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PART I

Perspectives

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CHAPTER 1

Context in archaeology

Introduction

Archaeology is at a crossroads. During the late 1960s and early 1970s, center stage in North American archaeology was reserved not for competing interpretations of historical processes but for discussion of the New Archaeology. This phenomenon can be interpreted as a public debate, generated in no small part by the exponential increase in empirical data during the 30 years prior to 1960. The gathering of facts had become increasingly additive, rather than contributing to a cumulative body of real information. Syntheses tended to be descriptive, simplistic, and speculative. The New Archaeology began as an American intergenerational conflict, as an introspective reassessment of means and purpose. But these painful beginnings, with the new castigating the old, were then followed by constructive debate among a new international generation of archaeologists in regard to goals and the optimal strategies to attain them. The net impact has been healthy, with refinement in the strategies of empirical research and far more sophisticated interpretation.

Nonetheless, the so-called great debate in archaeology also created its own simplifications. By polarizing old and new approaches, the impression was given that archaeologists were either empirical or theoretical. But on closer inspection the small group of active participants in the great debate are seen to be neither pure theorists nor pure deductivists. Archaeology is, by its nature, ultimately empirical. The great debate is far more than a matter of philosophical abstractions. It is a fundamental reevaluation of the conceptual framework of archaeological research, a quest for a paradigm that will rationalize both the laborious data gathering and the frustrating interpretative activities of the discipline.

Those in the swelling ranks of the emerging consensus are of one mind in only one essential matter – that fresh and more productive vistas

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must be opened. The great diversity of possible innovative approaches is illustrated by the many articles and books, ranging from ethnoarchaeology to computer simulation, that appeared during the 1970s. They suggest that archaeologists have begun to opt for a pluralistic paradigm in their search for better insights and that a rapid radiation of new research directions is under way. The majority of these trends reflect an intellectual confrontation with several facets of cultural anthropology. There also is a considerable debt to the discipline of human geography, in particular to spatial theory. What remains poorly articulated is the equally fundamental environmental dimension.

Ironically, environmental archaeology is one of the oldest interdisciplinary bridges in the field. Archaeologists have always been conscious of environmental context, and from the earliest days diverse groups of scientists have participated directly or indirectly in excavation. Compared with some 5,000 individual members of the Society for American Archaeology, there are about 500 members in the new Society for Archaeological Sciences, with little overlap in affiliation. This surprising ratio suggests substantial empirical input from those involved in the applied sciences, who nevertheless have little impact on the dominant intellectual currents within archaeology.

Perhaps the environment is taken for granted. Certainly the environment is specified as a variable in most processual equations, but in all too many instances such an equation is then resolved by treating that variable as a constant. Also, archaeologists often take a static, classificatory approach to the environment, even when the human variables happen to be considered as part of a dynamic system.

It is my belief that the concept of *environment* should not be considered synonymous with a body of static, descriptive background data. The environment can indeed be considered as a dynamic factor in the analysis of archaeological context. The basic ingredients of archaeology are artifacts and their context, ranging from food residues to sediment and landscape matrix. The term *context* means many things to many people, but the word is derived from the Latin verb *contexere*, "to weave together" or "to connect." For archaeology, context implies a four-dimensional spatial-temporal matrix that comprises both a cultural environment and a noncultural environment and that can be applied to a single artifact or to a constellation of sites. Context, so defined, is a primary focus for several approaches within archaeology. For example, spatial archaeology is concerned with horizontal patterning of aggregates within a site as well as with interconnections between sites. Con-

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text also has long been the focus for archaeometry, which is concerned with temporal frameworks, materials analysis and technology, and raw-material sources. But most important, context has been the traditional focus for a poorly defined but wide-ranging enterprise sometimes described as environmental archaeology, including such specializations as archaeobotany, zoo-archaeology, and geo-archaeology.

In an excellent introductory text, Evans (1978:xiii) defined environmental archaeology as "the study of the past environment of man." He specifically emphasized techniques and indicators useful in reconstructing the environments of ancient human communities, as well as the applications of such techniques. This definition is not only narrow but also unacceptable.

To use an analogy, the distinction is between geological archaeology and archaeological geology. To me, archaeological geology is geology that is pursued with an archaeological bias or application. This is fundamentally distinct from geological archaeology, carried out by means of geological methods, techniques, and concepts, but constituting what is first and foremost an archaeological endeavor (Butzer, 1977*c*). At issue are the goals, rather than the techniques.

I have long held the view that our ultimate goal is to determine the interrelationship between culture and environment, emphasizing archaeological research "directed toward a fuller understanding of the human ecology of prehistoric communities" (Butzer, 1964:vii, 5). But in the early 1960s such relationships proved difficult to identify, both for archaeologists and for those in the applied environmental sciences. In part, the problem was a paucity of empirical data, but the problem was compounded by lack of an adequate conceptual framework within which to analyze complex relationships among multivariate phenomena.

In the interim, much has changed. The information base has been increased by an order of magnitude, and although it is still far from adequate, at least it now permits the formulation of coherent hypotheses. But, most important, systems theory has suggested a model with which to illustrate and even analyze complex interrelationships. Systems theory has had profound influences on conceptual formulations in several disciplines: in environmental science since a seminal paper by Chorley in 1962, in ecological anthropology since Geertz's *Agricultural Involution* in 1963, and in archaeology since an article by Flannery in 1968.

That a cybernetics model cannot be transferred in toto to another

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discipline requires little emphasis, and most of us will appreciate that systems jargon can obscure an issue as easily as illuminate it. Furthermore, it would be foolish simply to apply a biological systems approach in the social sciences. But the basic principles of systems theory are essential to integrate the environmental dimension within a contextual archaeology.

Context and ecology

Odum (1971:8) has defined an ecosystem as a community of organisms in a given area interacting with the physical environment, so that energy flow leads to clearly defined food chains, biotic diversity, and exchange of materials between the living and nonliving parts. Transforming this concept to human populations, the essential components of the noncultural environment become distance or space, topography or landforms, and resources – biotic, mineral, and atmospheric. Modern geography is particularly concerned with the interrelationships between human communities and their environments, and increasingly so with the spatial expression of the attendant socioeconomic phenomena. This focus differs only in its spatial emphasis from ecological anthropology (Hardesty, 1977; Moran, 1979), which is equally concerned with intersecting social and environmental systems.

Such broad systems concepts are, however, too complex for practical application. Yet the problem can be minimized by identifying primary research components, as distinct from ultimate systemic objectives. The primary or lower-level objectives relate to the techniques and immediate goals of each method, such as spatial archaeology, archaeometry, and environmental archaeology. The secondary or higher-level objective is the common goal of context, shared by all the contributing methods.[1]

Thus, the primary goal of environmental archaeology should be to define the characteristics and processes of the biophysical environment that provide a matrix for and interact with socioeconomic systems, as reflected, for example, in subsistence activities and settlement patterns. The secondary objective of this and of all the contributing methods is

[1]By identifying primary and secondary goals, it is possible first to explicate how each approach contributes individually to contextual archaeology. In this way, multidisciplinary inputs can be channeled toward a common goal, obviating the need for distinct ecological and geographical paradigms, as proposed by Clarke (1972:7). Second, explicitly hierarchical goals help to identify basic research components and facilitate intermediate analysis and resolution, as well as attainment of ultimate systemic objectives.

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to understand the human ecosystem defined by that systemic intersection (Chorley and Kennedy, 1971:4). A practicable general goal for contextual archaeology is the study of archaeological sites or site networks as part of a human ecosystem. It is within this human ecosystem that earlier communities interacted spatially, economically, and socially with the environmental matrices into which they were adaptively interwoven.[2] The term ecosystem, here and elsewhere in this study, is used as a conceptual framework with which to draw attention to ecosystemic interrelationships. No formal systemic structures are proposed or employed.

Less concerned with artifacts than with sites, contextual archaeology focuses on the multidimensional expression of human decision making within the environment. And, without attempting to deal directly with ecological phenomena such as energy flows and food chains, it aims to stimulate holistic research by calling attention to the complex systemic interactions among cultural, biological, and physical factors and processes.

Five central themes are singled out for specific emphasis, namely, space, scale, complexity, interaction, and stability or equilibrium state (Butzer, 1978*a*). These concepts were originally geographical or biological, but they have direct anthropological and archaeological applications, and they incorporate spatial as well as temporal dimensions. Furthermore, each of these properties is measurable and therefore replicable, and so amenable to scientific study (Butzer, 1980f).

Space. Rarely are phenomena distributed evenly in space. Topographic features, climates, biological communities, and human groups exhibit spatial patterning and thus are amenable to spatial analysis.

Scale. Spatial analysis is used to distinguish small-, medium-, and large-scale objects, aggregates, or patterns. Similarly, the configurations of living communities or physical aggregates are established,

[2]So defined, contextual archaeology includes several scales and dimensions. To clarify, scale is a metrical concept, distinct from dimension, that has both magnitude and direction, with respect to two or more coordinates, and conveys a sense of scope or perspective. Contextual archaeology implies variable scales, because both socioeconomic and spatial systems can be examined at the detailed level or the general level. It also includes several dimensions, namely, spatial (the site subsystem), hierarchical (the environmental subsystem), and ecological (the interactive processes). So, for example, this approach can be applied to simple foraging societies, in which settlement and subsistence are organized primarily on a horizontal plane, as well as complex societies characterized by significant vertical structures.

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maintained, or modified by processes that operate at several spatial and temporal scales and that may be periodic or aperiodic. Microscale and macroscale studies obviously are complementary, and both are necessary for comprehensive interpretation.

Complexity. Environments and communities are not homogeneous. This makes both their characterization and delimitation difficult, thus requiring flexible, multiscale spatial and temporal approaches.

Interaction. In a complex environment with an uneven distribution of resources, human and nonhuman communities interact internally, with each other, and with the nonliving environment; they do so at different scales, from varying degrees of proximity, and at changing or unequal rates.

Equilibrium state. The diverse communities of any environmental complex are all affected to some extent by negative feedback resulting from internal processes or external inputs. In consequence, readjustment, whether minor or major, short term or long term, is the rule rather than the exception.

These five perspectives can be explicated by a number of examples that will serve to illustrate the several scales and dimensions of a contextual approach.

Scales and dimensions of contextual archaeology

A false-color LANDSAT photograph of central Illinois or eastern Africa will provide an impressive illustration of differential biotic productivity that will show how inappropriate is the basic assumption of most geometric spatial analysis – the assumption that space is homogeneous. The reds and blues show concentrated and diffuse regional patterns, some sharply demarcated, others grading across broad transitions. A census of wildlife distributions at any given moment will show similar complex aggregations.

The importance of biotic patterning in human-resource evaluation is matched by the importance of the topographic and sedimentary matrix in designing an archaeological survey or in interpreting site locations. So, for example, in the Nile Valley of Middle Egypt the known late-prehistorical sites are in no way representative of Predynastic settlement patterns, but are largely a function of selective surface preservation of

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only those sites on the margins of the valley (Butzer, 1960*a*). Similarly, the sites of rock engravings in southern Africa are predicated on the locations of suitable rock outcrops, microscale topographic change, and environmental variability (Butzer et al., 1979). Spatial archaeology has contributed much of value in recent years (e.g., Clarke, 1977), but many of its practitioners still do not conceptualize real space as opposed to abstract space.

The mosaic distribution of biophysical phenomena also serves to illustrate the synchronic attributes of scale. Arborescent foods can be perceived at the microscale of the individual tree or cluster of trees, at the mesoscale of individual upland or floodplain forest components, or at the macroscale of the regional forest-prairie mosaic. As a consequence, the average pollen profile may serve to establish a paleoclimatic sequence of some stratigraphic value, specific to a regional habitat or biome, but it more often than not contributes little to elucidate the complexity of a potential resource catchment, unless the palynologist approaches the problem as an archaeologist (e.g., Bryant, 1982).

This spatial perspective of scale is complemented by the temporal or diachronic framework: seasonality and predictability of collected or produced foods; the significance of cyclic anomalies, major perturbations, and long-term shifts of equilibrium thresholds that define the environmental system. Temporal variability will affect, at various scales, the biomass of plant and animal foods, and even the quantitative and qualitative characters of biotic communities. As a consequence, ecosystemic variability, trends, and transformations probably will also affect demography, subsistence strategies, settlement patterns, and even the social fabric with different degrees of intensity, depending on the magnitude of change and on the information and decisions of the human communities.

The role of complexity is readily illustrated by the parallel problems of classification and demarcation of artifact types and climatic types. What are the most appropriate criteria? Better yet, what are the practicable criteria in view of the data base? Do these describe useful classes? Are these classes mutually exclusive? The computer helps to tidy up appearances, but it does not necessarily resolve the basic logical problems of defining assemblages of artifacts and sites or the defining of biophysical phenomena. The problem is vastly compounded when one attempts to identify process and response among a chain of interlocking subsystems. The roles of possible concatenations of negative inputs can be simulated by computer, but the result will be no more than a

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working hypothesis. It will require multiple lines of specialized contextual investigation to identify the key components and the low or intermediate-order processual interactions.

The matter of interaction can be illustrated by the example of Axum, an early civilization that flourished in northern Ethiopia during the first millennium A.D. (Butzer, 1981*a*). Axum owed its prosperity to international trade, but its market resources were found in several distinct environments occupied by alien peoples bound in various relationships to Axum. Gold came from the semiarid lowlands that Axum temporarily dominated but never fully controlled. Ivory and frankincense were initially abundant in local upland forests, but as both elephants and trees became increasingly scarce, ivory had to be obtained from distant parts of humid Ethiopia. In fact, the demographic base of Axum eventually exceeded the subsistence productivity of its local habitat. When international market demand faltered during the seventh century, Axum lost the means to control its critical trade resources. Because it lacked an adequate subsistence base in isolation, excessive demographic pressure led to severe landscape degradation and general impoverishment. Concomitantly, repeated failure of the spring rains meant one rather than two annual crops on unirrigated lands. Drastic depopulation ensued. Eventually there was a shift of power and population to new and more productive environments in central Ethiopia. Axum provides an example of how spatial and temporal availability of resources, and the interactions between a society and its resource base, can be of fundamental significance in the analysis of historical processes.

In the larger perspective, it is apparent that elaborate prehistorical and historical cultural systems have enjoyed centuries of adaptive equilibrium, with or without sustained growth, that have then been followed by discontinuities. The five millennia of Egyptian history (Butzer, 1981*b*) and Mesopotamian history (Adams, 1978) show cyclic alternations between centuries when population and productivity increased in apparent response to effective hierarchical control and other centuries marked by demographic decline and political fragmentation. Endogenic and exogenic inputs led to repeated readjustments. Whereas minor crises were overcome by temporary structural shifts, major crises required reorganization of the political and economic superstructure, with or without a transformation of identity. But the fundamental adaptive system continues to survive in Egypt and modern Iraq as a flexible but persistent social adjustment to a floodplain environment. In the long-range view, elaborate cultural systems are dynamic rather than stable or

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homeostatic, because structural changes are repeatedly required to ensure viability and even survival (Butzer, 1980*c*).

A unifying thread in these illustrations of the hierarchical components of a contextual paradigm is provided by *adaptation* (specifically as a strategy for survival) and *adaptability* (as the capacity of a cultural system to adjust) (see Chapter 15). These concepts, as defined in cultural terms rather than biological terms (Kirch, 1980*a*), are at the heart of the human ecosystem; they provide criteria for the analysis of historical process and culture change that I believe to be more suitable than those of the popular ontogenetic model that compares civilizations and cultures with organisms that first grow and then die. Archaeologists share with cultural anthropologists, historians, and students of human geography the ultimate objective of historical interpretation. Many conceptual methods and models are also shared. But the analytical techniques and scientific methods of the archaeologist have less in common with the techniques and methods in these other fields. This point can be demonstrated by drawing attention to the literature on natural extremes and social resilience: Central in all instances are the roles of the individual and of the community in decision making (Burton et al., 1978; Torry, 1979). In default of any historical records or a reasonable degree of ethnographic continuity, prehistorical archaeology can never hope to elucidate the nature of this decision-making process. We may or may not be able to identify the outcome of such a process, but we shall never know why, how, or when it was initiated.

Archaeology as archaeology

It has been said that archaeology is anthropology or it is nothing (Willey and Phillips, 1958:2). I beg to differ with this view. Archaeology and cultural anthropology do, or at least should, enjoy a close symbiotic relationship, and archaeology is indeed critically dependent on stimuli and models grounded in social, ecological, and evolutionary anthropology. But archaeology has been equally dependent on geology, biology, and geography at various times during its development. Archaeology is a complex social science in its own right – a view recently articulated by Gumerman and Phillips (1978) as well as Wiseman (1980). But, like geography, archaeology is heavily dependent on both the empirical methods and models of the natural sciences, qualifying as a social science mainly by virtue of its objectives. The specific methodologies of other disciplines, including cultural anthropology and biol-

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