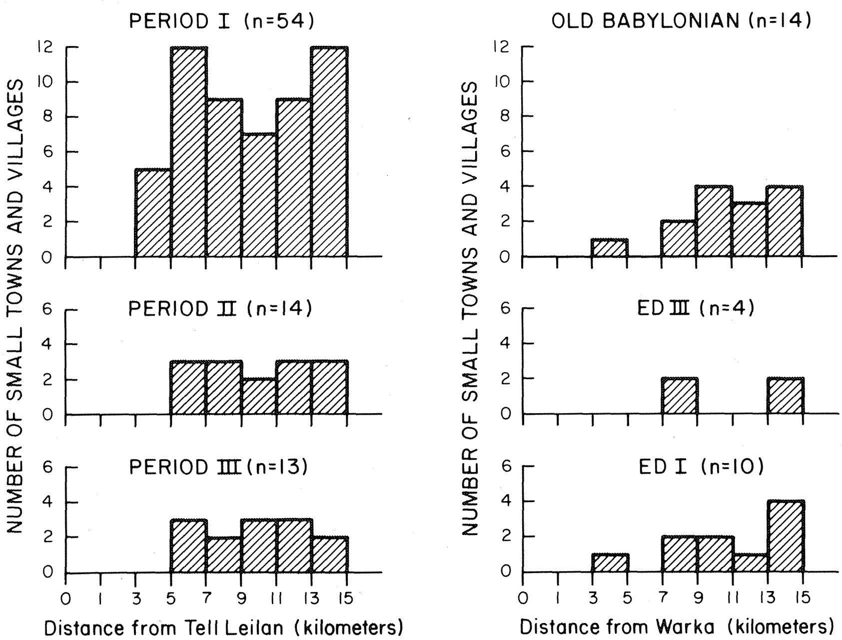
While it is somewhat surprising to note the similarity of distributions for Periods III and II, it is also surprising to note the differences that do exist between Periods II and I. The same patterns obtain within the sustaining area distributions illustrated in figure 13, which are here compared with Warka region site distributions derived from Adams (1982). The contrast between site distributions for an irrigation-agriculture city and a dry-farming city may help us to understand the forces that each needed to mediate.

The spatial distribution of settlement, regardless of environment, reflects two essential, but conflicting qualities: first, the positive quality, that increases in space represent increases in available resources; and second, the negative quality, that increases in space represent increases in distance to resources. Dense agglomerations of people require extensive sustaining areas (Boserup 1981: 63–92; 1983: 390–92). Northern and southern populations were forced to adapt to this problem in different ways because of the fundamental difference in the characteristics of their agricultural production.

Adams has indicated that when Warka emerged to city status in the Early Dynastic I period, the city comprised some 400 hectares of built-up area. By his calculations this represents a population of 40,000 that would have required 1.5 hectares of cultivable land per person for subsistence. The sustaining area for Warka in the Early Dynastic I period would then represent the land enclosed within a circle of 14 kilometers' radius.

The exceptional size of Warka at this time requires resolution of the space-as-resource and space-as-distance problem. Adams has no ready solution to the problem given the geographical considerations that place four kilometers as a commuting limit to fields (Adams 1982: 87 citing Chisholm 1970: 112, 131). This problem has received considerable attention recently, with new observations suggesting considerably varying ranges for the provisioning of agricultural settlements: in northern Iraq, for instance, seven kilometers has been reported to be an upper limit for village-to-field travel (Oates and Oates 1976: 120), while more extensive and varied field zonation has been recorded in the Aşvan region of Turkey (Hillman 1973: 219–220). Innovative archaeological field work now suggests the complexity of this issue, historically, theoretically and methodologically (Wilkinson 1982), although it may prove difficult to progress beyond the problems of establishing the limits imposed within historically

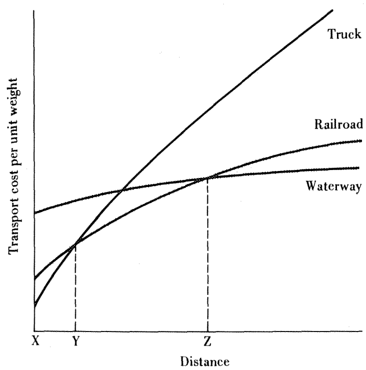
Figure 13: SUSTAINING AREA SITE DISTRIBUTION

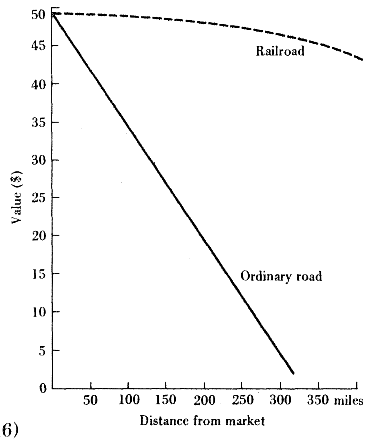


definable modes of production. That is to say, while "isolines of catchment value," computed as yield minus effort, may be computed in the fashion of "potential surfaces" (Hassan 1981; Bayliss-Smith 1984: 106), these remain unconstrained by the social organization of production, which at any given time defines the relative values of both yield and effort. Market, free market, capitalist, or simply "formalist" economics, have little to add to discussions of ancient societies where the essential human input, labor, remains to be defined.[6] Ration-labor, for instance, cannot be evaluated against the market-oriented peasant cultivator; Ricardian economic rent, and certainly locational analyses derived from it, assumes production, labor, and transport values unknown in antiquity.

The problem presented by Early Dynastic I Warka is only accentuated in the Early Dynastic III period when more of the remaining settlements within 15 kilometers of the city were absorbed within it. How then did the Warkans manage to cultivate and harvest the 600 square

6 · Nevertheless, "there seem . . . several flaws in 'Polanyism' as a self-sufficient theory of economic history, principally the absence of a concept of exploitation, an economic analysis based on patterns of allocation rather than relations of production, and the stress on integration at the cost of disregarding conflict and competition" (Cartledge 1983: 6).





(Source: Lloyd and Dicken 1972: figs. 5.7, 5.16)

Figure 14: Idealized transport curves for three transportation media.

Figure 15: Wheat value/market distance for two transportation media.

kilometers of land required by their dense concentration? In the irrigation agriculture regions of the south, canals served as the transport medium that conquered the space-as-distance problem: relative to animal-drawn wheeled transport, water transport of bulk commodities such as grain can represent only one-quarter to one-half the costs in men, animals, and time.

Figures 14 and 15 illustrate the relationship between modern water and land transport in an idealized fashion. When water is the transport medium (figure 14), the greater the distance the greater the transport savings; or, as in figure 15, the market value of cereal grain decreases with distance from market at different rates for different transport media.

Southern Mesopotamian water use, whether river or canal for short- or long-distance transport is, of course, well documented in the cuneiform sources: dozens of boat-type names in Sumerian and Akkadian, categories of load sizes (up to 60 *gur*, or 15 tons, in Ur III and earlier periods), lists of transported goods (mostly cereals), canals distributed through cereal fields, storage depots at quays (e.g., the Ur III Umma month name "[month, in which] the grain is on hand at the harbor"), responsibilities of carriers, are all clearly described (e.g., Sauren 1966: 90–171; Salonen 1942; Rowton 1969; Leemans 1972: 77–85; *CAD* s.v. *elippu*). Even the metaphors for describing a dead or dying city in the Sumerian and Akkadian traditions are canal tow-paths covered with weeds alongside roadways covered with thorn-bushes (e.g., Cooper 1983: 26).[7]

7 · The efficiency of water transport and its role in the genesis of early civilizations in Egypt and India was already discussed by Adam Smith in considerable detail (Smith 1776: I,

In the dry-farming lowland plains of Syria and Iraq, however, local or long-distance water transport was not available for the movement of workers, seed or harvests. The major transport medium in northern Mesopotamia was carts (e.g. at Arraphe; Zaccagnini 1977). A very different solution to the space-as-distance problem was therefore required in the north, just as land tenure in the north has traditionally departed from the systems that have characterized the south (Haider 1942: 171). The left-hand side of figure 13 may reflect this difference.

In Leilan period III, Tell Leilan was no more than 15 hectares in size. We can assume that this represents a population of 1500 persons each requiring three hectares of land for subsistence because we have demonstrated above that dry-farming is only half as productive as irrigation agriculture per unit of cultivation. Leilan period III therefore required an area of 45 square kilometers as a sustaining area or the area enclosed within a circle with a radius of 3.78 kilometers. This may explain why there is no settlement within 5 kilometers of Tell Leilan during this period.

When Leilan suddenly grew to 90 hectares it may have been occupied by 5400 persons to judge from the relative densities of settlement between northern cities and villages.[8] Leilan then would have required a sustaining area with a radius of about 6 kilometers (between 5.86 and 7.18). Beyond that point the dry-farming countryside was dotted with small farming communities, smaller but more densely distributed across the countryside than in the south.

This distribution, apparently, provided the strength of the dry-farming economy of the north: the *dimtu*-type settlements for which we have much descriptive data from Nuzi (Zaccagnini 1979; Fadhil 1972: 41–43; Grosz 1983; Leemans 1982, 1984). *Dimtu*-villages were distributed around *âlu*-cities; within the fields cultivated by these villagers were stables (*kuppatu*), sheep-folds (*tarbaṣu*), and threshing-floors (*magrattu*).

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iii, 3–7). The lectures upon which *The Wealth of Nations* is based were delivered at least as early as 1762, and probably as early as 1752 (Meek 1976: 99). Richard Cantillon, with whose *Essai sur la nature de commerce en général* (1755) Smith was familiar, had noted that "Great Cities are usually built on the seacoast or on the banks of large Rivers for the convenience of transport; because water carriage of the produce and merchandise necessary for the subsistence and comfort of the inhabitants is much cheaper than Carriages and Land Transport" (Cantillon 1755: 22–23). The role of water transport in maintaining the Roman empire is discussed by Finley 1973: 126–28. " . . . even today it costs approximately the same amount to move wheat 32 km by truck, 800 km by railway and 4800 km by sea" (Grigg 1974: 259).

8 · "One possible correction factor facilitating the comparison of Mesopotamian cities with smaller settlements is derived from the probability that only forty to sixty per cent of built-up city mound area was comprised of residential structures" (Weiss 1975: 441). Here we are assuming 60% of the otherwise reasonable estimate of 100 persons per hectare of mounded settlement.

For the early historic period this kind of distribution may have reached its apogee during the Old Babylonian period, or at Tell Leilan during period I. Small-village settlement boomed during this period, a symptom possibly of the intrusive settlement of formerly non-sedentary population and/or a function of the intensification of regional production upon the installation of Shamshi-Adad's imperial power. The differences between Period II and Period I settlement distributions may eventually be understood if we first examine some of the possible explanations for the Period I distribution from the epigraphic record and a consideration of dry-farming land use.

Seizure of the Assyrian capital and the founding of a new capital at Shubat Enlil on the Habur Plains altered both the political and economic structure of northern Mesopotamia, even though little of the preceding structure is well-known. Assyrian royal authority and the imperial aspirations of the fourteenth century apparently were derived from the reign of Shamshi-Adad (Garelli 1982). With his reign, descent from a particular line begins to define legitimacy for royal office (Lambert 1974: 427). New commercial and legal procedures, a new calendrical system, and tighter control over inter-city trade (the *wakil tamkāri*) were also introduced (Larsen 1976: 52–53; Veenhof 1982: 384–85).

Among the few extant texts (apart from the Mari letters) that can be assigned to Shamshi-Adad is the royal inscription on alabaster tablets recovered from the excavations at Aššur (Grayson 1972: 19–21). This inscription includes Shamshi-Adad's boastful description of the Aššur/Enlil temple construction at Aššur (cedar timbers, gold and silver stars upon the doors, lavish wall foundation deposits), and a paragraph establishing agricultural price equivalences:

> When I built the temple of the god Enlil, my lord, the market price in my city, Aššur, was: in the market of my city, Aššur, two *kurru* [ca. 600 liters] of barley could be purchased for one *sheqel* of silver [ca. 8 grams]; 15 *manu* of wool for one *sheqel* of silver; two *seah* of oil for one *sheqel* of silver. (Grayson 1972: 20:127).

Two evaluations of this proclamation have been offered: either the price equivalents are too low, utopian and propagandistic (Grayson 1972: n. 64), or in spite of possibly moral overtones the price equivalences may reflect economic conditions in some general fashion (Snell 1982: 207; Sollberger 1965: 15). In any case, the document does express an involvement with the alteration of agricultural conditions.

On the Habur Plains, epigraphic documentation for agricultural conditions include the extraordinary lists of ration-paid workers from Chagar Bazar employed in "'the palace,' or, what is perhaps the same thing, in the 'house of Shubat-Enlil'": plowmen, shepherds, swineherds, oxherds, smiths, potters, leather and basket workers, cooks, bakers, grinders, and weavers, all receiving rations "according to the measure of the *kinātum*" (Gadd 1940: 33). Administrative texts employing the same ration measure have been retrieved from contemporary Rimah (Dalley 1976: letter 18), as well as the contemporary temple at Tell Leilan.[9] The *kinātu* are sometimes translated "household servants," "menials," or "kinsmen." Recently they have been defined as perhaps "unemployed semi-nomadic laborers, unskilled tribesmen who are caught in the transition from nomadic to sedentary life" (J. G. Westenholz 1983: 226–28). After constructing many plows at Shubat Enlil, Shamshi-Adad found his work force short of plowmen and requested that Yasmah-Adad send five to him from Mari, in exchange for which Shamshi-Adad would send ten *kinātu* to Yasmah-Adad (*ARM* I 44).

It is impossible to reconstruct completely an agricultural system from individual descriptions such as these; nevertheless, ration-labor paid by the palace clearly worked royal lands across the stretch from Chagar Bazar to Tell Leilan. According to the Chagar Bazar texts the cereal was almost exclusively barley, with wheat unmentioned (Gadd 1940: 29). Barley also dominates the flotation-retrieved floral samples from the Leilan Period I temples.[10]

The distinguishing characteristics of dry-farming on the Habur Plains during the early second millennium are then cereal monoculture (barley), relatively high interannual rainfall variability, and palace-dominated agriculture ration-labor. This situation is somewhat different from that obtaining in the south at this time, where "the ration system was slowly dying out . . . although it continued strongly in outlying regions such as Mari and Chagar Bazar" (Gelb 1965: 243). Mari, however, also differs from Chagar Bazar in that its irrigation agriculture was quite diversified, and not exclusively focused upon barley (Milano 1981: 94–113).

The possibility exists that within the relatively high-yield, but high-risk environment of extensive dry-farming on the Habur Plains, palace organizations could absorb short-run fluctuations, while generating high returns, with fields almost exclusively devoted to barley. Smaller farming units conceivably would have planted crop combinations maximizing guaranteed annual returns. Such at least are conclusions that may be drawn from a decision-theory analysis of land use under conditions of environmental uncertainty (Cromley 1982). Ration-workers, palace economies, dispersed *dimtu*-villages, and extended field processing stations

9 · These texts have been copied and edited by Dr. Daniel Snell, and will be published in *Tell Leilan Research*, 2.

10 · The analysis of Leilan flotation samples has been conducted by Dr. Wilma Wetterstrom, Harvard Botanical Museum, and will appear in *Tell Leilan Research*, 2.

utilizing land transport were each integrated by the second millennium into a system that may have maximized long term yields.

The settlement pattern data for the mid-third millennium B.C. do not now allow us to perceive the genesis of this system. They suggest instead, by contrast, that mid-third millennium urbanization at Tell Leilan and elsewhere across the dry-farming plains was not a function of pre-existent palace or other centralizing, risk-absorbing, institutions. Factors quite different from those assigned causal significance in southern Mesopotamia may have dominated urban developments in the dry-farming zone. There, for example, the kinds of social disequilibrium generated by natural differences in the fertility of available plots of land are of less significance than the competitive or adaptive advantages of absorbing climatic uncertainty through a variety of land-use strategies.

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