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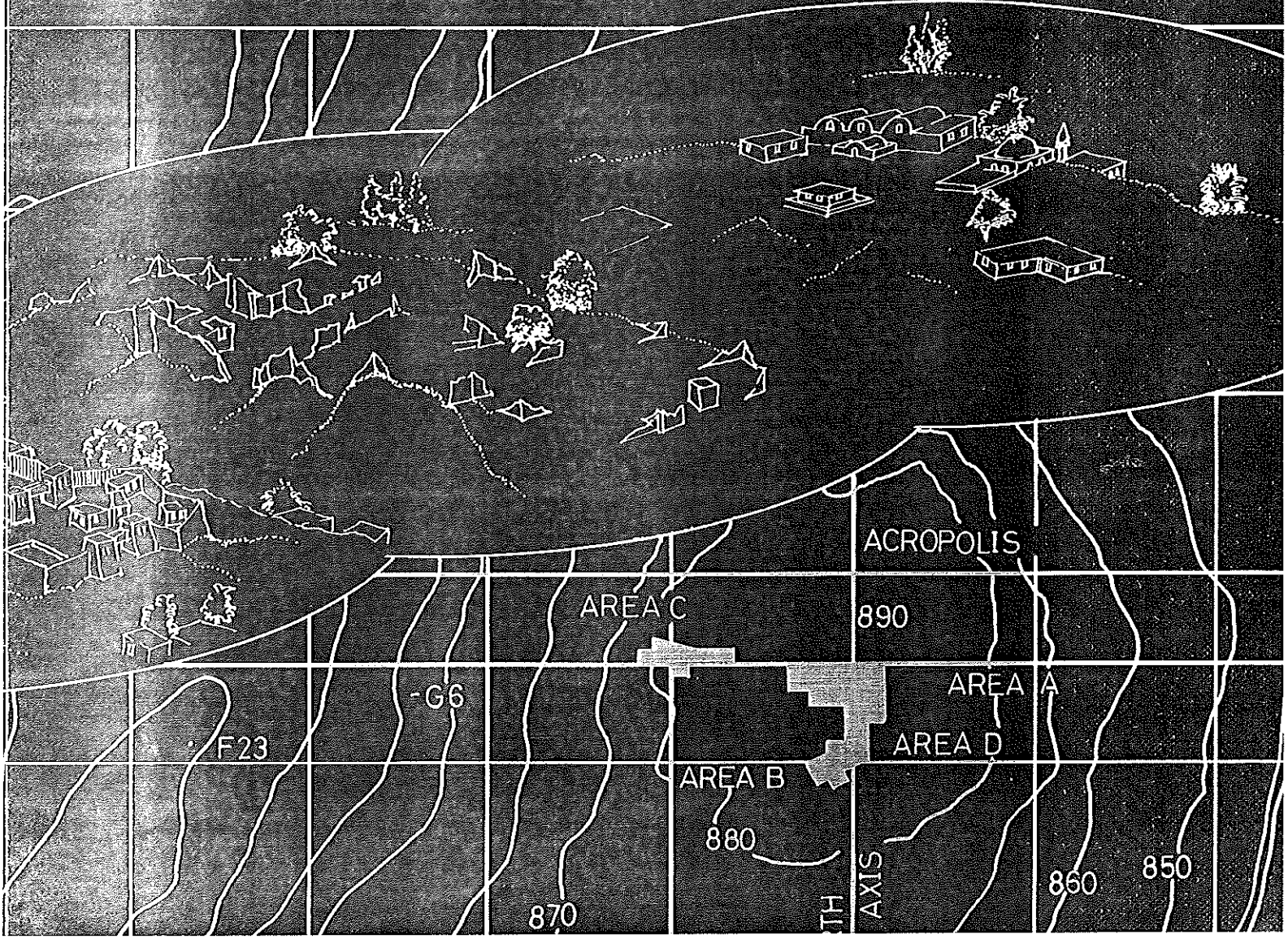
Sedentarization and Nomadization

Øystein Sakala LaBianca



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SEDENTARIZATION AND NOMADIZATION:

FOOD SYSTEM CYCLES AT HESBAN AND VICINITY IN TRANSJORDAN

by

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Chapter One

Introduction to the Food System Concept and the Heshbon Expedition

The Problem

The phenomena that this study is concerned with are the archaeological residues encountered in the Hesban region in Transjordan which bear witness to four millennia of changing configurations of human occupation and livelihood. Over the centuries since the dawn of history in this region, the residues of sedentary inhabitants, such as the ruins of farmsteads, villages, and towns, have been laid down in alternating sequence with the residues of nonsedentary, migratory peoples, such as the scattered remains of ancient campsites, storage depots, and burial sites. Sedentary occupation, therefore, has been a transient phenomenon in this region rather than an unabated development.

Simply stated, the primary purpose of this investigation is to reconstruct and analyze various diachronic and synchronic dimensions of these long-term changes in human occupation and livelihood going back to about 1500 B.C. or to the Late Bronze Age. What were the extent and nature of the sedentary occupation at various points in time? What were the extent and nature of the migratory populations at various points in time? To what extent were their modes of livelihood intermeshed with those of the sedentary populations? What were the forces which account for the growth and decline of sedentary occupation? Who were the peoples involved in the successive dramas which have taken place on this stage?

As will be explained in greater detail further on, a three-tiered scaffolding had to be set up in order to come to grips with these questions. Given the diverse and fragmentary nature of the archaeological information upon which our quest for answers had to rely, some way had to be found whereby these many different lines of evidence could be integrated and pieced together into a dynamic whole. The first tier of this scaffolding, therefore, is the concept of the *food system* which is introduced in the present chapter. This concept, along with the related concepts of food system *intensification* and *abatement*, enabled the sort of integrative fitting together of the disparate pieces of archaeological and historical information upon which we had to rely in the present study.

The second tier of this scaffolding involved ascertaining, in a general way, certain salient characteristics of Middle Eastern food systems. To this end, a review was undertaken of pertinent secondary sources which resulted in the delineation of a number of environmental and sociocultural factors which appear to have played a role in determining food system conditions throughout past millennia in this region. A crucial assumption as far as the present investigation is concerned was confirmed as a result of this review. This was the assumption that in the Middle East, temporal changes in food systems involving intensification and abatement have traditionally manifested themselves in the processes of *sedentarization* and *nomadization*.

The third tier which had to be erected in order to provide an adequate foundation for answering the aforementioned questions involved ascertaining the salient features of the present-day food system of central Transjordan. To this end, an investigation was carried out of the changes in food system conditions which have occurred over the past century and a half in the vicinity of Hesban. The insights gained from this undertaking proved to be absolutely essential in guiding the process of reconstructing and fitting together the disparate lines of archaeological information on which this study of long-term changes in the food system of this locality have had to rely. The project area with which

this research has been concerned, along with the types of residues of ancient patterns of occupation and livelihood upon which this analysis is based, are briefly described toward the end of the present chapter and are discussed in greater detail in chapters three and four.

The Roots of the Food System Concept

As an explicit theoretical construct within the field of anthropology, the concept of the food system, as defined further on, represents a convergence of many formerly disparate approaches to the subject of food within anthropology. Indeed, a review of anthropological approaches to matters related to the quest for food inescapably leads to encounters with some of the most prominent theoretical orientations within French, British, and American anthropology. A brief review of some of the most influential of these is offered next in order to acknowledge the diversity of perspectives and approaches which, in a general way, constitute the theoretical underpinnings of the food system concept.

British and French Approaches

In the second chapter of his book, *Cooking, Cuisine and Class*, Jack Goody (1982) offers a succinct overview of British and French approaches to the anthropological study of food. His review is divided into five sections: precursors, functional approaches, structural approaches, cultural approaches, and historical approaches ("changing worlds"). Between these approaches Goody attempts merely to "make a conjunction," believing that "shifts of the kind from functionalism to structural functionalism can hardly be said to reorganize a body of theory and data in the way that Kuhn (1962) suggested for the natural sciences" (1982: 39).

Among the precursors Goody names Sir James Frazer (1890), Ernest Crawley (1927), and W. Robertson Smith (1889). These 19th-century investigators were interested largely in practices dealing with religious aspects of the process of consumption such as taboos, sacrifice, and communion (Goody 1982: 10). These authors were searching for a rational explanation for these ritual and supernatural aspects of consumption in the light of evolutionary theory. In isolating "certain widespread features of human behavior," these investigators "set the terms" of subsequent inquiry of cultural aspects of food and eating.

The contribution of the functionalist approach was to focus attention on the social function of food (Goody 1982: 13). Radcliffe-Brown (1922: 227), for example, noted that among the Andaman Islanders, the "social value" of food was inculcated in the young by means of initiation ceremonies involving prohibitions of relished foods from which they were later released. Such observations led him to conclude that the getting of food is "by far the most important social activity" among these islanders, because it is around food that "the social sentiments are most frequently called into action" (*cf.* Firth 1964).

In the works of other functionalists such as Malinowski (1935), and especially that of Audrey Richards (1939), the quest for food is seen as a principal agent in fostering cooperation and as the "chief determinant of human relationships, initially within the family, but later in wider social groups, the village, age-grade, or political states" (Richards 1939: ix; Goody 1982: 15). In Richards' pivotal study, *Land, Labour and Diet in Northern Rhodesia* (1939), for example, patterns of consumption are placed "firmly and more specifically in the context of the whole process of productive activity" (Goody 1982: 16). Thus her book includes treatment of such topics as the organization of labor in relation to notions of time, techniques for producing and preparing food, and the "cultural determinants of food and feeding" (Richards 1939: 405).

While Goody (1982: 17) acknowledges the larger purpose behind Levi-Strauss' structuralist approach to food preparation and eating manners, namely "to look at the structure of human thought itself, even of the human mind," he is critical of Levi-Strauss' tendency

> to spirit away the more concrete aspects of human life, even food, sex and sacrifice, by locating their interpretation only at the deeper level, which is largely a matter of privileging the symbolic at the expense of the more immediately communicable dimensions of social action (Goody 1982: 25).

Furthermore, in emphasizing binary oppositions in the tradition of structural linguistics, such as that between the "raw" and the "cooked," Levi-Strauss' analysis not only abstracts arbitrarily the symbolic aspects of culinary activity from other related activities, such as the "relation between consumption,

production and the social economic order," it simultaneously "defines biological factors out of the explanation of social action" (Goody 1982: 25).

This tendency to neglect or even deny the role of biological and material factors is also evident in the cultural approaches of Mary Douglas (1966, 1971; Douglas and Isherwood 1979) and, especially, Marshall Sahlins (1976). Douglas' investigations focus, for example, primarily on such cultural aspects of food getting as the symbolic meaning of the meal. Her approach "is strongly reminiscent of Radcliffe-Brown's attempt to extract meaning by examining similar *ritual* acts in dissimilar social contexts" (Goody 1982: 31). Rather than contributing a broadly unifying framework to the anthropological analysis of food, therefore, both structuralist and cultural approaches have tended to restrict the analytic field within which behaviors related to the quest for food are examined.

Goody's review of British and French social anthropologists' approaches to the study of food concludes by noting that the dimension that all of them "play down is time—and to a lesser degree space" (1982: 33). The focus on the meaning of activities related to the preparation and consumption of food in specific cultural contexts "has tended to push aside studies of long-term change" (1982: 37). This limited focus has also tended to obscure the fact that changes in patterns of consumption, particularly in complex societies, occur as the result, not only of local changes in production and distribution, but of changes in world-wide patterns of production and exchange. Thus, "the meaning of sugar for the Lancashire mill worker is not determined in the metropolitan heartland alone. It is embedded in a world economy" (Goody 1982: 37).

Goody's own work, *Cooking, Cuisine and Class* (1982), is offered as a beginning remedy to this situation. He suggests a framework which emphasizes the "conjunction" between the various aspects of the quest for food isolated for study by investigators such as those whom he reviews. Specifically, he proposes to examine the "four main areas" of the "process of providing and transforming food," namely that of "growing, allocating, cooking and eating, which represent the phases of production, distribution, preparation and consumption" (1982: 37). These four phases, in turn, have their respective loci in which they occur, namely farm, granary/market, kitchen, and table. To these he adds an often forgotten fifth phase, that of clearing up or disposal, which occurs in the scullery.

In attempting to account for why a differentiated haute cuisine has not emerged in Africa, as it has in other parts of the world, Goody adopts the sort of comparative historical approach pioneered by Marc Bloch, Lucien Febvre, and Ferdinand Braudel, members of the so-called French Annals School of social history. Goody (1982: 38), by trying

> to link the nature of different cuisines to the ways in which food is produced, and to relate the system of agricultural production to the subcultures and social strata that are differentiated by their styles of life,

makes apparent the conjunctions which link the various phases of the quest for food into one complex unity. His work, therefore, represents the current state of the art of European and British contributions toward the development of a broadly integrative concept for thinking about food.

American Approaches

In contrast to the emphasis on symbolic interpretations of food preparation and consumption which has occupied British and French anthropologists for more than half a century, American anthropologists have tended to focus their research on economic and ecological aspects of food production and distribution. As Hatch (1973) has noted, the path followed by American anthropologists was one which Franz Boas, the father of American anthropology, had implicitly approved, despite his anti-theoretical and anti-materialistic biases.

While rejecting environmentalism, Boas espoused possibilism, the idea that the historical development of cultures is restricted by the limits set by environmental conditions. Wrote Boas (1940: 265-266):

> The lack of vegetable products in the Arctic, the absence of stone in extended parts of South America, the dearth of water in the desert, to mention only a few outstanding facts, limit the activities of man in definite ways.

Furthermore, in the Boasian view, the implicit assumption was made that

> when environmental factors pass beyond the thresholds established by man's material needs—when the climate is too cold for human survival, or when the local flora and fauna do not provide adequate sustenance for a given population

> density–cultural adjustments must take place (Hatch 1973: 232).

It was during the 1930s and 1940s, as American anthropologists sought to rise above the theoretical limitations of Boasian historical particularism, that a solid foundation was laid for the growth of economic, subsistence, and ecological studies in American anthropology (Hatch 1973). This foundation was provided, in particular, by Leslie White (1943, 1947) and Julian Steward (1936, 1937, 1955). While there were many potential directions for American anthropologists to follow, including those pursued by British and French anthropologists, the nascent materialism in Boas' writings–*i.e.* his implicit assumption that those institutions which were rooted in the physical world through the life-sustaining needs of the members of society were somehow immune to the vicissitudes of history–appears to have been a deciding factor in accounting for the widespread acceptance of White's, and in particular, Steward's theoretical proposals among American anthropologists (Hatch 1973).

Julian Steward's (1955) cultural ecology went beyond the possibilism of Boas in that it involved an attempt to classify cultures according to the salient features of their technoeconomic core. In particular, his work aimed at elucidating how different ways of exploiting the environment, or how different types of subsistence activities and economic arrangements, created similar or differing institutions. For example, societies which came to depend on irrigation could, according to Steward, be expected to possess certain parallel features when it came to how they were organized sociopolitically. Whereas such irrigation civilizations were thought of as representing a certain cultural type with respect to their socioeconomic cores, those societies which depended on hunting-gathering were thought of as representing another, and so on.

While it might be concluded from these examples that Steward's views had their basis in some kind of doctrinal materialist position (*cf.* Harris 1968), this appears not to have been the case. Indeed, as Bennett (1976: 214) has noted, a balance or interplay between "the role of the environment as a facilitating factor–permitting choice–and its role as a limiting factor–constraining choice," is implicit in much of Steward's work. While he "felt that the core caused other features of culture," he also believed that "these same features shaped the core at some past time" (Bennett 1976: 214). It is this implicit notion of systemic feedback which has made Steward's work foundational for much of the subsequent work being carried out in the name of cultural ecology by anthropologists over the past three decades.

One of the earliest American anthropologists to be concerned with such systemic feedback relationships was Clifford Geertz (1963). In his book, *Agricultural Involution*, for example, he advances an explicitly ecosystemic approach which emphasizes the interdependence of the physical environment and human institutions. By means of their food production activities, humans either disrupt balanced environments, help to maintain them, or even help to create new balanced environments (*cf.* Bennett 1976: 166; Hardesty 1977: 14-15).

An even more explicit attempt by an anthropologist to operationalize the idea of ecosystemic feedback is Rappaport's (1967) analysis of warfare and territorial expansion among the Tsembaga Maring peoples of New Guinea. In this study it is asserted that ecological control is ultimately maintained by means of a cycle of rituals. Ritual, writes Rappaport (1967: 28-29),

> helps to maintain an undergraded environment, limits fighting to frequencies which do not endanger the existence of the regional population, adjusts man-land ratios, facilitates trade, distributes local surpluses of pigs throughout the regional population in the form of pork, and assures people of high-quality protein when they are most in need of it.

Although both of these approaches involve the use of the ecosystem concept, they differ considerably in how they use it. For example, for Geertz the concept is at best a kind of metaphor which has been invoked in order to emphasize the complex interdependence which exists between human activities and their environments. In Rappaport's case, by contrast, the concept has been operationalized with far greater attention to analogies between human and biological systems. In other words, to a much greater degree than Geertz, Rappaport seems to assume that human social systems are analogous to biological systems, and hence, that they are stable, self-regulating systems which function at a level of organization largely beyond human awareness and control (*cf.* Bennett 1976: 182-193).

It is when it comes to reckoning with the role of human control and self-conscious awareness that adaptivist anthropology represents an advance over

formulations such as these. To the concern with systemic feedback between environments and human institutions manifest in Geertz's and Rappaport's cultural ecosystemicism, adaptivist anthropologists have added the dimension of human decision-making and choice. Rather than assuming that human social systems operate at a level of organization largely beyond human awareness, adaptivists acknowledge the fact that humans make explicit choices, some of which may be good and some of which may be bad in terms of their consequences for the maintenance of a balanced environment (*cf.* Bennett 1976: 166).

An example of a society in which interrelationship between environment and humans is clearly mediated by a conscious effort to resist using the most efficient means of exploiting the physical environment and to limit consumption are the Amish communities of North America (Stoltzfus 1973). Another would be the Hutterites, whose sectarian beliefs form the foundation for numerous self-imposed controls over their use of the physical environment (*cf.* Hostetler and Huntington 1980).

To a significant degree, the adaptive dynamics approach represents a synthesis of the concerns of American cultural ecologists and British social anthropologists. This is true, at least, to the extent that adaptivist anthropologists have added to the traditional preoccupation of cultural ecologists with settlement patterns and subsistence techniques numerous dimensions relating to the social environments within which human choices are made, many of which have been the traditional preoccupations of British social anthropologists. Specifically, their focus on adaptive behavioral processes has led them to incorporate in their analysis of systemic feedback loops dimensions such as ideology, attitudes, politics, and social reciprocities (Newman 1970; Thompson 1972; Stini 1975; Vayda and McCay 1975; Yellen and Lee 1976; Haas and Harrison 1977; Hardesty 1977; Thomas, Winterhalder, and McRae 1979; Bartlett 1980; Rappaport 1968, 1971, 1977; Ortner 1983).

This trend is clearly apparent in the rapidly developing field of nutritional anthropology, a specialization into which a number of adaptivist anthropologists have recently been moving (Haas and Harrison 1977; Benham 1981; Messer 1984). For example, a recent review of anthropological perspectives on food, completed by Messer (1984), details the ways in which anthropologists, in their search for factors that govern food choices, have been concerned with a wide range of biological and cultural factors influencing adaptive behavioral processes in humans. These include how sensory judgments and preferences such as taste, smell, texture, and color affect selection of foods; how foods are classified by various cultures for purposes of symbolic representation of their edible and health environments; how foods and their manner of preparation have been utilized to express social relations; how foods and foodways function in the maintenance of ethnic identity; how economic factors limit the extent to which people can satisfy their taste choices; and how styles of cooking and eating are shaped by traditional nutritional wisdom.

Perhaps one of the most significant developments which have taken place as a result of Julian Steward's work is that his cultural ecological perspective set in motion a gradual rapprochement of the concerns of American ethnographers with those of prehistoric archaeologists. Particularly catalytic, in this regard, was the Stewardian focus on subsistence-settlement systems. This focus stimulated increasing coordination between investigators studying the present and those studying the past in so far as both were interested in fundamentally the same problem, namely in arriving at typologies of technoeconomic cores. Furthermore, as the orientation of American ethnographers shifted in the direction of adaptive behavioral processes, so did the orientation of prehistorians. This was in particular the case with the new archaeologists (*cf.* Binford 1962, 1964, 1965, 1983; Adams 1965, 1966, 1978; Adams and Nissen 1972; Flannery 1967, 1972, 1976; Flannery *et al.* 1967; Deetz 1967, 1972; Trigger 1968, 1971; Angel 1972; Leone 1972; Redman 1973, 1976, 1978; Sterud, Straus, and Abramovitz 1980; Sabloff 1981; Orme 1981; Butzer 1982). A good example is Flannery's (1972) attempt to identify specific behavioral mechanisms whereby cultural evolution proceeded in Mesopotamia. In this study what is emphasized is the adaptivist's concern with cultural processes rather than the Stewardian focus on cultural types.

Approaches From Other Disciplines

Because of the centrality of food to the human experience, it is hard to think of an academic discipline which, in one way or another, has not had something to offer in the way of a perspective on

either its production, distribution, preparation, consumption, or disposal. Any attempt, therefore, to identify tentacles of the food system concept emerging from other disciplines can at best be a highly selective undertaking. Offered here, therefore, is a brief overview of selected perspectives from disciplines other than anthropology which have been influential in the present formulation of the food system concept.

A wide range of disciplinary perspectives dealing with how people and other living organisms utilize natural resources for the purpose of food procurement depend upon concepts developed in biological ecology. Examples would include such concepts as ecosystem, food chain, and food web (Boughey 1973; Cox and Atkins 1979; Clapham 1981). The ecosystem concept, for example, emphasizes the complex unity which ultimately accounts for the systematic interactions between various abiotic and biotic components of terrestrial ecosystems. These interactions are the result of solar energy flowing through biogeochemical cycles, including the carbon, nitrogen, phosphorus, and hydrologic cycles.

The idea of the food chain is one approach to describing the flow of energy through living organisms. Green plants are the primary producers upon whose tissue various kinds of herbivores, collectively called primary consumers, feed. Carnivores, in turn, consume the animal tissue of herbivores and other carnivores, thus establishing various trophic or feeding relationships in the system. These trophic levels, it is suggested, constitute links in a chain of feeding relationships (Boughey 1973: 121-131).

A more complex model of the pathways for energy flow through living organisms is the food web concept. While the food chain concept may be adequate to describe ecosystems with very few species, the food web concept has been advanced as a means to think about feeding relationships involving a number of species on each trophic level—some species eating both herbivores and other carnivores and others being omnivorous (Boughey 1973: 132-141).

Mention needs also to be made of the detritus food chain, whereby "dead plant and animal matter accumulates and is gradually broken down by detritus feeding animals and decomposers" (Cox and Atkins 1979: 42). Of the total energy which flows through an entire ecosystem, about half of it flows through the former, and about half of it flows through the latter of these two chains.

Agroecosystems, or ecosystems managed by human beings, differ from natural ecosystems in that they concentrate energy flow through a particular group of plant and animal species desirable to the human managers. Smith and Hill (1975) have shown that natural and agricultural ecosystems form a continuum. To distinguish natural from manipulated ecosystems, these investigators used species diversity and the intensity of human intervention (management) as the basis for constructing the continuum shown in fig. 1.1, which illustrates the relationship between natural versus managed ecosystems. While the scheme portrayed in this figure applies in a general way to agroecosystems, it should perhaps be noted that there are some types of managed ecosystems which it does not reckon with. An example would be the highly diverse, little managed, mixed-crop swidden systems found in the tropics.

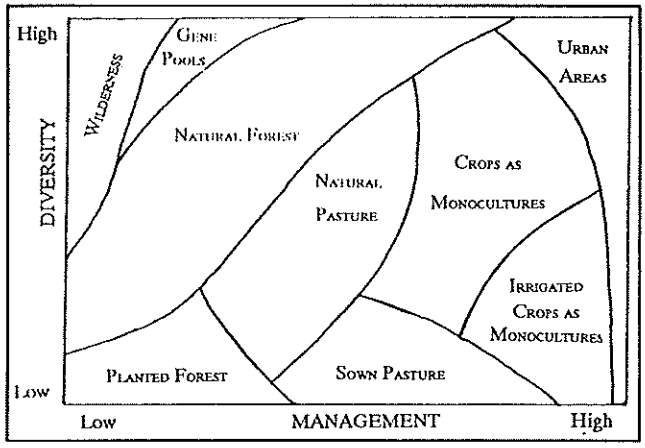

Fig. 1.1 Natural versus managed ecosystems (after Smith and Hill 1975)

The principle of energy flow through ecosystems has been applied by Duckham and Masefield (1971: 9) to the analysis of the relative efficiency of various farming food chains. They distinguish four chains: tillage crops—people (A); tillage crops—livestock—people (B); grassland—ruminants—people (C); tillage crops and grassland—ruminants—people (D). Overall Chain A is the most efficient, followed by Chains C and D. The least efficient is Chain B (Duckham and Masefield 1971: 9).

The arena in which the concerns of anthropologists most clearly overlap with those of investiga-

tors from disciplines such as economics and agricultural science involves attempts to identify the factors which cooperate in determining the form and intensity of a particular agroeconomic or farming system. Duckham and Masefield (1971: 97), for example, have identified nine independent variables or locating factors which cooperate in determining the form and intensity of actual farm enterprises. These include climate, landform, operational facilities (such as farm buildings, farm tools and equipment), agrarian, social, and economic infrastructures, price conditions, market conditions, and feasible species. A similarly broad scheme of factors has been suggested by Gilbert, Norman, and Winch (1980: 6-10), although their "farming systems approach" emphasizes to a greater degree the pivotal role of the farmer as a rational, maximizing strategist at the center of farming system interactions.

The significance of these ecological and agronomic perspectives for the present investigation is twofold. To begin with, they remind us of the fact that anthropological perspectives represent only a portion of the range of possible perspectives from which to begin an analysis such as is being pursued here. More important, perhaps, the fact that each of the approaches referred to above is founded upon the same fundamental assumption that most of the anthropological perspectives mentioned in the preceding sections are founded upon—namely the assumption that the quest for food by all forms of life involves systemic interactions of various kinds—is suggestive of the paradigmatic status of the systems perspective when it comes to investigations of the topic of food procurement by natural and social scientists.

Definitions, Scope, and Parameters of the Food System

Toward a Definition of the Food System Concept

Despite the vast amount of research and writing which has been done on the general topic of food, no widely-held consensus appears to exist regarding which term should be used in referring to the range of phenomena having to do with the quest for food. Depending on the interests and disciplinary orientations of different investigators, a wide range of terms are used to delimit the field of study. For example, in the literature cited above,

> a food system is a complex unity consisting of all of the purposive, patterned (institutionalized), and interconnected activities carried out by a group of individuals in order to procure, process, distribute, prepare or consume food, and dispose of food remains

terms like subsistence activities, agriculture, farming systems, agroecosystems, cultural ecology, foodways, cuisine, and diet have all been used to delimit different and overlapping aspects of the field of study which deals with the quest for food.

Conspicuously infrequent in the literature reviewed thus far by this investigator are references to the notion of the food system. Significantly, however, where the term is encountered, it is in studies where the complex unity which exists between production, processing, distribution, preparation, and consumption is either explicitly or implicitly acknowledged (Steinhart and Steinhart 1975; Bodley 1976: 95; Pimentel and Pimentel 1979: 8; Pelto and Pelto 1983; Messer 1984: 205; Goode, Theophano, and Curtis 1985; Khare and Rao 1986). In common as well in these analyses, therefore, is a systems perspective emphasizing the common purpose and interconnectedness of the many diverse parts of the system.

Even harder to come by than the term itself, are explicit definitions of the food system concept. As noted, the authors cited in the previous paragraph all assume a common implicit meaning of the term. Central to this investigation, however, has been the following definition: *a food system is a complex unity consisting of all of the purposive, patterned (institutionalized), and interconnected activities carried out by a group of individuals in order to procure, process, distribute, prepare or consume food, and dispose of food remains.* This formulation incorporates into an earlier definition proposed by Dyson-Hudson and Dyson-Hudson (1970: 92-123) the five phases of the process of providing food discussed by Goody (1982: 37) and others (Pimentel and Pimentel 1979; Messer 1984).

There are a number of reasons why the food system concept is preferable to the many other terms which have been utilized in delimiting the broad field of study having to do with people's quest for food. Particularly when the meanings of

The food system concept . . .

- includes all institutions and processes providing and transforming foodstuffs;
- focuses on daily activities;
- examines interaction between populations and their environments;
- avoids the sedentary bias;
- focuses on hunting and gathering;
- focuses on feeding relationships; and
- provides a framework using varied lines of research.

terms such as those mentioned above are kept in mind do their limitations become apparent. On the one hand, to most people the terms agriculture and farming suggest enterprises having to do with the production of food on cultivated fields by sedentary farmers. Thus they tend to exclude from consideration the livelihoods of nomadic pastoralists, hunters, and gatherers. On the other hand, terms like foodways, cuisine, and diet bring to mind practices having to do with the preparation and consumption of food. The term subsistence has become very closely associated with subsistence farmers—people who produce food primarily for their own consumption rather than for the market. Thus, in various ways, these alternatives fail to focus analysis on the complex unity or, as Goody (1982) would say, the conjunctions between the various parts of the whole system, including (as mentioned above) the production, processing, distribution, preparation, consumption, and disposal of food.

The Scope of the Food System Concept

The suitability of the food system concept as a vehicle for integrating different aspects of the quest for food needs to be further explained. Among the reasons for why the concept has been employed in this investigation are the following.

First, as already noted, what recommends the food system concept over any other concept now in use for systematically thinking about people's life-maintenance activities is that it brings together conceptually all of the diverse institutions and processes involved in providing and transforming foodstuffs into nutriment for human beings. Examples of such institutions and processes would be those which regulate how access to land and water resources is allocated, how labor is organized, how the means of production are controlled, how food products are distributed, how land and labor disputes are settled, which animals and foods are clean and which are unclean, how and what plants and animals are produced (landuse conditions), how and where people settle or migrate on the land (settlement conditions), how and what facilities, tools and equipment are produced or imported (operational conditions), how and what foods are eaten (dietary conditions), and so on.

Second, the food system concept provides a framework for analyzing the majority of the daily activities carried out by the majority of the people living in the world today and having lived in earlier times. Representing a fundamental concern of all human populations throughout all historical and prehistorical times, this concept offers an important linkage point between the present and the past. This continuity with the past is particularly in evidence when it comes to traditions governing how food is prepared and eaten, for, as Braudel (1967) has noted, such traditions belong among history's deepest and slowest moving undercurrents. A food system perspective, therefore, provides a theoretical rationale for the study of present-day practices as a means to gain insights for use in interpreting the historical and archaeological record.

Third, a food system perspective directs attention, on the one hand, to the interaction between populations and their local environments or habitats insofar as the latter are exploited for the purposes of gathering or producing food. On the other hand, it also directs attention to interactions between populations located in outlying geographical regions insofar as these are involved in competition over land resources and exchanges of food surpluses, technological know-how, and production resources.

Fourth, as noted earlier, the food system concept avoids the sedentary bias which often results

from conceptualizations based on the term agriculture. To most Europeans and North Americans, except perhaps those who are experts in the field of agricultural development, agriculture implies village-based farming. In the case of the Middle East, however, village-based farming is only part of the whole picture, the other part being the food production activities of nomadic pastoralists, such as the Bedouins of the Arabian desert. In the food system notion we have a concept which lends itself equally well to the analysis of the food production activities of both village farmers and Bedouins. Furthermore, as defined above, this concept reaches beyond what happens in the fields to the infrastructure which lies behind what happens there—*i.e.* to all those political, economic, social, religious, educational, and technological arrangements which are supportive of particular strategies of procuring food.

Fifth, the food system concept, in contrast to the food production concept, makes important consideration also of hunting and gathering as components of the food system. In the case of both villagers and nomadic pastoralists, hunting and gathering have traditionally played a much greater role than has hitherto generally been acknowledged. Furthermore, hunting and gathering were, for the greater part of prehistory, the primary means of obtaining food.

Sixth, the food system concept—in so far as it is rooted in ecological theory—provides a framework for consideration of the larger web of feeding relationships in which humans play just one part. For example, the wildlife encountered in villages and towns, as well as in archaeological excavations in the form of animal remains, can in most cases be readily accounted for when the feeding habits of the particular species represented are taken into consideration. In the case of animals such as dogs, cats, certain species of rodents and reptiles, their entire lives are lived out within the confines of human settlement. When they die, therefore, their remains represent a natural *thanatocoenosis*—an assemblage of organisms or their parts existing together in death as they had in life. Other species, in turn, are civilization followers—animals that belong either to cereal or grassland ecosystems, or scavengers feeding upon the organic wastes which abound in and around human settlements. Thus the large majority of animals found in association with human populations can be accounted for when considered in the light of the theoretical underpinnings of the food system concept.

Seventh, the food system concept has proven itself capable of dismantling the arbitrary disciplinary walls which have tended to frustrate attempts at fitting together the results of such varied lines of research as epigraphy, ethnoarchaeology, ethnohistory, stratigraphy, ceramic analysis, metallurgy, faunal analysis, palaeobotany, numismatics, surface survey, geology, hydrology, pedology, human osteology, taphonomy, and so on. To the extent that each of these and other lines of research illuminate individual food system components, or their dynamic interrelationships, they may be drawn upon. Indeed, once explicitly promoted as a vehicle for integrating various lines of research, various members of a multidisciplinary team of investigators are in a much better position to offer suggestions as to the pertinence of their results to understanding the food system. Without such a concept, their results will, understandably, be offered as contributions to a particular discipline rather than as contributions toward the solution of problems requiring multidisciplinary cooperation.

Parameters of the Food System Concept

In order to operationalize research concerned with food systems it is necessary to analytically isolate parameters of such systems which are capable of being investigated empirically. While the idea of the food system itself is a theoretical abstraction—a sort of heuristic device for thinking about the complex unity of parts and processes of which food systems are made up—it is possible to draw up a large number of observable phenomena which would constitute empirical referents of food systems. Many of these have been suggested in the foregoing section.

For reasons which will be stated in greater detail in Chapter Four, this study focuses attention on five broad parameters of the food system: *environmental conditions, settlement conditions, landuse conditions, operational conditions,* and *dietary conditions.* The primary reason for the selection of these five parameters is that all five are more or less directly traceable archaeologically. Changes in environmental conditions, for example, can be traced through analysis of plant and animal remains; changes in settlement conditions can be

traced through analysis of the locations of ruins of villages, campsites, and buildings; changes in landuse conditions can be traced through analysis of plant and animal remains, terrace walls, and soil conditions; changes in operational conditions can be traced through analysis of the remains of agricultural tools and facilities such as storage installations, water management installations, food processing installations, and so on; and finally, dietary conditions can be traced through analysis of plant and animal remains as well as human skeletal remains. The sufficiency of these five parameters with respect to providing data about food systems is indicated by the fact that together they embrace the majority of the locating factors which, according to Duckham and Masefield (1971: 97), cooperate in determining the form and intensity of particular food systems (see above, p. 9).

While the reconstruction of past states of the food system is made possible by focusing on these five parameters, reconstruction of recent changes in the state of such systems is equally possible and, indeed, desirable. It is desirable because through investigation of present conditions of the food system, as apprehended by means of these five parameters, what many of the important parts of the system are and how they interact with one another can be observed directly. Because such present-day conditions are so much more readily available to empirical investigation than are past conditions of the food system, they offer archaeologists and historians a base line against which to compare and contrast conditions in the past. This investigation illustrates this point by including a chapter (Three) which provides base line information about a food system (that of present-day Hesban and vicinity) which then is also traced archaeologically.

Parameters of food system conditions

environmental: plant and animal remains;

settlement: ruins of villages, campsites, and buildings;

landuse: plant and animal remains, water and soil management works, and settlement conditions;

operational: food storage, water management, and food processing installations, market places, road remains; and

dietary: plant and animal remains, human skeletal remains and food residues on pottery.

The Dynamics of Food System Transitions

Towards a Balanced Conception of Food System Changes

Food systems are dynamic, constantly changing configurations, oscillating in their degree of intensity. This point can be illustrated with reference to the above-mentioned five parameters of the food system. Thus, environmental conditions may oscillate between states involving high species diversity and the dominance of wild plants and animals and states involving low species diversity and the dominance of cultivated plants and domesticated animals (*cf.* Smith and Hill 1975). Settlement conditions may oscillate between states involving migratory groups of hunter-gatherers occupying the land in low population densities and states involving urban-dominated settled farmers occupying the land in high population densities (*cf.* Murdock 1965). Landuse conditions may oscillate between states involving low amounts of human intervention and management, such as in the case of hunting and gathering, and states involving high amounts of human intervention and management, such as in the case of farmers engaged in specialized production of selected field crops, tree crops, or animals (*cf.* Boserup 1965). Facilities conditions may oscillate between states involving a few readily transportable facilities such as tents, storage skins, and light arms for protection and hunting and states involving massive public works such as regional water management systems, terraces, public granaries and fortifications (*cf.* Barth 1973; LaBianca 1984). Finally, dietary conditions may oscillate between states involving consumption primarily of locally available raw or unprocessed foods in season and states involving consumption of a wide variety of imported, preserved, or processed foods (*cf.* Goody 1982; LaBianca 1984).

Definitions of intensification and abatement

intensification: when, within a given locality, there is a measurable *increase* in the totality of energy expended on producing and transforming foodstuffs into nutriments for humans and their animals

abatement: when, within a given locality, there is a measurable *decrease* in the totality of energy expended on producing and transforming foodstuffs into nutriments for humans and their animals

When the anthropological literature is canvassed for theoretical frameworks dealing with how and why food systems change, a striking imbalance is encountered. While one can find hundreds of articles and books which in some way or another offer insights pertinent to understanding how and why food systems intensify, explicit theoretical frameworks for dealing with the opposite process, how and why food systems decrease in intensity, are far less common. Indeed, it appears that when anthropologists are concerned with change, it inevitably turns out to be a concern with notions of progress and increase of some kind or another. Thus, some of the most familiar concepts in the anthropological literature are usually tied somehow to notions of development and progress. A quick scanning of word indices of some general works on anthropology helps to make this point. While concepts like evolution, domestication, sedentarization, specialization, stratification, maximization, urbanization, industrialization, and modernization recur as constructs around which a body of literature has emerged within the field of anthropology today, it is hard to even come up with the antonyms to these concepts, let alone a body of literature concerned with their opposites.

In order to remedy this imbalance, we have introduced elsewhere (LaBianca 1986) the concept of abatement as a term to refer to the process whereby food systems decrease in intensity. The specific sense in which this concept is used is as an antonym to the concept of intensification. Since, according to Webster's Third New International Dictionary there is no such word as dis-intensification, the word abatement comes the closest to expressing the opposite of intensification. According to the same dictionary *abatement* means "to reduce or lessen in degree or intensity" and suggested synonyms include "diminish" and "decrease."

One general dimension along which temporal transitions in food system intensities can be conceptualized is that of the amount of energy expended in the process of providing and transforming food. Thus, as noted earlier, by means of human manipulation and management of natural resources, energy in the form of water, mineral, plant, animal, and human resources is harnessed to serve culturally prescribed ends. For the purposes of this investigation, therefore, what is meant by the word *transition* is a passage or movement from one state to another with respect to amounts of energy expended. We shall assume furthermore, that the greater the amount of human manipulation and management of natural resources for the purpose of providing and transforming food, the greater the amount of energy expended and, therefore, the more intense the food system. The lower the amount of human manipulation and management, the lower the amount of energy expended and the less intense the food system.

Correlates of Food System Intensification

As already noted, a great amount has already been written about how and why food systems intensify. Anthropological research concerned with this problem can be grouped into four general categories. First, there are the studies of the origins of domesticated plants (Halbaek 1959a; Renfrew 1973; Ford 1979; Wing and Brown 1979) and animals (Angress and Reed 1962; Bokonyi 1971; Olsen 1971; Clutton-Brock and Uerpmann 1974; Flannery 1974; Meadow and Zeder 1978; Lyman 1982; Reed 1983). Second, there are those dealing with the origins and development of agricultural communities (Halbaek 1959b; Braidwood 1964: 112-135; Ucko and Dimbleby 1969; Flannery 1970, 1974, 1982; Sahlins 1972; MacNeish 1974; Butzer 1976; Cohen 1977; Redman 1978; Rhindos 1980; Binford 1983: 195-213; Hassan 1983). Third, there are those which deal more broadly with the role of agricultural intensification in accounting for the rise of cities and civilization generally (Clark 1962: 76-98; Adams 1965, 1966, 1974, 1978, 1981; Flannery 1972; Cowgill 1975a, 1975b; Cohen and Service

1978; Wenke 1981; Goody 1982). And fourth, there are those which focus more narrowly on the nature of agricultural intensification as a problem in and of itself (Geertz 1963; Boserup 1965, 1983; Spooner 1972; Cowgill 1975a, 1975b; J. W. Bennett 1976; Barlett 1980; Green 1980; Pelto and Pelto 1983; Dow 1985). To each of these categories dozens of additional references could be added.

In this overview of correlates of food system intensification we shall limit ourselves to consideration of seven correlates, namely innovation, population growth, new opportunities, centralization due to cost of transport, craft specialization, state formation and bureaucratization, and delocalization of diet. Represented among these seven correlates are proposals not only regarding the manner in which food systems intensify, but also regarding why they intensify in the first place. Since each of these correlates have been discussed in much greater detail elsewhere by the individuals cited below, we offer here a mere orientation to each.

Intensification has been linked to . . .

- innovation
- population growth
- new opportunities
- centralization
- craft specialization
- state formation and bureaucratization
- delocalization of diet

Innovation

Taking issue with those who would argue that humans are basically uninventive and complacent creatures, H. G. Barnett (1953) has argued that the innovative process is "the basis of culture change." According to Barnett, innovation involves a process of synthesis and recombination in order to manipulate and transform resources to meet culturally prescribed ends. He notes, for example, the variety of specialized tools and implements developed by the Eskimos, such as bow drills, shoe cleats, snow goggles, needles, buoys, seal lures and detectors, sledge runners, blood stoppers, skewers, whale harpoons, bird arrows, bows, fishhooks, snow houses, skin boats or kayaks, and their "tough, warm, and well-tailored skin clothing." Tools and implements such as these have made the Eskimos "admirably adapted to their habitat" and testify to "achievements of real insight and skill" among traditional peoples (Barnett 1953: 23-24, 237-238).

While the occurrence of the innovative process is indisputable, why it occurs and how it contributes to food system intensification is problematic. As already noted, many anthropologists disagree with Barnett's assumption that the innovative process is inescapable in humans—a voluntaristic impulse which continuously leads to new inventions and culture change. Furthermore, as Bennett (1976: 253) has noted, the rationality assumption which is implicit in Barnett's view of the innovative process "is no guarantee of survival-oriented outcomes. The 'right' choice based on abundant information may be the 'wrong' choice from the standpoint of ecologically adaptive consequences if the ends sought were destructive or exploitative." Thus, although the innovative process is an important one to reckon with in accounting for either food system intensification or abatement, its function and outcome are probably best understood in relation to other cooperative mechanisms, including the following ones.

Population Growth

Another proposal regarding why food systems intensify claims that it is a consequence of population growth. Proposed in 1965 by the Danish geographer Esther Boserup in *The Conditions of Agricultural Growth* (1965), this model is based on the assumption that population growth, due to natural birth rates or immigration, creates the conditions which lead to agricultural development. As population pressure on resources intensifies, people are forced to change their methods of food procurement so that a greater population density can be supported on a given hectare of land. In order to do this, populations usually increase the amount of labor expended per hectare by shortening fallow periods and increasing the frequency of cropping. Thus although the amount of food produced may diminish in relation to the amount of labor expended, intensification continues as long as the need to feed more people keeps growing. According to this proposal, therefore, it is population pressure which creates the conditions which lead to innovation and adoption of improved methods of food procurement, not the other way around.

The population pressure hypothesis has found a number of influential advocates within the camp of adaptivist anthropology (Binford 1968: 332; Flannery 1969: 80; Harner 1970: 69; Smith and Young 1972: 33; Spooner 1972; Cohen 1977). It has not, however, been unanimously accepted. A widely cited critique of this hypothesis is Cowgill (1975a, 1975b). He (1975a: 513) draws attention to the tendency of most adherents of the population pressure hypothesis to view population growth rates as "relatively inelastic, that is, relatively unresponsive to moderate changes in other variables." By taking population growth more or less for granted, they tend to overlook the fact that preindustrial population rates "have been very elastic, and very responsive to a host of still poorly understood factors." Consequently, "why some societies, and not others, embark on episodes of population growth remains a fundamental problem, and growth, just as much as decrease, needs to be explained" (Cowgill 1975a: 514).

New Opportunities

To understand why developmental episodes occur when and where they do, Cowgill (1975a) calls attention to the role of economic and institutional factors in either encouraging or discouraging it. Noting that the Industrial Revolution was spurred, not by European overpopulation, but by the sense of new opportunities which followed in the wake of the age of discovery and exploration, Cowgill favors taking into consideration basic motivational factors in accounting for the behavior of populations. When people perceive that a certain change may be to their advantage, and the economic and institutional possibilities exist to act on this perception, chances are that a change will be made, regardless of population pressure. Thus,

> asking whether population growth is *the* independent or *the* dependent variable is an inept question, and we should think of population variables as members of sets of variables, including technological and environmental variables and political, economic, and other institutions, which are all concomitantly interacting with one another (Cowgill 1975a: 516-517).

Centralization Due to Cost of Transport

In addition to the incentives for change created by a sense of new opportunities, locational factors may play a role as well in accounting for food system intensification. Thus, von Thünen (1930) noted already in the previous century that the cost of transport will in certain locations lead to concentration of agricultural production near major centers. This tendency may be reinforced by other factors such as

> greater accessibility of the nonagricultural goods and services which are provided by the center, importance of the center as a place one must visit for various business or political transactions and participation in important rituals, or simply the greater excitement and variety of the center (Cowgill 1975b: 517-518).

By means of this process, population densities as well as food production intensities will tend to be relatively high in the vicinity of such centers, "while at the same time more remote regions may be actually losing population, and land that is potentially quite productive may be going out of use" (Cowgill 1975a: 518).

Craft Specialization

The existence of a correlation between the division of labor into nonagricultural craft specialties (such as pottery making, weaving, basketry, and metalwork) and agricultural intensity is an empirical phenomenon which has been known for some time already (Hobhouse, Wheeler, and Ginsberg 1914; Gouldner and Peterson 1962; Murdock and Provost 1973; Childe 1946; Smith 1976; Fried 1967; and Service 1975). Recently Dow (1985), by means of computer-assisted regression analysis of a worldwide sample of 131 pre-industrial societies, has provided support for the hypothesis of reciprocal effects between these two variables. More specifically, he reports that "the reciprocal effects display a marked asymmetry in magnitudes" involving a stronger effect from labor specialization to the agricultural intensity variable than vice versa (Dow 1985: 150). Thus, the process of food system intensification seems to occur simultaneously with growth in nonagricultural craft specialization, the latter having an important role to play in promoting growth in the former.

State Formation and Bureaucratization

A well-documented phenomenon in the anthropological literature is the co-occurrence of state-level political systems and high-intensity food systems (Adams 1966; Flannery 1972; Sanders 1973; Bodley 1976: 109-110; Hunt and Hunt 1976; Wenke 1981; Hassan 1983). This literature offers ample empirical evidence for the reciprocal nature

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of the processes involved in the intensification of food systems and the development of state-level political systems and bureaucracies. On the one hand, state-level political systems and bureaucracies play an important role in developing and maintaining the socioeconomic infrastructure which is needed to support high intensity agriculture. Functions typically provided for by this infrastructure include formalized systems of land tenure and conflict resolution; protection against predatory populations; region-wide water management facilities and organizations; facilities for marketing, transporting, and storing produce; and centers of worship for the agricultural population. The bureaucrats, of course, are "those officers who are in the chain of command between the policy-makers and those who actually do the production work" (Hunt 1985). The farmers, on the other hand, are depended upon not merely to supply themselves with food, but also to produce a sufficient surplus to feed the state-level infrastructure personnel, craft specialists, and other specialized groups that usually exist within state-level societies.

Delocalization of Diet

The term *delocalization* has recently been suggested to describe the process whereby "food varieties, production methods, and consumption patterns are disseminated throughout the world in an ever-increasing and intensifying network of socioeconomic and political interdependency" (Pelto and Pelto 1983: 507). Three principal processes are involved in delocalization: first, "world-wide dissemination of domesticated plant and animal varieties"; second, "the rise of increasingly complex, international food distribution networks, and the growth of food-processing industries"; and third, "the migration of people from rural to urban centers, and from one continent to another . . . with a resulting exchange of culinary and dietary techniques and preferences" (Pelto and Pelto 1983: 508-509).

While delocalization is a process which has been ongoing since antiquity, its rate has accelerated markedly in the past two and a half centuries. As it has progressed, it has resulted in decreased local autonomy of food supplies and increased sensitivity of local regions to world-wide fluctuations in supply and demand. While local abatements in delocalization have no doubt occurred in certain isolated regions of the world at certain times and places in history, delocalization represents a "unidirectional tendency in human history" (Pelto and Pelto 1983: 510) which has contributed to increasingly widespread occurrences of high intensity food systems. Consequently, low intensity, autonomous, subsistence-based food systems are today practically extinct.

Correlates of Food System Abatement

The absence of a commonly agreed upon term among anthropologists and other social scientists for referring to the abatement process makes it difficult to ascertain the full extent of previous work on this topic. No doubt, as future research becomes more focused and cumulative, past contributions to this line of research will gradually come to light. Meanwhile, it seems appropriate to begin by recalling some of the social science disciplines in which the problem of abatement has been addressed, if only to emphasize that this is by no means a novel subject.

To begin with, it can be noted that among historians the subject of abatement, as it pertains to nations and empires, has received considerable attention. The classic work on this subject by an historian is, of course, Gibbon's (n.d.) *The Decline and Fall of the Roman Empire*. Since this classic appeared, literally dozens of historical works have been published which have utilized the first five words of Gibbon's title. A theme which is frequently encountered in these works is that abatement is the result of character weaknesses and shortsightedness on the part of rulers and other powerful people and organizations. This theme is, of course, at least as ancient as the Greek tragedies of the 4th and 5th centuries B.C. Historians, however, tend not to be concerned specifically with food system abatements.

The subject of abatement has also had a long and venerable following within the discipline of economics. Indeed, ever since Malthus' (1914) classic, the field of economics has had the distinction of being known as "the dismal science" because of its practitioners' frequent predictions of doom and gloom. The Malthusian doctrine that population tends to increase at a faster rate than its means of subsistence and that this inevitably results in degradation and poverty of the lower classes must certainly be ranked among the earliest and most influential theoretical propositions pertaining to the general subject of abatement. Recently, as noted

earlier, this doctrine has been challenged by Boserup (1965) whose thesis that population growth leads to agricultural intensification and economic specialization has spawned much recent research and writing in the field of anthropology (Spooner 1972; Cowgill 1975a; Cohen 1977).

Also from the field of geography have come proposals which must be reckoned with in an overview of social science research on the problem of abatement. Specific mention can be made of Ellsworth Huntington's influential, but today largely discredited notions regarding climatic change and the destiny of nations. As Chappell (1970: 358) explains,

> Huntington speculated that pulsations of climate had served as a driving force in the history of Eurasia, impelling nomadic invaders to overrun the civilized nations that surrounded them whenever the climatic cycle neared a trough of aridity.

This conclusion led Huntington (1907: 385) to write in the *Pulse of Asia* that

> With every throb of the climatic pulse which we have felt in Central Asia, the center of civilization has moved this way or that. Each throb has sent pain and decay to the lands whose day was done, life and vigor to those whose day was yet to be.

The controversy which has surrounded Huntington's thesis within the field of geography has been reviewed by Chappell (1970).

In the past two decades sociologists working within the framework of world system theory have focused attention on the economic imbalances which have led to the stagnation and demise experienced by certain third world peoples. According to Wallerstein (1974), one of the leading proponents of this approach, since the beginning of colonial times the industrialized nations of the world have taken advantage of the cheap labor and natural resources of "third world" countries in order to stimulate continuous growth within their own economies. The demonstrable inability of the underdeveloped countries to catch up with the economies of the developed nations is attributed to the process of underdevelopment. In essence, this process has involved the capitalist or core nations having introduced and maintained scarcity producing mechanisms in the world's peripheral or poor nations. Thus, rather than experiencing the same process of development which occurred in the west, these local food systems have, so to speak, been set on a path of abatement leading to food shortages, famines, and general cultural degradation (*cf.* Frank 1966; Franke and Chasin 1980; Lappe and Collins 1985).

Despite the absence of any widely-accepted concept in the anthropological lexicon for dealing with the problem of abatement, isolated studies do exist in both Old and New World archaeological literature which offer a starting point for theory building with regard to food system abatements. As I have discussed elsewhere (LaBianca 1986) a well-known example from the Old World would be

Abatement has been linked to . . .

- accumulating hazards
- lost opportunities
- hyperintegration
- myopic policies
- underdevelopment
- food shortages and epidemics

Adams' study of the collapse of the Sassanian canal network which integrated the flooding cycles of both the Euphrates and Tigris rivers to support intensive hydraulic agriculture in the Mesopotamian floodplain between A.D. 226 and 637 (Adams 1978). In the New World, Upham's study of the pre-Columbian abandonment of sedentary agriculture in favor of seasonal subsistence strategies by Pueblo groups in the American southwest represents another example (Upham 1984).

As a further step toward developing a framework for analyzing the problem of abatement, particularly as it pertains to food system transitions, we shall next distinguish analytically between several different correlates of abatement. Specifically, we shall introduce accumulating hazards, lost opportunities, hyperintegration, myopic policies, underdevelopment, and food shortages and epidemics as examples of such correlates. I have discussed each of these in greater detail elsewhere (LaBianca 1986).

Accumulating Hazards

All over the world, people's quest for food brings them into dynamic interactions with a wide variety of extreme events or hazards such as

droughts, floods, earthquakes, and epidemics. A useful framework for analyzing how people manage the risks involved in occupying a particular place with respect to such hazards has recently been proposed by Burton, Kates, and White (1978: 19). Their approach involves examining three elements in the situation, including how people recognize and describe a hazard, how they deal with it, and how they choose among the various possible actions that seem to them available (Burton *et al.* 1978: 19). The cumulative hazardousness of a place can be determined by ascertaining the probability of various extreme events occurring over a given period of time (Burton *et al.* 1978: 28). As a general rule, the more hazardous a particular location is, the more difficult it is to intensify as far as the food system is concerned.

Lost Opportunities

The role of new or lost opportunities in accounting for population and landuse dynamics is another important matter to consider in accounting for food system abatements. As noted earlier, Cowgill (1975a, 1975b) has argued that population growth is "a human possibility which is encouraged by certain institutional, as well as technological or environmental circumstances, but equally may be *discouraged* by other circumstances" (Cowgill 1975a: 516). Locational factors, such as availability of transport and proximity to major regional centers, play a crucial role as well in food system abatements. The growth of such centers

> can encourage local population concentrations, so that population density may be relatively high and agricultural intensification relatively great in the vicinity of major centers, while at the same time more remote regions may be actually losing population, and land that is potentially quite productive may be going out of use (Cowgill 1975a: 518).

Hyperintegration

A condition which may lead to the abatement of very intense food systems is *hyperintegration* or *hypercoherence*. This condition results when, in a highly centralized system, the autonomy of the various smaller subsystems is completely broken down (Flannery 1972: 421). Hyperintegration is one among several cultural pathologies identified by Rappaport (1969) which can lead to destabilization of high intensity systems. According to Flannery (1972: 420) hypercoherence may have contributed to abatements in both the Mesopotamian and the Mayan context. In both cases "marriage alliances between the ruling families of formerly hostile states" so strengthened "communication and influence between them" as to have destroyed "the natural buffering" which "insulated one from the upheavals in another." In the period which comes before the collapse of the Classic Maya, this condition appears to be reflected in the settlement pattern which reached, during this time, its nearest resemblance to the hexagonal spacing of sites which is characteristic of highly interdependent patterns of alliances and trade.

Myopic Policies

Myopic or shortsighted policies prevail where the long-term consequences of particular policies and technologies are ignored for the sake of short-term gain or preservation of the status quo. Thus, in Mesopotamia, in order to overcome uncertainty over future water supplies, excessive watering whenever canal levels allowed led to exacerbation of the problem of salinization, and eventually to abatement of the food system. In the Mayan context, the policies which encouraged intensification in the direction of terrace-and-field agriculture also appear to have led to subjugation of the peasants for the sake of more intensive agricultural output. The long-term consequence of this development was that it produced the discontent which led ultimately to abatement of the food system (*cf.* Hamblin and Pitcher 1980).

Underdevelopment

The possibility that some food systems may take a downward turn as a result of meddling by outsiders in the affairs of indigenous populations has, as we have noted earlier, received considerable attention recently by sociologists. Lappe and Collins, for example, have argued that colonialism actively prevented certain indigenous populations from remaining self-sufficient in their quest for food. By means of the process of underdevelopment, colonial powers

> forced peasants to replace food crops with cash crops that were then expropriated at very low prices; took over the best agricultural land for export crop plantations and then forced the most able-bodied workers to leave the village fields to work as slaves or for very low wages on plantations; encouraged a dependence on imported food; (and) blocked native peasant cash crop

> production from competing with cash crops produced by settlers or foreign firms (Lappe and Collins 1985: 210; *cf.* Lappe and Collins 1977).

While in some cases such colonial interventions stimulated an upward turn in the intensity of food production, as in the case of South Africa, in many other instances, such as in the Sahel region of West Africa, the introduction of more intensive forms of cultivation by colonial powers eventually resulted in ecological destruction, food shortages, and degradation of certain formerly productive regions (Franke and Chasin 1980).

Wallerstein's (1974; *cf.* Chirot and Hall 1982; Ragin and Chirot 1984) scheme for understanding the global relations which lead to underdevelopment and dependency was briefly noted beforehand. According to his model, what accounts for the success of entrepreneurs from the industrialized West is the fact that they have been able to take advantage of global inequalities without becoming subject to political pressures toward redistribution. By exploiting new opportunities in regions beyond the boundaries of their native countries they have been able to escape the strains toward redistribution which operate within their own societies (see Ragin and Chirot 1984).

Food Shortages and Epidemics

As correlates of abatement, food shortages and mass infections are appropriately discussed last in this line-up of mechanisms. The reason for this is that one or the other or both usually occur as the consequence of the above correlates—cumulative hazardousness, lost opportunities, hyperintegration, myopic policies, and underdevelopment. Furthermore, the unabating threat of food shortages may actually make food system intensification harder to achieve in certain regions, thus exerting a kind of downward pull in the direction of self-sufficiency and resiliency. The reasons for this have been illuminated by recent investigations of social responses to food shortages and epidemics.

To begin with, Dirks (1980: 31) has noted that how people respond to food shortages and famine is "remarkably uniform cross-culturally." Reviewing a wide range of studies of famished communities, he has shown that the changes which take place in human interaction patterns as food shortages worsen correspond to the triphasic pattern of Selye's (1956) general adaptation syndrome. Thus, like the human body's response to stress, populations respond to nutritional stressors by an initial *alarm phase* involving system-wide hyperactivation; this is followed by an energy-conserving *resistance phase*, which in the end is followed by an *exhaustion phase* during which a last all-out effort to survive is followed by death.

When the behaviors which characterize each of these phases are examined, insight is gained into a number of processes which play a role in abating food system intensity levels. For example, the alarm phase is manifest by speculative hoarding, emigration, increased hostility, and political unrest. Indeed "rebellion and revolution are more likely to occur during the first phase of famine than later" (Dirks 1980: 27). The next phase, resistance, begins when "hyperactivity gives way to hypoactivity." There is a "general depression in the frequency of interaction, particularly mating behavior, greeting behavior, play, and fighting." Social life becomes progressively atomistic and there is increasing economy of action. There is also a tendency for

> the division of labor to collapse as everyone turn(s) attention to the quest for food . . . As obtaining food from familiar sources becomes more and more difficult, efforts to procure nourishment expand into previously unexploited niches, competition intensifies, and agonistic encounters increase (Dirks 1980: 27-30).

This situation, in turn, necessitates greater concern with the protection of food stores and gardens. Thus people begin to take turns day and night looking after their food supply.

Whereas families usually remain together during the resistance phase, they collapse during the exhaustion phase: "Reciprocity eventually constricts to a point at which the family ceases to function as a redistributive, protective entity and individuals begin to fend exclusively for themselves" (Dirks 1980: 30). Turnbull's (1972) controversial report on the Ik of East Africa is a classic example of the behavior which characterizes the exhaustion phase.

Particularly in the world's dry regions, the threat of famine has played a crucial role in shaping the structural arrangements which govern traditional food procurement strategies (Kates, Johnson, and Haring 1977; Marx 1977; Burton *et al.* 1978; Colson 1979; Franke and Chasin 1980; Campbell 1984). In such regions there is a constant pull in the direction of self-sufficiency which is realized through resilient food strategies emphasizing diversification rather than specialization. This pull toward self-reliance is obviously a crucial factor to

be reckoned with in accounting for periodic abatements in food system intensities.

That a synergistic relationship exists between famines and epidemics is a "recurrent theme in human history" (Taylor 1983). What accounts for this synergism is, of course, the fact that prolonged periods of nutritional stress gradually weaken the effectiveness of the body's ability to overcome or contain the constant invasion of biological and physical pathogens into the system (Cassel 1974). While individuals and populations are capable of a certain amount of physiological adaptation to such stress (Stini 1973), when the limits of such adaptation are reached the physical organism is overcome by disease and eventually dies.

There can be little doubt that epidemics, by affecting the labor pool of local food systems, have contributed significantly to abatement processes in different times and places. Large scale die-offs have repeatedly affected Old World populations (McNeill 1976; Dols 1977) and have played a pivotal role in the history of the New World as well (Cook 1973; Joralemon 1982). Indeed, it has been argued that what subdued the native Indians of America in the face of European expansion was not the superior methods of warfare of the latter, but the mortality which resulted from the diseases transmitted to the Indians by the European invaders (Crosby 1972).

Stability and resilience

stable systems: absorb *as few* disturbances as possible and return *rapidly* to equilibrium.

resilient systems: absorb *large amounts* of disturbances and return *more slowly* to equilibrium.

Another way in which infectious microparasites may impact the labor pool of local food systems is by setting in motion various cycles of migrations. McNeill (1979) has noted, for example, that urban centers must maintain a constant inflow of persons from rural communities in order to make up for the excessive die-offs which result from the greater ease with which diseases develop and spread when large numbers of people live so close together. He also notes that isolated communities on the periphery of such centers are more vulnerable to the new diseases incubated in urban centers because they have less opportunity to develop immunities to them. Throughout the history of the Old World, this situation, he argues, has tended to set in motion two flows of people—

> one toward the center, where endemic high mortality rates maintained what we might think of as a zone of demographic "low pressure" inviting in-migration, and the second towards the periphery, where epidemic die-offs produced sporadic zones of demographic "low pressure" that also invited in-migration (McNeill 1979: 96).

Stability and Resilience

Viewed from a temporal perspective, food systems can be expected to oscillate up and down in intensity, depending on the actions of mechanisms such as those mentioned above. This, it turns out, is a temporal characteristic of all living systems as has been noted by Holling (1973) and Winterhalder (1978). In a widely-cited article, for example, Holling (1973) employed the concepts of stability and resilience to describe the two alternative responses of living systems to perturbations. On the one hand, a system might respond to perturbations by fluctuating within certain ranges, and yet may return by more or less regular oscillations to an equilibrium. Because such systems are capable of absorbing large amounts of perturbations, they are said to be resilient. On the other hand, a system might respond to perturbations by returning as rapidly as possible, and with the least fluctuations, to equilibrium. Because such systems absorb fewer disturbances and are more rapid in returning to equilibrium they are said to be stable. Stable systems, consequently, are more likely than resilient ones "to shift into another domain" or to go into extinction (Holling 1973; Winterhalder 1978: 52).

Holling's proposals have been adopted by Adams (1978) to distinguish between the adaptive strategies of two competing social elements in ancient Mesopotamian society: those of the urban elites and those of the farmers and herdsmen on whom the "urban edifice of power, privilege, tradition, and ceremony ultimately depend" (Adams 1978: 333). On the one hand, he sees the urban elites of the Third Dynasty of Ur (3rd millennium B.C.) and the later Sassanian dynasty (A.D. 226-

637) as the protagonists of stability. As noted earlier, their state ideologies "assumed the convergence of everyone's interest on a single, maximizing approach" emphasizing short-term maximization of benefits by and for urban elites. In the long-run, however their strategies produced an unstable mixture of concerns and goals that tended to preclude the development of plans and institutions to promote continuity and survival.

On the other hand, the alternative to the centralizing propensities of the urban elites is furnished by the survival strategies emphasized by the primary producers, in particular the tribally organized, seminomadic elements of ancient Mesopotamian society. Their emphasis on "mobility, military prowess, and the maintenance of a spectrum of subsistence options that balanced herding with limited cultivation" assured survival, if not comparable stability or prosperity. In the long term, therefore, it is this element in ancient Mesopotamian society which has persisted between the short-term "peaks of dynastic consolidation."

Building on the insights of Holling (1973) and Adams (1978), Stuart and Gauthier (1981), and Upham (1984) have offered another pair of metaphors for use in differentiating between strategies of survival and strategies of maximization. Distinguishing between strategies of power and strategies of efficiency, they note that, on the one hand, cultural systems create a power drive—they pump up, so to speak—"when they increase rates of population growth, rates of production, or rates of energy expenditure" (Stuart and Gauthier 1981: 10). Such systems also burn out.

On the other hand, efficient systems are "rather the opposite, so that energy in and energy out are more nearly equal, and the efficiency drive is characterized by decreased rates of population growth, production or energy expenditure" (Stuart and Gauthier 1981: 10). Given these two opposing strategies, most food systems could be located somewhere along an axis with hunter-gatherers at the efficient end and United States agribusiness at the power end. While efficient strategies tend to be areally extensive and to involve the use of population-regulating mechanisms such as infanticide, postpartum sexual taboos, population budding, etc., to ensure a balance between population size and available resources, power strategies tend to lead to areally intensive landuse, population growth, intensive resource procurement, social stratification, productive specialization, elite political organizations, extensive local and regional exchange, and social, economic, and political alliances (Upham 1984: 236-237).

The Heshbon Expedition

The Expedition's Name

Throughout the entire period of fieldwork in Jordan, the campaigns at Tell Hesban and vicinity were carried out under the name of *Heshbon Expedition.* The reference to "Heshbon" rather than "Hesban" in this name reflects the original reason for initiating fieldwork, namely to advance our understanding of various biblical events linked to this site, known in the Old Testament as Heshbon. As will be explained below and in Chapter Four, the decision to use "Hesban" instead of "Heshbon" in the present context is a consequence of the broadening of the expedition's goals over the period of fieldwork and beyond. In the following brief overview of the history of the expedition, however, we shall use its original name.

Autobiographical Background

This investigation of food system cycles in Transjordan began in the autumn of 1969 while I was an undergraduate student in the Behavioral Sciences Department at Andrews University. By invitation from Robert Little, Instructor in General Anthropology, I was given the opportunity to assist with cleaning and identifying animal bones recovered from the first season of excavations at Tell Hesban, which had taken place during the summer of 1968. My involvement with animal bones was greatly accelerated during the summer of 1971, when I was asked to take Mr. Little's place as faunal analyst during the second campaign at Tell Hesban. I continued as the Heshbon Expedition's "bone man" during all of its subsequent campaigns.

This involvement with animal bones during each of the four field seasons of the Heshbon Expedition was fortuitous in that it led to a personal quest to justify time and energy thus spent (LaBianca 1986). Since animal bones were not normally collected by biblical archaeologists at this stage in the development of the discipline, it was also unclear to many fellow staff members why time and money should be spent on bone work and other pursuits

which I insisted on being allowed to carry out, such as collecting skeletal remains of recently butchered or killed animals, making ethnographic observations of present-day animal husbandry and butchering practices, and collecting samples of present-day wild plants and cultigens. Were it not for the willingness and encouragement of the leadership (identified below) of the expedition to let such nontraditional inquiries proceed, this research would have been aborted a long time ago.

Ready answers to why "bone work" should be carried out at a historical site like Tell Hesban were not forthcoming from the writings of anthropological archaeologists either, for nearly all of their published research at that time dealt with prehistoric sites where the problem of domestication of animals and plants provided an obvious justification for saving and studying their remains. However, from Tell Hesban little could be learned about the domestication process of animals like sheep, goats, and cattle, for all of them had been domesticated long before the Early Iron Age, the earliest stratum at this site. Add to this the fact that the excavations yielded thousands of bone fragments per week, and one can appreciate the traditional biblical archaeologist's solution to how to deal with animal bones, which was simply to throw them away.

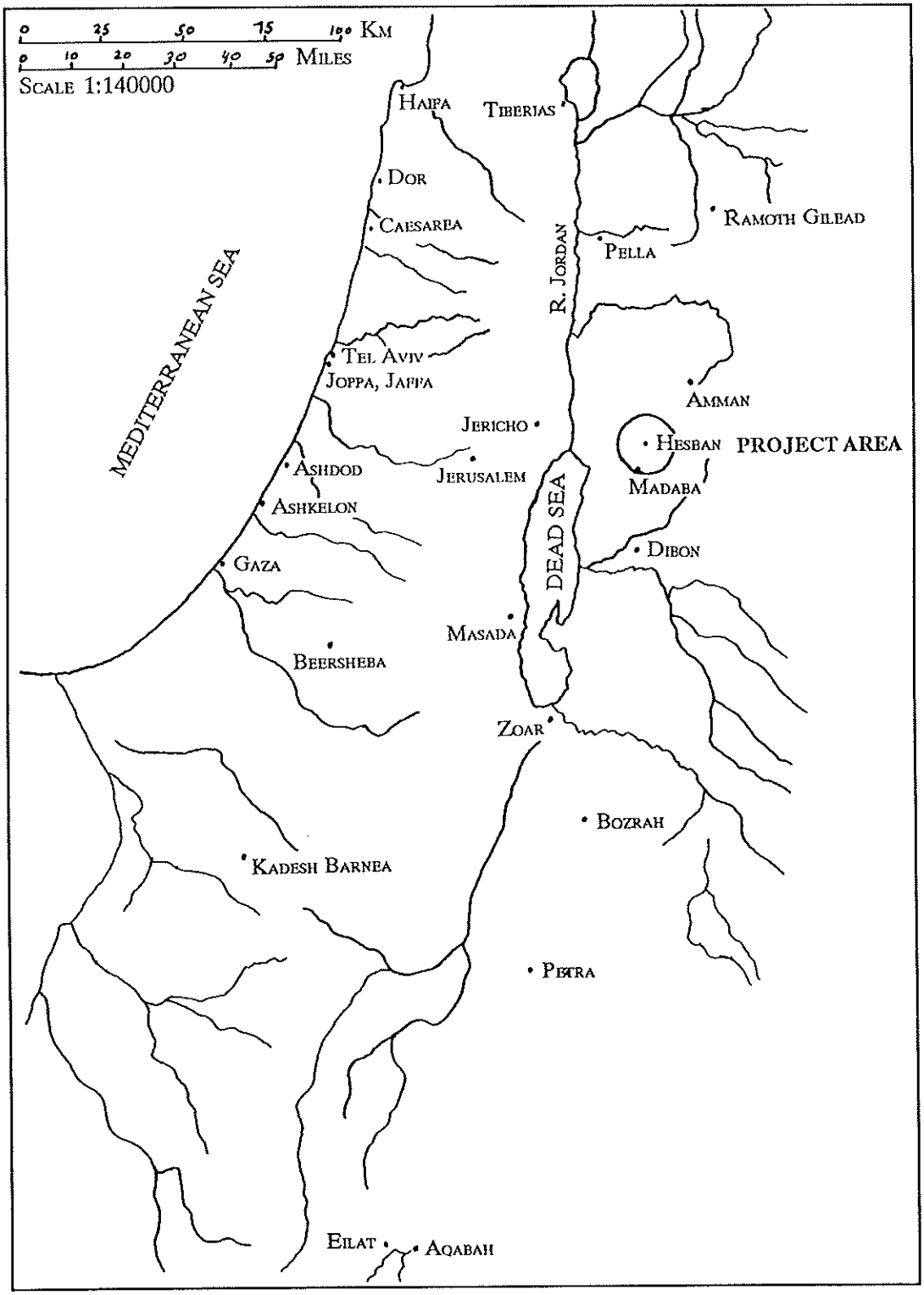
Added impetus to the quest for a theoretical framework for justifying these new lines of inquiry emerged during the years immediately following the last major field season at Tell Hesban in 1976. This impetus was provided by the leaders' desire to publish a final report on the findings of the Heshbon Expedition. Since it was deemed necessary to go beyond the sort of descriptive accounts which had been published in the preliminary reports about the project, the need for a theoretical framework for integrating the wide range of specialist reports and stratigraphic analysis was seen to be urgent. This research must also be viewed, therefore, as an initial endeavor to meet this challenge by attempting to show that temporal transitions reflected in the animal bone assemblage, in survey results, in stratigraphic results, and in specialists' accounts of identified objects, etc., represent food system transitions involving the processes of intensification and abatement.

It is because of its comprehensiveness, involving the dimensions of procurement, distribution, preparation, consumption, and disposal of food, and because of its diachronic scope, involving the processes of intensification and abatement, that the food system framework was found to be the most helpful to carrying out the challenge presented by the findings from Tell Hesban and vicinity. Not only did these findings include material traces pertaining to each of these various aspects of the quest for food, the findings spanned a period of time reaching more than 3,000 years into the past, hence the need for a diachronic frame of reference. Furthermore, as delineated in the previous sections, the food system framework represents, first of all, a heuristic device whereby the findings of investigators representing the entire gamut of scientific and humanistic disciplines concerned, implicitly or explicitly, with one or another aspect of food and its uses, could be integrated. Yet, while it is a comprehensive concept, and entails both a concern with systemic relationships in general and ecological interactions in particular, it is sufficiently focused in its explicit concern with food that it avoids many of the ambiguities and/or causal presuppositions which ultimately ruled out, for the purposes of the present inquiry, wholesale adoption of one or another of the frameworks referred to in the above section dealing with the roots of the food system concept. Instead, by means of synthesis and recombination of various aspects of these previous proposals, the food system framework discussed above was arrived at.

The Campaigns

Ever since Seetzen's visit in 1805 to a site which the local Arabs called Hesban or Hisban (both spellings occur in 19th-century travelers' accounts), explorers and biblical scholars have returned to this prominent mound along the edge of the Transjordanian highland (see fig. 1.2). One after another, after seeing the site, they have accepted this as the location of biblical Heshbon. According to various Old Testament accounts (Num 21; Josh 13) Heshbon was the capital of Sihon, king of the Amorites (*cf.* Horn 1982). When the Israelites arrived from Egypt they were denied permission to travel through Sihon's kingdom. A war ensued which the Israelites won. According to these same accounts, the town of Heshbon, as well as its surrounding territories were thereafter settled by "the children of Reuben" (Num 21:21-26, 34; 32:37; Josh 13:15, 17).

Fig. 1.2 Map of Palestine showing location of project area



To find support for a hypothesized 15th century B.C. date for these events was one of the original purposes of the Heshbon Expedition. Another purpose was to illuminate subsequent biblical and historical events involving this site. To this end three eight-week campaigns were organized and carried out during the summers of 1968, 1971, 1973. These three campaigns were led by Siegfried H. Horn (pl. 1.1), then Professor of Archaeology and History of Antiquity at Andrews University in Michigan. His chief archaeologist was Professor Roger S. Boraas of Upsala College in East Orange, New Jersey. Their international team consisted of a staff of 42 members in 1968, 51 in 1971, and 59 in 1973. In addition, several dozen local villagers were hired each season as workmen.

Two additional campaigns were subsequently organized and led by Lawrence T. Geraty, Professor Horn's successor at the Theological Seminary at Andrews University. His chief archaeologist was again Professor Boraas and his international team consisted of 75 members in 1974 and 100 in 1976. In addition, about 150 villagers participated as workmen. In 1978, a sixth campaign was organized by John I. Lawlor of the Baptist Bible College at Clark's Summit, Pennsylvania. His chief archaeologist was Larry G. Herr, then a graduate student in the Department of Near Eastern Languages and Literatures at Harvard University. This sixth campaign consisted of a staff of about 20 persons, plus a few workmen. Except for the report on the carbonized seeds, the findings of the 1978 campaign have not been available for inclusion in this investigation.

Over the years that archaeological excavations and surveys were carried out at Tell Hesban and vicinity, the conceptualization of the goals of the expedition evolved substantially. To the initial concern with the chronology and biblical significance of a single site were added broader concerns pertaining to the regional environment and nature of cultural change and continuity in this region. Particularly under the leadership of Professor Geraty, multidisciplinary concerns were given a high priority, a fact which is reflected in the expansion of ethnographic and ecological inquiries during the '74 and '76 campaigns.

Extensive preliminary reports were published at the end of each campaign (Boraas and Horn 1969, 1973, 1975; Boraas and Geraty 1976, 1978). The marked increase in specialists' contributions included in the fourth and fifth campaigns' reports attest to the high priority given to anthropological concerns during these seasons. A number of accounts of these expeditions have been published elsewhere as well, including many popularized accounts (*cf.* Appendix A).

Ten Lines of Information: A Challenge of Integration

As indicated earlier, the present investigation includes among its objectives to propose and test a single framework for fitting together the many different lines of information which are represented in the diverse findings of the Heshbon Expedition. For the sake of this initial introduction to the empirical context (more will be said in Chapter Four), reference will here be made to ten different lines of research or categories of information with which the present study has been concerned.

Archaeological Stratum Descriptions

Excavations at Tell Hesban were carried out in accordance with the standard procedures of tell archaeology in Palestine during the late '60s and early '70s. Specifically, squares measuring approximately 7 m x 7 m were laid out in sectors of the tell deemed suitable for uncovering such things as the remains of principal public buildings, fortification walls, and domestic housing areas. In all, 34 squares were excavated on the tell itself over the five principal seasons. Upon completion, these squares varied in depth between one and eight meters. Distinguishable by means of careful attention to soil layers in each square, and to their relationships to those in other squares, were a total of 19 stratigraphic horizons, the earliest one being Iron I or *ca.* 1200 B.C. (*cf.* fig. 4.1). In addition to these results, 41 "test trenches" were dug in various locations beyond the main part of the tell, and over 40 tombs and caves were entered. Examined here are the excavators' published and to-be-published accounts of what was found in these various undertakings insofar as they contained information having a bearing upon the subject of the quest for food by the tell's ancient inhabitants.

Pottery Readings

In order to establish the temporal context of the excavated materials, the ubiquitous presence of broken pieces of pottery was relied upon as a pri-

Plate 1.1 Siegfried H. Horn, Heshbon Expedition organizer and director '68, '71, and '73 campaigns

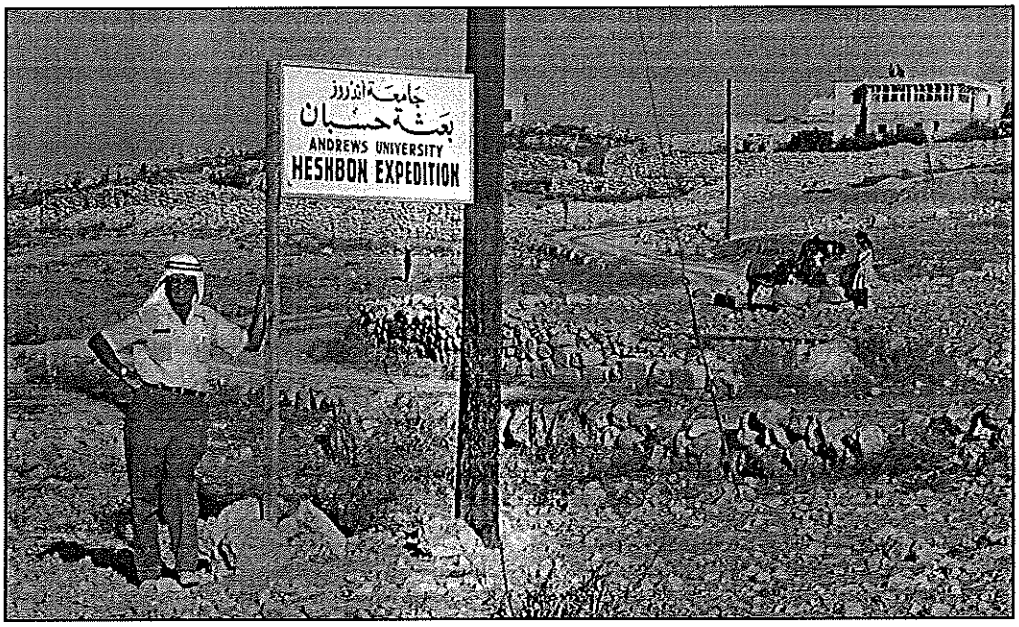


Plate 1.2 Prince Raad Zeid Hussein, royal patron of the Heshbon Expedition, excavating at Hesban

mary basis for assigning dates. Although other clues to the temporal context of finds were also relied upon, such as stratigraphic relationships, architectural features, and other datable small finds such as coins or inscribed objects, field readings of pottery fragments from each provenience unit were the most consistently relied upon data for dating purposes. Field readings of the pottery during the second through fifth campaigns were provided by James Sauer (Lugenbeal and Sauer 1972), the expedition's principal ceramicist. To the extent that every provenience unit was assigned a date on the basis of its pottery contents, the present investigation has relied on this line of information for the purposes of dating.

Ten lines of information

- Archaeological Stratum Descriptions
- Pottery Readings
- Registered Small Finds
- Animal Bones
- Carbonized Seeds
- Archaeological Survey Findings
- Ecological Survey Findings
- Ethnoarchaeological Findings
- Explorer's Accounts
- Secondary Sources

Registered Small Finds

For purposes of identification, analysis and preservation, the approximately 2,800 small finds unearthed during the five principal seasons, such as coins, bronze, iron, or bone implements, jewelry pieces, grinding stones, whole or restorable pieces of pottery, and so on, were processed separately by the expedition's object registrar, namely Siegfried H. Horn. A computer listing of these finds according to stratum of origin, as well as manuscripts dealing with these small finds by Wade Kotter (stone objects), Elizabeth Platt (jewelry), and B. London (metals), represent another line of information examined in this study.

Animal Bones

During the five principal campaigns of the Heshbon Expedition, over 100,000 animal bone fragments were recovered, the vast majority of which belonged to animals such as camel, horse, donkey, cattle, sheep, goats, pigs, and poultry. Over 800 fish bones were also included, along with varying quantities of wild mammal and bird remains. Animal bones were collected from day one at Tell Hesban, thanks to the efforts of Siegfried H. Horn and Robert M. Little (*cf.* Little 1969). As noted above, the bone work was continued during subsequent seasons by the writer (LaBianca 1973, 1978a, 1978b; LaBianca and LaBianca 1975, 1976), who invited Joachim Boessneck and Angela von den Driesch to carry out the final analysis of the bone material from the five principal campaigns. As a result of their efforts during a three-week marathon bone analysis session in Amman in 1976 (LaBianca 1978a, 1978b), they and their associates at the University of Munich have completed several reports on the bone finds, some of which have been published and others await publication in the near future. All of these reports have been utilized in the course of this investigation (Boessneck and von den Driesch 1978a, 1981; von den Driesch and Boessneck forthcoming; Lepiksaar forthcoming; Lindner 1979; Weiler 1981) In addition, extensive use has been made of various computer summarizations of the 1976 campaign's bones.

Carbonized Seeds

Flotation of samples of ash and soil encountered in selected findspots from Tell Hesban was begun during the fourth season of excavations in 1974. Identification of the carbonized seeds thus recovered was carried out by Robert Stewart in cooperation with Patricia Crawford (Crawford, LaBianca, and Stewart 1976). Flotation sampling was continued during the 1976 campaign by Patricia Crawford. The samples from the 1976 campaign, as well as those from the 1978 campaign, were identified and studied by Dennis R. Gilliland (1986). Although the quantity of carbonized seeds and other palaeobotanical remains which were collected at Tell Hesban was small, an effort is made in this investigation to reckon with what was found.

Archaeological Survey Findings

Initiated in 1973, the first archaeological survey carried out in connection with the Heshbon Expedition had as its objective "to trace the Roman road from Livias (modern Tell er-Rameh) in the Jordan Valley to Esbus (the Greek-Latin

designation for Biblical Heshbon)" (Waterhouse and Ibach 1975: 217). During the subsequent fourth and fifth campaigns, the survey initiated in 1973 was expanded to encompass the entire region within an approximately 10-km radius of Tell Hesban (Ibach 1976, 1978, 1987). The purpose of this expanded survey was to look for and map as many archaeological sites as could be found within this 10-km territory. The total number of sites recorded by the survey team after three summers' work was 155. Extensive use has been made of the findings of this survey in the present study, particularly of the descriptions of the individual sites offered in Ibach's (1987) report on the survey.

Ecological Survey Findings

The first survey of an aspect of the ecology of Hesban and vicinity to be carried out in connection with the Heshbon Expedition was Reuben G. Bullard's study of geological processes and features of the Hesban region during the summer of 1971 (Bullard 1972). In 1973, taphonomic surveys in and around the village of Hesban were initiated in order to illuminate the process whereby butchered or killed animals were preserved for the archaeological record (LaBianca and LaBianca 1975). Such studies were continued during the subsequent field seasons (LaBianca 1978a, 1980). The collection of samples of the local flora was begun in 1974 (Crawford and LaBianca 1976) and continued during the 1976 season (Crawford 1986). Field observations of present-day wild birds and mammals were carried out during the 1976 campaign by Merling Alomia (1978) and Joachim Boessneck and Angela von den Driesch (1978a). Climatological measurements were begun at Tell Hesban during the 1976 campaign as well (Ferguson and Hudson 1986). More recently, in the summer of 1979, studies of the ecology of the entire territory within a 10-km radius of Tell Hesban were carried out by Larry Lacelle, who produced reports on the geology, hydrology, and plant ecology of this territory (Lacelle 1986a, 1986b, 1986c). The findings reported by these various investigators is another line of information utilized in the present study.

Ethnoarchaeological Findings

The first ethnoarchaeological inquiries initiated in connection with the Heshbon Expedition were begun in 1973 and were concerned with patterns of animal exploitation observable in the village of Hesban (LaBianca and LaBianca 1975, 1976). During the 1974 and 1976 campaigns, such inquiries were broadened to include a generalized ethnographic study of the villagers of Hesban (LaBianca 1974, 1978a). These inquires served to heighten awareness of the links between present-day daily life activities and those of previous centuries. From this insight emerged the plans for the region-wide ethnoarchaeological work carried out between October 1980 and March 1981 (LaBianca 1984). It was as a result of this last inquiry that the significance of the food system concept as a vehicle for integrating the different lines of information discussed above emerged (LaBianca 1984).

Explorers' Accounts

In order to supplement the information provided by villagers regarding changes in the local food system over the past two centuries, the eyewitness accounts of travelers and explorers who visited Hesban and vicinity in the previous century and the early part of the present century have been extensively utilized. Their accounts and illustrations have also been referred to as a source of information about sites and ruins from earlier centuries.

Secondary Sources

Finally, numerous secondary sources dealing with Hesban's wider sociopolitical context, or ancient literary references to the site or its surrounding region, have been referred to throughout this study. Several of these were studies carried out specifically on behalf of the Heshbon Expedition by graduate students and core staff members.

The Project Area

Throughout this study reference will frequently be made to the Hesban project area or simply the project area (fig. 1.2). What is meant by this is the region within a radius of approximately 10-km of Tell Hesban. As noted above, this region was initially delimited for study by the archaeological survey team (Ibach 1976). Not only were archaeological sites recorded by this team within this region, it is also the region within which the ecological survey was carried out and 31 villages and towns were visited in the course of the ethnoarchaeological investigation completed in 1980-81 (LaBianca 1984).

Four topographical units of project area

western descent: slopes and valleys in the western half

plateau ridge: highland strip running north-south along the center

northern hills: hilly region in the north-eastern quadrant

eastern plain: gently rolling plain in the southeastern quadrant

Included within this project area are four principal topographical units, namely *western descent, plateau ridge, northern hills,* and *eastern plain* (see fig. 1.3). The significant extent of ecological diversity which characterizes these units has contributed to considerable adaptive diversity in regards to human livelihoods within the project area as a whole. The ecological attributes and relationships between these four units, as well as the range of human adaptive diversity within the project area, will be discussed in greater detail in Chapter Three.

The 10-km limit within which the archaeological survey team carried out their work was chosen because it was practical and in part because of the influence of the work of Vita-Finzi (1978) on the expedition's leadership (Boraas personal communication). In the hilly region to the east of the ridge there were roads running along this 10-km perimeter which facilitated access to sites along the ridge, on the eastern plain, and in the northern hills. In the western descent, the Wadi Hesban with its tributaries was largely contained within the western half of this project area. These wadis passed through terrain which included valleys and springs in the vicinity of which signs of human settlement could reasonably be expected. Thus, the 10-km limit seemed to present a practical perimeter within which to carry out the archaeological survey, given its goals, its staffing, and the time available to do the work.

The ecological and ethnoarchaeological surveys were restricted to approximately the same territory as the archaeological survey in order to permit comparisons within a singular unit of present-day landuse and settlement patterns with those of previous centuries. For reasons discussed earlier, it was intended that present conditions would have provided a base line against which to compare livelihood conditions in the past.

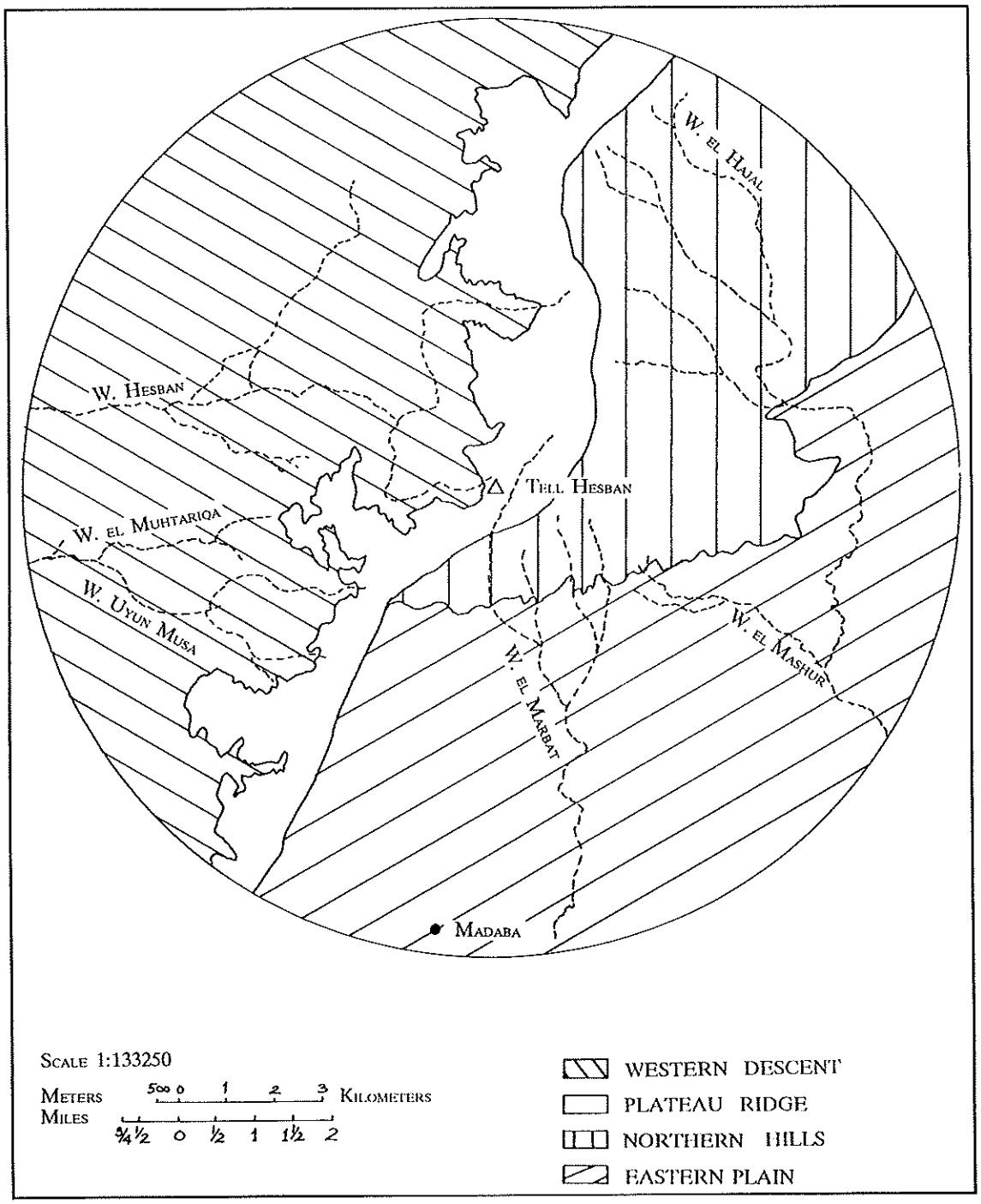
Overview of Subsequent Chapters

Chapter Two provides a general background to the phenomena of sedentarization and nomadization in the Middle East. Whereas sedentarization is shown to be associated with the process of food system intensification, nomadization is linked to the process of food system abatement. As a foundation for understanding why and how these processes have operated, this chapter focuses attention on how the physical environment has contributed to the development and coexistence in this part of the world of a range of alternative food procurement strategies. Discussed with reference to this environmental situation are three structural mechanisms, namely tribal organization, political allegiance, and shared ideals, whereby Middle Eastern peoples are able to maintain a considerable degree of social fluidity as a means to cope with the natural hazards ubiquitous throughout their environment.

Chapter Three describes the process of intensification which took place within the project area over the past two centuries. Specifically examined are the interrelated changes which took place in environmental conditions, settlement conditions, landuse conditions, operational conditions, and dietary conditions. On the basis of this analysis, it is proposed that three different configurations of locally-prevailing food systems may be distinguished, including transhumant pastoralism, village cereal farming, and urban-oriented intensive agriculture. These configurations, in turn, provide a heuristic device for generating hypotheses, interpreting, and integrating the diverse lines of archaeological information which form the basis for the reconstructions of ancient food system changes which are offered in chapters five, six, and seven.

Chapter Four discusses in greater detail nature and limitations of the archaeological information available from Tell Hesban and the project area. It also details the type of analysis forming the basis for reconstructions of the local food system during the various historical epochs included in this investigation. To this end an overview of previous

Fig. 1.3 Four topographical subregions of project area



archaeological research in Transjordan is included, along with a discussion of how archaeological information generated by the Heshbon Expedition was converted into data about food system conditions. This information, in turn, enabled the formulation of proposals regarding food system configurations integrating the various lines of evidence from the various historical periods investigated here.

Chapters five, six, and seven present reconstructions of the interrelated changes in environmental, settlement, landuse, operational, and dietary conditions which occurred within the project area during the Iron Age (Chapter Five), the Greco-Roman period (Chapter Six) and the Islamic period (Chapter Seven) respectively. Evidence is presented which points to significant movement back and forth between periods of high and low intensity food systems in this region over the millennia in question.

Chapter Eight examines the food system transitions which took place within the project area in light of the intensification and abatement mechanisms presented in Chapter One. Certain features of the food system of Central Jordan, including suggestions regarding the reasons for the temporal variability in the intensity of the food system, are discussed. Also noted are the limitations of the present study and problems requiring further study.