

The Early Bronze Age Environment of the Southern Ghor and the Moab Plateau

Introduction

Trends toward urban development in Palestine, with establishment of settled villages, towns and cities have been interrupted from time to time by episodes in which most of the settlements are abandoned and the land is occupied by tent dwellers. This does not mean that arable agriculture is abandoned altogether, for tent people also sow, but the amount of land devoted to plow agriculture is much reduced during these episodes. Fluctuations in urbanism are not synchronized between the regions east of the Jordan rift and the regions to the west. Evidence indicates that the last collapse of urban settlement east of the Jordan occurred in the 13th century and that the land had a rest from urban disturbance for some 650 years before the urban trend resumed again early in this century (Nyrop *et al.*, 1974). This feature of history makes it possible to make a reasonable reconstruction of natural resources at various periods over the last 5,000 years. One can determine the effects of urbanization by comparing the situation in the last century with the present.

Vegetation, wild life, and water resources were studied in some detail by 19th century travelers. Some were botanists, zoologists, ornithologists, naturalists, others were enthusiastic amateurs, and most were interested in ruins of Biblical sites. Descriptions were sometimes detailed, sometimes sketchy, but in composite make a remarkably consistent account of the environment and the natural resources before the onset of the present urban trend.

The strategy for this paper, therefore, is first to compare the 19th century situation with the present in order to assess the effects of urbanization, then to examine such evidence as is available concerning changes of climate between the 3rd millennium BC and the past century, and finally to extrapolate the observations into the climatic evidence for a reconstruction of the EB environment. There are hazards, of course, in such extrapolations, but I believe we shall not be far from the mark.

Conflict between the desert and the sown

According to a considerable body of archaeological evidence,

the first urbanization of the region began about 3100–3000 BC with expansion and consolidation of Ghassulian culture (Albright, 1971; Archaeological Institute of America, 1967; Kenyon, 1966, 1969; De Vaux, 1971). This corresponds to active development of civilizations in Egypt and Mesopotamia although nothing so spectacular developed east of the Dead Sea. Bab edh-Dhra and other towns were founded in the Ghor and there was a sprinkling of small villages down the highlands from the Jabbok into Edom. The settlements grew and seemingly prospered for some centuries. Some became fortified with stone walls, towers and gates. Then, abruptly, around 2300 BC, the system collapsed in some sort of raging conflagration. Jericho, Bab edh-Dhra, Numeira, Bethshan, Khirbet Karak, Ai, and other EB settlements were destroyed and most of them burned.

The Old Kingdom of Egypt collapsed and the First Intermediate Period closed in (Hawkes, 1974). For approximately 170 years almost no major monuments were constructed and we do not even have a reliable record of the names of all the kings (Breasted, 1905). Few Egyptian records survive from the period, but a number of those that did allude to famine, depopulation, invasion by foreigners, and collapse of civil government (Bell, 1971). The Egyptian Intermediate had its counterpart in Palestine.

Recovery began west of the Jordan about 1850 BC but was delayed in the east for another 600 years. About 1250 BC settled villages again appeared in Moab and Edom. There was another decline of shorter duration and intensity to the east of the Jordan from the 8th to the 4th century BC (Glueck, 1934, 1935, 1939). Urban civilization remained strong through the Graeco-Roman, Byzantine, Early Islamic and Early Medieval periods, but collapsed again early in the 13th century. Tent dwellers dominated through the periods of the Mamlukes and Turkish rule (Glueck, 1940, 1951). The present urban trend began after World War I.

This description of the alternate rise and collapse of urban life is obviously generalized and sketchy and may not hold entirely for local situations. For example, the early survey by Glueck (1939) found little evidence of EB I, II, and III in the highlands but a fair amount of EB IV remains, while in the

Ghor EB I, II, and III are most abundant and EB IV is known from the tombs and a small settlement on top of the ruined EB III wall of Bab edh-Dhra (Rast, 1981). Still, the general trends seem to be supported by studies at a number of sites.

The 19th vs. 20th centuries

Descriptions, sometimes rather detailed, were made by travelers in the 19th century of places that can be readily identified and are familiar to us today. Some of these are listed below:

The Ghor

Site of Bab edh-Dhra De Saulcy, 1853; Tristram, 1873.

The plain of Bab edh-Dhra Irby and Mangles, 1844; De Saulcy, 1853; Tristram, 1873.

Lower end of Wadi Karak Irby and Mangles, 1823; De Saulcy, 1853; Tristram, 1873.

Mazra'a and Haditha Irby and Mangles, 1844; De Saulcy, 1853; Palmer, 1871; Tristram, 1873; Lortet, 1884; Hornstein, 1898.

Isal and Numeira Lynch, 1852; Klein, 1880; Hill, 1896.

Safi Irby and Mangles, 1823; De Saulcy, 1853; Tristram, 1865; Hayne, 1873; Tristram, 1873; Klein, 1880; Kit-chener, 1884; Hart, 1885; Hill, 1896.

Moab Highlands

Karak Burckhardt, 1822; Tristram, 1873; Doughty, 1876 (Publ. 1923); Bliss, 1895.

The plateau De Saulcy, 1853; Stanley, 1856; Tristram, 1873; Schick, 1879; Conder, 1881; Hull, 1886.

Edom Highlands

Irby and Mangles, 1844; Lindsay, 1847; Doughty, 1877 (Publ. 1923)

'Amman

Burckhardt, 1822; Tristram, 1873; Thomson, 1885.

The observers were consistent in what they saw and their descriptions give a very different impression from what we see today. The land was not heavily populated then. There were small Gawrani villages at Mazra'a-Haditha and Safi. Some people lived in tents, others in reed-mat huts. These were so hidden amongst great thickets of trees as to be scarcely visible at a distance of a few meters. Wadi Karak was a permanent stream then, abounding in fish and the waters were diverted by a system of small canals to irrigate arable patches cleared of thicket. Wadi Hasa was used in the same way.

Each of the Ghors, Haditha, Mazra'a, es-Sal, Numeira, and Safi supported massive canebrakes near the shores of the Dead Sea where the underground flow of the wadis kept the soil permanently moist. These canebrakes were of considerable extent at Haditha-Mazra'a and Safi, were virtually impenetrable to men and domestic animals, but abounded in wild pigs. Indeed, parts of the cane fields were so marshy that De Saulcy lost some pack animals in the mud and some of the party barely escaped themselves. The swine population supported a few leopards, and jackals were common.

All observers commented on the enormous numbers of pigeons and other birds nesting or roosting in the trees. Grass and pasture was abundant and the streams swarmed with fish. The most striking difference between the present and one hundred years ago, however, is in the stability of the stream beds and wadi banks. The Wadi Karak at Bab edh-Dhra was described by both Tristram (1873) and De Saulcy (1853) as being a charming glen with clear running water full of fish and the banks forested with olander, tamarisk, willow, poplar, acacia, dwarf palms, and other trees. The banks of the Hasa were also stable after emerging from the mouth of the canyon onto the Ghor. Hayne (1873) was especially impressed by the palms that grew at the edge of the Dead Sea and which dotted the steep slopes above as far as the eye could see. In those days, the shores of the Dead Sea were heaped high with driftwood, mostly composed of trees eroded from the banks of the Jordan River to the north.

Today, the thickets are nearly all cleared away for fields, orchards, and vineyards. Only occasional specimen trees remain although some of these are of considerable size. The canebrakes are all but gone with only small clumps of reed remaining. Klein (1880) described Wadi Dra'a as splashing 'merrily.' Today, essentially all the water is used by the village and the fields around it, and what is left sinks silently into the sand. The Karak is no longer used for irrigation on a regular basis. 'Ain Sikkin, 'Ain Maghara, Wadi Ibn Hammad and some tube wells supply water for the Mazra'a-Haditha Ghor (Harlan, 1981).

The ravine below the site of Bab edh-Dhra was described by Tristram (1873) as 'densely wooded' and by Irby and Mangles (1823) as beautiful and shady and 'whose banks are covered in profusion with the palm, acassia, aspine, and oleander in full flower and beauty.' There are a few oleanders left and some tamarisks that are dwarfed because of flood waters sweeping over them. A few poplar and acacia trees remain here and there, but the whole wadi bed is essentially stripped bare from wall to wall and such banks as are left are temporary and too unstable for trees to become established. This is true of all the other wadis emptying on to the southern ghors including Wadi Hasa which is by far the most stable of the group (Harlan, 1981).

While measurements were not made, the combined descriptions of several observers leave little doubt that the streams carried more water, were clear, dependable, stable, and well stocked with fish. Floods must have been infrequent and less violent because the banks were sufficiently stable to be 'densely wooded'. The difference is clearly due to changes in the catchment area on the plateau above.

The Moab plateau at the time was treeless and covered with a dense stand of grass and herbaceous vegetation along the western breaks. The sward was repeatedly described as growing luxuriantly. This turf gradually became thinner to the east and blended into a low desert shrub of *Artemisia* at the fringes of the desert. Schick (1879) estimated that only about a tenth of the land was plowed for crop production.

Tristram (1873) and Hayne (1873) both observed that the usual practice was to take a single crop from a plowed patch and to then abandon it for several years before plowing and sowing again. The abandoned patch was quickly revegetated. Several observers noted that the soil was open and pervious and rainwater sank into it readily. The soils are derived from a deep chalky formation that overlies hard limestone beds. Conder (1889) observed that springs gushed forth at the base of the chalk and top of the limestone formation in all the wadis of Moab and Edom. Springs continue to flow, but it is very doubtful that they flow as much or as reliably as they once did.

Every knoll and hillock on the plateau was capped by ruins of an uninhabited village or town. The population was sparse and nearly all of the people lived in tents. Karak and Shawbak did have some residents, but about half of them lived in tents or spent part of the year outside the towns. Bliss (1895) estimated the population of Karak at 8–10,000 but that included people who never lived in the town, which was then confined entirely within the walls.

Today, most of the western part of the Moab plateau is plowed every year for crops. The drier portions are still grazed, but the grazing pressures are very intense. Not only has the number of animals increased, but the land available for pasture has been drastically reduced as more of it is put under the plow. The end result is a near total loss of protection for the soil. Heavy rains run off and the water goes crashing down the wadis instead of soaking into the turf as it once did. Destructive floods are now a normal feature of the drainage systems that conduct water from the plateau to the ghor. The flood waters by-pass the springs and spring flow is reduced by that amount.

Observers of the last century put the woodlands exactly where they are today. A woodland of dwarfed and stunted trees was observed near Busiera, a better developed one south of Tafleleh and a well developed woodland was observed near Dana. This general pattern has not changed, although there may be some degradation due to hacking for firewood. Actually, photographs taken early in this century at Tafleleh show hillsides more barren than the present (Libbey and Hoskins, 1905). It may be that the advent of alternative fuels has resulted in less exploitation of the woodland than formerly. The old story that the southern highlands were deforested to fuel the Damascus to Mecca railways seems to have no basis in fact.

Climatic conditions in Early Bronze Age

Ehrich (1965), Bell (1971), Crown (1972), Butzer (1976), Lamb (1977), McGhee (1981) and Wigley *et al.* (1981) have reviewed evidence for climatic change within the time period of interest here. The sources of evidence have generally been the same or similar so it is not surprising there is considerable general agreement. The consensus seems to be that Early Bronze opened during a minor pluvial and favorable climate. Conditions began to change about 3500 BC with a slight drop

in temperature and increased rainfall. The oak woodland spread rapidly in the zagros or at least the oak component increased. The newly established towns of Mesopotamia suffered increased flooding and Egypt began to flourish.

There is also general agreement that a sharp climatic crisis occurred about 2300 BC. The temperature rose and rainfall decreased; droughts and crop failures became common. The Old Kingdom of Egypt collapsed and the First Intermediate Period set in. The fragments of literature that come down to us from this period are starkly eloquent:

‘Everyone was dying of hunger on this sandbank of hell . . . All of Upper Egypt was dying of hunger to such a degree that everyone had come to eating his children. . .’ (Tomb of Ankhtifi, Bell 1971)

‘The whole land has perished . . . the river of Egypt is empty . . . men cross over the water on foot . . . the south wind drives away the north wind’ (Neferly, Bell, 1971)

‘. . . grain hath perished everywhere . . . the storehouse is bare, and he that hath kept it lieth stretched out on the ground . . .’ (Lament of Ipuwer, Erman, 1927).

A number of similar statements can be found in Vandier (1936), Erman (1927) and Bell (1971). O’Connor (1972) reported on burial rates in Upper Egypt using several sites as sources. He found a rather steady rate of 1.2/year in 25th to 23rd centuries BC. This rose dramatically to 12.2/year during the period 2160–2100 and dropped to 3.5 in 21st century and to 0.6 in 20th century BC. This seems to be a bit later than the 2300 BC crisis but is probably part of the same phenomenon.

Other evidence includes salt tongues that formed in the Dead Sea and other salt lakes. Lake Maribad dried up and vegetation on the bottom burned. Timber trees died of drought as far away as France (Crown, 1972). There is evidence of people moving out of the Sahara as shown by abandonment of sites and cessation of rock paintings (Butzer, 1976). Hordes of nomadic herdsmen were forced from their desiccating steppes and invaded settled agricultural lands. The Akkadian Empire fell apart 2230–2130 BC. Ebla was sacked and burned 2250 BC and Troy II was destroyed 2149 ± 97 BC. The number of agricultural communities in Turkmenistan declined, reaching a low point about 2100 BC (Masson, 1968). Towns, cities and villages throughout Palestine were sacked and burned including Jericho, Bab edh-Dhra and Numeira (Harlan 1982).

Early Bronze Age environment

With descriptions from the 19th century available, it is not too difficult to visualize the situation as it must have been in the third millennium BC. We do not know how much more rainfall the region received at the onset of EB, but it could not possibly have been sufficient for dryland farming in the Ghor. Agriculture there would have depended then as now on rains in the highlands depositing water that either ran down the wadi beds or infiltrated the rocks and emerged as springs. The

stream and spring flows were surely stronger and more stable and dependable than now.

Because of a relative abundance of water beneath the alluvial fans, tree growth should have been well developed. Acacia, poplar, tamarisk, Christ-thorn, date palms, retam, salvadora, willow and other trees should have made thickets at least as dense as in the 19th century AD. The Dead Sea side of each fan was, no doubt, covered by a dense canebrake of reeds and rushes and inhabited by wild pigs in abundance. Not only leopards but lions as well preyed on them and jackals and hyenas helped to scavenge the kills. Birds and fish would have been no less numerous than 100 years ago and were probably even more abundant. The Ghor was ripe for settlement and exploitation.

'And Lot lifted up his eyes, and saw that the Jordan valley was well watered everywhere like the garden of the Lord, like the land of Egypt in the direction of Zoar; this was before the Lord destroyed Sodom and Gomorrah' Gen. 13:10 RSV.

Judging from last century descriptions, even the upper slopes of the Ghors were studded with acacia trees and dwarf palms were scattered up the steep slopes. The banks of the wadis were stable, heavily wooded and the streams were bordered by dense stands of oleander and willow. Ibex should have been common on the slopes of the rift.

Even with somewhat more rainfall, the plains of Moab were treeless then as now. The herbage should have been rank and thick and the winter and spring grazing excellent. Most of the herbaceous vegetation would have turned brown in the summer drought. There was little surface water on the plains proper and wells would need to be dug to supply village settlements. The easily worked friable soils and availability of well water would have made the hill country of Moab a tempting region for settlement. The woodlands were, no doubt, where they are now, but individual trees were probably larger and the diversity somewhat richer. Wild almond and pistachio may well have been more abundant and species of vine and fig may have been present.

The picture of a fat and pleasant land must have changed with the drastic climatic reversal toward the end of the 3rd millennium. A sudden rise in temperature and decrease in rainfall can have a shocking effect on the vegetation as well as the people. Trees on the upper slopes of the alluvial fans probably died; the thickets receded to areas of most reliable water supply. Grazing lands suffered sharply reduced productivity. Crops failed and wells dried up. The ecology suddenly favored tent dwellers of the semi-arid steppes and desert fringes. Temporarily, the fertile crescent was fertile no more.

The anomaly was, apparently, rather short in duration. Conditions improved in the 21st century and in many regions full recovery was achieved in the 20th century BC. East of the Jordan, however, the blow to urbanism was long-lasting and it was nearly a thousand years before the trend resumed in Moab.

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