1
The Late Prehistoric Environmental History of the Near East

Karl W. Butzer

History of Investigations

For almost a century the history of climatic changes in the Near East has had an unusual interest for historians and archaeologists. Here Western scholars first saw signs of former fertility on the margins of the present arid zone, and sought for explanations. Quaternary studies began in the 1880s, and the conclusions drawn from the accumulating evidence for Pleistocene climates substantially different from those of the present were, during the first quarter of the twentieth century, blithely extended to apply to the Holocene and even to historical times. The paradigm of environmental determinism was first formulated here, and the riposte of the ''possibilists'' was illustrated from the same ground so fertile in examples. In the end, much of this controversy was reduced to divergent interpretations of the empirical evidence for climatic change.

The phase of field-studies which terminated with World War II did not produce much incontrovertible evidence, despite many extensive regional studies and some details from specific sites. This was partly because the lack of chronometric aids rendered most stratigraphic correlations ingenuous if not incorrect: moreover, conclusions were almost exclusively based upon geological interpretations, at a time when sedimentological studies were few, and geomorphic systems almost unknown. I attempted to compile, discuss and evaluate these earlier data (Butzer, 1958), shortly before a new phase of economic affluence allowed Western scholars to approach the same problems again, but with more evolved techniques, and with the assistance of radiocarbon dating.

The last fifteen years have consequently seen a proliferation of new regional or local studies, essentially geomorphological, but now complemented by varied paleo-biological investigations, the range of which can be gauged from the chapters of this volume. Unquestionably, a great deal has been learned. But, as I have also emphasized in a recent critical review (Butzer, 1975a), the available information is still unsatisfactory, incomplete and often inconclusive. The actual number of field studies is still small, compared with those in Europe and North America, and their scope is often extensive. Remarkably few stratigraphic events have been radiometrically fixed outside Israel and the Nile Valley. Changes within environmental systems in the Mediterranean Basin and in the arid zones generate features that more often than not remain difficult to interpret: in particular, minor climatic variations are only discernible, let alone explicable, with some degree of subjectivity. Above all, the quality of the work has been uneven. Many researchers apply ever more discriminating criteria to their subject matter, as they learn by experience and seek to improve their conceptual modes. Some, however, persist in using *a priori* theoretical frameworks or outmoded technologies, sometimes in the guise of "scientism", and continue to subject their colleagues to conclusions that are no less simplistic and subjective than those of an earlier generation. Even in matters of dating we find that isolated lithic artefacts are still being employed to correlate and "fix" Pleistocene phenomena in time.

By all acceptable standards, the Near Eastern evidence is still fragmentary and frequently of variable quality, and chronological data are inadequate for a stratigraphy of the region as a whole. At the general rather than local level, one can still do little more than outline and discuss the present state of regional information from different categories of evidence. The broad, generalized impressions that emerge are intriguing but remain elusive in their details. This brief paper will only attempt to summarize some of these generalizations. For a specific enumeration and analysis of the data, the reader is referred to Butzer (1975a, b, 1976a), as well as to the individual chapters of this volume.

The information falls logically within three regional contexts:

A. the highland perimeter (Anatolia, Armenia, Kurdistan, Iran);
B. the hills and plains of the "Fertile Crescent" (the Levant and Mesopotamia);
C. the lower Nile Basin (including the north-eastern Sahara).

The Three Sub-regions

The Northern Highlands

The record of the highland belt between the Late Pleistocene and the Mid-Holocene can at present be synthesized as follows.

1. Glacial vestiges are widespread in Turkey, Transcaucasia, Iran and the adjacent parts of Iraq, as well as in the high Lebanon. They all serve to indicate a colder climate during the Würm Full Glacial. Mean summer temperatures may have been in the order of 6–7°C lower than at present. The multiple minor ("recessional") moraines found in association with most of these Late Pleistocene glaciers afford evidence of one or more re-

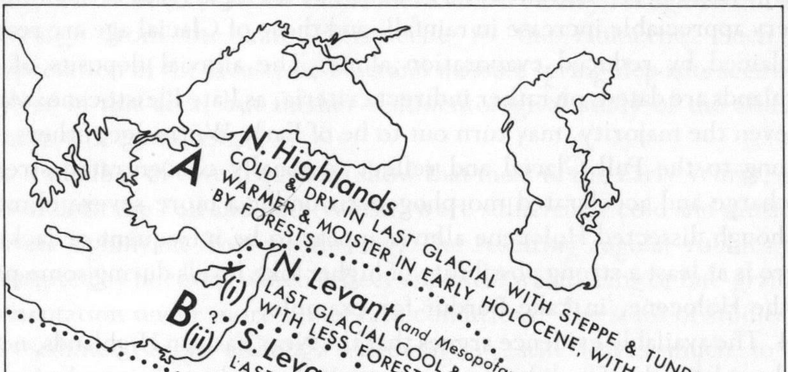

Fig. 1: Regional conditions. The design and the wording are editorial. The Northern Zagros sites fall within Region A.

advances during the Late Glacial as well as of one or more stages of temporary readvance or re-glaciation during the Holocene.

2. Pollen diagrams and associated evidence, particularly from Lake Zeribar, suggest that an open vegetation of steppe and mountain tundra, perhaps with scrub-steppe in more favoured localities, was characteristic of Turkey, north-eastern Iraq, and most of Iran, during the Full Glacial. The warm-up during the Alleröd, and particularly during the Early Holocene, appears to have been accompanied by an increase in precipitation which led to a gradual re-forestation of the highlands.

3. Other categories of geomorphologic evidence from the highlands do not appear to contradict these conclusions from Lake Zeribar. Few lacustrine deposits have been dated, and many but not all seem to be of Early Würm or of Holocene date. In no case do the higher lake levels indicate a very appreciable increase in rainfall, and those of Glacial age are readily explained by reduced evaporation alone. The alluvial deposits of the highlands are dated, on rather indirect criteria, as Late Pleistocene: some, or even the majority, may turn out to be of Early Würm age; others may belong to the Full Glacial and reflect seasonally concentrated stream-discharge and accelerated morphogenesis under a more severe climate. Although dissected Holocene alluvia appear to be infrequent or lacking, there is at least a strong possibility of higher lake levels during some parts of the Holocene, in Lake Burdur for example.

4. The available evidence argues that the Near Eastern Highlands, north of about latitude 35°, did not experience "pluvial" conditions during the last 50,000 years or so. The Full and Late Glacial were conspicuously cold and comparatively dry. The Holocene environment appears to have remained fairly constant, with conditions similar to what might be expected today without human disturbance. Perhaps the only significant post-Pleistocene changes in this regional setting have been those accompanying and following intensive or rapacious land-use. Under any circumstances, considerable environmental changes must have accompanied the Pleistocene–Holocene transition, but unfortunately the exact nature of these changes can only be conjectured at the moment.

The Levant and Mesopotamia

The climatic vicissitudes of the late Pleistocene and Early Holocene are documented by several categories of evidence in the hill country and plainlands of Syria, Lebanon, Israel, Jordan and Iraq.

1. It is somewhat surprising that there are no imposing lake deposits

outside the Jordan Valley, and geomorphologic changes are mainly reflected in the fairly widespread alluvial fills that accompany many streams both large and small. The implications of these now-dissected alluvia are not unequivocal, and they may be a result of one or more of the following factors: more torrential rains; more concentrated discharge and/or precipitation; greater precipitation; more detritus as a result of accelerated weathering; and, in areas with an effective vegetation mat today, changes of the vegetative cover through differing temperatures and evaporation rates. Until more detailed work has been done and isotopic dating has become available, the geomorphic environment of the Levant and Mesopotamia in recent geological times will remain somewhat enigmatic. Important exceptions are the Damascus Basin and the Jordan Valley, where several moist interludes can be clearly recognized in the time-range from the Late Pleistocene to the Holocene. Such an interpretation of the lacustrine beds and massive spring-deposits seems to be clear in this area; but further sedimentological study of the alluvial terraces will be necessary.

2. A number of cave sequences show that most of the Early Würm, and parts of both the Full and Late Würm, were sufficiently cold and moist to generate significant frost-weathering. The resulting angular rubbles are interrupted by horizons which reflect chemical weathering or fine-grained sedimentation under more temperate conditions. The state of studies of cave sedimentology, although encouraging, still leaves much to be desired.

3. Biological evidence from the Levant and Mesopotamia includes both faunas and some pollen. Although the Full Glacial cave-deposits of the Levant show a number of intrusive Palaearctic forms, the Glacial age faunas everywhere suggest ecological conditions remarkably similar to those of today.

Far more impressive are the pollen data, which show that forest vegetation was generally diminished during the Glacial periods. This was much more the case in northern Syria and Lebanon, where absolute rainfall must have decreased markedly during the Full Glacial, than in Israel, and notably in the Negev, where rainfall did not decline appreciably but where reduced evaporation favoured expansion of existing woodlands. There may also be some biological evidence that conditions were moister during part of the Early and Middle Holocene in Israel and the Damascus Basin; but the paucity of evidence for change elsewhere should be taken to imply that there has been little alteration of climate of ecological significance in post-Pleistocene times north of perhaps 32° latitude.

4. The available evidence provides no support for theories once current that agriculture originated through post-Pleistocene desiccation. There is no evidence for a deterioration of conditions in lands suitable for agriculture in the Levant or Mesopotamia during the transition from the Pleistocene to the Holocene. Rather, at the close of the Pleistocene extensive arable lands were opened up in the high country. Similarly, there is no reason whatsoever to believe that agricultural dispersals were affected or aided by progressive desiccation of the nuclear agricultural area in south-western Asia (Butzer 1971, Chapters 32–33).

Egypt–Arabia

Modest increases of precipitation have had disproportionately great effects on geomorphic equilibrium and ecological conditions in a hyper-arid environment such as Egypt. Yet even here true "pluvial" conditions were last experienced during the first half or so of the Würm. In the later, Full Glacial, period Egypt was as dry as it is today.

1. There is evidence of increased discharge down wadis in Egypt and Nubia somewhat prior to 25,000 years ago. Stream activity in these deserts was also more significant than now during much of the period between 15,000 and 3000 B.C., except for three major dry interludes centered at approximately 9500 B.C., 5500 B.C. and 4500 B.C.: the relevant geomorphologic evidence, substantiated by fragmentary biological data, suggests that rains became more frequent and perhaps of greater duration during much of this time. A reddish palaeosol, bearing distinctive evidence of biochemical weathering, can be dated to 5000 B.C. In Arabia as well, lake-beds and spring-deposits seem to show that one or more moist spells occurred in Mid-Holocene times.

2. The effects of "sub-pluvial" intervals on the fauna of Egypt during late prehistoric times has long been of interest. There is no evidence, however, that episodes of Late Pleistocene desiccation in Egypt forced prehistoric settlement to concentrate in the Nile Valley, as was once claimed. Lower and Middle Paleolithic habitation seems to have been confined already to the vicinity of reliable sources of water, and the Late Paleolithic settlers of the Nile Valley did not expand into the nearby deserts during moister intervals. However, the biomass and diversity of game resources outside the riverine zone would have varied significantly, with potential implications for at least some of the activities of certain prehistoric groups.

3. Present-day ecological conditions were finally established in Old

Kingdom times, and a long arid phase, during which dunes became more active and the floods of the Nile were comparatively low, had begun by the end of the Fifth Dynasty (*c.* 2350 B.C.). This period of drought was probably responsible in part for the ultimate breakdown of the Old Kingdom (Butzer 1976b).

General Conclusions

The available evidence allows several broader conclusions:

a. The last Interglacial period is poorly recorded in most areas, but was apparently more often than not characterized by environmental conditions similar to those of today. Nonetheless, wherever there is detailed information it is becoming equally evident that climates changed through time.

b. During the last Glacial there were three distinct paleoclimatic provinces in the Near East: the highlands of Anatolia and Iran, intensely cold most of the time and very dry during the Full Glacial, with next-to-no tree growth possible; the Levant, moderately cold and relatively dry in the north, cool and comparatively moist in the south (this distinction possibly extended eastwards across Mesopotamia and southern Iran); Egypt, which experienced long periods of increased rainfall, except during the maximum of the Würm Glacial (a pattern possibly repeated in Sinai and Arabia). Different trends again are apparent in the southern Sahara and East Africa (Butzer *et al.*, 1972).

c. During Mid-Holocene times there were repeated moister episodes in Egypt and Arabia, comparable to those in sub-Saharan Africa. These moister spells affected Israel too, but are not evident farther north.

d. The Early-to-Middle Pleistocene period, although not discussed here, is, in fact, virtually intangible in view of the fragmentary evidence, and above all in consideration of the almost total lack of those radiometric and palynological criteria that are proving to be essential for unravelling the environmental history of Late Pleistocene and Holocene times in the Near East.

e. All of the climatic changes recorded were of relatively short "wavelength", and none exceeded the duration of the standard Late Pleistocene substages used in European geochronology. This makes direct correlations with the European sequences difficult if not undesirable, particularly in default of radiometric dating.

f. Except for Egypt, there is no sound evidence for pluvials as such in the

Near East—and in any case the term "pluvial" is best used only as an adjective to describe a specified range of phenomena.

References

Butzer, K. W. 1958. Quaternary Stratigraphy and Climate in the Near East. *Bonn. Geog. Abh.* **24**; 1969 Bonn and New York: Johnson Reprint Corporation, pp. 1–157.

Butzer, K. W. 1971. *Environment and Archeology: and ecological approach to prehistory*. London: Methuen, and Chicago, Aldine, 705 pp.

Butzer, K. W. 1975a. Patterns of environmental change in the Near East during late Pleistocene and Holocene times. *In: Problems in Prehistory: North Africa and the Levant* (F. Wendorf and A. E. Marks, eds), pp. 389–410. Dallas: Southern Methodist University Press.

Butzer, K. W. 1975b. Pleistocene littoral-sedimentary cycles of the Mediterranean Basin. *In: After the Australopithecines*. (K. W. Butzer and G. L. Isaac, eds), pp. 25–71. The Hague: Mouton; and Chicago: Aldine.

Butzer, K. W. 1976a. Pleistocene climates. *In: The Ecology of the Pleistocene* (R. C. West, ed.), Baton Rouge; *Geosci. Man* **13** (in press).

Butzer, K. W. 1976b. Early hydraulic civilization in Egypt: a study in cultural ecology. *Prehist. Archeol. Ecol.* **3**, 1–134.

Butzer, K. W., Isaac, G. L., Richardson, J. L. and Washbourn-Kamau, C. K. 1972. Radiocarbon dating of East African lake levels. *Science* **175**, 1069–1076.