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RETHINKING THE ACERAMIC NEOLITHIC: INSIGHTS FROM AN ETHNOARCHAEOLOGICAL STUDY ON CYPRUS

by

Sherry Lynn Marks

Bachelor of Arts
University of New Mexico
1991

A thesis submitted in partial fulfillment of the requirements for the degree of

Master of Arts

in

Anthropology

Department of Anthropology
University of Nevada, Las Vegas
May 1999

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The Thesis prepared by

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Entitled

Rethinking the Aceramic Neolithic: Insights from an Ethnoarchaeological Study on Cyprus

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Examination Committee Chair

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ABSTRACT

Rethinking the Aceramic Neolithic: Insights from an Ethnoarchaeological Study on Cyprus

by

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Dr. Alan H. Simmons, Examination Committee Chair
Professor of Anthropology
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The so-called bizarre Aceramic Neolithic Period on the Mediterranean island of Cyprus is reconsidered in light of an ethnoarchaeological study conducted in conjunction with the Kholetria-Ortos Project. The ethnoarchaeological study was designed to discover the organizational aspects of agropastoral strategies on the modern landscape and its relevance, if any, to the study of agropastoralism during the Aceramic Neolithic Period. As a result, a number of strategies considered "irrational" by agricultural policy analysts were identified, posing an analogical conceptual dilemma of contemporary phenomena. The presentation and discussion of the ethnoarchaeological results from the perspective of economic uncertainty, however, demonstrates that these strategies are in fact effective responses to environmental variability. The discussion of conceptual frameworks regarding economic uncertainty are considered relevant for rethinking the so-called bizarre Aceramic Neolithic on Cyprus.
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CHAPTER 1

RETHINKING THE ACERAMIC NEOLITHIC

1.1 Introduction

The Aceramic Neolithic period (ca. 7,000 - 5,000 B.C.) on the Mediterranean island of Cyprus has been referred to in the literature as "a bizarre and insular anachronism" (Watkins 1980, citing common opinion), "a catalogue of contradictions" (Le Brun et al. 1987), "an unsolved riddle" (Ronen 1995), and even, "retarded" (Held 1990, citing common opinion regarding cultural evolution throughout the Early Prehistoric period). While most researchers agree that descriptions such as these do not reflect the archaeological reality we strive to discover, attempting to overcome such entrenched notions through the prevailing conceptual and theoretical frameworks guiding Aceramic Neolithic research on Cyprus is, in a manner of speaking, a dilemma. From within its disciplinary context, the traditional preoccupation of comparing the prehistoric cultural record on Cyprus with parallel records throughout the Near East and Mediterranean is readily understandable. However, the descriptive and typological approaches integral to this framework and characteristic of the Old World paradigm dominating much of Aceramic Neolithic research on Cyprus merely continues to highlight the "bizarre" features of this record. Furthermore, theoretical models of island adaptations and cultural evolution that have been introduced in an attempt to move beyond
such particularistic preoccupations have in fact extenuated those aspects of the Aceramic Neolithic that are considered "bizarre". While the importance of such models and related issues cannot be overstated, the excessive theoretical abstraction that is often associated with this framework obscures the need to explain in practical terms the underlying dynamics that have resulted in the formation of an enigmatic prehistoric record.

This paper is an attempt to move beyond the seemingly inescapable dilemma posed by the "bizarre" and offer an alternative conceptual framework that may, in effect, lead to a more constructive inquiry of the Aceramic Neolithic record. In particular, models and perspectives surrounding economic uncertainty, risk, and contingent responses are examined in relation to the results of an ethnoarchaeological study conducted in conjunction with the Kholetria-Ortos Project. The ethnoarchaeological study was designed to discover the organizational aspects of agropastoral strategies on the modern landscape and its relevance, if any, to the study of prehistoric agropastoralism in general and any insights that may be extended towards the study of village-based agropastoralism during the Aceramic Neolithic in particular. As a result, a number of strategies considered "irrational", "inefficient", and "conservative" by agricultural policy analysts were identified, posing an analogical conceptual dilemma of contemporary phenomena. The examination of similar practices reported elsewhere from the perspective of economic uncertainty, however, demonstrates that these strategies are in fact effective responses to environmental variability. Consequently, conceptual frameworks designed to discover the structure of environmental variability and the patterning of contingent responses are considered relevant to the study of the Aceramic Neolithic on Cyprus and for "rethinking" the conceptual dilemma posed by the so-called bizarre.
1.2 Kholetria-Ortos Project: Recognition of the Problem

As the first Aceramic Neolithic site to be extensively investigated on the western portion of the island (Figure 1.1), multidisciplinary research conducted at Kholetria-Ortos (ca. 6,385 - 5950 cal B.C.) has contributed immensely to our understanding of the spatial and chronological extent of this time period (cf. Fox 1988; Simmons 1994a, 1994b, 1996; Simmons and Corona 1994). More importantly, three seasons of field excavation between 1992 and 1994 at Ortos has augmented an increasing recognition regarding the range of variation in socioeconomic adaptations on the island (see Chapter 2). At present, variation in settlement organization and socioeconomic orientation among Aceramic Neolithic sites cannot be attributed to chronological differences and is presumably the result of functional differences (Cherry 1990:156; Held 1989b:8; Knapp et al. 1994:404; Stanley Price 1977a:69; Watkins 1980:147). The recognition of this variation, however, has not led to greater efforts to explain and specify its causes. In fact, the meaning of “functional differences” has rarely even been defined or elaborated on in the archaeological literature concerned with the Aceramic Neolithic.

In an attempt to discern the factors associated with variation from areas where the archaeological record is relatively well documented, such as the Near East or the southwestern portion of the United States, site variability is commonly assumed to be closely correlated with climatic and environmental variation (Bar-Yosef and Belfer-Cohen 1989; Halstead and O’Shea 1989; Madsen and O’Connell 1982:5; Minnis 1985, 1996). The contingent responses by human communities to variable environments (both natural and social) may in fact account for the variation in settlement and socioeconomic orientation of
Figure 1.1 Location of Kholetria-Ortos and Selected Aceramic Neolithic Sites
contemporaneous sites within a designated region and noted in the archaeological record. There are a number of problems, however, both practical and theoretical, that undermine such an approach to the study of variability in the Aceramic Neolithic of Cyprus. Many of these are outlined in Chapter two, however, it is the position of the author that the primary obstacle has been and continues to be the conceptual and theoretical frameworks that currently dominate the island's research issues.

1.3 Statement of the Problem

A review of the archaeological literature concerned with the Aceramic Neolithic (also referred to as the Khirokitia Culture) on Cyprus reveals a general preoccupation with demonstrating and enumerating the similarities and differences between the material culture, architecture, and burial customs of the Cypriot Neolithic and the mainland Neolithic (see Chapter two). While comparisons have revealed limited analogous developments or explanations applicable to the prehistoric record on Cyprus (e.g. Le Brun 1989b; Le Brun et al. 1987; Rollefson 1989), the purpose of such particularistic endeavors has always been approached from the perspective of discerning the origin of the island's cultures and, more recently, on elucidating the nature of prehistoric island colonizations (Held 1989a:146). These issues are inextricably tied to discussions of the Aceramic Neolithic period due to the sudden appearance of the Khirokitia Culture on the island sometime between the eighth and seventh millennium B.C. (Le Brun 1997). Although the Aceramic Neolithic period is no longer considered the initial colonization of Cyprus by humans (see Chapter 2), the evidence to date appears to indicate that the establishment of the Khirokitia Culture is the result of a separate
and distinct occupation from the Levantine or Anatolian Mainland followed by more than 1,500 years of settlement.

The nature of this island adaptation has been contrasted and compared in many respects with the developments of its “parent culture” on the mainland. The focus of these comparisons has centered on those “traits whose significance seems to derive from the social and psychological sphere of cultural relationships rather than those related to primary subsistence activities” (Stanley Price 1977a:79). Perhaps even more striking than the typological variability exhibited between the archaeological records of the two areas is the retention of particular cultural traits on Cyprus throughout the Neolithic and Chalcolithic periods. The enigmatic issue of trait retention is further highlighted in the literature by a chronological gap in radiocarbon dates immediately following the Aceramic phase, tentatively dated to ca. 5800/5500 B.C., in which settlement on the island seems to disappear from the archaeological record until the establishment of the subsequent Ceramic Neolithic period (or Sotira Culture) at ca. 5,000 B.C. (Knapp et al. 1994:385, 404).

Within the last twenty years, issues surrounding island colonization during the Aceramic Neolithic, the distinct and conservative nature of this period's development in comparison with the mainland, and the presumed chronological gap have received even greater attention with the introduction of theoretical models and approaches to island archaeology derived from the disciplines of biogeography (MacArthur and Wilson 1967) and more recently sociogeography (Patton 1996). These models approach ‘islands as laboratories for the study of cultural process’ (Cherry 1990; Evans 1973, 1977; Held 1989a; Patton 1996) based on the premise that the insular nature of island environments will necessarily narrow
the range of environmental or external variables related to cultural developments, thereby allowing for a more readily defined study of human adaptation. Accordingly, the study of human adaptation in the context of an ecologically-limited and isolated environment characteristic of islands has brought forth the applicability of biological concepts such as insularity and its effect on Aceramic Neolithic communities (cf. Held 1989a; Stanley Price 1977a, 1977b).

While it is beyond the scope and purpose of this paper to present a detailed review of the complexities of the various colonization models and hypotheses, an attempt is made here to point out that the underlying concern of these approaches is the role of insularity as a clearly defined variable in the study of the relationship between human society and the natural environment (Patton 1996:2). As a result, tracing the impact of insularity on human settlements during the Early Prehistoric period (Neolithic, Chalcolithic) has often included the following methodological considerations:

Some of the more significant characteristics of island ecosystems are relative isolation; limitation in, or even absence of certain other resources; limitation in organic diversity; reduced inter-species competition; protection from outside competition and consequent preservation of archaic, bizarre, or possibly ill-adapted forms; tendency toward climatic equability; extreme vulnerability, or tendency toward great instability when isolation is broken down; and tendency toward rapid increase in entropy when change has set in (Fosberg 1963:5; emphases added).

From this perspective, the emphasis on insularity as an external variable has not in and of itself increased our understanding of human adaptation specifically during the Aceramic Neolithic period. Instead, the concept has contributed to a tautological line of reasoning in the examination of those aspects of the Aceramic Neolithic that are considered “bizarre” by invoking insularity or its related principles as an explanation. Variability, and even the role...
of complexity, has often been obscured in such discussions by continuing the comparative
descriptions of the prehistoric record that simply support the impression of the "bizarre". The
"bizarre", however, often finds justification in the archaeological literature concerned with the
Aceramic Neolithic on Cyprus by recourse to insularity as an *explanation* rather than
encouraging the *examination* of the complexity and variability of human adaptation and how
this is reflected archaeologically. The necessity of moving beyond the conceptual relationship
of the "bizarre" to insularity as an explanatory tool to a more constructive investigation of the
relationship between human communities and their environments resulted in an
ethnoarchaeological study conducted in conjunction with the Kholetria-Ortos Project.

1.4 Ethnoarchaeology as a Methodology

What has been obscured from discussions, such as those highlighted above, is a more
effective understanding of *how* human communities managed, organized, and utilized their
resources in the *context* of their environment and how this organization differs among
settlements. In an attempt to overcome the difficulties posed by such analytical omissions,
an ethnoarchaeological investigation was conducted in the modern village of Kholetria
(currently located approximately 1.5 km E/SE from the Aceramic Neolithic site Kholetria-
Ortos) during the summer of 1996 as part of the Kholetria-Ortos Project. The intent of the
study was to discover the organizational aspects of agropastoral strategies on the
contemporary landscape and how such strategies change through time, thereby providing
researchers with additional data that may lead to a more thorough consideration of how such
systems may have operated in the past in "practical terms" (M. Forbes 1976; Kingsnorth
1993). In particular, the integration of pastoral and agricultural production strategies may occur at a number of levels depending on the scale of analyses and the particular environment (natural and social, historical, political), resulting in a complex agropastoral system (cf. Chang and Koster 1986; Cribb 1991; Dyson-Hudson and Dyson-Hudson 1980; Galaty and Johnson 1990; Khazanov 1984; McCorkle 1992; Meadow 1992; Reddy 1997; Vincze 1980). An understanding of this complexity and its integration of strategies is necessary to any conceptual framework regarding agropastoralism in prehistory.

While the premise of this study was based on the simple fact that an understanding of functioning agropastoral systems can provide archaeologists with a greater understanding of its complexities and of the relevant variables for study when considering agropastoral strategies in prehistory, it was not an attempt to impose the description of a modern, market-oriented system directly on to the past. The obstacles and criticisms against a methodology that is considered by many to have little relevance to the actual dynamics of prehistoric systems are well known (cf. Freeman 1968:69; Gould 1980; Hodder 1983; Lyman 1982:341-342; Wobst 1978); however, the archaeologist has little recourse if (s)he is to surmount a study of pure ‘artifact physics’ based on a static record (DeBoer and Lathrap 1979:103). Furthermore, this is not a proposal for the use of *ad hoc* ethnographic parallels, but rather an attempt to utilize a methodology that allows for the identification and study of the relevant variables in dynamic settings, the development of hypotheses, and their applicability to the past (Binford 1968; Chang 1992,1994; Chang and Koster 1986; Cribb 1991:5; Orme 1981; Rossignol and Wandsnider 1992; Simms 1992; Wylie 1985). Particularly in the case of Cyprus where very few, although highly significant, ethnoarchaeological studies stemming from the
difficulties of the prehistoric record and the analyses of archaeological assumptions have been conducted (cf. Allen 1989; Keswani 1994; Legge 1982; Pearlman 1984; Sallade 1978, 1979, 1989; Sallade and Braun 1982).

1.5 Analogical Conceptual Dilemma

With the relocation of the village of Kholetria in 1975 and the incredible transformation of its natural and social environment, particularly since 1974\(^1\), the suitability of such a study sample appears to bear little relevance to the study of prehistoric agropastoralism in general. However, the study offered unexpected insights as a result of an analogical conceptual dilemma posed by data collected on a number of behavioral strategies considered “irrational”, “conservative”, and “defective” by Cypriot agricultural policy analysts (cf. Christodoulou 1959; Karouzis 1977). The discussion of similar practices and comments by cultural ecologists and anthropologists from the perspective of environmental variability and the patterning of cultural responses to the uncertainty and risk posed by such variability (both natural and social), particularly with respect to agropastoral strategies, demonstrates the rationale for the continued use of such practices (cf. Barlett 1980; Bentley 1987, 1990; Cashdan 1990; Colson 1979; H. Forbes 1976, 1989; Forbes and Foxhall 1995; Shutes 1997; Waddell 1975). Furthermore, the classification of these responses (also referred

\(^1\) On July 20, 1974 Cyprus was invaded by Turkey (pretext of which was the failed coup d’etat led by the Greek Junta against the President of Cyprus, Archbishop Makarios). The result was the devastating displacement and separation of the island’s Greek and Turkish populations and the military occupation of 37% of the island. The island is artificially divided by the “Attila line” (also known as the Green line) and the area occupied during the 1974 invasion is still controlled today by Turkey, despite international condemnation.
to as buffering mechanisms and coping strategies) and their patterning have recently been outlined by archaeologists in an attempt to highlight the applicability of this conceptual framework to prehistoric inquiries (Halstead and O'Shea 1989; Minnis 1985, 1996; Tainter and Tainter 1996), and it is the position of the author that such a framework may similarly offer conceptual insights that will transcend the obstacles posed by the “bizarre”.

The presentation of the results from the ethnoarchaeological study includes the identification of environmental variability noted during the study and the behavioral responses to such variability according to the general categories proposed by Halstead and O'Shea (1989) consisting of diversification, storage, exchange and mobility. These categories of responses are employed in an effort “to lessen the impact of environmental variability by dampening its effects” (Halstead and O'Shea 1989:3). Additional strategies and responses have been outlined by others and are discussed in Chapter 6, however, the purpose of presenting the data in this manner is twofold. First, it is an attempt to avoid additional terminology for an approach that has already been widely implemented by cultural ecologists and a number of archaeologists. Secondly, the time constraints on the study allow for only a superficial understanding of the organizational features of agropastoralism and the spatial and temporal changes to this production system in Kholetria. Unfortunately, the patterning of responses are, more or less, anecdotal and must be supplemented by auxiliary sources (both published and unpublished).

1.6 Organization of the Thesis

The organization of this thesis follows the development of the problem in the context of archaeological research concerned with the Aceramic Neolithic and the resulting attempt
through ethnoarchaeology to contribute to the development and discourse regarding alternative conceptual frameworks. In Chapter 2, the Aceramic Neolithic is discussed in more detail to provide the reader with a contextual background of the island's research issues and the differences emphasized between the Aceramic Neolithic on Cyprus and the mainland Neolithic. The material is outlined according to the traditional lines of presentation with emphasis placed on those areas of research obscured by the prevailing conceptual frameworks dominating the island's research issues, particularly with regards to environmental and economic analyses. In Chapter 3, the reader is introduced to the modern villages of Kholetria through a brief background of its geographical setting and settlement history, while Chapter 4 introduces the methodology used during the ethnoarchaeological study conducted in the village. Chapter 5 presents the results of the ethnoarchaeological study according to the outline of responses proposed by Halstead and O'Shea (1989) and focuses primarily on diversification, storage, mobility, and exchange. In Chapter 6, additional responses are discussed in relation to the models that have been developed for discerning such responses in prehistory and the significance of this conceptual framework for rethinking the Aceramic Neolithic.
CHAPTER 2

BACKGROUND TO THE STUDY

2.1 Physical Setting

Cyprus is the third largest island in the Mediterranean Sea, after Sicily and Sardinia, covering a total surface area of 9,251 km². Its length from the west to the easternmost point of Cape Apostolos Andreas is 225 km (140 mi) and its maximum width is approximately 96 km (60 mi). Located in the northeastern corner of the Mediterranean Basin, the island is visible from both the southern coastline of Turkey and, under favorable atmospheric conditions, western Syria (Held 1989a:75; Karageorghis 1982:11; Stanley Price 1977a:76). The proximity of Cyprus to the mainland (64 km south of Turkey and 100 km west of Syria) and its unique configuration supported the traditional belief that the island was once united with the mainland, a belief that can be traced back to legends relating its separation from Syria by medieval Arabic authors (Astrom 1960:35). These legends, however, have been replaced today with detailed geological research documenting the island's oceanic origin. The purpose of the following sketch is to demonstrate the fact that Cyprus has always been isolated from the mainland despite earlier suggestions that a possible post-Miocene landbridge may have existed (Constantinou 1982:13; Knapp et al. 1994:393).

The complexity and structural variety associated with the island's geological
evolution, particularly with regards to the Troodos Ophiolite, has attracted a considerable amount of attention from researchers throughout the world. Intricate formative processes associated with the island's four principal geomorphological regions (the Kyrenia or Pendaktylos Range, the Troodos Range, the Mamonía Complex, and the Central or Mesaoria Plain) (Figure 2.1) has generated a notable interpretive discourse among geologists and geochemists (cf. Moores and Vine 1971; Swarbrick 1993; Thy and Moores 1988; Thy et al. 1985; Varga and Moores 1985). The brief review presented here, however, focuses primarily on the development of the island from the Tertiary Period to the present. For brevity's sake, this review omits much of the detail associated with the convergent and divergent motions of the Eurasian and African plates involved in the island's formation.

Throughout most of the Tertiary Period Cyprus was literally 'two islands': the Troodos (or Troodos Range, referring to its present landform) and the Kyrenia Range (Gifford 1978:8; King 1987:8). During a major episode of tectonism in the area that led to the displacement and anti-clockwise rotation of the Troodos Ophiolite (an Upper Cretaceous fragment of oceanic crust formed along a mid-ocean ridge within the Tethyan Sea) some 70 Ma, the Mamonía Complex or Terrain (a series of rocks ranging in age from Upper Triassic to Middle/Lower Cretaceous) was emplaced in its present position on the southwest edge of the Troodos (Dilek et. al 1990; Geological Survey Department 1996; Swarbrick 1993:381). The Troodos Ophiolite Complex emerged above sea level about 20 Ma; however, it did not reach its present height until the recent past, approximately 1 - 0.5 Ma. The emergence of the second island was the result of folding and fracturing of the sedimentary rocks (Permian-Middle Miocene age) comprising the Kyrenia Range (the southernmost end of the Tauro-
Figure 2.1 Map of the Main Geomorphological Regions on Cyprus
Information from Urquhart and Banner (1994: figure 1)
Dynaric belt within the Alpine Orogeny) (Geological Survey Department 1996). The Kyrenia Range was uplifted slightly above sea level at the end of the Miocene, however, the two islands (presently the two mountain ranges on Cyprus) were still separated within the Tethys Sea by the submerged Central Plain (Pantazis 1971:9).

Continued sediment deposition during a small-scale submergence of the Troodos and Kyrenia Ranges in the Pliocene period resulted in the marly limestones and marls that currently surround and separate these landforms and comprise the upper sediment layers of the Central Plain (an intermontaine plain with a sediment series ranging in age from Upper Cretaceous to the end of the Pleistocene) (Geological Survey Department 1996). The two islands were joined approximately two million years ago due to a massive uplift of the entire island that is still occurring today. It is this under thrusting, as the African plate moves beneath the Eurasian plate, that uplifted the Central Plain above sea level resulting in the present configuration of the island, with changes in the coastal configuration occurring throughout the Holocene (Geological Survey Department 1996; King 1987:8; Pantazis 1971).

2.2 Vegetational History

Unlike the continuing documentation and interpretive discourse concerning the island's geological history, systematic research of early Holocene environmental conditions has been largely neglected on Cyprus and discussion centers primarily on the tentative assumptions put forth by various authors. These assumptions are based on rather superficial characterizations of the extensive vegetation cover of maquis, garrigue, and batha communities on the present landscape as degraded or eroded, presumably the result of
anthropogenic impacts to the island’s vegetation over thousands of years (Knapp et al. 1994:395). The conclusion necessarily follows that prior to human colonization, and even during the initial periods of human occupation during the early Holocene, the landscape of Cyprus must have supported a much denser vegetative cover of Mediterranean evergreen, sclerophyllous forest than currently characterizes the island's modern vegetation (Croft 1989; Held 1983, 1989a:107). The extent of this forest cover and its vegetation climax varies according to the altitudinal and edaphic conditions of contemporary vegetation landscapes on the island; however, these assumptions are based primarily on indirect observations and inferences drawn from contemporary research, historical evidence, and/or from palaeoenvironmental data from ecologically similar environments in the Near East and Crete (Croft 1989; Held 1990; Knapp et al. 1994:394; Stanley Price 1979:1).

Initial support for the presumed vegetation cover of the island has been adopted from traditional Mediterranean-type ecosystems research. The pasture study conducted by Jones, Merton, Poore, and Harris (JMPH scheme) (1958) is an example of such research and has been widely cited in the archaeological literature (cf. Croft 1989; Held 1983, 1989a; Stanley Price 1979). On the basis of successive stages of degradation in the island's modern vegetation distribution (woodland, maquis, garrigue, and batha), the researchers defined 13 zones and their associated climax vegetation. The hypothetical map of twelve of these zones appears in Christodoulou (1959: Figure 117) and has been reproduced in Figure 2.2. Implicit in the definition of climax vegetation is that anything other than a forest/woodland community is a degraded vegetation community often attributed to human interference (Naveh 1989:95). Consequently, all zones were assumed to be covered by a climax vegetation of
Figure 2.2 Climax Vegetation Regions on Cyprus as Proposed by Jones, Merton, Poore, and Harris (1958). Map Reproduced from Christodoulou (1959: figure 117).
"Mediterranean evergreen, sclerophyllous forest in which oaks, juniper and cypress were the dominant species in different regions" (Jones et al. 1958:24). Additional support for the role of human activity in the progressive deforestation from the early Holocene climax forest cover of the island has customarily been reinforced by citing references from historical sources (Stanley Price 1979:13).

The often-cited passage by Strabo (Geography 14.6.3), referring to Eratosthenes' description of the island as heavily forested almost two and a half centuries before (third century B.C.), has served to support the notions of a forest climax vegetation in the past, at least until large scale clearances of timber were needed for shipbuilding and copper ore smelting. A recent approximation of the extent of deforestation attributed to the copper mining industry illustrates the role of human interference in contributing to today's "degraded" landscape:

It has been estimated, however, that during the past 3000 years roughly 150,000 km² of forest has been destroyed in Cyprus due to the copper mining industry; the equivalent of 16 times the surface area of the island (Constantinou 1982:22; as cited by Gomez et al 1987:6).

Such an estimate leaves little room for doubt regarding the impact of humans on the island's vegetation, although these historical sources and estimations do not reveal the nature of the island's vegetation during the early Holocene. These sources refer to environmental conditions thousands of years after the initial appearance of humans on the island in the early Holocene and cannot be used as evidence for the climax vegetation (Stanley Price 1979:13). Furthermore, the inherent bias of historical sources rarely records periods of reforestation, or the reversal of deforestation by nature (Stanley Price 1979:13). An issue that has been
further emphasized by Blumler (1993:288) in his examination of the traditional views of succession within Mediterranean-type ecosystems research.

Although the JMPH (1958) pasture study has been widely cited in the archaeological literature, the objectives and purpose of the study have rarely been scrutinized. Recently, the traditional assumptions of linear succession underlying traditional Mediterranean-type ecosystems models, such as the JMPH (1958) scheme, have been questioned by Blumler (1993). Blumler's position demonstrates that the nature of human impact on the vegetation and soils in the Mediterranean and Near East is much more complicated than has traditionally been acknowledged and may be less negative (Blumler 1993:289). The role of both the Mediterranean-type climate (generally characterized by cold, wet winters and hot, dry summers) and edaphics is given greater consideration in his conclusion that "an open deciduous parkland (not dense forest) with an annual-dominated understory" might have characterized much of the early Holocene Mediterranean basin area (Blumler 1993:299).

The scheme proposed by Blumler may be a more accurate assessment as palynological data retrieved from the Aceramic Neolithic type-site of Khirokitia-Vounoi (Renault-Miskovsky 1989), the Chalcolithic site Lemba-Lakkous, and the basal levels (3,000 B.C.) of a core taken near Ayia Moni Monastery by the Canadian Palaipaphos Survey Project all show low percentages of arboreal and high percentages of herbaceous pollen (Croft 1989; Rupp et al.1987:44). The cores have been interpreted by the various analysts as signs of a sparsely wooded landscape at the time of site occupation of all of these sites, at least within their immediate surroundings (Renault-Miskovsky 1989; Rupp et al.1987:44). Whether these terrestrial pollen samples are representative of regional environmental conditions throughout
the entire island or merely describe the local surroundings of the sites have not yet been confirmed. Furthermore, only the limited soundings from Khirokitia-Vounoi are applicable to early Holocene vegetation conditions on Cyprus and the need for additional research from other Aceramic Neolithic sites is required if archaeologists are to effectively evaluate the impact early cultures had on the island and the economic implications posed by various microenvironments throughout the island (cf. Held 1993:28).

The final line of support for early Holocene conditions has been derived of proxy data (i.e. palaeoenvironmental data from ecologically similar climates and vegetational landscapes) from the Near East and Crete (cf. Croft 1989, 1991; Stanley Price 1979). In lieu of systematic pollen spectra studies on Cyprus, the use of pollen analyses such as those studied by Van Zeist and Bottema (1982) for the Near East and Bottema (1980) in Crete is often the only alternative and "independent check" to the JMPH scheme (Stanley Price 1979:14). However, such recourse also has its limitations in evaluating palaeoenvironmental conditions on Cyprus since the pollen cores from Near Eastern regions in relatively close proximity have revealed considerable variations in vegetation and climate during the early Holocene. For example Van Zeist and Bottema (1982:287) have pointed out that in northern Israel, the forest expanded in the Late Glacial period and contracted in the early Holocene. In Syria, however, the forest was significantly reduced in the Late Glacial period but it reached its greatest expansion in the early Holocene. The applicability of either of these samples to Cyprus may further disguise rather than reveal the nature of and differences in its vegetation from surrounding regions.

While caution in utilizing indirect evidence is generally acknowledged by
archaeologists concerned with the Early Prehistoric record, the continued reliance on such evidence poses an additional obstacle to the reconstruction of Aceramic Neolithic economic patterns. Site catchment analyses (or the more commonly utilized approach known as territorial analysis) that have been done with reference to the Cypriot Neolithic have been of limited value in furthering our understanding of the economy since the nature of the palaeoenvironment has not been clearly demonstrated (cf. Gomez et al. 1987:6; Legge 1982; Le Brun et al. 1987:312-314; Sallade and Braun 1982; Wagstaff 1988; Watkins 1980). Such a statement may seem awkward in view of the fact that territorial analyses have been based primarily on modern resource distributions; however, the climatic and edaphic changes affecting vegetation combined with human impacts reveal a very different landscape from that of the past. The use of modern data for assessing the economic potential can be highly unreliable and distorting without a more accurate understanding of palaeoenvironmental conditions and how the landscape has changed over time (Dennell 1980:14; Roper 1979:127). Without a clearer understanding of what environmental conditions were met by the initial colonists and favored the settlement of Cyprus (perhaps select areas at select times), the interrelationship of the variables associated with human adaptation will always be subject to doubt.

2.3 Chronology

Within the past few years, the Early Prehistoric chronological record (see Table 2.1) and issues surrounding the initial colonization of the island have been reconsidered due to the documented presence of a pre-Neolithic phase of occupation on the island (Simmons...
Table 2.1 Chronological Framework for the Early Prehistoric Period

Information from Knapp et al. (1994:381) and Simmons (1991)

<table>
<thead>
<tr>
<th>Early Prehistoric Period</th>
<th>10,000 - 2,400 cal B.C.</th>
</tr>
</thead>
<tbody>
<tr>
<td>pre-Neolithic/Akrotiri Phase</td>
<td>8,500 B.C.</td>
</tr>
<tr>
<td>Khirokitia Culture/Aceramic Neolithic</td>
<td>7,000/6,500-5,000 B.C.*</td>
</tr>
<tr>
<td></td>
<td>*gap?-5,800/5,500-5,000 B.C.</td>
</tr>
<tr>
<td>Sotira Culture/ceramic Neolithic</td>
<td>5,000-3,900/3,700 B.C.</td>
</tr>
<tr>
<td>Erimi Culture/Chalcolithic</td>
<td>3,900/3,700 - 2,400 B.C.</td>
</tr>
</tbody>
</table>

1991, 1992; Held 1989a). Whereas the Khirokitia Culture has traditionally represented the first settlement on the island, the excavation of the pre-Neolithic rockshelter site at Akrotiri-Aetokremnos has established an initial occupation date of about 8,500 BC (uncalibrated) or about 1,500 years earlier than originally believed (Simmons 1988, 1991, 1999). A human presence at the site is evidenced by in situ cultural material (chipped stone tools and hearths) with a faunal assemblage consisting of Pleistocene faunal species such as pygmy hippopotami (Phanourios minutus) and dwarf elephants (Elephas cypriotes), as well as avifauna and marine shells (Simmons 1991:862). The excavation of this apparent pre-Neolithic site has led to the possible suggestion that human predation may be responsible for the demise of the island's Pleistocene fauna, since their extinction seems to have occurred prior to the establishment of the food-producing Khirokitia Culture and the fact that hippopotami and elephant remains have not been recovered from Aceramic Neolithic contexts (exceptions include single hippopotami bones recorded at Cape Andreas Kastros (Davis 1989:191-193) and Akanthou-Akosyko (Reese 1989:29)). The relationship between the initial occupants
and the Aceramic Neolithic, however, is unclear due to the extreme differences between settlement types, socioeconomic orientation, and a temporal separation between the two of approximately 1,500 years (cf. Knapp et al. 1994).

Refinement of the Aceramic Neolithic chronological record has presently established the period's dates to ca. 7,000 - 5,000 B.C. (Held 1992:164; Knapp et al. 1994: 404), although researchers generally agree on the lack of clarity regarding its earliest and latest phases (Held 1989a:211-250). The radiocarbon determinations for these dates have been derived primarily from Khirokitia-Vounoi and Kalavasos-Tenta (Cherry 1990: 150-151; Held 1992: 165-167; Knapp 1994:382-385; Le Brun and Ervin 1991; Todd 1987:174), while the radiocarbon determinations from three other Khirokitia Culture sites (Cape Andreas Kastros, Kholetria-Ortos and Dhali-Agridhi) corroborate the temporal picture with the floruit of the Aceramic Neolithic (based on averages from four sites) believed to be in the second half of the seventh millennium cal BC (Cherry 1990:157). The earliest phases of the Aceramic Neolithic period are complicated by the recent announcement by the Department of Antiquities in Cyprus of a 10,000-year-old male skeleton recovered from the Aceramic level at Parekklisha-Shillourokambos (Cyprus Mail, 14 January 1999), while the latest phases of the Aceramic Neolithic period, ca. 5000 BC, is complicated by the appearance of a gap in the period's chronological record (ca. 5800/5500-5000 BC). The chronological sequences at Khirokitia-Vounoi, Kalavasos-Tenta, and Klepini-Troulli, however, all attest to some sort of hiatus in the occupation of these sites immediately following the Aceramic Neolithic until reoccupation or reutilization is recorded in the Ceramic Neolithic period (Todd 1987:182).

The presence of this chronological gap has been questioned as to whether it
accurately reflects reality or is simply a matter of research bias (Held 1990:22; Knapp et al. 1994; Simmons 1996:39). Superficially, the chronological gaps in the radiocarbon dates prior to and immediately following the Aceramic Neolithic appear to be a characteristic of the Early Prehistoric record on Cyprus where the occupational history of many of these archaeological sites rarely exceeded a single cultural period (Cherry 1990:161; Held 1990:24; Knapp et al. 1994:406; Muhly 1997:90). However, the establishment of real vs supposed gaps (due to research bias) is compounded by the fact that there are relatively few Aceramic Neolithic sites that have been sufficiently excavated on the island making it almost impossible to evaluate the various hypotheses that invoke socioeconomic, demographic, ecological, and even genetic/biological variables to explain the presumed lacuna in settlement (cf. Cherry 1990; Held 1990; Ronen 1995:200; Stanley Price 1977a: 85; Todd 1989). While the need to refine the chronology of the Aceramic Neolithic is necessary to establish the validity of the presumed gap (on either side of the period), chronological refinement has been more commonly used for determining the relationship of Cypriot Aceramic sites (particularly architectural types and burial customs) to their mainland counterparts (Todd 1986:18, 1987:183, 184).

2.4 Aceramic Neolithic Settlement Patterns and Site Locations

Since the initial discovery of the Aceramic Neolithic on Cyprus in the late 1920s and early 1930s by the Swedish Cyprus Expedition (Gjerstad 1926; Gjerstad et al. 1934:1-13), only four sites have been extensively excavated: Khirokitia-Vounoi, the type-site of the period (Dikaios 1953; Le Brun 1984, 1989, 1994), Kalavasos-Tenta (Todd 1977, 1978, 1979, 1982,
1989), Rizokarpaso-Cape Andreas Kastros (Le Brun 1981), and Kholetria-Ortos (Fox 1988; Simmons 1994a, 1994b, 1996; Simmons and Corona 1994). Nine additional sites have been partially excavated (Cherry 1990:155; Knapp et al. 1994:404), while the number of Aceramic Neolithic sites recorded during survey or believed to contain Aceramic Neolithic components varies by author. According to Knapp et al. (1994:404), sixteen sites are known from features or diagnostic artifacts and a further eight are thought to have Khirokitia Culture affiliations, while Held (1986:10) states “that the total number of affiliated sites may exceed fifty, although seventeen or eighteen of them represent actual settlements”.

The locational criteria of Aceramic Neolithic sites are usually described according to coastal areas and inland locations. The following are coastal sites: the village settlement Cape Andreas Kastros; the material remains of Klepini-Troulli (architecture from Ceramic Neolithic levels excavated only); the curvilinear huts of Limnitis Petra tou Limniti (extent 300 m²), which is currently 80 meters offshore on an islet; and Cape Greco (extent unknown) (Stanley Price 1977a:68; Todd 1987:187,188). A second group of sites, found within 10 km of the southern coast, is situated on elevated outcrops or hilltops in river valleys. These include the larger village settlements of Khirokitia-Vounoi (extent 1.5 ha) (Le Brun 1997:26) and Kalavasos-Tenta (extent 1600-3000 m²) (Todd 1987:31), Parreklisia-Shillourokambos (extent ca. 4 ha) (Guilaine et al. 1995; Herscher 1995:264, 265), and Kholetria-Ortos (extent 2.4 ha). However, architecture was not preserved at this site (Simmons 1994, 1996). Similar elevated locations have been noted at sites located in the interior of the island, such as the rather large settlement of Kataliondas-Kourvellos (extent 15 ha?) (Watkins 1980: 143), Kritou Marottou-Ais Yiorkis (evidence of some sort of architecture (extent .4 ha))(Fox
1987:20; Simmons, personal communication), and Kedhares-Yero Vasili (extent .1 ha) (Fox 1987:24). The location of all of these sites has been interpreted as strategic due to the commanding views of their surroundings afforded by elevated positions on the landscape or locations that offer natural protection by the surrounding relief (eg. *Petra tou Limniti, Cape Andreas Kastros*) (Le Brun et al. 1987:286; Ronen 1995:180; Todd 1989:6, 1987:180). Sites that appear to be at odds with such strategic locations include the occupational floor at Dhali-Agridhi (extent unknown), consisting of a workshop area, a garbage area, two pits, and no architecture; the irregular rectilinear floor plan at Phrenaros-Vounistiri (extent unknown); and possibly the site of Kannaviou-Kochina (1.4 ha) (Aceramic Neolithic assignment is unclear; cf. Simmons 1998). They are all situated in lower elevations (Stanley Price 1977a:68; Todd 1987:180).

As mentioned in Chapter One, the variation in the size and types of Aceramic Neolithic sites on Cyprus has been attributed to functional rather than temporal differences (Fox 1987:26; Knapp et al. 1994:404; Stanley Price 1977a:69). Special activity sites have been suggested for many of the smaller sites such as *Petra tou Limniti* and Dhali-Agridhi, a possible herding hamlet has been proposed for Kritou Marottou (Fox 1987), while seasonal occupation may be evident at the larger sites of Kataliondas-Kourvellos (Knapp et. al 1994:404) and Kholetria-Ortos (Cooper 1997:99). Although the testing of these propositions against the prehistoric record remains a future goal, the wealth of data from Mediterranean and Near Eastern ethnoarchaeological studies aimed at identifying the differences in the material remains of various socioeconomic situations in the archaeological record continues to be ignored. Instead, the majority of archaeological focus has been on the visible
architectural developments at sites such as Kalavasos-Tenta, Cape Andreas Kastros, and Khirokitia due to the presence of curvilinear structures that characterize not only these sites but subsequent architectural developments throughout much of the Early Prehistoric period.

The circular architecture of the Aceramic Neolithic (Figure 2.3) has been a principal source of contrast with the mainland where architecture at this time is characterized by rectilinear structures from numerous contemporaneous Pre-Pottery Neolithic sites (PPNB) that replaced the circular structures characterizing the earlier Natufian and PPNA sites (Todd 1986:18). The appearance and incredible longevity of circular architecture (approximately 4,000 years) on Cyprus has been attributed to insularity and conservatism further highlighting the limited nature of foreign contact (Karageorghis 1982:18). However, Ronen (1995:181) has cited several examples of the curvilinear house form from PPNB and later sites on the mainland in his attempt to elucidate the "unsolved riddle". While the architectural units differ greatly from many sites on the mainland, Aceramic Neolithic sites on Cyprus containing such architecture are limited and comparable only amongst themselves for differences that may or may not be attributable to the economic function/orientation of the site.

Kalavasos-Tenta, Khirokitia-Vounoi, and Cape Andreas Kastros all contain circular domestic structures and non-domestic structures (both ranging from 3 m - 6 m in diameter), internal and external features, and courtyards. The close configuration of the structures and layout of these settlements seems to indicate some sort of town planning and social organization (Muhly 1997:91). In addition, the sites of Kalavasos-Tenta and Khirokitia-Vounoi were surrounded by walls that have been interpreted as a sign of insecurity or some sort of defensive measure (Karageorghis 1982:22,23; Le Brun et al. 1987:289; Todd 1989:5-
a. Reconstruction of Dwelling Structures Found at Khirokitia-Vounoi

b. Remains of a Structure from Kalavasos-Tenta

Figure 2.3 (a, b) Examples of Circular Architecture from Select Aceramic Neolithic Sites
Additional variation among these three sites is exhibited in the use and emphasis of particular building materials (dried mud bricks, stone, and/or pisé) and internal features (Le Brun 1987 et al.:292; Ronen 1995:180; Todd 1987:29). Most of these structures contain flat roofs, contrary to the domed impression proposed by Dikaios (1953) (Le Brun 1984:26-28; Todd 1987:43). Wall paintings have been uncovered at Tenta (Todd 1986:17) and the floors range from plastered surfaces to packed earth, with a few notable exceptions from Kalavasos-Tenta and Khirokitia-Vounoi where some of the floors were painted (Le Brun 1984; Todd 1987:45). Many of the structures at Tenta and Khirokitia-Vounoi contain internal piers (supporting an upper wooden floor) that were presumably built to extend the internal space of the structure. Such features, however, have not been found at Cape Andreas Kastros (Todd 1987:181).

Just as architectural structures and features may be paralleled with the mainland, burial customs documented from these three sites are commonly related with the Levant and Anatolia. Human burials occur in various contexts at Aceramic Neolithic sites often displaying variation in the location and the association of grave goods. The majority of burials occur below floors of buildings (Khirokitia), in open areas such as pits located outside of the structure, or a combination of the two locales (Tenta and Cape Andreas Kastros) (Todd 1987:182). Approximately 234 skeletons have been recovered from such contexts at Khirokitia, eight from Cape Andreas Kastros, and twenty from Kalavasos-Tenta (Le Mort 1995). In addition, the skeletal remains of a 10,000-year-old male from Parreklishia-Shillourokambos have been reported (Cyprus Mail, 14 January 1999) and the remains of at least two individuals from Kholetria-Ortos are noted (Simmons 1996:38). Delay in the full
publication of the results from Parreklishia-Shillourokambos and the disturbed nature of the remains from Kholetria-Ortos precludes their inclusion in this brief review.

A significant proportion of the crania recovered from burial contexts evidence artificial cranial deformation (Le Mort 1995:112). Burials may be either single or multiple, primary inhumations were the rule (as opposed to secondary combined with the custom of skull decoration known from contemporaneous mainland sites), and the placement of the skeletons includes flexed, contracted, or hypercontracted positions (the degree of contraction appears to be associated with the age of the deceased) (Le Brun 1997:27; Le Mort 1995; Todd 1987:184).

Burial rites are further differentiated between sites by the presence or absence of grave offerings. At Khirokitia, grave goods were more commonly associated with female burials, however, there is an apparent association between the type of grave offering and the sex of the individual. Grave goods consisted of shell and stone necklaces, stone bowls and vases, chipped stone tools, and bones (Le Brun 1997:28; Le Mort 1995). At the coastal site of Cape Andreas Kastros grave goods consisted of shells, while at Tenta the only grave offering recovered that appears to have been an intentional association is a fragment of red ochre (Todd 1987:182).

The burial and architectural features of these three settlements have been compared to mainland sites and their similarities and dissimilarities extensively discussed. How they compare with other Aceramic Neolithic sites on Cyprus must necessarily await future excavations and full publication of research that is still ongoing. However, for a site such as Kholetria-Ortos, that has been extensively excavated and presumably contained similar
architectural structures (with perhaps less effort in the construction, since the only remnants are those of melted mudbricks and pise) (Simmons 1996), can comparable similarities in site function or socioeconomic orientation be discerned? Palaeoeconomic investigations, however, have not been a major focus of Aceramic Neolithic investigations and sites such as Kholetria-Ortos must necessarily be compared on the basis of subsistence data and subsequent analyses that have been derived from the study of the faunal, palaeobotanical, and technological assemblages.

2.5 The Subsistence Economy

At present, our knowledge of the Aceramic Neolithic subsistence patterns on Cyprus relies primarily on faunal, palaeobotanical, and technological assemblages from four sites: Khirokitia-Vounoi, Kalavasos-Tenta, Rizocarpaso-Cape Andreas Kastros, and Kholetria-Ortos. Additional research from the Aceramic levels of Dhal-Agridhi (Lehavy 1989) and Parreklisia-Shillourokambos (Guilaine et al. 1995) supplements much of this information. In addition to the faunal and paleobotanical assemblages, ichthyological samples have been analyzed from Cape Andreas Kastros (Desse and Desse-Berset 1994) and Khirokitia (Desse 1984; Desse and Desse-Berset 1989), as well as the identification of economic shell (marine molluscs, land snails, and fresh water gastropods) from Cape Andreas Kastros (Catalliotti-Valdina 1994; Garnier 1981), Kholetria-Ortos (Reese 1993, 1995), and Khirokitia-Vounoi (Demotropoulos 1984).

Prior to a review of this information, it should be mentioned that the study of subsistence remains is not the equivalent of an economic analysis in prehistory (cf. Bailey
The confusion between subsistence and economy has been an historical pitfall in prehistoric archaeological investigations due to the inherent limitations of the database: "namely the necessity of having to approach the analysis of economy, however defined, largely through the analysis of environmental and subsistence data in the first instance, rather than through the analysis of prehistoric social relations" (Bailey 1981:192). Nevertheless, many of the analyses cited below have made the attempt to move beyond mere subsistence studies and provide insightful information and hypotheses regarding Aceramic Neolithic economic patterns that have been somewhat overshadowed by the larger issues governing the island's archaeology.

2.5.1 Faunal Remains

The faunal assemblages from Aceramic Neolithic contexts all contain substantial proportions of caprine (sheep/goat), fallow deer (*Dama mesopotamica*), and pig remains. In addition, fragments of mice (*Mus musculus*) and fox remains have been noted in all of the faunal assemblages (Croft 1996). Cat is represented only at Kholetria-Ortos (Croft 1996), Khirokitia (Davis 1989), and Kalavasos-Tenta (Croft 1989:64), while dog, thus far, is known only from Cape Andreas Kastros (Davis 1989:195). In addition, avifauna have been identified in small numbers from all sites including woodpigeon (*Columba palumbus*), crow (*Corvus corone*), and white stork (*Ciconia ciconia*) from the Khirokitia assemblage (Pichon 1984), while only woodpigeon has been identified from Kalavasos-Tenta (Croft 1989). At
Kholetría-Ortos, at least four different avian species are represented all unidentified with the exception of a fragment attributed to duck (Croft 1996:6).

With the exclusion of mice and avifauna, none of the faunal species mentioned above were present on the island prior to its occupation in the Aceramic Neolithic. Their presence is currently believed to have been due to importation by humans from the mainland sometime between 8,000-10,000 years ago (Croft 1991; Davis 1994:305; Stanley Price 1977b:27). Two aspects of the imported fauna that traditionally distinguished the repertoire from contemporaneous sites on the mainland are the presence of fallow deer and the absence of cattle.

While sheep, goat, and pig (initial phase of domestication) (Davis 1989:197) are known to have been domesticated at the time on the mainland, the presence of fallow deer in the prehistoric record of Cyprus is considered to be quite unique. Fallow deer is not associated with mainland Neolithic subsistence patterns in significant proportions and its presence on the mainland has been identified primarily from Pleistocene archaeological contexts (up to and including the Natufian) where both gazelle and fallow deer were the most common faunal species recorded (Croft 1991:65; Davis 1991:382). Furthermore, behavioral studies of deer have demonstrated the implausibility that such a species was possible to domesticate or even control by humans (contra Ronen 1995:188 and Zeuner 1958) (Chapman and Chapman 1975:156; Dansie 1984; Tomlinson 1988:93, as cited by Croft 1991:66). Nevertheless, Croft (1991) has presented a well-argued case that the importation of fallow deer to Cyprus during the Aceramic Neolithic was a rational choice based on its ecological suitability, a necessary stocking of the island with an alternative subsistence
resource, the relatively small number needed to establish a breeding population and their high
slaughter value (approximately 60% of body weight is edible meat). More importantly, he
has attempted to account for its apparent predominance in the subsistence economy of the
Cypriot prehistoric record from the Aceramic Neolithic through the Chalcolithic period (ca.
7,000 BC - 2,400 BC) from a functional economic perspective.

In contrast to Croft's economic perspective, Ronen's (1995) attempt to explain the "unsolved riddle" from a social perspective has included a consideration of the absence of cattle in his references to Aceramic Neolithic faunal assemblages. The absence of bovid remains from Aceramic faunal assemblages is not necessarily significant in light of the relatively small proportion that has been recovered from contemporaneous sites on the mainland and Crete; however, Cyprus is remarkable in the fact that cattle do not appear substantially in the faunal assemblages of Early Prehistoric sites until the mid-third millennium BC (Croft 1989:99). Ronen has pointed out the cultic significance of cattle on the mainland and has concluded that the absence of cattle was an associated dietary taboo in his argument that the Aceramic Neolithic may have been a sect. The evaluation of this particular line of evidence as a general characteristic of the Aceramic Neolithic is no longer tenable due to the recovery of bovid remains from the Aceramic levels of Shillourokambos (Guilaine et al. 1995:16) and the radiocarbon determination of ca. 7,500 bp from bovid remains recovered from the inland site of Kritou Marottou-Ais Yiorkis on the western portion of the island (Simmons 1998).

With respect to the Aceramic Neolithic, the combination of animals that appear in all of the sites' faunal assemblages (with the exclusion perhaps of cattle which thus far appears
only at two sites) is a pattern that sustains the subsistence economy throughout the Early Prehistoric period until cattle were introduced [on a broader scale] at the beginning of the Bronze Age (Croft 1989:64). The relative proportions of those species contributing to this combination differ among sites and through time, although they all consist of substantial proportions of caprine, fallow deer, and pig remains. With regards to caprines, it should be mentioned that sheep outnumber goats anywhere between 77-85% at Ortos, Tenta and Khirokitia, while at Cape Andreas goats outnumber sheep (Croft 1996).

Diachronic changes noted in the faunal assemblages from Tenta, Khirokitia, and Cape Andreas Kastros all reveal variation in the exploitation of specific species (Table 2.2). At Khirokitia, the relative proportion of caprines increases from the earliest to the latest periods during the Aceramic Neolithic occupation, while the proportion of deer and pig declines (Davis 1994:306). A similar pattern occurs at Tenta with a more moderate shift in the relative proportions through time (Croft 1991:67, 1996:8). In contrast to Tenta and Khirokitia, the number of caprine remains decreases at Cape Andreas Kastros, while deer and pig increase (Croft 1991:69, 1996:8). Chronological subdivision of the faunal assemblage from Ortos was not possible, however, it was amenable to a calculation of the meat yield supplied by the various animals.

Croft (1989, 1991, 1996) has assessed the relative contribution of the various animals to the subsistence economy in terms of meat supply, which is considered a more accurate reflection of the animals' significance in contributing to the subsistence patterns noted above. The edible proportion of caprines (50%), deer (60%), and pig (75%) may be expressed as the ratio 1:3.4:4. If raw counts are used the ratio becomes 1:3.4:3 (as in the extrapolation
Table 2.2 (a-c) Percentages of Faunal Remains and Contributions to the Meat Supply from Selected Aceramic Neolithic Sites

**a. Kalavasos-Tenta**

<table>
<thead>
<tr>
<th>Percentage of identified faunal remains</th>
<th>Percentage of Meat Supply</th>
</tr>
</thead>
<tbody>
<tr>
<td><img src="chart1.png" alt="Bar Chart" /></td>
<td><img src="chart2.png" alt="Bar Chart" /></td>
</tr>
</tbody>
</table>

Information on faunal remain percentages and meat supply percentages from Croft (1989, Table 4.10a and 1991:68, Figure 1).

**b. Cape Andreas Kastros**

<table>
<thead>
<tr>
<th>Percentage of identified faunal remains</th>
<th>Percentage of Meat Supply</th>
</tr>
</thead>
<tbody>
<tr>
<td><img src="chart3.png" alt="Bar Chart" /></td>
<td><img src="chart4.png" alt="Bar Chart" /></td>
</tr>
</tbody>
</table>


**c. Khirokitia-Vouni**

<table>
<thead>
<tr>
<th>Percentage of identified faunal remains</th>
<th>Percentage of Meat Supply</th>
</tr>
</thead>
<tbody>
<tr>
<td><img src="chart5.png" alt="Bar Chart" /></td>
<td><img src="chart6.png" alt="Bar Chart" /></td>
</tr>
</tbody>
</table>

of data for Khirokitia on Table 2.2) due to the larger number of skeletal elements of pigs compared with caprines and deer (Croft 1989:17). The resulting calculations reveal that deer and pig contributed a significant proportion in terms of meat supply in the later periods at Tenta and Cape Andreas Kastros, while the contribution of caprines to the meat supply increased at Khirokitia compared to both pig and deer. The emphasis on caprines in the later periods at Khirokitia may be a reflection of economic intensification in the pastoral sector of the subsistence economy brought on by growing populations at this site (Croft 1996:8,9) or it may reflect a response to changing vegetation conditions in the local surroundings (Davis 1994:308). Davis' hypotheses, however, has not been confirmed by the palaeoenvironmental studies conducted at Khirokitia. Interestingly enough, this pattern does not persist in the following Ceramic Neolithic period as sites are characterized by an even greater contribution of deer to the meat supply (Croft 1989:69). At Ortos, approximately half of the faunal assemblage consisted of caprines and the other half was made up of deer and pig; however, the calculation of the contributing meat supply reveals that only 26% was contributed by caprines, 35% from pig, and 39% from deer (Croft 1996:10).

2.5.2 Palaeobotanical Remains

In contrast to the information on the faunal contribution to the subsistence economy of the Aceramic Neolithic, information on the vegetal contribution has been even more difficult to obtain due to the poor preservation conditions on Cyprus (Hansen 1991). The palaeobotanical assemblages of the five sites consist primarily of einkorn wheat (Triticum monococcum), emmer wheat (Triticum dicoccum), and lentil (Lens culinaris) combined with
smaller amounts of barley (*Hordeum* sp.) (two- or six-rowed) and pea (*Pisum sativum*) (Hansen 1996). The association of wheat, barley, and lentil crops form the basis of the founder crop combination of Old World Neolithic agriculture and were imported as a suite to the island (Zohary and Hopf 1993:92). With the exception of wild barley, none of the crops mentioned above are indigenous to the island. The wild progenitor of barley (*Hordeum vulgare*), however, has not been identified from any of the Aceramic Neolithic palaeobotanical assemblages excavated to date (Le Brun et al. 1987:310). The assemblages vary in relative proportions of specific species between sites (Table 2.3), while contextual linkages of the species has been possible only at Khirokitia with the recovery of plant remains from grinding installations, storage areas, and hearths (Hansen 1991).

In addition to the plant remains, wild plants and weed seeds have also been recovered from Aceramic Neolithic palaeobotanical assemblages. Whereas wild plants are often recorded for possible clues regarding local vegetation and climatic factors, the presence of weeds is often overlooked in archaeological syntheses of the period. They do, however, provide additional information regarding agricultural practices as indicators of various processing stages during cultivation (Hillman 1984; Jones 1984; Reddy 1997:160) and as possible sources of food, fodder, or pasture grass (Hansen 1978; Miller 1984). Additional weed seeds have been noted from Kalavasos-*Tenta*; however, issues of contamination from modern species precludes their appearance on Table 2.3. They include pigweed (*Amaranthus retroflexus*), broom (*Genista* sp.), clover (*Trifolium resupinatum*), fumitory (*fumaria* sp), bedstraw (*Galium* sp), and blackberry/ raspberry (*Rubus* sp.) (Hansen 1978:183,184).

The differences in crop frequencies between Khirokitia, Kalavasos-*Tenta*, Kholetria-
Table 2.3 Palaeobotanical Remains Recovered from Aceramic Neolithic Contexts


<table>
<thead>
<tr>
<th>Species</th>
<th>Kholetria-Ortos</th>
<th>Khirokitia-Vounoi</th>
<th>Cape Andreas Kastros</th>
<th>Kalavasos-Tenta</th>
<th>Dhal-Agridhi</th>
</tr>
</thead>
<tbody>
<tr>
<td>Einkorn wheat (<em>Triticum monococcum</em>)</td>
<td>few</td>
<td>prevailing</td>
<td>frequent</td>
<td>frequent</td>
<td>X? (Triticum sp.)</td>
</tr>
<tr>
<td>Emmer wheat (<em>Triticum dicoccum</em>)</td>
<td>rare</td>
<td>frequent</td>
<td>prevailing</td>
<td>frequent</td>
<td></td>
</tr>
<tr>
<td>Barley (<em>Hordeum sp.</em>)</td>
<td>frequent</td>
<td>few</td>
<td>frequent</td>
<td>few</td>
<td></td>
</tr>
<tr>
<td>Lentil (<em>Lens culinaris</em>)</td>
<td>prevailing</td>
<td>frequent</td>
<td>frequent</td>
<td>prevailing</td>
<td>X (Lens sp.)</td>
</tr>
<tr>
<td>Pea (<em>Pisum sativum</em>)</td>
<td>rare</td>
<td>few</td>
<td>rare</td>
<td>rare</td>
<td></td>
</tr>
<tr>
<td>Grass pea (<em>Lathyrus sativus</em>)</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Vetch (<em>Vicia sp.</em>)</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Milk Vetch (<em>Astragalus sp.</em>)</td>
<td>X</td>
<td></td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Medick (<em>Medicago sp.</em>)</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Wild olive (<em>Olea sp.</em>)</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Wild pistachio (<em>Pistacia sp.</em>)</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Wild fig (<em>Ficus sp.</em>)</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Wild plum (<em>Prunus institia</em>)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>Flax (<em>Linum bienne/usitatissimum</em>)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>Ryegrass (<em>Lolium perenne/rigidum</em>)</td>
<td>X</td>
<td>frequent</td>
<td></td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Mallow (<em>Malva sp.</em>) *</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>Corn spurry (<em>Spergula arvensis</em>)</td>
<td></td>
<td></td>
<td></td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Gromwell (<em>Lithospermum sp.</em>) *</td>
<td>X</td>
<td></td>
<td></td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Canary Grass (<em>Phalaris sp.</em>) *</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>Bog rush (<em>Schoenus nigricans</em>) *</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>X</td>
</tr>
</tbody>
</table>

* - Weed  X - Present (quantity or quantification method unknown)
Ortos and Cape Andreas Kastros have been quantified based on the absolute number of recovered seeds and fragments. This method allows for the development of inferences regarding subsistence preferences among sites to be analyzed on the basis of possible localized environmental variables contributing to these differences or possible variations in the socioeconomic orientation of a particular site. Assessing the relative importance of the various resources utilized by a particular settlement has usually been avoided, however, citing the poor preservation of palaeobotanical remains on Cyprus (cf. Croft 1989:1; Hansen 1991; Knapp et al. 1994:397).

2.5.3 Ichthyological and Shell Assemblage

The ichthyological samples identified have been recovered primarily from Khirokitia (Desse 1984; Desse and Desse-Berset 1989) and Cape Andreas Kastros (Desse and Desse-Berset 1994; Garnier 1981). The following species have been identified from both sites: grouper (Ephinephelus sp.), bass (Decentrarchus labrax), sea bream (Sparus aurata) and mullet (Mugil sp.). Since the recovery of ichthyofaunal remains at Khirokitia is small in relation to Cape Andreas Kastros, the analysts have pointed to the possibility that fish were consumed at the coast due to the role of transport factors on the return (Khirokitia is approximately 6 km from the coast) (Desse and Desse-Berset 1989: 230). The proximity of Cape Andreas Kastros to the coast, on the other hand, has resulted in the recovery and identification of over 3,888 fish remains, highlighting the interaction of local environmental factors and specific strategies in this site's subsistence economy (cf. Desse and Desse-Berset 1994).
In addition to the species listed above, the following have been recovered from Cape Andreas Kastros: shark (*Mustelus mustelus*), stingray (*Dasyatis pastinaca*), red tuna (*Thunnus thynnus*), mackerels and tunas (*Scombridae*), mackerels (*Trachurus*), jacks/pompanos (*Seriola*), sea bass (*Serranus*), trigger fishes (*Balistes carolinensis*), eel (*Muraena*), various seabreams belonging to the Sparidae family (i.e. *Sparus pagrus*, *Pagellus* sp., *Pagrus* sp., *Oblada* sp., *Diplodus sargus* or *Diplodus annularis*), dentex (*Dentex*), salema (*Sarpa salpa*), drum (*Sciaena*), and meagre (*Argyrosomus*). The size and species of fish present from both sites indicates that fishing was selective and concentrated on the capture of large fish requiring hook and line fishing, while schools of fish may have been captured with the use of meshed nets (Desse and Desse-Berset 1989:230; Le Brun 1997:37). Such bone fish hooks have been recovered from Cape Andreas Kastros; however, the emphasis on the role of marine resources in the subsistence economies of the Aceramic Neolithic is usually only mentioned with reference to that site as a fishing village (cf. Knapp et al. 1994; Le Brun 1997:36). Similar patterns are assumed to be evident at the other coastal sites (*Petra tou Limniti*, *Troulli* and Cape Greco) (Watkins 1980:145).

Economic shell has been recovered and identified from Cape Andreas Kastros (Cataliotti-Valdina 1994), Kholetria-Ortos (Reese 1993, 1995), and Khirokitia (Demetropoulos 1984). Due to the number of items recovered, a list has been provided in Table 2.4. The limited discussions of economic shell in the Cypriot Aceramic Neolithic have briefly mentioned their uses as food items, ornaments, decorative objects, tools, and grave goods. In addition to these inquiries, Cataliotti-Valdina (1994) has provided a quantification study of 11,378 shells and shell fragments from Cape Andreas Kastros. The study
Table 2.4 Economic Shells Recovered from Aceramic Neolithic Contexts on Cyprus

Information from Reese (1993, 1995); Cataliotti-Valdina (1994); and Demetriopoulos (1984)

<table>
<thead>
<tr>
<th>Shells</th>
<th>Kholetria-Ortios</th>
<th>Khirokitia-Younoi</th>
<th>Cape Andreas Kastros</th>
<th>Type/Function</th>
</tr>
</thead>
<tbody>
<tr>
<td>Arca noae</td>
<td>X</td>
<td></td>
<td>X</td>
<td>Bivalve; decorative?</td>
</tr>
<tr>
<td>Astrea operculum</td>
<td>X</td>
<td></td>
<td></td>
<td>Marine mollusc</td>
</tr>
<tr>
<td>Astrea rugosa</td>
<td>X</td>
<td></td>
<td></td>
<td>Marine mollusc; decorative?</td>
</tr>
<tr>
<td>Brittium reticulatum</td>
<td>X</td>
<td></td>
<td></td>
<td>Marine mollusc</td>
</tr>
<tr>
<td>Bulla striata</td>
<td>X</td>
<td></td>
<td></td>
<td>Marine mollusc</td>
</tr>
<tr>
<td>Bursa scrobilator</td>
<td></td>
<td></td>
<td>X</td>
<td>Marine mollusc</td>
</tr>
<tr>
<td>Calliostoma laugieri</td>
<td></td>
<td></td>
<td>X</td>
<td>Marine mollusc</td>
</tr>
<tr>
<td>Cardiidae</td>
<td></td>
<td></td>
<td>X</td>
<td>Bivalve</td>
</tr>
<tr>
<td>Cardita calyculata</td>
<td>X</td>
<td></td>
<td></td>
<td>Bivalve</td>
</tr>
<tr>
<td>Cardium (Acanthocardia) tuberculatum</td>
<td>X</td>
<td>X</td>
<td></td>
<td>Bivalve</td>
</tr>
<tr>
<td>Cassidaria sp</td>
<td></td>
<td></td>
<td>X</td>
<td>Marine mollusc</td>
</tr>
<tr>
<td>Cassis sulcosa</td>
<td></td>
<td></td>
<td>X</td>
<td>Marine mollusc</td>
</tr>
<tr>
<td>Cerastoderma</td>
<td>X</td>
<td></td>
<td></td>
<td>Bivalve</td>
</tr>
<tr>
<td>Cerithium sp.</td>
<td></td>
<td></td>
<td>X</td>
<td>Marine mollusc</td>
</tr>
<tr>
<td>Cerithium vulgatum</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>Marine mollusc; edible</td>
</tr>
<tr>
<td>Chama Gryphoides</td>
<td></td>
<td></td>
<td>X</td>
<td>Bivalve</td>
</tr>
<tr>
<td>Charonia variagata (=C. sequenze)</td>
<td>X</td>
<td>X</td>
<td></td>
<td>Marine mollusc; tool?</td>
</tr>
<tr>
<td>Charonia lampas</td>
<td></td>
<td></td>
<td>X</td>
<td>Marine mollusc; tool?</td>
</tr>
<tr>
<td>Chiton olivaceus</td>
<td></td>
<td></td>
<td>X</td>
<td>Marine mollusc</td>
</tr>
<tr>
<td>Clanculus jussieuui</td>
<td></td>
<td></td>
<td>X</td>
<td>Marine mollusc</td>
</tr>
<tr>
<td>Columbella sp.</td>
<td>X</td>
<td></td>
<td>X</td>
<td>Marine mollusc</td>
</tr>
<tr>
<td>Columbella rustica</td>
<td></td>
<td></td>
<td>X</td>
<td>Marine mollusc</td>
</tr>
<tr>
<td>Conus</td>
<td></td>
<td></td>
<td></td>
<td>Marine mollusc</td>
</tr>
<tr>
<td>Conus mediterraneus</td>
<td>X</td>
<td></td>
<td></td>
<td>Marine mollusc</td>
</tr>
<tr>
<td>Cymatium corrugatum</td>
<td></td>
<td></td>
<td>X</td>
<td>Marine mollusc</td>
</tr>
<tr>
<td>Cyproæaidæ</td>
<td></td>
<td></td>
<td>X</td>
<td>Marine mollusc; tool?</td>
</tr>
<tr>
<td>Cyproæa spurca</td>
<td></td>
<td></td>
<td>X</td>
<td>Marine mollusc</td>
</tr>
<tr>
<td>Cyproæa lurida</td>
<td></td>
<td></td>
<td>X</td>
<td>Marine mollusc</td>
</tr>
<tr>
<td>Dentalium dentalis</td>
<td>X</td>
<td>X</td>
<td></td>
<td>Scaphopoda; decorative</td>
</tr>
<tr>
<td>Dentalium rebescens</td>
<td></td>
<td></td>
<td>X</td>
<td>Scaphopoda; decorative</td>
</tr>
</tbody>
</table>

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<table>
<thead>
<tr>
<th>Shells</th>
<th>Kholetria-Ortos</th>
<th>Khirokitia-Vounoi</th>
<th>Cape Andreas Kastros</th>
<th>Type/Function</th>
</tr>
</thead>
<tbody>
<tr>
<td>Denitium vulgare</td>
<td></td>
<td>X</td>
<td></td>
<td>Scaphopoda; decorative</td>
</tr>
<tr>
<td>Diodora gibberula</td>
<td></td>
<td></td>
<td>X</td>
<td>Marine mollusc; decorative?</td>
</tr>
<tr>
<td>Euspira sp.</td>
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<td>X</td>
<td>Marine mollusc</td>
</tr>
<tr>
<td>Fascioraria lignaria</td>
<td></td>
<td></td>
<td>X</td>
<td>Marine mollusc</td>
</tr>
<tr>
<td>Gibbula sp.</td>
<td>X</td>
<td></td>
<td>X</td>
<td>Marine mollusc</td>
</tr>
<tr>
<td>Gibbula nebulosa</td>
<td></td>
<td></td>
<td>X</td>
<td>Marine mollusc</td>
</tr>
<tr>
<td>Gibbula pilosa</td>
<td></td>
<td>X</td>
<td></td>
<td>Marine mollusc</td>
</tr>
<tr>
<td>Gibbula rarifrons</td>
<td></td>
<td></td>
<td>X</td>
<td>Marine mollusc</td>
</tr>
<tr>
<td>Gibbula richardi</td>
<td></td>
<td></td>
<td>X</td>
<td>Marine mollusc</td>
</tr>
<tr>
<td>Gibbula turbinoides</td>
<td></td>
<td></td>
<td>X</td>
<td>Marine mollusc</td>
</tr>
<tr>
<td>Gibbula varia</td>
<td>X</td>
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<td>Marine mollusc</td>
</tr>
<tr>
<td>Glaes trapedia</td>
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<td>X</td>
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</tr>
<tr>
<td>Glycymeris sp.</td>
<td></td>
<td></td>
<td>X</td>
<td>Bivalve</td>
</tr>
<tr>
<td>Glycymeris glycymeris</td>
<td></td>
<td></td>
<td>X</td>
<td>Bivalve</td>
</tr>
<tr>
<td>Glycymeris inaprica</td>
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<td></td>
<td>X</td>
<td>Bivalve</td>
</tr>
<tr>
<td>Glycymeris pilosa</td>
<td></td>
<td></td>
<td>X</td>
<td>Bivalve; edible</td>
</tr>
<tr>
<td>Glycymeris violaeens</td>
<td></td>
<td></td>
<td>X</td>
<td>Bivalve; edible</td>
</tr>
<tr>
<td>Hadriana oretea</td>
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<td></td>
<td>X</td>
<td>Marine mollusc</td>
</tr>
<tr>
<td>Helix sp.</td>
<td></td>
<td></td>
<td>X</td>
<td>Land snail; edible</td>
</tr>
<tr>
<td>Helix cincta</td>
<td></td>
<td></td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>Hexaplex trunculus</td>
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<td></td>
<td>X</td>
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</tr>
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<td>Homalopoma sanguineum</td>
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<td></td>
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<td>Littorina nertitiodes</td>
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<tr>
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<td></td>
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<td>Marine mollusc; tool?; dec?</td>
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<tr>
<td>Melanopsis praeiosa</td>
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<td>Fresh water gastropod</td>
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<td></td>
<td>X</td>
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</tr>
<tr>
<td>Monodonta turbinata</td>
<td></td>
<td></td>
<td>X</td>
<td>Marine mollusc; edible</td>
</tr>
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<td>Muricopsis cristata</td>
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</tr>
<tr>
<td>Murex brandaris</td>
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<td></td>
<td>X</td>
<td>Marine mollusc; edible, dec?</td>
</tr>
<tr>
<td>Murex trunculus</td>
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<td></td>
<td>X</td>
<td>Marine mollusc; edible, dec?</td>
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<tr>
<td>Shells</td>
<td>Kholetria-Ortos</td>
<td>Khirokitia-Vounoi</td>
<td>Cape Andreas Kastros</td>
<td>Type/Function</td>
</tr>
<tr>
<td>--------------------------</td>
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</tr>
<tr>
<td>Nassarius gibbusolus</td>
<td></td>
<td>X</td>
<td>X</td>
<td>Marine mollusc; decorative</td>
</tr>
<tr>
<td>Nassarius incrassatus</td>
<td></td>
<td></td>
<td>X</td>
<td>Marine mollusc</td>
</tr>
<tr>
<td>Nassarius sp.</td>
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<td></td>
<td>X</td>
<td>Marine mollusc</td>
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<td>Natica hebraea</td>
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<td>Neeveria josephinia</td>
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<tr>
<td>Patella sp.</td>
<td>X</td>
<td></td>
<td>X</td>
<td>Marine mollusc; edible?</td>
</tr>
<tr>
<td>Patella caerulea</td>
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<td>X</td>
<td>Marine mollusc</td>
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<tr>
<td>Patella caerulea subplana</td>
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<tr>
<td>Patella intermedia</td>
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<td>Patella rustica</td>
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<td>X</td>
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</tr>
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<td>Patella ulysipenensis</td>
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<td>Pecten jacobus</td>
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<td>Bivalve</td>
</tr>
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<td>Petaloconchus glomeratus</td>
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<td>Marine mollusc</td>
</tr>
<tr>
<td>Pinna sp.</td>
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<td></td>
<td>X</td>
<td>Bivalve; edible</td>
</tr>
<tr>
<td>Pinna nobilis</td>
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<td>X</td>
<td></td>
</tr>
<tr>
<td>Pisania striata</td>
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</tr>
<tr>
<td>Piaaria chione</td>
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<td>X</td>
<td>Bivalve; edible</td>
</tr>
<tr>
<td>Polia dorbignyi</td>
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<td>Pyrenella conica</td>
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<td>Marine mollusc</td>
</tr>
<tr>
<td>Ranellidae sp?</td>
<td></td>
<td></td>
<td>X</td>
<td>Marine mollusc</td>
</tr>
<tr>
<td>Scaphander sp.</td>
<td></td>
<td></td>
<td>X</td>
<td>Marine mollusc</td>
</tr>
<tr>
<td>Serpulorbis arenaria</td>
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<td>Marine mollusc</td>
</tr>
<tr>
<td>Spondylus sp.</td>
<td></td>
<td></td>
<td>X</td>
<td>Bivalve</td>
</tr>
<tr>
<td>Spondylus gaederopus</td>
<td></td>
<td></td>
<td>X</td>
<td>Bivalve; edible</td>
</tr>
<tr>
<td>Thais haemastoma/Stramonita haemastoma?</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>Marine mollusc</td>
</tr>
<tr>
<td>Theba sp.</td>
<td></td>
<td></td>
<td>X</td>
<td>Land snail</td>
</tr>
<tr>
<td>Trivia pulex</td>
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<td></td>
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<td>Marine mollusc</td>
</tr>
<tr>
<td>Trivia sp.</td>
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<td></td>
<td>X</td>
<td>Marine mollusc</td>
</tr>
<tr>
<td>Turitella sp.</td>
<td></td>
<td>X</td>
<td>X</td>
<td>Marine mollusc</td>
</tr>
<tr>
<td>Vermetidae</td>
<td></td>
<td></td>
<td>X</td>
<td>Marine mollusc</td>
</tr>
<tr>
<td>Vermetus triquetrus</td>
<td></td>
<td></td>
<td>X</td>
<td>Marine mollusc</td>
</tr>
<tr>
<td>Vermetus sp.</td>
<td></td>
<td></td>
<td>X</td>
<td>Marine mollusc</td>
</tr>
</tbody>
</table>
demonstrates possible usages of these shells based on explicitly stated archaeological indicators and presents a unique look at diachronic changes in marine shell abundance at this site from levels I/II to the surface.

2.6 Technological Assemblage

The principal materials used in the manufacture of Aceramic Neolithic tools include various grades of chert, deer bones, limestone, basalt, and diabase. The chipped stone industry is often characterized as simplistic or nondescript based primarily on blade and flake technology (Ronen 1995:188; Simmons and Corona 1994:5; Waechter 1953:414) and is usually noted more for what it lacks (projectile points) rather than what it contains. The recent techno-typological analysis of over 60,000 chipped stone pieces recovered from Kholetria-Ortos (the largest Aceramic Neolithic lithic assemblage published to date), however, has revealed a broader variety of pieces and technological sophistication than was originally assumed through comparison with the mainland (Cooper 1997:66-75; Simmons 1996:34). In addition, the technological analysis has explicitly accounted for the manufacturing sequence in an attempt to discern any variation in the site's function that may be evident in production oriented towards a particular stage in the sequence. The analysis demonstrated that "all stages of technological reduction were practiced from initial reduction to final tool production" with a focus on final tool production evidenced by the relatively high percentage of tertiary material in the assemblage (Simmons 1996:35).

The comparison of the chipped stone assemblage from Kholetria-Ortos reveals similarities with other Aceramic Neolithic sites in the presence of sickles, scrapers, retouched
flakes and blades, truncations, bifaces, burins, and perforators (Cooper 1997:70-73; Le Brun et al. 1987:297-299; Le Brun 1981:33; Simmons 1996:35,36). The abundance of sickle blades recovered from Kholetria-Ortos (15.9% of tools, 1992-1993 samples only) is notable in comparison with the majority of Aceramic Neolithic sites (Le Brun 1997:32) due to the large percentage revealing 'sickle sheen'. Microwear analysis of these sickle blades has demonstrated a larger range of uses than has traditionally been recognized, including cereal harvesting, reed cutting, and skin scraping (Le Brun 1997:32). In addition, tang flakes have been noted from both Kholetria-Ortos (Simmons 1996:35,36) and Khirokitia-Vounoi (Held 1993:30; Steckelis 1953:411) that "more closely resemble crude projectile points which are very rare in the Cypriot Neolithic" (Simmons 1996:36).

The absence of projectile points either as imports or locally manufactured is contrasted with the mainland where projectile points are a dominating Neolithic tool type made of obsidian in Anatolia and chert in the Levant (Todd 1986:16-17, 1987:179). However, comparisons with the mainland can hardly account for how the fallow deer was hunted on Cyprus. The actual technique is still unknown and suggested methods include handled flint blades, traps, wooden spears with fire hardened points (Le Brun 1997:40), and even taming (Ronen 1995:188). The suggestion of taming deer, however, has been contradicted by the behavioral studies cited by Croft (section 2.5.1) and the recovery of traps and/or wooden spears are unlikely to preserve in the archaeological record.

In addition to projectile points, the presence or absence of obsidian (an imported material) from the various Aceramic Neolithic sites has been a continual goal in the retrieval of lithic assemblages for demonstrating trade with the Anatolian mainland. Small numbers of
obsidian blades and blade fragments have been recovered from all excavated Aceramic Neolithic sites, with the exception of Phrenaros-Vounistiri (Le Brun 1989:162; Todd 1987:179). The obsidian recovered and analyzed from Kholetria-Ortos (Tykot 1996), Khirokitia (Renfrew, Dixon and Cann 1968:322), Troulli (Held 1993:30; Peltenburg 1979:36-37), Cape Andreas Kastros (Le Brun 1981:41), and Tenta (Todd 1987:178) demonstrates that the raw material was derived from the Çiftlik source of south-central Anatolia (Karageorghis 1982:25; Todd 1987:179, 1986:16).

The relatively small number of obsidian pieces recovered from all sites (less than 100) has been used as evidence of the limited trading relationship with Anatolia (Knapp et al. 1994:406), perhaps imported only during a single colonization episode (Karageorghis 1982:25; Ronen 1995:189). However, Herscher (1995:264) has noted the unprecedented amount of obsidian recovered from the aceramic levels at Shillourokambos, while the excavators have commented that the amount is approximately 2% of the assemblage, or 400 pieces (Guilaine et al.1995:24), nearly four times the amount previously recorded for the entire period. The amount recovered at this site has interesting implications in the redistribution of obsidian throughout Cyprus.

The aceramic Neolithic bone industry includes implements associated primarily with manufacture such as points, pins, and tools for perforation (Le Brun et al. 1987:301), however, bone fish hooks have been recovered from Cape Andreas Kastros and bone pendants and other jewelry have been recovered from Tenta (Todd 1989:7). The larger bone points derived from deer metapodia, which do not bear meat and are usually abandoned off-site, have been recorded from Tenta and Khirokitia (Croft 1989).
Unlike the simplistic characterizations that surround the Khirokitia Culture’s chipped stone technology, the range of ground stone artifacts (querns, bowls [with or without spouts] grinding stones, axes, and pounders) recovered from all sites are often pointed out as a curiosity due to the remarkable skill and effort expended in their production. In comparisons with Near Eastern sites, they often represent “an elaboration and proliferation of ground stone containers found on the mainland” (Stanley Price 1977a:82) as evidenced primarily by the engraved or incised decorations on a variety of bowls. Additional incised ground stone objects include the igneous cobblestones of unknown function from Khirokitia-Vounoi and Kholetria-Ortos (Le Brun 1997, Simmons 1994a, 1994b, 1996), anthropomorphic figurines, and the elaborately incised human heads from sites such as Khirokitia, Kholetria-Ortos and Petra tou Limniti (Pearlman 1993; Stanley Price 1977a).

2.7 Summary

The presentation of the Aceramic Neolithic in this chapter has intentionally followed the traditional lines of description found in the archaeological literature in an attempt to highlight the areas of research that are often obscured by normative comparisons of the material culture of the Aceramic Neolithic on Cyprus with the mainland. These areas of research primarily include the nature of the environment during the early Holocene, the socioeconomic variability among Aceramic Neolithic settlements, and the economy. With respect to the economy, much research and information has been gained regarding subsistence patterns documented by faunal analyses. Unfortunately, these economic hypotheses have rarely been investigated further nor have they been evaluated from the perspective of the
spatial and temporal requirements of the various subsistence activities and how these strategies may vary with respect to microclimatic conditions on the island. Furthermore, these analyses have not been integrated with the information obtained from other areas of research relating to subsistence such as palaeobotanical, ichthyological, and technological studies.
CHAPTER 3

THE VILLAGES OF KHOLETRIA

3.1 Introduction

The modern village of Kholetria (or Nea Kholetria) is located in the Paphos District of southwest Cyprus, approximately 15 kilometers east of the district's capital. It is situated at an altitude of ca. 300 - 316 m asl in the lower reaches of the Xeropotamos Valley approximately 1.5 kilometers east of the Xeropotamos and 9 km north of the island's southern coast. The river delineates the western boundary of the 684 ha of land contained within the village's territory (Figure 3.1), while the eastern boundary extends along the secondary road that links the coastal highway to Kholetria. Within Kholetria’s territory, architectural remains of the village’s former settlement, Palia Kholetria (Old Kholetria), stand in a dilapidated state approximately 1.25 km northwest of its present establishment and 350 m east of the Xeropotamos. The relocation of its community members to the site of Nea Kholetria (New Kholetria) was officially completed in 1975 and the abandoned remains of Palia Kholetria now stand as a silent testament to the rapid and extensive political, economic, and social changes that have occurred throughout Cyprus over the last thirty years. From an ethnoarchaeological standpoint, the two settlements represent a rare opportunity to study, among other issues, the temporal and spatial variability in the environment (both natural and the surrounding...
Figure 3.1 Map of Kholetria's Territory and Sites
Inset: Location and Area of Village Boundary Illustrated

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political, economic, and social environment) and the corresponding responses to this variability. A brief background of Kholetria’s geographical setting within the Paphos region, settlement history, and land use patterns is necessary to provide the reader with a contextual framework from within which to view the responses discussed in Chapter five.

3.2 Geographical Setting

Due to the extreme heterogeneity of the island’s topography, the following discussion of Kholetria’s geographical setting from a regional perspective is based primarily on the outline of the Paphos District discussed by Stanley Price (1979). The Paphos District consists of the foothills of the Troodos Range that define the northeastern portion of the region, as well as the low-lying coastal plain in the south. Within these physical boundaries, the interior portion of the region is characterized by the limestone plateaus that extend west of the Khrysokhou river valley and define the landscape surrounding Kholetria. The plateaus of the southern portion of the region are deeply dissected by river drainages that include the Xeropotamos and originate on the western side of the Troodos Mountains. The Mamonía Complex is extensively exposed throughout the river drainage systems in the south (Rupp et al. 1984:142).

The Mamonía Complex (referred to in Chapter two) is the principal geological feature underlying the interior region of the Paphos District. The complex consists of a volcano-sedimentary assemblage that includes alkali volcanics and volcanic breccias, limestones, cherts, pillow lavas, schists, sandstones, and marbles (Geological Survey Department 1995, 1996). In addition, a major fault in the Paphos District located immediately south of Palia
Kholetria that runs from slightly north of Paphos in the northwest to Kouklia in the southeast has demonstrated the unstable geological nature of the Mamonia Complex and its overlying geological formations (particularly the marls and chalks of the Lapithos and Pakhna Formations) during tectonic activity. The most extensive damage to this landscape in the recent past occurred during the earthquake of 1953 that destroyed villages such as Stroumbi, Kithasi, Phasoula, and Axylou and caused extensive damage in the villages of Nata and Kholetria (Lloyd 1982:5; Νεοφύτου 1993).

The major soil types of the Paphos District are clearly associated with the Mamonia Complex from which they are derived. In Kholetria, they consist of alluvium, the soil series associated with the Mamonia Group and Pakhna Formation, and soils formed on serpentine outcrops (Figure 3.2). The alluvium within the valley floor of the Xeropotamos belongs to the soils series Timi (TT) and has been characterized as a deep and extremely calcareous soil with a clay loam texture. These soils are suitable for almost all crops and contain aquifers within the river gravels that provide a localized water supply (Rupp et al. 1984:145). The Mamonia Group consists of sedentary soils such as the deep, reddish brown Mamonia colluvium (C₃MA) to the reddish, brown soils overlying gray, greenish clays ranging in depth from moderate to very deep. These fine-textured soils are classified according to aspect and the depth at which the clay horizon becomes impermeable (MA₁ - MA₄) (Soteriades and Koudounas 1968:19). These soils are distributed throughout Kholetria’s landscape and are suitable for most crops except those with extensive root development. Exceptions to this characterization include soils where the clay horizon is found at a sufficient depth below the surface to allow for root penetration (Soteriades and Koudounas 1968:19).
Figure 3.2 Outline of Kholetria's Soils
Information Provided by Loizos Martidis, Department of Agriculture, Cyprus
The Pakhna soil series consists of marls overlying limestone and chalk and these soils are found in a limited area south of Palia Kholetria. This soil series is also subdivided according to the depth at which limestone or chalk is found (PA₁-PA₃) and they are all characterized as extremely calcareous (CaCO₃ 60-80%), whitish soils (Soteriades and Koudounas 1968:61). The impermeability of soil moisture below the calcium carbonate horizons (referred to locally where it is found either as the extremely hard and cement-like kafkalla or the softer havara found below the kafkalla layer) found close to the surface (PA₁) are considered highly unsuitable for crops (Rupp et al. 1984:145,146). Crops grown on soils in which the horizon is found at a sufficient depth below the surface or where the kafkalla layer has been subjected to deep ploughing to allow for moisture retention (Soteriades and Koudounas 1968:61) can support even the dry land vineyards found on these soils in Kholetria. The final soil type found within Kholetria’s boundaries are the gray-green and gray-brown/black soils that have formed on the weathered serpentine outcrops associated with the Mamonia Complex. Referred to locally as melanos (black), these soils are highly unsuitable for agricultural use due to the “toxic concentrations of exchangeable magnesium that severely restrict plant growth”(Rupp et al. 1984:145). The allusions to the agricultural suitability of particular soils in relation to aspects of the landscape such as slope and drainage is not solely dependent on the region’s geology, but also its interrelationship with the area’s climate and vegetation.

3.2.1 Climate

The climate of western Cyprus is classified as a Mediterranean-type characterized by
a marked seasonal cycle of warm to hot, dry summers and cool to cold, wet winters. On Cyprus, rainfall is concentrated almost exclusively to the winter months (October to March) with most of the annual precipitation occurring during the months of December, January, and February. Rainfall totals vary according to altitude on the island with as little as 300 mm recorded from the Central Plain to over 1,000 mm recorded from Mount Olympos (1,951 m asl) on the Troodos Range (MANR 1986:7). It is conceivable that the average annual rainfall received in Kholetria (84 -340 m asl) closely reflects, or is slightly less than, the average reported for the Paphos District of approximately 500 mm (King 1987:14). Rainfall averages, however, tend to conceal the striking interannual variation in precipitation totals characterized by years with exceptionally heavy, often devastating, rainfall followed by years of average or drought conditions (Figure 3.3). In fact, it has been estimated that the island is confronted by a severe drought once every ten years and a moderate one every three years (MANR 1986:1).

The severity of drought years to the island’s agricultural regime has traditionally posed a serious problem for the dry-farming conditions of Kholetria in which over 75% of all crops planted depend exclusively on winter rainfall. Reliance on the run-off from the Xeropotamos in the summer months is exacerbated by figures on its loss through evaporation and aquifers in excess of the total precipitation received on the island. One figure estimates that the annual potential evapotranspiration for the Paphos District amounts to ca. 1,800 mm (Rupp et al. 1984:135). The inadequate and irregular supply of rainfall combined with the seasonal flow of the island’s rivers has necessarily resulted in alternative methods for obtaining a sufficient water supply ranging from traditional attempts to locate settlements near springs to the
Figure 3.3 Total Yearly Precipitation Recorded at the Limassol Station: 1889 - 1989
Information from www.ncdc.noaa.gov/cgi-bin/elimvisghenvl.html
Note: Eight years of missing data: 1897, 1939 - 1945
The construction of dams and reservoirs.

The location of Palia Kholoetria, as well as Ayia Irini (Medieval site believed to be the previous settlement of Palia Kholoetria’s inhabitants), are both situated adjacent to springs where water stored in faults and shatter zones found on igneous and chalk formations discharges at contact points with marl formations (Stanley-Price 1979:11). In addition to the island’s naturally occurring springs, rock-lined wells are used to tap the underground water sources of the island and can be found throughout the landscape of Kholoetria. Supplementing such traditional methods intended to secure an adequate supply of water, the British Colonial Government initiated a dam and reservoir construction program in 1898 and by Cyprus’ independence in 1960, 16 dams with a storage capacity of 600 million cubic meters had been constructed (Kondonassis and Yesilada 1993:119). Under the auspices of the Republic of Cyprus, the Paphos Irrigation Project began in 1976 with the goal of supplying irrigation water to the coastal plain of Paphos between the river Khatopotami and Ayios Georgios Peyeias and also resulted in the construction of the Asprokremmo Dam above the Xeropotamos with an overall storage capacity of 51 million cubic meters (MANR 1986:11; Πολίδωρος 1994:117, 118). Despite such efforts, however, the inadequate supply of water in Kholoetria remains a principal problem of agricultural endeavors.

3.2.2 Vegetation

The uncultivated landscape of Cyprus is characterized as Mediterranean in type dominated by a large majority of evergreen species. The distribution of the island’s “natural” vegetational communities is extremely diverse and varies in relation to altitude, edaphics and
climate. The traditional method of delineating vegetational communities on the island according to the dominance of woodland, maquis, garrigue, and batha communities has already been mentioned in Chapter two and this section concentrates primarily on the nonagricultural vegetation surrounding the villages of Kholetria that consists predominantly of the low-growing xerophytic shrublands known as garrigue. In addition to garrigue, an associated grass-steppe vegetation characterizes those areas of serpentinite that have been heavily grazed (Rupp et al. 1984:135,136). The most prevalent species of the garrigue vegetation community can be found in association with the slopes of incised stream channels or ravines that drain the landscape. In the summer, these species include extensive areas characterized by spiny burnet (Poterium spinosum), thyme (Thymus capitatus), and goldendrop (Onosma frutescens). The vegetation is somewhat denser near the floodplain of the Xeropotamos, in stream channels or in areas where wells or springs exist including moisture-signaling species such as oleander (Nerium oleander), tamarisk (Tamarix sp), and occasionally plane (Platanus orientalis).

In addition, species such as terebinths (Pistacia terebinthus), olive (Olea europea), hawthorn (Crataegus sp), and kermes oak (Quercus cocciferus) occur in sparse, isolated stands in abandoned fields or on the edges of cultivated lands (Burnett 1993). The presence of caper (Capparis spinosa) and a variety of grasses and herbs such as Phagnalon sp., bedstraw (Galium aparine), asparagus (Asparagus acutifolius), and Greater Ammi (Ammi visnaga) have also been noted (Burnett 1993; Christodoulou 1959:49).
3.3 Settlement History and Traditional Land Use Patterns

The settlement history of the small, Greek village of Kholetria is not well known as it has never been of much interest to historians, nor has it drawn the attention of the casual visitor. There are no historical references to the village and the only documentation regarding the settlement history of Palia Kholetria and its relocation to Nea Kholetria in 1975 is a published account by the village priest based on the collected oral histories of its inhabitants and supplemented by the writings kept by the priests of the small church Ayios Panteleimon.

According to Neofutou (1993), it is commonly believed that settlers of Palia Kholetria came from the site of Ayia Irini, approximately 750 m south of Nea Kholetria. The following is a selection of translated statements taken from Neofutou (1993:5-6) regarding the historical connection to Ayia Irini and the movement of its inhabitants to the site of Palia Kholetria.

According to tradition, including the very old writings of the church, Kholetria is about 500 years old. It was initially established long ago at the locality known as Ayia Irini. To this day, the site retains a very old, slightly damaged church, the foundations of a few houses, and an olive mill [see Figure 3.4].

According to a witness, the old woman Charalambous, who died at Kholetria in 1950 at the age of 120, the reasons that the first settlers were driven from Ayia Irini are the following (old woman Charalambous related this to me [Neofutou] and much of what follows are the stories told to her by her grandfather):

The site of Ayia Irini was visible from the sea. The Sarakinoi and other invaders could see the lights of the village from a distance. As they approached the beach, they attacked the village, slaughtered the inhabitants and plundered the houses.

Those inhabitants who survived the Turkish raids moved to a site far from the sea. The locality was isolated within a valley between two mountains with rich vegetation and running water. In addition, the river Xeros was nearby. It became what is known today as Old Kholetria.

The first inhabitants of Kholetria were all independent herders. The reason was due
a. North Wall of Church

b. Remains of Habitation Structures Associated with Ayia Irini (Presently Utilized as a Terrace Wall)

Figure 3.4 (a, b) Remains of the Site Ayia Irini
to the fact that almost all of the field plots surrounding Kholetria belonged to Vassiotes [people from the village of Vasa, 20km NE of Kholetria]. They came every winter to sow their fields and again in the summer to harvest. Many of these farmers had their own houses in the village. Much later, the inhabitants of Kholetria became involved in agriculture. The first houses were not very large, many the size of mandres for animals. Many of these houses have survived to the present [see Figure 3.5].

The first century of the villagers’ life in this new locality was passed with many hardships, economic poverty and misery. To begin with, it was well known that all of the land belonged to the Kukkou Monastery, hence, the phrase “The Mandres of Kukkou”.

Supplementing the accounts written by Neofutou, the archaeological survey conducted by the Canadian Palaipaphos Survey Project (CPSP) recorded the site of Ayia Irini as a Medieval occupation/establishment with a Chalcolithic component (Rupp 1981:262; Rupp et al. 1992:289). In addition to the chronological assignment of Ayia Irini provided by the CPSP, a subjective attempt was made to locate any documentation regarding the movement of the settlement’s inhabitants; however, it is difficult to establish the timing of the movement and whether the raids Neofutou refers to coincide with the Ottoman conquest of the island in 1570 or to the numerous and violent struggles that occurred between 1572 and 1669 or even in 1821.

Establishing the presence of land owners from the village of Vasa and the Kukkou Monastery in the area of Palia Kholetria was possible during my study through access to the 1926 land registration record (Department of Lands and Survey). Access to earlier records was not possible, however, and the history of land tenure prior to that time is based only on the register’s recording of a small number of land holdings by Vassiotes as inherited, thereby extending the presence of these villagers in Palia Kholetria by at least one generation. As for the 1926 record, over 55.11 ha of land were registered to Vassiotes as fields (dry farming),
Figure 3.5 (a, b) Examples of Preserved House Structures from the Abandoned Settlement of Palia Kholetria

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houses (size not registered), *alonia* (threshing floors), orchards and single olive trees, while approximately 25.82 ha of land devoted to fields (dry farming) were registered in the name of the Kukkou Monastery.

Additional historical information on the site of Palía Kholetría has been recorded by Goodwin (1978:407) and he believes that the village was possibly the feudal estate of Chlora with a population of ca. 100 people in 1878 (Goodwin 1978:407). Presumably the population of Palía Kholetria had grown to about 400 by 1953 and decreased by one-half that total in 1968 (Nefitou 1993:14). Beginning around 1920, the traditional subsistence-oriented economy of Palía Kholetría becomes part of the living memory of many of the village members of Nea Kholetria and those years are often reflected upon as “filled with much poverty and tyranny”.

The traditional system of land use in Kholetría is characterized by the dry farming of cereals and legumes utilized primarily for subsistence needs and livestock production. Traditional methods of cultivation included the use of oxen- and/or mule-drawn ploughs and sickles for harvesting. Threshing took place at *alonia* (threshing floors) located on the periphery of the village proper with the use of oxen-drawn *dhoukanes* (threshing sledges). Irrigated holdings were limited and confined to the area adjacent to the Xeropotamos with the use of a soil irrigation canal (lined with cement in the late 1950s) dependent on the flow of the river. Water for human consumption was supplied by a spring in the northeastern portion of the village and later by pumped water supplied through a public faucet located in the *plateia* (village plaza). In addition, subsistence was supplemented by garden vegetables and the use of secondary products derived from small herds of goat and sheep kept in or near
the household or from the larger herds kept outside of the village proper. The family household supplied its own labor and maintained itself as the work force. Local needs (resources, tools) not met by the family unit or neighbor exchange relations were supplied either by travel to other villages or to Paphos/Ktima and, more commonly, through the regional/market exchange systems on Cyprus that are still common today and known as *paneyiria* (patron saint’s day festivals) (Millen 1935:488; Christodoulou 1959:102).

Occupations outside of this system were considered limited within the village and only rarely consisted of part-time work to supplement the agropastoral subsistence base. The village did not contain services, aside from the local kafeneio (coffee shop) and barber shop, and part-time occupations were either seasonally-based employing assistance during the harvest periods (rare), small fees (usually in the form of produce) for the use of another individual’s threshing floor, or in the construction of houses within the village. With the introduction of mechanized agriculture to Kholetria in the late 1950s, those who could afford it often paid for assistance for the use of another’s combine for threshing (at that time they were located exclusively near alonia). The use of mechanized agriculture on a wide scale at this time was rare and oxen were still utilized in the village for agricultural purposes until the late 1970s. After the first appearance of the automobile in Kholetria in 1953, a local individual drove a bus that ran between Kholetria and Paphos beginning in 1958. Additional opportunities outside of agriculture necessitated migration to urban areas or apprenticeships in the cities, while opportunities through education were even more limited. The establishment of an elementary school in Palia Kholetria in 1926 still remains the only educational facility within the village of Nea Kholetria, however, today secondary education is mandated by the
State and transportation is provided to secondary schools located in nearby villages and Paphos.

The impression conveyed by the brief description of Kholetria in the first half of this century closely mirrors Christodoulou’s (1959:104) comment regarding the island’s small, rural villages as composed of self-sufficient households within a contained region. However, such an impression is not intended to exclude the “peasant incorporation” of villages such as Kholetria by the state through the taxation system imposed on agricultural and pastoral pursuits by the Turkish and British governments (Attalides 1976:364; Christodoulou 1959:92; Karouzis 1977:31,32). Furthermore, the common perception of most individuals reflecting on the British Period considered the state as disinterested or “indifferent to the quality of life of the inhabitants” with the exception of the oppressive tax and loan collection systems (Neofytou 1993:8). Aside from the historical changes in the political and economic situation of the island beginning in the 1940s, the events associated with Kholetria’s relocation eventually begin to change the perception of the state as completely indifferent to one that recognizes and reinforces the view of the village as encompassed within the larger state.

On September 10, 1953, a number of households in Palia Kholetria suffered costly damage from one of the most destructive earthquakes in recent times to strike the Paphos District. The relocation of settlements with extensive damage by the British Colonial Government (1878-1960, however, officially annexed as a colony in 1914) presented itself as an opportunity to relocate the village of Kholetria closer to the main road that would in effect increase communications between Kholetria and the surrounding villages, including the city of Paphos. The destruction in Kholetria, however, was not as extreme as the damage
suffered by a number of other villages requiring immediate government assistance and combined with the contradictory opinions of Palia Kholetria's inhabitants regarding relocation of the village, the government decided to reconstruct the damaged houses (Neofyto 1993:14).

In the years following the reconstruction of Kholetria's houses, however, additional structures were damaged as a result of subsidence and slumping underscored by unusually heavy winter rains between the years of 1962-1968, further highlighting the unstable nature of the underlying geological formations. Between those years, numerous attempts by Kholetria's village members were made to the Republic of Cyprus (Cyprus gained its independence in 1960) for relocation. After the fourth and final visit to Kholetria in 1969 by the Geological Survey Department, the State decided to relocate the village to the area known as Mosphilia-Akanthokambos. Drawings for eighty house plots were conducted in 1971 and the construction of houses intended to improve the standard of living (piped water, electricity, sanitation services) began in 1973. The relocation of Palia Kholetria's members was completed in 1975 (Neofyto 1993).

Between 1968 and 1996, the present population of Nea Kholetria has increased from approximately 200 to 287. Urban migration has affected demographic trends within the village (particularly during the period between 1953 - 1968); however, the population remains relatively stable since its relocation with a large majority of its members involved in the construction and the service sectors of Paphos. The impetus for this occupational change has largely been the development and striking growth of the tourist economy in the district capital. After the Turkish invasion and occupation of 37% of the island in 1974 (resulting in
the present separation of the island and the displacement of its population), the economy of Cyprus was devastated by the loss of over half of its agricultural land, 90% of its hotels, and approximately 80% of the quarrying and building material areas located in the occupied area (Christodoulou 1992:xiv). In response, the crippled economy of the island diversified and expanded. In particular, the development of new tourist centers such as Paphos witnessed incredible growth. In fact, the number of tourists to the island between 1979 and 1992 increased 526% (Herscher 1995:227).

3.4 Present Land Tenure and Land Use Patterns

Contingent with the prevailing climate, topography and soil, the cultivated landscape of Kholetria continues to be characterized by the dry farming of cereal crops and legumes dependent on winter rainfall and the practice of animal husbandry. Of the irrigated crops cultivated, the most important are citrus (lemons, orange, mandarines), vegetables (potatoes), and fruit trees (peaches). In addition to the constraints of the natural environment, however, land use is also affected by the surrounding political, economic, and social environment on the island. The description of the present land tenure and use patterns cannot be seen in isolation of such influences and they will be highlighted when applicable; however, the discussion of the responses to these changes will be elaborated on in Chapter five.

Within the village of Kholetria, a total of approximately 684 ha of land was recorded in the land registration record of 1982 (Department of Lands and Survey 1982), including the land area in the southwestern portion of the village (adjacent to the Xeropotamos) that was acquired by the Republic of Cyprus during the construction of the Asprokremmo Dam. The
acquisition of some 15.9 ha of land during dam construction reduces the actual figure to approximately 668.1 ha and is the figure utilized in the present discussion. The various land tenure categories presently recorded in Kholetria include private land, state land, and church and monastery land.

During the Ottoman occupation of the island between 1570 - 1878, all agricultural land officially belonged to the state; however, “those who worked the land were in effect hereditary tenants whose right to the land was usufructuary” (Kondonassis and Yesilada 1993:120). This land code remained in effect under the British Administration until 1946 when a land law was enacted that allowed for unrestricted legal ownership of private land. Today, nearly 90% of all land within Kholetria’s boundaries is privately owned and transfer of ownership is primarily through sale or through the traditional system of partible and bilateral inheritance. Of the total area owned by private individuals, approximately 580.7 ha is utilized for agricultural and pastoral purposes or presently lies fallow (the remainder, ca. 16.05 ha, consists of houses or their appropriation for construction in the villages of Palia Kholetria and Nea Kholetria). Private holdings are fragmented and dispersed throughout the landscape: a characteristic of land use throughout Cyprus prior to the establishment of the Land Consolidation Authority in 1969 and commonly assumed to be the result of the system of daughter’s dowry and equal land inheritance. With the exception of the land consolidated during the construction of the Asprokremmo Dam (15.9 ha), land consolidation has not occurred in Kholetria on a significant scale.

The primary crops grown in Kholetria include the extensive field areas of dry land cereals such as *sitari* (wheat) and *krithari* (barley), however, the area of cultivation devoted
to these crops has decreased considerably since the early 1970s. Such a trend largely reflects the island-wide decline of the agricultural sector as the largest, single contributor to the country’s gross domestic product between 1960 and 1974 to a contribution of 6.1% of the GDP in 1994 and employing approximately 12.4% of the population (Fisher 1997:350). Government assistance in the form of improved infrastructure, the introduction of new and improved varieties of crops, expansion of irrigation methods, mechanization of agricultural activities, loans and subsidies, and the provision of veterinary assistance allows for the continued pursuit of agricultural and pastoral endeavors, primarily on a part-time basis, on Kholetria’s landscape.

At present, those fields designated for cereal crops are no longer grown according to the traditional method based on a cereal-fallow-cereal rotation with sesame and cotton often planted in place of fallow, however, they are still rotated in alternating years with legume crops such as vikko (common vetch), rovi (bitter vetch), louvana (ochrus vetch), koukkia (broad bean) and, until the late 1960s, fakes (lentils) and revithi (chick pea). The cultivation of lentils and chick peas has declined due to the high labor input required to process these crops and the lower prices of imports on the market. While the cultivation of traditional crops such as cereals, legumes, olives, and almonds continues to be a feature of land use, it is no longer directed towards subsistence and, with few exceptions, the majority of these pursuits are usually supplemental to income derived from outside occupations. Furthermore, those engaged in full-time agropastoralism currently produce for both subsistence needs and for the market. The trend towards production for the market has increased over the last thirty years with the appearance of exclusive cash crops cultivated on private holdings, such as the
extensive plots of citrus orchards that lie adjacent to the Xeropotamos and the cultivation of vineyards on a decreasing scale since their introduction in the late 1960s.

In addition to agricultural holdings, private land located outside of the village proper is utilized for sheep and goat pastoralism as evidenced by the presence of *mandres* (animal folds), both abandoned and utilized, that mark the landscape. At present, over 600 animals comprising sheep, goat, or mixed flocks are maintained on private holdings with the remaining mandres containing over 1,200 animals located on state land, however, these flocks and their herders utilize private land within the village’s territory for growing fodder crops, grazing sites, and water sources. In addition, the primary product and economic focus of maintaining large herds continues to be milk and to a lesser extent the sale of animals for meat, cheese and dairy products (haloumi and anari), wool/hair, and manure.

Approximately 10% of the land within Kholetría’s territory belongs to the state and is classified as either *halitika* (ca. 37.92 ha) or land registered as “fields”. *Halitika* or hali land refers to waste lands, rock outcrops, or lands that usually cannot be cultivated without soil conservation practices. The category of hali land was originally listed under the Ottoman Land Code as *Arazi mevat* and defined as:

“...mountains, rocky places, stony fields...and grazing ground which is not in the possession of anyone by title-deed nor assigned ab antiquo to the use of inhabitants of a town or village, and lies at such a distance from towns and villages from which a human voice cannot be heard at the nearest inhabited place” (as cited by Karouzis 1977:89,90).

A large majority of the hali land in Kholetría refers to the presence of rock outcrops on the landscape. The second category of state land registered in Kholetría refers to Turkish
fields. After the Turkish occupation of the northeastern portion of the island in 1974, the two ethnic groups have been physically dislocated and separated. All fields registered to Turkish owners remain in their name, however, the Republic of Cyprus currently controls these fields and administers use rights. Approximately 30 ha. of land are still registered to Turkish owners from villages that were predominantly Turkish prior to 1974 such as Stavrokonno, Mandria, Souskiou, and Phinikas.

Additional state land utilized by members of Kholetria, although not physically located within its boundaries, is Mamonia which lies directly east of the village. Mamonia is one of the four Paphos Chiftlikis established during the Lusignan-Venetian periods (Karouzis 1977:47,92-94). These chiftlikis, or large estates, belonged to absentee landlords during the Ottoman period and were taken over by the British Colonial Government in 1947. Today, the state leases the land to tenants (Christodoulou 1959; Karouzis 1977). Many of the pastoralists of Kholetria established mandres at Mamonia (Mouti tou Korona) after the village was relocated in 1975 since herd animals could no longer be stabled directly within the household structure. In 1991, the area was designated as a construction zone in the expansion of Kholetria and the herders were forced to relocate. With government incentives and loan provisions, many of the herders moved to the area of Latzi, also located in Mamonia. To increase production, government incentives included the design of large, cement-block constructed facilities for the herd animals and provisions for water, modern disposal areas, and washing areas.

The final land tenure category presented in this review and recorded in Kholetria today includes church and monastery land. The area of land in Kholetria belonging to the village
church, surrounding churches and monasteries has decreased considerably since the 1926 register's recording of this category and presently includes less than 1% of the land area. The donation of land to the church was a significant phenomenon during the Turkish period as a means of avoiding confiscation or usurpation (Karouzis 1977:49). According to Karouzis, there has been an increasing tendency since 1946 “for church land to be sold either directly to private owners or through the co-op societies to farmers and a very limited amount of land is donated to the church today”(Karouzis 1980:129).

In summary, the description of present and past land use patterns, the environmental setting, and settlement history of Kholetria is an attempt to provide the reader with a background to the ethnoarchaeological study. In particular, aspects affecting the organization of agropastoral endeavors on the present and past landscape have been briefly mentioned through a discussion of environmental variability associated with the area's climate and geology, as well as factors associated with the political and social environment.
CHAPTER 4

METHODOLOGY

The ethnoarchaeological study conducted in Kholetria was designed to discover the organizational aspects of agropastoral activities on the landscape and the relevance of these data, if any, to the study of prehistoric agropastoralism. Ethnographic information pertaining to the environmental, social, and behavioral factors related to the operation of such systems is essential to a more thorough consideration of their operation in prehistory. These factors and the complexity of their interrelationship with respect to the Aceramic Neolithic record, however, has often been obscured by the prevailing conceptual frameworks. In an attempt to partially rectify this situation, the ethnoarchaeological investigation described here was conducted to acquire information on the relevant factors that may reveal an alternative, more constructive approach to the study of the aceramic Neolithic.

4.1 The Sample

There are a number of villages presently located within the dry land farming region of Cyprus that are still involved to some extent in agropastoral pursuits. Any one of these villages could have served as an appropriate sample for the present study; however, the decision to focus ethnoarchaeological data collection from sample households in Nea Kholetria was based on a number of considerations. The most compelling factor was quite
simply the rapport that developed between the various landowners within Nea Kholetria and the members of the Kholetria-Ortos Project. Three field seasons of archaeological investigations conducted at the site of Kholetria-Ortos established the project’s members as a familiar presence within Kholetria’s territory each summer between 1992 and 1994. Many of the village landowners took an interest in the project’s investigation and often assisted researchers by providing historical background on the types and methods of cultivation conducted on or near the site’s location. The relationships maintained by the Kholetria-Ortos Project during its investigations would at least allow for initial contacts upon my introduction to the village in 1996 and, in a sense, it was an assurance that I would gather some data within the time constraints of the study.

In addition, my own involvement and participation in the Kholetria-Ortos Project in 1994 contributed to a preliminary understanding of Kholetria’s physical territory and the types of economic strategies pursued on the landscape. With the exception of the construction of the Asprokremmo Dam, the state’s various land consolidation schemes had not significantly affected the spatial organization of agropastoralism in Kholetria. This was an important consideration for the likelihood of gathering data on the responses of agriculturalists and pastoralists to the spatial variation in the natural, as well as social, environment. Furthermore, the abandoned site of Palia Kholetria was also a consideration during site selection. The site offered the opportunity for collecting data on past subsistence strategies from informants presently residing in Nea Kholetria and from independent surveys of the abandoned village. This could provide the study with information on the transition from the traditional strategy of agropastoralism in Kholetria directed primarily towards subsistence to its present strategy directed primarily at production for market.
4.2 Preparation for Fieldwork

In order to ensure that the ethical standards involved in social and ethnographic investigations would be observed throughout the study, the following steps were taken prior to conducting any ethnographic research: 1) a Protocol Form for Research Involving Human Subjects was submitted to the Office of Sponsored Programs, UNLV; and 2) a copy of the Informed Consent form to be handed out to each informant of the study was submitted in Greek and English for approval. Permission for the study was granted by the Office April 15, 1996 (cf. OSP# 101s0496-013e).

4.3 Fieldwork

Fieldwork for this study was conducted over a ten week period from June through mid-August of 1996 and consisted of data collection from interviews (both formal and informal), participant observation, mapping, and auxiliary sources (both published and unpublished). Interactions and interviews were conducted in Greek with assistance in data collection, as well as an occasionally needed translation, provided by my husband, Theocharis Danamidis. Additional assistance in arranging introductions with local village officials (both political and religious) during our first week in Kholetria was provided by a local family from whom we rented a small guest house in the village during fieldwork. Their kindness and interest in the study contributed immensely to our ability to locate and meet a significantly greater number of informants than would have otherwise been possible by our haphazard, yet daily, moped excursions of the village territory surveying fields and searching for individuals working in their fields or herding animals. Despite the fact that these excursions to locate
informants from the village were highly unsystematic and often resulted in countless and frustrating hours of driving, the chance encounters that did arise were often very productive in terms of data collection and we quickly learned to accommodate our schedule to the flexibility that is inherent in the daily decision making of Kholetria’s households.

Upon initial introductions with individuals, a copy of the Informed Consent form was handed out to participants of the study apprising them of the intent of the research and how the information was to be used in the study. Interviews and observations of individuals were conducted on a volunteer basis (no payment) only after the consent form was read and explained, questions regarding the study were answered, and consent was given directly to me or my husband. Notes were taken during all interviews and interactions with individuals and, if permission was given, a tape recorder was used during interviews and the information was transcribed at a later date. Interviews were not conducted with individuals who appeared uncommunicative or displayed reservations to answering any of our questions. Personal information on all individuals is kept in strict confidence and any references to individuals or households in the present study are by an assigned code number that was produced during and after fieldwork from collected genealogies and local village land registers for the years 1926 and 1982 provided by the koinotarchis (local village official).

During the period of fieldwork, twenty-five out of Kholetria’s eighty-eight households were identified for formal and informal interviews on the basis of occupation, either past or present. The original fieldwork design had emphasized interviewing all households in Kholetria and recording occupational data, genealogies, census data and age structures, however, the time constraints on the study and the need to develop a rapport with individuals
presently engaged in herding and agriculture led to the abandonment of such an endeavor early on in the study. A partial genealogy was constructed with the households interviewed to be used in conjunction with the land registers. Participant observation was not limited, however, to the household and we had the chance to participate in a few village-wide celebrations such as Kholetria's patron saint's day festival in July and a baptism. The following sections outline the general data categories recorded during fieldwork from maps, records obtained from government agencies, photographs, participant observation of pastoral and agricultural activities, and interviews.

4.3.1 Mapping, Records, and Photographs

An interest in the spatial structure of agricultural and pastoral strategies and their integration and articulation with the environmental and constructed aspects of Kholetria's present landscape necessarily required the use of and design of maps during fieldwork. Maps were obtained from the Department of Lands and Survey in Paphos and Nicosia and consisted of 1:5,000 scale cadastral and topographic maps, while a 1:10,000 scale aerial photograph outlining the soil classifications of Kholetria was provided by the Geological Survey Department in Nicosia. In addition, the koinotarchis of Kholetria provided land registration records from 1926 and 1982 containing information on the location of all field plots, the size and type of field plot (i.e. field, orchard, vineyard, halitika, or mandra), and information on the owner. This information was recorded for both years and used in combination with the cadastral and topographic maps during surveys to update changes in the cultivated landscape since 1982.
Approximately 70% of the field plots were surveyed during fieldwork, while the remaining 30% were not identified due to an inability to locate the present owner of the field for permission to enter or cross through those fields that are not easily accessible by the road. The following includes the changes and additions to the land registration records made during survey: approximately 50% of the plots recorded as "field" in the 1982 land registration records were surveyed and identified according to the type of crop cultivated as either cereal (wheat, barley), legume (vetch, broad bean, chick pea), or vegetable (potatoes, artichokes); the presence and type of multiple crops planted on one plot were recorded; fields presently under irrigation, fallow, abandoned, terraced, bounded by walls, containing crops not listed by the register, or containing architectural features other than mandres were also recorded; and the location of all mandres belonging to members of Kholetria and not recorded in the land registration record due to their presence outside the village boundaries were noted on cadastral and topographic maps, as well as their spatial relation to agricultural fields, village structures, and aspects of the natural environment such as water sources (springs, wells), natural vegetation, and rock outcrops.

In addition to the use of cadastral and topographic maps, the original research design included the collection of detailed measurements, plan drawings, and inventories of the construction materials for all mandres (past and present) registered to members of Kholetria within and outside of the village territory; however, this endeavor was accomplished with a limited degree of success. Detailed measurements of abandoned mandres located and recorded either through the use of the 1926 land registration record or recorded on topographic maps in the area of Mouti tou Korona were limited due to an inability to locate
the present owner for permission to enter the field plot upon which a particular mandra was situated or the lack of preservation over time. Of the mandres registered in 1926, detailed measurements of the stone outline of only one mandra abandoned approximately forty years ago was possible. Photographic records and approximate dimensions of three additional mandres abandoned twenty to fifty years ago were identified during survey.

Mandres constructed in the area of Mouti tou Korona and occupied from 1974 - 1990 are presently situated in a construction zone. Herders occupying mandres in this area were forced to move to the area of Latzi or privately-owned fields, while others abandoned the occupation. Needless to say, mapping the preserved remains of mandres in this area proved difficult. Four out of the nine mandres located in the area were completely destroyed due to construction, two were somewhat amenable to more detailed mapping, and one to a sketch. An inventory of artifacts and construction materials of the remaining five mandres was also recorded.

Maps drawn of mandres presently utilized for sheltering herd animals are represented by only nine of the twelve households currently engaged in pastoralism and consist primarily of sketch maps due to the reservations displayed by the owners over detailed measurements. Photographs, however, were permissible and the architecture, artifacts, and locational features found within eight of the nine mandres were photographed. In addition, an informal inventory of the construction materials of each mandra was recorded and its location (environmental, social or political) in relation to water, slope, vegetation, and agricultural fields were also noted.

A 1:2,500 scale cadastral map of the village Palia Kholetria was also utilized for
recording agricultural and pastoral features located within and surrounding the abandoned village. Agricultural field plots currently under cultivation and located within the village area were informally surveyed and recorded for type of crop cultivated and its location. Additional features recorded during informal surveys of the village included the presence of threshing floors, water sources, buildings other than habitation structures (schools, church, kafeneia, and barbershop), and habitation structures. Three houses in Palia Kholetria were mapped in detail and seven sketched for use during interviews regarding traditional agricultural and pastoral strategies and related features incorporated directly into the habitation structure.

4.3.2 Participant Observation

Participant observation of agricultural and pastoral activities in Kholetria was conducted with nine of the twelve households currently involved in part-time and full-time pastoralism and agriculture, while an additional eight households were observed in agricultural activities during the course of fieldwork. The types of data recorded during participant observation of pastoral activities were often conducted in the context of informal and unstructured interviews at the mandra, in fields, or while accompanying individuals during herding. The time involved in the participation and observation of various activities at or away from each of the mandres was not systematically conducted. For example, the data collected from one pastoral household consists of over twenty days of observation with at least three hours per day of direct observation of a particular activity, while the information on another pastoral household was collected over four days with at least two hours per day of direct observation. The variability in the time allotted for observation of a particular
household was often related to an informant’s availability for interviews and observations due to employment in various occupations outside of Kholetria.

The types of data recorded during direct observation include: the composition of the herd at the time of the study and the household members involved in its management; the use of tools in herd management activities; the presence of dogs and other animals; the time and processes involved in various daily activities such as milking, feeding, and water supply; the storage of fodder supply; the use and disposal of manure; and the type and number of animals penned during herding. In addition, we also accompanied and assisted herders in activities that occurred away from the mandra and the types of data observed and recorded include: the method of transportation of milk; the time and process involved in the production of cheese (haloumi and anari); the activities involved in summer agricultural duties; the distances travelled during summer herding and the patterns of movement in relation to agricultural fields, habitation areas, and environmental features such as water sources; the use of dogs during herding; and carcass disposal. Seasonal activities such as shearing, births, and the penning of animals during the winter were not observed and were elicited through interviews from an expanded sample, while the observation of certain activities such as veterinary assistance or the selection of animals for butchering and the processes involved were rare and occurred only once. In addition, quantified data on the productivity of animals was not collected during fieldwork since this information would not accurately reflect the yearly fluctuations in the herd population through births or sale and in the fluctuations of milk yields associated with the annual cycle.

Direct and participant observation of agricultural activities were conducted with all
nine pastoral households as well as an additional eight households currently involved in part-time agricultural pursuits. The type of information collected includes: the members of the household or kinsmen involved in a particular agricultural activity; the location and size of field; the type of crop cultivated; the use of irrigation; the time involved in harvesting a particular crop; the tools involved and techniques employed; the method of transporting harvested crops; and the presence or absence of grazing flocks. As with the observation of pastoral households, the majority of information collected from direct observation of agricultural activities refers to summer activities (primarily harvesting activities). Additional information on the seasonal cycle of labor demands associated with a particular crop and the growing seasons of crops was elicited through interviews from an expanded sample.

4.3.3 Interviews

Due to the bias inherent in participant observation of seasonally-based agropastoral activities, both formal and informal interviews were conducted with a total of twenty-five households to collect additional data on the entire seasonal and, often interannual, cycle of agricultural and pastoral activities for both the present and the past. The types of agricultural information recorded during these interviews include: the location of all field plots registered to an owner; the method of acquisition or transfer of all field plots; the types of crops cultivated in the past and present; environmental factors affecting a crop's growth cycle (i.e. pests, drought); the distinction between subsistence crops and cash crops; the factors affecting the choice of a particular crop; the timing and scheduling of all activities associated with a particular crop; the location of agricultural activities associated with a particular crop; the
length of fallow; the techniques employed; storage facilities; and the frequency of visits to a particular field location.

In addition, the evidence from Palia Kholetria suggested that pastoralism was much more extensive in the past and information recorded from interviews was extended to include information on pastoral strategies at Palia Kholetria, as well as the management of animals other than herd animals for both the present and the past. The type of information recorded includes: the species and number of animals managed by a household; the fodder requirements; the types of storage facilities; the time involved in the management of each species; the types of shelter provided for each species; the scheduling of animal management activities in relation to agricultural activities; and the secondary products provided by each species.

4.4 Organization of the Results

Data collected during fieldwork proceeded in terms of identifying organizational aspects related to the management of resources and the integration of agropastoral strategies in Palia and Nea Kholetria. Two aspects of the data collected on the integration of agropastoral organizational features drew the focus of the study to the role of variability in Kholetria’s natural and social environment and the responses towards such variability by its households. The first aspect refers to data on “traditional” land use strategies currently employed on the landscape despite their “inefficiency” according to agricultural development schemes (cf. Karouzis 1971, 1977). The second aspect of the data refers to somewhat anecdotal information regarding traditional subsistence strategies collected during interviews.
concerning the responses towards variable environmental factors and the choices involved in the employment of particular strategies over time and as immediate responses to particular risks posed by the environment. The following chapter presents the results of the ethnoarchaeological data collection in terms of the structure of environmental variability and the organization of agropastoral strategies as corresponding responses to Kholetria's variable landscape.
CHAPTER 5

AN IDENTIFICATION OF THE SPATIAL, TEMPORAL, AND SOCIAL ORGANIZATION OF KHOLETRIA'S LANDSCAPE

5.1 Introduction

The results of the ethnoarchaeological data collection in this section are discussed according to the structure of environmental variability (natural and social) of Kholetria's landscape, the significance of temporal and spatial variability to agricultural and pastoral strategies, and the initial identification of responses to resource fluctuations associated with such variability. In Kholetria, these responses often are used in combination due to the interdependent nature of agricultural and pastoral production strategies. For organizational purposes, the responses are presented according to the general categories outlined by Halstead and O'Shea (1989) of diversification, mobility, storage, and exchange. These results cannot be considered an attempt to discover all responses associated with the variability of Kholetria's landscape nor are they documented sufficiently from any one particular scale of analysis. These results do, however, represent an initial attempt to approach an understanding of the interaction between humans and their environment.

5.2 Environmental Variability

Aspects of variability in Kholetria's natural environment include fluctuations in the
seasonal, interannual, and spatial availability of resources associated with the region’s semi-arid climate and the landscape’s topographic diversity (both referred to in Chapter three). In addition, both short-term and long-term variability in the surrounding social, political, and economic environment have affected the integration, organization, and the relative economic benefits of agricultural and pastoral activities in Kholetria through time and over the spatial landscape. Ethnohistoric accounts of strategies used in Palia Kholetria combined with the data collected on agropastoral strategies on the present landscape provide an initial identification of the responses and their effectiveness in mitigating risk.

The relatively predictable nature of resource availability from season to season is reflected in the integration of agricultural and pastoral activities scheduled throughout the year (Table 5.1). While the timing of these activities may vary somewhat from year to year in relation to the onset of rainfall, the organizational features are predicated on the seasonal nature of precipitation, the growth cycle of the various species of crops dependent on winter rainfall, and the seasonal labor requirements involved in the management of cultivated fields and herd animals in Kholetria. Differences in the timing and nature of seasonal activities associated with the annual cycle reported by informants were minimal, while the comparison of past and present seasonal strategies revealed variations based on the available technology, the type of crop grown, the numbers and types of animals managed, and the surrounding political environment.

The unpredictable nature of interannual variation in resource availability is reflected in ethnohistoric accounts of destructive thunderstorms associated with the years of 1953 and 1968 and periods of drought associated with the years of 1931-1933, 1959-1960, 1971-1974,
Table 5.1 Seasonal Cycle of Selected Agricultural and Pastoral Activities in Kholetria

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<th>Activity</th>
<th>January</th>
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<td>Lentil/Unica/Chickpea/cowpea</td>
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<td>Rainfed foders</td>
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* Date varies according to observance of the Greek Orthodox calendar.
* Scheduling of activities are based on fully-developed trees (scheduling will vary until the tree is fully established > 13 years).
* Activity varies with the onset of winter rains.
* Period of greatest labor input based on information from Papachristodoulou et al. (1992).
and 1982. The risks of shortage or losses due to interannual fluctuations in precipitation is further highlighted by losses of an unpredictable nature resulting from pest infestation, disease, taxation, and periods of instability in the surrounding social and political environment. Ethnohistoric accounts regarding traditional and present responses to interannual variability include references to the use of domesticated animals, alternative resources, dispersed field plots, and the implementation of strategies such as storage and, in more extreme situations, migration.

Combined with the temporal structure of variability, the spatial variability in the location of a household's fields, their aspect, and soil quality is also considered relevant to the organization of agropastoral activities in Kholetria. The marked diversity of the river valley's alluvium, the Mmonia and Pakhnna soil series, and the agricultural waste lands referred to as halitika (section 3.2) reveal decisions regarding the suitability of these soils for agricultural and pastoral endeavors. In addition, the location, size, and distance of a particular field plot relative to the village, the availability of water sources, and the time involved in the cultivation of a particular crop also are considered in terms of spatial variability. Responses to the spatial variability of Kholetria's landscape include a range of traditional diversification practices currently recorded during the ethnoarchaeological data collection such as land fragmentation, multiple cropping, the location of mandres, and the mobility strategies practiced by households with larger livestock herds.

5.3 The Use and Management of Domesticated Animals: Aspects of Diversification

The immediate benefits of diversifying household agricultural production through the
use and management of domesticated animals stabilizes the household’s resource base against seasonal and, in most cases, interannual variability. Domesticated animals complement agricultural endeavors by providing meat and secondary products that ultimately enrich the household’s diet, provide alternative food resources for human use during periods of subsistence stress and crop failures, convert nonusable plant materials into food, and increase the household’s available income sources (Halstead 1989; Hole 1978; Koster 1977; McCorkle 1992; O’Shea 1981,1989; Vincze 1980). The relative economic benefits, as well as the complex integration of pastoral production with agricultural production strategies, are highlighted by the numbers and types of animals managed through time, the social and spatial relationship of agropastoral endeavors on Kholetria’s landscape, and the changes in the social and spatial organization of an integrated production system.

The changes associated with the types and numbers of animals managed is reflected in the variety of shelter types used for containing animals and their location on the landscape. The provision of shelter is essential to the efficient management of a range of animals kept at Palia Kholetria and Nea Kholetria. Various enclosures are used to shelter animals against threats and hazards associated with the natural and social environment (such as the winter rains, predators, and thieves), thereby lessening the risk of loss to the household’s resource base. The informal survey of Palia Kholetria reveals various enclosures for a variety of animals including rooms directly incorporated into the habitation structure, surrounding the habitation, and surrounding the village. The range of animals kept at Palia Kholetria includes oxen, donkeys, chickens, pigs, and small numbers of goats and sheep. The relative value and economic benefits derived from these animals is recorded from ethnohistoric accounts.

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concerning the role of each animal in the agropastoral subsistence economy and the type of structure used to shelter animals. As mentioned in Chapter three, the confinement of animals directly within rooms incorporated into the habitation structure is evident only at Palia Kholetria due to legislation passed in the late 1960s forbidding animal enclosures within the household. After the relocation of the site to Nea Kholetria in 1975, animal enclosures are discoverable either in the form of cages for rabbits and hares, pens for chickens, and roosts for pigeons. These are all found within the yard surrounding the household or, in the case of larger numbers of animals such as sheep and goats, in mandres (animal folds) surrounding the village.

5.3.1 The Management of Animals at Palia Kholetria

With respect to oxen, the high status of these animals at Palia Kholetria was, at least, partially attributable to their function in the subsistence economy as draft animals. Oxen pairs were maintained for plowing agricultural fields and threshing. They were not considered animals for consumption since the livelihood of the household's economy depended on the animal's survival and care. The value accorded to oxen is discernible in the specific enclosures utilized at Palia Kholetria known as stavloi (stables). A number of households surveyed contain a room within the habitation structure recognizable as a type of stable for sheltering oxen based on the following diagnostic features: pangos or fatmi (feeding stall), metal hooks on top of the front wall of the feeding stall used for tethering the animal and, in some cases, straw was noted on the floor of such rooms (Figure 5.1). The energy investment involved in the construction of the pangos may be related to an observation made by Halstead regarding...
Second Floor
North door leads out to village road

Entrance is boarded with rocks. Currently used as a herding site.

Ground floor

Storage Room (fodder)

Sleeping area (9)
Area for receiving guests

Roof of room III

Feeding stall for oxen. Constructed of cement.

Roof of room IV

Structure 21
Built 1956
Abandoned 1974

[a] holes in the construction of the wall
[b] shelf
[v] vaulted ceiling

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<tr>
<td>holes in the construction of the wall</td>
<td>shelf</td>
<td>vaulted ceiling</td>
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| Artifact/feature recorded through informants. |
| window |
| rock |
| cement blocks |

Remains of rock fence

Remains of rock fence

Water storage

Figure 5.1 Map of Household 21, Palia Kholetria
Room III Illustrates the Stable Area for Oxen
Photograph: Remains of a Feeding Stall Found within Structure # 49/1/1

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the inability of cattle to graze close to the ground (Halstead 1981a:324). Not all households at Palia Kholetria, however, are reported by informants to contain distinct stables and, often, living rooms of smaller habitations are shared directly with oxen. Similar occurrences have been commented on by Christodoulou (1959:64):

Many dwellings of the poorer people or poorer areas, in particular Paphos or Tylliria, are no more than hovels. In some cases rooms are shared with livestock. In the past that custom was widespread. Oxen were acceptable to share the family bedroom because their breath was believed to be beneficial (Christodoulou 1959:64).

In contrast to the value of oxen as a work animal in the subsistence economy of Palia Kholetria, the similar role of donkeys and mules in agricultural endeavors is not easily detected, revealing less care in their management. Specific enclosures within Palia Kholetria were not recognizable and reportedly consisted of makeshift areas or sheds in the yard during the winter rains. Their use as a “beast of burden” made them a necessity throughout the year for transportation and ploughing. They are still utilized for transportation to and from field plots by Kholetria’s older generation and households without motor vehicles. In the summer, they are often left tethered in the fields or yards to graze throughout the night, as they are today in the fields surrounding Nea Kholetria.

Small numbers of chickens and pigs were also reported to be kept at Palia Kholetria by the majority of households interviewed. Chickens were kept in the yard or small roosts were incorporated into the structure of the house. The numbers of chickens reported for the majority of households were less than ten, with the exception of one household reporting over one hundred. As a diversifying strategy, chickens provided the household with supplemental protein in the form of eggs and meat. Furthermore, the time and labor in the management of
small numbers of these animals was often minimal consisting of shelter and food provision in the form of weeds gathered from the fields, barley, and non-usable kitchen waste. Five households interviewed at Nea Kholetria were noted to contain chickens at the time of the ethnoarchaeological study. The management of chickens currently provides these households in Nea Kholetria with extra income through the limited sale of eggs, nonproductive animals are often culled, thereby contributing to the household’s diet, and the manure swept from their sheds provides an essential fertilizer for garden crops and trees within the yard.

Pigs were consistently reported by the majority of households to be kept in small numbers at Palia Kholetria (ranging in numbers from one to five) with the majority of households containing only one pig acquired a few months prior to Christmas and maintained in sheds. These animals were an important diversifying strategy since their management usually consisted of food provisions in the form of non-usable kitchen waste, such as the whey leftover from cheese production, barley flour, and vegetation scavenged from the immediate yard. In addition, pigs were traditionally consumed on Christmas and the leftover meat was often preserved with lard and salt, thereby supplying meat during the winter season when its fat was most needed. Almost all households in Nea Kholetria still reported consuming pork on Christmas, however, it is usually purchased from local butchers in nearby villages or butcher shops in Paphos.

Sheep and goats, considered less efficient converters of vegetation into protein than pigs, provide the household with products in addition to meat, such as milk, wool/hair, and manure. The multi-purpose role of sheep and goats also necessitated roofed shelter of these animals during the winter rains, particularly since the winter season marks the period of births.
and lactation in these animals. A separate and distinct room in the habitation structure used for sheltering sheep and/or goats was recorded during the informal survey of Palia Kholetria, however, it was often difficult to recognize by the lack of artifacts (refer to Figure 5.1). A common statement regarding the management of sheep and goats in the past was that "mandres were in the yard or part of the house at Palia Kholetria". One habitation was noted during survey that did in fact contain a mandra within the yard for these animals (Figure 5.2).

The numbers of sheep and goat that can be tethered within or near the home at Palia Kholetria are reported to range from nearly ten to sixty animals at any one time with the majority of informants reporting approximately eight to fifteen animals. The labor demands associated with the household’s management of smaller numbers of goats and sheep usually did not conflict with the scheduling of agricultural endeavors as older children in the household were reported to be responsible for herding animals on fallow fields in the spring and the stubble from harvested fields during the summer and early autumn season. The straw and chaff from harvested crops provided stored fodder during the winter rains (see section 5.6), while lactation was highest immediately following this period allowing for the production of haloumi (cheese). The production of haloumi is a particularly effective use of the milk from goats and sheep as a diversifying strategy due to its long storage life (some reporting over six months) and the nutrients it provided the household. According to Ryder, cheese contains twenty-five percent protein and thirty-five percent fat compared with twenty percent protein and thirty percent fat in meat (Ryder 1981:195).

Additional social reasons for stabling flocks in or near the household was apparently the high incidence of animal, and even flock, theft reported in the past from mandres located

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Close-Up of Roofed Portion of *Mandra*

Figure 5.2 *Mandra* Constructed Within the Yard of Household 104
in the fields surrounding the village. Additional predators reported in the past included foxes. Larger flocks, however, necessitated the use of animal folds located outside of the village due to tensions and conflicts over crop damage by animals that resulted in the surrounding yards and fields. The data collected on the locational criteria of *mandres* over time also reveals aspects related to the social and spatial organization of pastoral production with agricultural production strategies.

5.3.2 *Mandres*

The *mandra* was and continues to be utilized for enclosing and managing large herds of sheep and goats away from the village. The type of fold, locational criteria, and spatial organization of activities in Kholetria vary through time reflecting changes in the economic, social, and political environment (Figure 5.3). According to the 1926 land registration record, ten *mandres* were recorded. Two individuals were listed each possessing two *mandres*, one located on the north and one on the south side of Palia Kholetria. The location of these mandres was presumably a response to the crop rotation system practiced by the village in the past. According to informants, the system of crop rotation practiced in Palia Kholetria included an alternate year fallow system in which half the village's fields were sown in one year, while the other half remained fallow. Fallowing land served a dual purpose in the subsistence economy of Palia Kholetria that allowed fields to regain some of their fertility through repeated ploughings during the fallow year to restore the soil's moisture and provided an essential grazing resource for herd animals. The integration of this system was of course laudatory as grazing flocks clear crop stubble and vegetation from the fields while at the same time providing an indispensable fertilizer in the deposition of dung. Furthermore,
Figure 5.3 Location of Mandres Recorded During Survey

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the lack of natural pastures in Kholetria and the inability to store large amounts of fodder at mandres in the past during the winter season necessitated the use of fallowed and nonarable land in providing herd animals with food.

With respect to locational criteria, the majority of animal folds recorded from the 1926 register reflect a preference for location near or on hali land, highlighting aspects of the uncultivated landscape and their use in pastoral strategies. While these soils are less than suitable for agricultural endeavors, they offer an important resource not only for construction materials, but also in the form of grazing areas immediately adjacent to or near the mandra. The exploitation of nonarable lands by pastoralists complemented agricultural endeavors on the landscape by allowing for the productive use of natural resources that enlarged the overall area of resource exploitation and permitted greater utilization of arable land for crop cultivation. Furthermore, the location of these enclosures on or near hali land lessens the likelihood of damage to cultivated fields by grazing animals or the possibility of conflict and tension between neighbors over such damage.

As mentioned in Chapter three, hali land in Kholetria is characterized by rock outcrops and land traditionally considered as waste lands. These outcrops and associated vegetation provide essential construction material for the animal enclosures recorded from the 1926 land registration record. During the ethnoarchaeological survey, all mandres noted and recorded from this register presently consist of low, stone wall outlines with one distinct room used for enclosing and separating the young within the mandra (Figure 5.4). According to informants, the construction of these folds included local materials found within the area recorded as halitika, consisting of low, rock walls with the roofed portion constructed of throumbi
Figure 5.4 Photograph and Map of Mandra (198/2) Recorded in the 1926 Land Register

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(Thymus capitatus-thyme), soil, and often, wood beams for roof support. Roof construction is reported to be similar to that found in the habitation structures at Palia Kholetria (Figure 5.5) with perhaps less energy investment and in the roofed portion of the mandra. The majority consisted primarily of konnos (soil with clay properties used for moisture retention) and throumbi, a characteristic species of barren and shallow soil often associated with rocky lands and “agony”[in terms of cultivation](Παναγιωτόπουλος 1967:68,69).

In addition, decisions regarding fold location include considerations such as alternative grazing areas and supplemental fodder in relation to a herder’s agricultural holdings, the extended family’s holdings, and the location of water sources. The seasonal integration of agricultural and pastoral pursuits can, however, lead to tensions over scarce resources at different times of the year. Depending on the location of fields and the timing of the activity, conflict can occur between individuals involved in the same production strategy over access to water resources and grazing areas. Crop failures, flock fluctuations, and periods of subsistence risk associated with prolonged drought years also can result in strains over resources between the two production strategies. On an individual basis, reports of flock theft from mandres between the late 1930s and 1950s were numerous and often required a herder to sleep at the mandra to guard the herd. In addition, the extensive area under cultivation in the past and a larger population relying on the yields from cultivated fields necessitated village and state level responses to reduce potential conflict between the two subsistence strategies. Reports included the presence of an agrofulakas (field guard or a local villager paid a stipend to guard cultivated fields from grazing flocks and potential damages) on Kholetria’s landscape until the late 1960s in an attempt to reduce damages to cultivated fields by grazing animals.
a. Photograph of Roof Remains from Structure #63, Palia Kholetria

b. Illustration of Roof Construction Found in Habitation Structures in Palia Kholetria Based on Ethnohistoric Accounts

Figure 5.5 (a, b) Examples of Roof Constructions Found in Habitation Structures in Palia Kholetria

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The recognition of additional *mandres* was possible through data collected from informants and the recording of stone outlines on the landscape not listed in the 1926 land register. Their period of occupation, however, was difficult to establish and precludes a sufficient discussion of how these aspects changed over time, at least until 1975. Most likely, many of the *mandres* recorded in 1926 were used by subsequent generations as the tendency is to pass on herds and *mandres* through inheritance and daughter’s dowry. Similarly, six of the *mandres* noted from the 1926 register belonged to two sets of brothers and one father and son relationship identified from the initial construction of Kholetria’s genealogy. Furthermore, *mandres* were utilized for brief periods of time, reoccupied, or abandoned. According to informants, herding is not always, nor has it always been, a lifetime occupation in Kholetria. Ethnohistoric accounts were taken from at least eight individuals who either sold the household herd to pursue agriculture more intensively, to provide a dowry for their children, to pursue occupations outside of the agropastoral subsistence economy, or through forced sale as a result of taxes and debt. Unfortunately, the time constraints of the study do not allow for an adequate discussion of many of these trends from a particular household’s perspective nor have quantified data been collected through tax records to demonstrate such fluctuations. The following, however, documents spatial changes associated with the relocation to Nea Kholetria in which most households reportedly sold the herd prior to relocation, or established *mandres* in the area of Mouti tou Korona or on privately-owned fields.

The establishment of *mandres* at Mouti tou Korona reveals a similar trend in the use of the uncultivated landscape, however, many of the construction materials differ as a result of the relocation to Nea Kholetria. Legislation forbidding animal enclosures within habitation
structures was passed prior to the village’s relocation although it was not enforced until the actual resiting of Kholetria. The area of Mouti tou Korona, located immediately east and adjacent to Nea Kholetria, is the state-owned Mavonia Chiftlik. As a result of the construction of Nea Kholetria, a large amount of construction materials were left over and utilized by these herders to establish *mandres* in this area for herds that were originally kept within the household or surrounding yard in Palia Kholetria. Those *mandres* still preserved on the landscape and surveyed consisted of either traditional techniques (Figure 5.6) or were constructed entirely with the lumbered timber, metal barrels, aluminum siding, and other materials that remained from Nea Kholetria’s construction or were later obtained through part-time occupations in the construction sector in Paphos (Figure 5.7).

In addition, preferences were noted regarding the location of *mandres* near rock outcrops or incorporating aspects of the natural landscape into the construction of the *mandra*. The unsuitable nature of this landscape for agricultural endeavors is not only highlighted by the presence of rock outcrops but also by the fact that much of the land utilized within the area of Mavonia has been historically neglected revealing a landscape exploited haphazardly since the Ottoman Period (Karouzis 1977:92-94). As a result, the area immediately surrounding these mandres contains no agricultural fields that would otherwise lead to possible conflict between agricultural and pastoral pursuits. The strains and tensions between pastoral and agricultural pursuits continues somewhat during this period not as a result of demographic pressure but due to the increase of cash crops on the landscape (such as citrus orchards and vineyards) and cultivation incentives provided by the government.

Of the nine *mandres* recorded at Mouti tou Korona, all were used for managing and
Original wall constructed of rocks to the height of the rock outcrop (approximately 1 meter). Layers of vegetation (thyme) and reeds found above rock wall (presumably the remnants of a roof).

Figure 5.6 The Remains of a Mandra at Mouti tou Korona Constructed with Traditional Techniques and Later Supplemented with Modern Construction Materials
Figure 5.7 Sketch Map of Mandra Remains (MTK1) Recorded at Mouti tou Korona
Inset: Photograph of MTK1 Facing North/Northwest
sheltering sheep and goats, with the exception of one fold reported for pigs. All herders with *mandres* located at Mouti tou Korona were reported to be engaged in pastoralism on a full-time basis with the exception of two herders that supplemented the income derived from pastoral production with part-time occupations beginning in the early 1980s in the construction sector of Paphos. In 1991, the area occupied by these *mandres* was slated as a construction zone in the expansion of Nea Kholetria's houses. All herders were forced to dismantle their *mandres*, apply for licenses and relocate either to individually-owned fields or to the area known as Latzi. One informant reported that his repeated refusal to tear down the *mandra* resulted in a brief jail sentence. His decision to sell the herd was ultimately based on the fact that compensation would not be given to any of the herders for their relocation and the area of Latzi would only be available to each herder if they constructed animal folds based on either government designs or with modern construction and management techniques.

Of the *mandres* presently located on the landscape, 9 of the 12 pastoral households were interviewed and the following is a description of the construction materials and the observation of management techniques (see Appendix I). The description of these *mandres* and the pastoral activities observed varies somewhat between the *mandres* located at Latzi and those located on private holdings. As mentioned earlier, the *mandres* located at Latzi were the result of government incentives and subsidies with "modern" cement-block designs and herd management techniques (Figure 5.8). All *mandres* constructed at Latzi are used for sheep and goats and one stable for cows. Not all herders located at Mouti tou Korona moved to Latzi, as some gave up the occupation, while two herders moved their *mandres* to
a. View of Latzi Facing North

b. Close-Up of Cement Block Construction of Mandres at Latzi

Figure 5.8 (a, b) Mandres Located at Latzi
privately-owned fields. None of the herders located at Mouti tou Korona received compensation for their move and one herder reported an initial cost of 9,000 Cypriot pounds (ca. $17,000) to relocate his herd to Latzi. The area of Latzi, also considered waste land, was utilized by Turkish pastoralists from Staurokonno prior to 1974 for the significant number of wells in the area (7 recorded). Supplementing the water supply in this area, the government also constructed additional water reservoirs, a communal disposal area for carcasses maintained by an authorized government entity, and a washing area for the herds. In addition, small and dispersed areas of Latzi suitable for agriculture were rented to herders at a discounted rate for sowing fodder crops.

One herder’s decision to relocate his *mandra* to a private holding was based on the location of the field, its proximity to Nea Kholetria and the presence of water from a nearby well. In addition, most herders who established *mandres* on private holdings since 1975 have considered the location of the field, its aspect, and proximity to Nea Kholetria in their decisions. The accessibility of construction materials for many of the present *mandres* located on private holdings also confirms the expansion of part-time and full-time occupations by Kholetria’s inhabitants in the construction sectors of Paphos. Those *mandres* originally built on private holdings in 1975 and constructed with traditional materials such as rocks, mud, *throumbi*, and wood posts have been expanded with materials such as aluminum siding, cement-blocks, and lumbered timber (Figure 5.9), while *mandres* built during the 1980s were constructed solely of such materials (Figure 5.10).
Olive tree

Original rock wall construction underlying aluminum roofing and room dividers.

Wood beams supporting aluminum roof.

Kid goats

60 goats

Water deposit

Storage of fodder

(Constructed of aluminum siding)

Area of dung accumulation

Key

- Rock
- Door/gate
- Feed troughs
- Water trough
- Cement block wall
- Wire and palette fence
- Surrounded yard of mandra
- Slope

Not drawn to scale

Figure 5.9 Photograph and Sketch Map of Mandra #325 on Present Landscape
Concrete wall supporting aluminum siding roof

Fodder Storage (barley and vetch)

Chickens

Separate Enclosure for goat kids (ca. 6mos.)

Area of dung accumulation

Figure 5.10 Photograph and Sketch Map of Mandra #330 on Present Landscape

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5.3.3 The Management of Herd Animals on the Present Landscape

As emphasized throughout this section, goats and sheep are multi-purpose animals serving an important diversifying strategy in the subsistence economy of Palia Kholetria and in the market-oriented economy of Nea Kholetria. Within the last 25 years, the introduction of modern veterinary medicine, the control of theft and natural predation, and the use of exclusive fodder crops and commercial feed has drastically altered flock fluctuations resulting from natural and social environmental factors of Kholetria's landscape. Presently, the number of animals kept in mandres ranges from 40 - 600; however, these numbers do not account for the fluctuations in flock totals that occur throughout the year, with the highest numbers reported in the winter after kidding and lambing and the lowest after sales of animals occurring throughout the year. In the past, the largest flock number recorded through ethnohistoric accounts was 200 with fluctuations attributed primarily to disease and the lack of fodder or grazing areas due to variable rainfall patterns (Christodoulou 1959:187).

The management of animals in Kholetria continues to be a family endeavor and hired labor is absent in pastoral activities and associated only with agriculture. All households interviewed are engaged in agricultural production to some extent; however, the provision of fodder solely through agricultural activities are met by only three households. The remaining households all purchase commercial feed to supplement the fodder supply. All members of the household are expected to assist in the various activities associated with the maintenance of animals kept by the family. Division of labor is not strictly adhered to; however, specific duties and chores are more often associated with males, females and children. These will be alluded to when applicable. The primary activities observed during this
ethnoarchaeological study were associated with the scheduling of summer activities and a consideration of milking, daily mandra maintenance activities, and cheese production are included in this section. Additional activities, such as harvesting agricultural and fodder crops, herding, and culling, are detailed in later sections.

According to Papachristodoulou et al. (1992), slightly less than one-half of the income derived from pastoral production in Cyprus is associated with the sale of milk and milk products (Papachristodoulou et al. 1992:200, 201). This is also the case in Kholetria where the primary focus of pastoral production has been milk for sale and the production of cheese, rather than meat. A dairy co-operative (referred to locally as the refrigerator) was established in Kholetria in 1983 that holds approximately 1100 liters of sheep milk and 650 liters of goat milk. Herders in Kholetria, as well as herders from the nearby village of Nikokleia, transport milk from goats and sheep daily to the co-op and are paid monthly for their sale. The production of milk usually exceeds the capacity of the co-op between the months of February and June due to the animals’ lactation period, while the months between October and December are reportedly the lowest amounts of milk due to the birthing season.

Milking during the summer season occurs once daily and varies in the amount of time depending on the number of animals managed and scheduling conflicts. Additional variance was noted in the use of tools and according to informants in the amount of milk analogous to the time of year. During the lactation period in the late winter and early spring, animals may be milked up to two times a day increasing the time and energy involved in this activity. All herds were milked by hand (Figure 5.11) with the exception of one flock of approximately 600 animals that is milked with the use of a thulastra (pressurized suction tool) (Figure 5.12).
Figure 5.11 (a, b) Milking the Flock
Figure 5.12 Milking the Flock with a *Thulastra*
An effective strategy for increasing the production of milk for human use noted by Cribb (1984) and observed in Kholetria is the removal of the young from the rest of the flock. Traditionally, this has involved the sale of newborns, however, legislation by the State requires a minimum weight for slaughter (usually three months) (Christodoulou 1959:118). Today, kids and lambs are separated physically within the mandra from their mothers for three to five months (with the exception of feeding) and then sold. In addition, kids and lambs retained within the flock must be weaned at various times from their mothers. The flocks of three herders interviewed used a faitsi (a wooden stick tied across the mouth of the young) to prevent sucking and accelerate weaning. Both methods highlight the economic importance of milk to pastoral households.

When the herd is milked it is driven through the entrance (or mati) of a separate room within the mandra that is then blocked by a milking cage with a door in which each animal must enter. The animal is either milked by the herder sitting behind the enclosed animal or the animal is allowed to pass through (in the case of rams or pregnant animals). Assistance in driving the herd through the mati is often provided by the household’s women and children, although women were also observed milking herd animals. At two mandres, the relatively small size of the flock did not necessitate the use of a cage. The herders simply walked behind each animal carrying a bucket to milk the animal in the area that it was apprehended. Apprehending the animal, however, often requires additional assistance from household members (usually children).

After milking, the flock is fed from stalled fodder (either in the form of straw and chaff, barley, or vetch) and the young are allowed to feed from their mothers. All herders fed
the flock twice daily during the summer with variance in the time of milking. Full-time herders tended to milk in the morning hours, while part-time herders milked the flock in the late afternoon upon return from work in Paphos. Regardless of the time of day, the collected milk is poured through a cheese-clothed covered barrel and transported to the co-op or to the house for cheese production.

Cheese production is a female-dominated activity in Kholetria and is produced primarily for the use of the household, however, limited sales upon request were noted. Sheep milk is preferred in the local and regional production of *haloumi* because of its higher fat content (6%) compared to goat milk (3.8%), however, goats produce more milk on average and for a longer period throughout the year than sheep (Christodoulou 1959:190; Gilbert 1975:58; Papachristodoulou et al. 1992:202). Depending on the composition of the flock, *haloumi* production in Kholetria is usually based on a combination of the milk from both sheep and goats. The production of *haloumi* requires heat, the use of putia (enzyme rennet found in the fourth stomach chamber of ruminants) to speed up the curdling process, and salt. The observation of *haloumi* production in one particular instance involved approximately 23 kilos of milk (3/4 sheep and 1/4 goat). Putia (currently processed and sold as capsules) was added to the milk and heated to 35°C for 30 minutes. As the *haloumi* begins to congeal, it is removed, formed into small rounds with the use of plastic molds, and set aside. The remaining milk continues to boil until the *anari* rises to the top of the liquid. It is scraped off the top of the liquid and set into cheese clothes to drain. The *haloumi* molds are then returned to the boiling liquid for a little over one hour (or until it rises). It is then removed and allowed to cool. After the *haloumi* has been molded and formed, it is preserved with salt adding to the
storage life of the cheese (Figure 5.13). The whey remaining from cheese production has traditionally been a supplemental food provision for animals such as household pigs.

Additional income derived from animal production strategies includes the collection of manure. The presence of dung is a pervasive feature of mandres in Kholetria both past and present. All of the abandoned folds located at Mouti tou Korona and the mandra noted in the yard at Palia Kholetria contained distinct areas of dung, while this feature was undetectable at mandres abandoned earlier on the landscape. It has been approximated that one sheep can produce 500 kg of manure per year (or 10x its weight/year) and hypothesized by Lewthwaite (1981:61) that in areas with less than fertile agricultural soils, dung may have been the principal reason for keeping sheep and goat flocks (cited in Garnsey 1988:206).

Presently, the collection of manure from mandres in Kholetria provides an additional income source for both full-time and part-time pastoralists. Assistance in cleaning the mandra is provided by the entire household, usually during the hours that the flock is milked and fed. Mandres located on privately-owned fields were cleaned daily. The collection of animal dung is swept outside of the mandra onto a manure heap with the use of a sarka (broom made of throumbi and wood). At Latzi, however, the larger area of these mandres required the use of tractors on a weekly basis in the collection of dung. At all mandres, the manure was collected in piles outside of the animal fold where it is picked up by a truck and transported for sale as a fertilizer for agricultural fields throughout the summer and early autumn seasons. Depending on the distance of a herders agricultural holdings and available transport, the manure collected from the mandra is also used as a fertilizer within their own fields.

The collection of manure for agricultural fields was reportedly more common at Palia
a. Removing the Haloumi to Set in Molds

b. Adding Salt to the Haloumi During the Final Phase of Production

Figure 5.13 (a, b) Haloumi Production in Kholetria

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Kholetria. The manure collected and transported from animal shelters within and surrounding the habitation structures at Palia Kholetria provided fertilizer for nearby fields known as soxorafia (small fields surrounding the village), usually consisting of perivolia (garden plots and areas where goat and sheep were restricted). Manure was rarely collected from the household for xoxorafia (larger, outlying fields) containing wheat and barley due to the difficulty of transport and the growth of grasses that direct manure fertilization encouraged in cereal fields. Outlying fields relied on the dung deposited from grazing animals.

During the time of the study, manure fertilization was noted in fields containing citrus orchards, fasolia (field beans), potatoes, and garden plots containing tomatoes and squash. The selection of particular fields and crops for manure fertilization highlights additional aspects of diversification associated with the organization of agropastoral strategies in terms of the spatial variability of the landscape.

5.4 Land Fragmentation: "Irrational" Aspects of Diversification

"Τα σπαρτά σου σκορπιστά και τα παιδιά σου συναχτά”

"Your lands scattered and your children collected together", according to a traditional Cypriot statement regarding land use. This statement refers to one of the most controversial issues in the last thirty years regarding land tenure in Cyprus: land fragmentation. Land fragmentation refers to a single farm that consists of numerous parcels of lands dispersed over a wide area of the landscape (Bentley 1987:31). In the 1926 land register, a total of 1037 parcels belonging to 238 individuals were recorded in Kholetria. The average number of parcels per individual consisted of 4.36 plots from a range of 0.25 to 28 field plots listed per
individual. In 1982, the total number of plots recorded in the land register consisted of 1299 parcels belonging to approximately 426 individuals. The average number of parcels per individual consisted of 3.049 from a range of 0.125 to 21 fields listed per individual. The apparent increase in field plots between the years recorded in the land registration records is not due to an expansion of land within Kholetria's territory. It is, rather, the result of numerous divisions of larger fields to provide an equal share of land for a household's children through inheritance or to provide a dowry at the time of a son's or daughter's marriage (a dowry may consist of land, may be used as collateral for a loan, or sold).

In addition, the increase in the village's population occurring during the first half of this century placed an increased pressure on the land available for subsistence endeavors. Division of a household's land holdings received at the time of marriage or through inheritance ensures that each child receives an equitable share of land for crops that may vary in productivity with respect to the diversity of the landscape (i.e., edaphics, the availability of water, distance from the village, etc.). There does not appear to be a significant increase, however, in the number of parcels recorded in Kholetria between 1982 and the time of this ethnoarchaeological study. As Karouzis (1977) has pointed out, this may be related to the fact that field division is no longer a prominent feature of land tenure in Cyprus and most households divide holdings rather than individual fields (Karouzis 1977:63).

According to informants, the dispersal of a household's field plots (Figure 5.14) is not limited to within the village territory and often extends to fields owned in distant villages. This is often the case when an individual establishes residence in Kholetria through marriage and the dowry includes field plots from his/her village of birth, individuals have migrated to
Figure 5.14 Example of Land Fragmentation in Kholetria: Location of Field Plots Owned or Utilized by One Household

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neighboring villages/cities and retain their share of the household's field plots in Kholetria, or through the purchase of land as an investment. Similarly, a significant percentage of owners of field plots in Kholetria reside elsewhere. According to the 1926 land register, approximately 41.86% (the figures for the 1926 register are incorrect due to missing measurements for a significant number of field plots and the actual percentage is considered to be much lower, approximately 32% - 38%) of the area devoted to agriculture and pastoralism in Kholetria belonged to owners residing in other villages and cities, while approximately 20% of the field plots (119 ha.; however, total does not include fields listed to Turkish owners or government owned) recorded in the 1982 land register belonged to owners residing elsewhere (Table 5.2). Dowry and inheritance rules are acknowledged trends associated with the appearance of owners residing elsewhere in both records; however, the two registers also suggest trends associated with the decrease in the amount of land and an increase in the number of owners that affect the social and spatial organization of agropastoral strategies on the landscape.

A decrease in the amount of land owned by all individuals residing in other villages and cities (with the exception of Phinikas) is a notable trend in the comparison of the two registers. While the number of addresses increases in the 1982 register, most informants reported that only residents of nearby villages and cities continue to cultivate land in Kholetria today. With respect to the 1926 register, however, approximately 25% of the land area (124.28 ha) belonged to owners residing in villages located at distances of more than 20 km. away from Kholetria. In particular, the reduced diversity of villages specializing in viticulture, such as Malia, Potamiou, and Vasa, led to the cultivation of cereal fields and the
Table 5.2 Field Plots Sorted by Village from the 1926 and 1982 Land Registration Records, Kholetria (Department of Lands and Survey, Cyprus)

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<th>Village</th>
<th>1926 # of plots</th>
<th>Total hectares</th>
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<td>Arminou+</td>
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<td>Constantinople+</td>
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<tr>
<td>Episkopi (Paphos)+</td>
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<tr>
<td>Government</td>
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<td>0*</td>
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<tr>
<td>Kholetria</td>
<td>752.278</td>
<td>289.88*</td>
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<td>Ktima+</td>
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<td>3.313*</td>
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<td>Kukkos+</td>
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<tr>
<td>Letimbou+</td>
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<td>Malia+</td>
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<td>Melamiou+</td>
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<td>Nata</td>
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<td><strong>498.59</strong></td>
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<td><strong>668.0859</strong></td>
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* Total is incorrect. Some or all field plots associated with an owner(s) and recorded in the land registration record are missing size measurements.

+ Village is located at a distance greater than 10 km from Kholetria.
ownership of houses used on a temporary basis in Kholetria. According to ethnohistoric accounts, these individuals resided in Kholetria seasonally (i.e., during the winter to sow cereal crops and again in the late summer to harvest) highlighting the use of complementary resource zones occurring throughout Cyprus and recorded in earlier accounts (cf. Christodoulou 1959:85; Stanley Price 1979:73). By the time of the 1982 recording, however, fields registered to Vassiotes declined in area to less than 1 ha. with over half listed as inherited and all uncultivated at the time of the study. While the presence of Vassiotes in Kholetria during the first half of this century highlights aspects of spatial diversity in cultivation strategies related to the island’s microenvironments, mobility, and trade relations between villages (section 5.7), the trend towards decreasing cultivation of fields owned in Kholetria by individuals currently residing in other villages and cities is significant for its effect on agropastoral strategies recorded during survey.

Despite the increase in the numbers of owners residing elsewhere and recorded in the 1982 land register (refer to Table 5.2), the extent of the area owned by outside residents and its cultivation has decreased due to migration, sale of field plots to members of Kholetria, and part-time or full-time occupations outside of agropastoralism. Approximately 15% of the fields surveyed and belonging to residents of other villages and cities were abandoned or uncultivated at the time of the study. With respect to pastoral strategies, the increase in abandoned fields provides additional grazing and water sources for the herds maintained on Kholetria’s landscape thereby reducing potential conflict over resources. Furthermore, land owned by individuals in distant cities and villages and under cultivation at the time of study was often rented to members of Kholetria for agropastoral purposes. For one herder, the
winter's supply of fodder is partially provided by the cultivation of vetch and the cultivation of broad beans as a cash crop on rented fields. In addition, parcels listed as Turkish fields are granted by the State to refugees residing in Kholetria (N=2) and elsewhere for cultivation purposes.

In all instances, these fields, as well as fields owned and cultivated by members of Kholetria, were dispersed throughout landscape. According to agricultural policy analysts, this system of land dispersal is considered an "inefficient" and "irrational" feature of land use on Cyprus (Bentley 1987; Karouzis 1977:41, 74). In fact, sixteen disadvantages of land fragmentation have been listed by Karouzis ranging from a waste of land and time to the increase in the cost of production and reduced agricultural productivity (Karouzis 1977:66-67). The advantages of land fragmentation, however, have often been underrated by agricultural policy analysts arguing for the abandonment of a strategy considered no more than "a useless relic of the past" in the face of mechanized agriculture, chemical fertilizers, and improved crop varieties (Bentley 1987:32).

Land fragmentation, however, has traditionally reduced the risks posed to agricultural endeavors by microclimatic factors such as pest infestation and to a limited degree hail storms and drought. Dispersal of a household's fields plots with the same crop ensures a fairly stable production for the year and minimizes the risk associated with relying on any one crop by diversifying the type of crop planted throughout the landscape. Some informants reported a loss of all crops located immediately adjacent to the Xeropotamos as a result of the river's overflow during the rainstorms of 1968. Fragmentation of land holdings, however, assures a crop yield from fields located elsewhere on the landscape and not affected by the rainstorms.
In addition, land fragmentation permits crop scheduling and diversifies the resource base by allowing for the cultivation of diverse crops on fields with variable soil types and water sources. Furthermore, practices associated with land fragmentation, such as growing multiple crops on single parcels, has reduced the risk associated with investing in introduced or cash crops on the more recent landscape.

5.5 Multiple Crops and Ownership: An Anachronism?

Multiple cropping practices (also referred to as polycropping) is the cultivation of two or more crops on the same field plot. Multiple cropping of arable land and trees has been considered by agricultural policy analysts as “one of the most anachronistic systems of land ownership” in Cyprus (Karouzis 1977:74). However, multiple cropping assures that at least one of the two crops planted will produce a harvest if the other fails due to insufficient rainfall. If the trees and field are owned by the same owner, multiple cropping strategies reduces the labor input while increasing the return (H. Forbes 1989:90). The integration of this strategy is complementary with agropastoral endeavors as olive trees and their droppings on cultivated cereal fields provides an additional and highly nutritional food resource for animals grazing the stubble and fallow of these fields. If not watched carefully, however, agile goats can cause extensive damage to olive trees as they move from the droppings of olive fruits and begin to prune the branches creating possible tension between the owners of the olive trees and the field and/or herd owner. Recent attempts to avoid such damage from occurring to tree crops, as well as vineyards, located adjacent to fields grazed by animals has been the use of fences. Damages still occur on the present landscape, however, and herders are usually fined an amount assessed by the village head.
Multiple cropping strategies in Palia Kholetria are recorded for only a small percentage of the fields in the 1926 land register consisting of dry farming fields (cereals, legumes) planted along with garden plots (approximately 6.6 ha.). Of the 426 individual olive trees registered on arable fields, only 142 belonged to same owner of the field. In addition, 55 olive trees were located on hali land that was otherwise uncultivated, 17 on fields cultivated in conjunction with garden plots, 6 in gardens, and the remainder in cereal/legume fields.

In the 1982 registration record, there is a significant increase in the recording of multiple cropping strategies with vineyards and fields (dry cereal/pulses) accounting for approximately 25.86 ha. of land. Vineyards were also cultivated with one of the following crops: almonds, olives and/or citrus orchards (9.7259 ha.). Presumably, the high incidence of vineyards combined with other crops was the risk posed by cultivating them in the first place. As mentioned in Chapter three, Kholetria has not been zoned for vineyards. Some attempts were said to have been made earlier this century, with only 2 field plots listed as vineyards in the 1926 land register (one a multiple crop with cereals). Viticulture began in the village in the late 1960s/early 1970s. During the catastrophic drought of 1973, some informants reported a loss of all cereal crops and minimal or a complete lack of straw to feed herd animals and oxen. The State’s response to the villagers of Kholetria was to thresh vines and their branches as a fodder supply. By the late 1980s and early 1990s, however, the overproduction of grapes throughout the island brought government incentives to compensate agriculturalists in Kholetria to pull out their vineyards. Approximately 10 households reported the abandonment of viticulture or a change of crop in some or all fields containing vineyards.
Decisions regarding the removal of a household’s vineyards were usually based on the small amount of land under vine cultivation and the yearly yield. Fifteen of these fields were identified during survey as fallow or converted to cereal crops.

Multiple cropping of citrus orchards and fields accounted for 1.795 ha. and olives and almonds grown together accounted for 6.36 ha. of land recorded in the 1982 register. Cereal/legume fields were also interspersed with almonds and olives. Fields used for the dry farming of cereals and legumes combined with almond trees accounted for approximately 2.375 ha recorded in the register, while 153 individually registered olive trees were located on fields (128 belonging to different owners than the field owner) and hali land.

In addition, trees belonging to Greek owners located on Turkish fields and vice versa were noted. The occurrence of multiple cropping strategies between the two ethnic groups suggests amicable relations at least until the 1950s. Intercommunal violence was increasingly more prevalent from the mid-1950s onward and had a significant effect on the mobility strategies and the nature of market exchange practiced by individuals in Kholetria during the years between the 1955 to 1974 (sections 5.7, 5.8). In effect, continued reliance on strategies such as storage of food and fodder occurred to a certain extent to lessen the variability associated with the political environment.

5.6 Storage

Storage is rarely practiced today in Kholetria, with the exception of stored fodder at mandres and to a limited extent in storage sheds in Nea Kholetria and Palia Kholetria for those involved in pastoralism. As a mechanism for mitigating risk, storage is no longer
considered necessary due to refrigeration, markets, increased communications, motorized transport, and indoor plumbing. The evidence from ethnohistoric accounts and the informal surveys of Palia Kholetria, however, indicates that storage was not only necessary but required due to the seasonal and interannual availability of cultivated crops and the need to provide fodder for animals sheltered during the winter season.

5.6.1 Aspects of Storage at Palia Kholetria

The seasonal availability of resources in Palia Kholetria necessitated storage of crops that can be produced in excess of a household’s immediate needs and easily preserved. In Kholetria, these crops have traditionally consisted of wheat, barley, lentils, broad beans, vetch (common, bitter, and ochrus), olives, and almonds. Ethnohistoric accounts regarding cultivation practices in the past refer to a much more extensive area of the landscape cultivated with wheat and barley crops. Bread made from wheat flour was the primary staple in the consumption patterns recorded by all informants interviewed and evidenced by the preservation of ovens at nearly all habitation structures preserved and surveyed at Palia Kholetria (Figure 5.15). Barley was regarded as a food for animals; however, all households interviewed reported the consumption of barley bread during periods of resource shortages. Bread was supplemented primarily with various stored legumes and, depending on the season, garden vegetables. Reports regarding the consumption of meat at Palia Kholetria was mentioned only in relation to the observance of holidays.

The processing required to store crops in various states is evidenced by numerous architectural and contextual features recorded during the survey of Palia Kholetria. One aloni
Figure 5.15 Oven Remains from Palia Kholetria

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(threshing floor) out of the forty-two recorded in the 1926 land register was located during survey (Figure 5.16). The floor had been paved with flagstones, however, dirt floors similar to those described by Pearlman (1984:40, 54) were mentioned by informants. All of the alonia (pl.) recorded in the 1926 register were located on the perimeter of the village or adjacent to fields with threshing occurring throughout the summer period after the harvest and transport of crops to the threshing floor. Cereals were threshed with the use of oxen- or mule-drawn dhoukanes (refer to Pearlman 1984). Additional processing features recorded during the survey of Palia Kholetria included the presence of a water mill near the Xeropotamos (Figure 5.17), the remains of an oil driven mill were found in one habitation structure, and the area of the olive mill was recorded through informants. In addition, hand mills were also noted in Nea Kholetria.

The importance of storage at Palia Kholetria is evidenced by the presence of features incorporated into the dwelling structures. Storage of water, grain, and straw can be found in various contexts of these structures (refer to Figure 5.1). One feature of the household used for storing seed crops, mainly wheat and barley, and recorded through ethnohistoric accounts is the sende, an inclined loft usually cast with tiles of gypsum (marmara). Unprocessed cereal seeds were stored in sacks on the sende to reduce the risk of loss by pests and mice. The marmara was obtained from the vicinity of the village of Amargetti and most households removed the tiles when the village relocated. Dismantled sendes were noted in three yards surrounding the houses of Nea Kholetria.

The most prominent feature incorporated into the dwelling structure is the sospitos (storeroom for chaff and straw). The area reserved for the storage of animal fodder and
Figure 5.16 Location of Alonia Recorded in the 1926 Land Registration Record

* Figure is missing 2 alonia located outside of the area illustrated.

- Aloni (threshing floor)
- Residential area (1926 record)
- Field plot boundaries

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a. Water Mill Facing Southwest

Figure 5.17 (a, b) Photographs of the Abandoned Water Mill Located Near Palia Kholetria

b. Close-Up of Water Wheel

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achuro (straw) was often as large, if not larger, than the living area occupied by the entire household. Identifying these rooms was sometimes difficult due to the removal of roof beams from many of the structures and the consequent roof collapse. A few of the younger structures constructed of cement roofs contain an achurotripa (an opening in the roof used for pouring the straw from harvested crops into the storeroom) (Figure 5.18). The presence of these rooms attest to a greater need and energy investment in providing fodder for animals kept within the household.

5.6.2 Aspects of Storage at Nea Kholetria: Mandres

The necessity of storing fodder throughout the winter and as supplemental feed throughout the year for goats and sheep is evidenced by the processing and storage of fodder by Nea Kholetria’s pastoralists. All herders interviewed stored fodder at the mandra, while two herders were noted to store the achuro from wheat and barley cultivation in various locations at Palia Kholetria. In addition, those herders using mules and donkeys for transportation to and from the mandra stored achuro at Nea Kholetria. Only one herder interviewed purchased his flock’s yearly fodder supply of barley and vikko, while the remainder cultivated crops of barley and vetch to some extent. Presently, only three herders provide the flock’s fodder supply solely through the cultivation of agricultural fields.

Crops cultivated and harvested for fodder consisted of barley and vetch, while the achuro from cash crops such as wheat, vetch, and broad beans were also gathered as supplemental feed. Harvested bails of barley and vetch are transported to the mandra for storage, while cash crops are harvested and threshed with combines and the remaining achuro
Figure 5.18 Map of Household 32/33 Exemplifies Storage Area
Inset: Photograph of Achyrotripa Incorporated into Roof of Room III

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is sacked and transported at a later date for storage at the *mandra*. One exception of a wheat field harvested by sickle was noted due to its small size and inaccessible area for the use of machinery (Figure 5.19). Participation in harvesting and threshing of cash crops consisting of cereals and legumes occurred on at least eight separate occasions with one full day of participation in a work party involved in threshing well over 10 ha. of crops (actual figure unknown as bails of wheat and barley belonging to extended family members were trucked in from fields located in neighboring villages). The combine was used in only three fields as harvested crops of the same species had been transported the week prior to these locations, reducing the time involved in moving the combine to each field and the time involved in gathering the remaining *achuro*. The remaining *achuro* from the combine’s separation of the seed from the stalk and chaff is bagged at a later date and used as fodder.

The length of time between harvesting and sacking *achuro* ranged between three days and one month. Risks involving the loss of *achuro* remaining on the landscape for an extended period of time included numerous fires throughout Kholetria’s landscape in the summer. These fires are reported by informants as unintentional and one response to mitigating the threat of fires to *achuro* is to plow all of the vegetation around the borders of the field and pile the soil to form a deterrent to the fire’s path (Figure 5.20).

5.7 Mobility

Mobility strategies employed to expand the spatial resource base of Kholetria’s diverse landscape are associated primarily with the individual grazing routes of pastoralists residing in the village. With the exception of the high incidence of urban migration recorded
Figure 5.19 (a, b) Harvesting and Threshing Techniques Observed on the Landscape of Kholetria
a. Diverting the Fire's Path from a Nearby *Mandra* Until Fire Trucks Arrive from Paphos

b. Plowed Field Edges Aimed at Reducing the Threat of Fire to *Achuro*

Figure 5.20 Threat of Summer Fires to Agricultural and Pastoral Endeavors
by Neofutou (1993) between the years of 1953-1968, residential mobility (in which a part or all of the population moves in response to resource availability) has not been a characteristic feature of Kholetria’s agropastoral adaptive strategies. Instead, aspects of mobility related to the daily movement of herd animals maintained in mandres and utilized as a response by individuals of agropastoral households to the temporal and spatial variability of the village’s landscape were recorded. Movement patterns, however, tended to be restricted to within the confines of the village territory (past and present) with residence maintained in the village throughout the year.

Variations in individual grazing routes have historically been shaped by aspects related to the natural, social, and political environment. The need to provide food to animals maintained in mandres prior to the 1950s depended almost entirely on grazing resources. Storage of fodder crops at mandres in the past was reportedly not practiced to an extensive degree and flocks were herded almost daily throughout the year. Grazing routes were patterned seasonally in relation to the time of the year, the composition of the herd, cultivated fields, and the location of water resources. During the summer, grazing routes continue to be patterned in relation to a herder’s agricultural holdings and the holdings of extended family members that allow herds to graze the stubble after the fields were harvested (Figure 5.21). The importance of these social ties were essential in the past for accessing the fields of relatives throughout the year including fallowed fields in the winter.

Flock fluctuations in herds maintained in mandres was reportedly high during the past and associated primarily with disease and fluctuations in the availability of resources related primarily to interannual variations in precipitation. Despite the additional grazing areas
Figure 5.21 Grazing on Stubble of Harvested Fields in the Summer
provided by hali land, some informants mentioned the incidence of disease associated with grazing on the fresh leaves of these areas in the spring following a period of drought. Exclusive reliance on these areas at such a critical time increases the consumed level of toxins found in various plant species of the maquis and garrigue vegetational communities. Under average conditions, the toxic effects associated with these species are harmless, however, reliance on these areas increases the level of toxins consumed resulting in higher mortality rates (Christodoulou 1959:187; Koster 1977:168; Πανάκετον 1967:216-218).

Additional variations in the movement patterns of individual herders were also reported with respect to risks posed by the political environment. The intercommunal tensions and violence between Greek and Turkish communities in the mid-1950s to 1974 limited movement of both flocks and people (particularly during travel to and from the local fairs or panyiria) in Kholetria. The area surrounding the Turkish village of Staurokoonno and the area of Latzi and Mamonio were reportedly avoided by herders during these years. More recently, the State has restricted movement of herders in the southwest portion of the village territory due to the construction of the Asprokremmo Dam.

During this ethnoarchaeological study, herders were accompanied during grazing and their patterns noted with respect to agricultural holdings and water sources in the summer season. In addition, dogs were observed to be used by all herders to guard the animals sheltered in mandres and to control the flock during herding. Animals maintained in mandres at Latzi tended to be herded in the areas of Mouti tou Korona and Latzi with variations in the patterns of movement noted during the harvest of agricultural fields. In addition, two herders with mandres established on privately-owned fields used Palia Kholetria as a herding site and
stored fodder in various habitation structures. The abandoned village also provided a source of water for herds in the *plateia*.

Additional water sources were noted by the presence of water troughs associated with wells located on privately-owned fields, abandoned fields, and in the area of Latzi and Mouti tou Korona (Figure 5.22). Despite the supply of piped water at all *mandres*, the importance placed on locating water sources in the summer in relation to agricultural fields can often exceed that of food provision (particularly if fields are rented). In one instance, a herder purchased a water tank and established it near fields he had rented in order to provide water for the flock as they grazed on the stubble while the family harvested and threshed the fields. Water sources on abandoned fields, however, were not claimed within the grazing area of any one particular herder and were jointly utilized by herders during the movement of flocks grazing on the stubble from agricultural fields.

**5.7 Paneyría: Aspects of Exchange**

The seasonal context and location of the local *paneyría* observed during the name day of the village's patron saint has traditionally been viewed as response to fluctuations in both the temporal and spatial availability of resources on Cyprus (cf. Christodoulou 1959; Pearlman 1984). The historic church in Kholetria continues to hold services during the *paneyría* on July 27 in honor of *Ayios Panteleimon* and on October 26 in honor of Vasa's patron saint, *Ayios Dimitrios* (Figure 5.23). The *paneyrí* held in honor of *Ayios Panteleimon* still occurs over a three day period and is a time of celebration, social gatherings for relatives residing elsewhere, and a market for the exchange, purchase, and sale of produce and
a. Rock-lined Well

b. Water Troughs Associated with Wells on Privately Owned Fields

Figure 5.22 Water Sources on the Landscape Used by Kholetria’s Herders
Figure 5.23 *Paneyiri* at Kholetria

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animals. The time dependent nature of these events has been described by Christodoulou (1959) as a response to the seasonal needs of villages throughout Cyprus.

The *paneyiri* of *Ayios Panteleimon* has traditionally served the needs of Kholetria immediately after the summer harvest when informants reported the exchange or sale of wheat and barley, goats, and sheep. During the *paneyiri* of *Ayios Dimitrios*, Vassiotes (people from Vasa) brought grapes and wine after their harvest season to Kholetria in exchange for additional seed for sowing their cereal fields in Kholetria. In addition, surplus in cereal and cheese products by members of Kholetria were often exchanged and sold at local fairs, while items such as *dhoukanes* and pigs were purchased at *paneyiria* in Kelokedara, Amargetti, Nata, and Kouklia (see Table 5.1 for the timing of these fairs). Movement to and from local fairs was compromised somewhat in the late 1950s and 1960s due to intercommunal violence, thereby lessening the effectiveness of market exchange as a mechanism for reducing risk. The tenacity of these market fairs throughout Cyprus, however, is quite remarkable, as Christodoulou has noted the existence of similar gatherings prior to the Roman Period (ca. 50 B.C. - A.D. 400) (Christodoulou 1959:102)

In addition to the economic role of *paneyiria*, the religious nature of these celebrations highlights issues related to traditional consumption patterns. The gathering of family members residing elsewhere and neighbors in local villages has traditionally been celebrated with feasts. According to informants, the slaughter of animals in the past was associated primarily with celebrations taking place during the *paneyiri*, Christmas (traditional slaughter of pig), Easter (traditional slaughter of lamb coinciding with the cycle of births), weddings, and baptisms (both goats and sheep). The baptism of one child during this
ethnoarchaeological study included the participant observation of the slaughter and processing of four sheep in preparation of the event’s communal celebration highlighting economic factors related to the management of herd animals on Kholetria’s landscape.

Selection of sheep for slaughter was based on physical deficiencies of sub-adult and adult females (i.e. one teat, age, etc.), the composition of the herd, and economic factors such as the higher market price for goats over sheep by one herd owner that provided the meat for the celebration. According to informants, the market value for goats is currently 2.50 CYP/kilo, while the value of sheep has declined to approximately 1.25 CYP/kilo, despite the fact that sheep products command a higher price in the market over goat products. The increased value of goat meat over sheep may be related to the leaner meat provided by these animals reflecting changing consumption patterns throughout Cyprus.

Sheep are butchered in the traditional manner by pulling the animal down on its side and cutting its throat. A small hole is punctured into the leg and air is pumped in (or traditionally blown in through a straw) to detach the skin from the carcass. The carcass is then hung by its hind legs and the head, hooves, and internal organs are all removed and discarded (with the exception of the skin that is retained for sale in Paphos for 6.00 CYP). Disposal of animals (either the discard of non-edible portions or by culling the animal from the herd due to disease) usually occurs away from the settlement and entails burning the carcass, disposing of carcasses in ravines, or in the case of animals slaughtered at Latzi, placed in a chemical disposal area.
5.5 Summary

The results of the ethnoarchaeological data collection in this section have outlined the seasonal, spatial, and to a limited extent, interannual variability associated with Kholetria’s landscape (both natural and social) and the significance of such variability to the organization of agricultural and pastoral strategies at Palia Kholetria and Nea Kholetria. In addition, the initial identification of responses used to lessen the risk of resource fluctuations associated primarily with seasonal and spatial variability were presented according to the general categories of buffering mechanisms outlined by Halstead and O’Shea (1989) of diversification, storage, mobility, and exchange. The significance of conceptual frameworks designed to discover the structure of environmental variability and the patterning of cultural responses to such variability in the archaeological record is discussed in the next section.
CHAPTER SIX

DISCUSSION AND CONCLUSIONS

6.1 Introduction

The results of this ethnoarchaeological study have provided a preliminary understanding of the organization of agropastoral strategies on Kholetria’s landscape in relation to the variability of the natural and social environment. The initial identification of the strategies employed to mitigate the effect of this variability on resource availability over time and space has been outlined according to four inclusive categories of responses (also referred to as buffering mechanisms) consisting of diversification, storage, mobility, and exchange. The purpose of this chapter is to demonstrate the relevance of conceptual frameworks surrounding the structure of environmental variability and the patterning of responses identified in ethnographic contexts to the study of the Aceramic Neolithic on Cyprus and for rethinking the conceptual dilemma posed by the “bizarre”.

6.2 Cultural Responses to Environmental Variability and their Implications to Prehistoric Investigations

The significance of environmental variability and the responses employed to mitigate the fluctuations in resources associated with such variability is based on the fact that not all sites within a given region will be equally affected by certain types of variability. Attempting
to demonstrate this fact through a single study of agropastoral organizational strategies without reference to a regional overview is hardly convincing. Anecdotal references, however, to the variations in socioeconomic orientations between villages such as Vasa and Palia Kholetria in the first half of this century have been briefly mentioned in the results of the ethnoarchaeological study. For a more elaborate discussion of the variation in land use patterns and socioeconomic orientations of Cypriot villages in the first half of this century, the reader is directed to Christodoulou’s work entitled *The Evolution of the Rural Land Use Pattern in Cyprus* (1959).

A more thorough consideration of the types of responses (and their patterning) used by human communities to mitigate the effects of environmental variability may account for the perceived variation in the settlement and socioeconomic orientation of contemporaneous sites in the prehistoric record. The potential offered to prehistoric inquiries of environmental variability is that the structure of environmental variability can be independently specified in the archaeological record in terms of its timing, spatial scale, frequency, duration, and severity (Halstead and O’Shea 1989; Minnis 1996). As highlighted by the ethnographic study, the environment is not limited simply to climatic factors; it includes variability associated with the social, economic, and political environment. Furthermore, a more rigorous study of the responses employed to mitigate the effects of such variability and how these responses are patterned in the ethnographic record may allow for the predictability of similar strategies in the prehistoric record and an assessment of the parameters various responses must maintain in order to be effective (Halstead and O’Shea 1989:5). Consequently, the effectiveness of these responses contain significant consequences for social organization and socioeconomic change over the long-term, as will be discussed in section 6.3.
A number of methodological issues highlighted during the ethnoarchaeological study must be addressed if the potential of such frameworks is to be fully realized with respect to the Aceramic Neolithic on Cyprus. The first issue relates to the lack of systematic research on early Holocene environmental and climatic conditions (referred to in Chapter Two). While the risks posed to agropastoralism during the Aceramic Neolithic on a seasonal and, in some cases, an interannual basis can be modelled to a certain extent from data retrieved through ethnographic studies, data on long-term responses to such variability is usually beyond the reach of ethnographers due to the brief observational frames of these investigations. A more concerted effort must be directed to overcoming the obstacles posed to palaeoenvironmental reconstructions on Cyprus in order to effectively evaluate the timing, spatial scale, and intensity of environmental variability and the ensuing implications for the organization of economic strategies during the Aceramic Neolithic.

Assessing the parameters that various responses must maintain in order to be effective with regards to agropastoral endeavors raises additional methodological issues identified during this study and outlined in the ethnographic and archaeological literature. To begin with, diversification strategies are effective as a “first line of defense” against shortage in resources either through the exploitation of a wider range of plant and animals or by exploiting a broader and varied area of the landscape (O'Shea 1981:169; Halstead and O'Shea 1989:4). Diversification strategies identified during this ethnoarchaeological study included the use of domesticated animals (primarily on a household level at Palia Kholetria), land fragmentation, and multiple cropping strategies. In addition, the use of barley as a staple during periods of resource shortages highlights the similar use of animal fodder as a reserve
food and diversification strategy also noted by others (cf. Cherry 1988; Halstead 1989; Halstead and Jones 1997; Watson 1978). Christodoulou has also commented on the consumption of roots and weeds during resource shortages associated with prolonged drought periods and taxation penalties in the late nineteenth century on Cyprus (Christodoulou 1959:124).

With respect to the use of domesticated animals during prehistory, issues related to herd demography and sheltering requirements must be addressed. How many animals were managed by Aceramic Neolithic villages and how were they managed? Were small numbers managed and kept near the household or were larger numbers of animals managed in shelters located at some distance from the settlement? An increasing number of surveys and studies have been conducted in the Near East, the Mediterranean, Africa, and Peru on pastoral site structure and shelters for enclosing herd animals (cf. Bar-Yosef and Khazanov 1992; Chang 1981,1984, 1994; Chang and Koster 1986; Cribb 1991; Gilbert 1975; Kuznar 1995; Murray and Chang 1981; Simms 1988). A prevalent feature of animal shelters noted by these investigations and during this ethnoarchaeological study is the presence of dung. Chemical analyses of phosphate levels and the study of spherulites have been conducted in an attempt to clearly define the location of animal shelters in prehistory (cf. Chang and Koster 1986; Brochier et al. 1992). While there are still difficulties in the accuracy and utility of these analyses, the duplication of such research in Cyprus can be undertaken through surveys and the refinement of chemical analyses in outlying areas and structures within village settlements that do not appear to have a known function. For example, structures lacking architectural features and floors, such as structures 28 and 39 at the site of Kalavasos-Tenta (cf. Todd
1987:36), may benefit from such investigations by testing archaeological assumptions on the function and nature of activities occurring within particular structures. In addition, the investigation of these structures and/or features can lead to additional information on the locational criteria and management techniques of herd animals in prehistory and how they may have varied among settlements.

Studies on the behavioral requirements of specific species, as well as quantitative studies of herd demography and productivity, in ethnographic contexts can be used to estimate the effectiveness of domesticated animals as a diversification strategy in relation to the spatial and temporal effects of environmental variability on the subsistence economy. Assessments have been made by Dahl and Hjort (1976) and Halstead (1981a) regarding the contribution of animals to the subsistence economy as compared to contributions from cultivated crops. Dahl and Hjort (1976) estimate that a family of six must kill about 120 sheep/year if mutton is their main source of calories. This strategy would require a live flock of 360 sheep or 60 per person and control over a grazing area of about 3.6 square km (as cited by Halstead 1981a:314). The implications of these figures to larger settlements such as Khirokitia-Vouni and Kalavasos-Tenta are staggering if not weighted against a reliance primarily on cultivated crops. Furthermore, extensions of these data must be made when considering the contribution of the poorly preserved vegetal remains to the Aceramic Neolithic subsistence economy.

Quantitative studies are also needed to effectively evaluate crop productivity in relation to behavioral mechanisms such as storage. Storage tends to be necessary for the maintenance of dense, aggregated populations although it is ineffective over prolonged
periods of resource stress (Halstead 1981b:191). In addition, crop yield data and quantitative studies in various regions of Cyprus can be used as an initial starting point for constructing models of the basic structure of temporal and spatial variability in prehistoric environments.

Forbes’ (1989) study revealed that Greek farmers in Methana attempt to maintain at least a two year storage supply of wheat in the event that the following year’s harvest fails and a four year storage of olive oil (Forbes 1989:93). Storage, however, reveals additional threats to resource availability due to loss from pests and deterioration. The hulled grains cultivated by Neolithic agropastoralists would have been much better protected than modern free threshing grains due to the fact that it was stored in the spikelet stage with a hard, outer glume to protect it (Forbes and Foxhall 1995; Halstead 1989:71; Hillman 1981).

With regards to mobility as a response to both the temporal and spatial variability of resources, one issue highlighted through the recording of individual mobility patterns of Kholetria’s herders in this ethnoarchaeological study and noted by Minnis (1996) is the effect of human exploitation on the surrounding landscape. A distinct difference in opinion exists between Mediterranean ethnographers (Forbes 1997; Koster 1977, 1997; Forbes and Koster 1976) and archaeologists in the Near East and elsewhere (Cribb 1991; Kohler-Rollefson 1987, 1988, 1992; Nyerges 1980; Vincze 1980) regarding the so-called “tragedy of the commons” (Hardin 1968). Common opinion regarding communal grazing lands is that they are heavily exploited resulting in long-term degradation and a climax vegetation unfavorable to pastoralism. Archaeologists in the Near East tend to view the degradation of the landscape as a result of this overgrazing, while Forbes (1997) has noted that very few systematic studies have been undertaken to determine the effects of grazing on plant communities. Undoubtedly,
the pressure placed on the landscape will be the result of the combined effects of abandoned agricultural fields and soil erosion, woodcutting, and fire (Forbes and Koster 1976). Despite one's position on the issue, the response tends to result in the movement of herds in seasonally and annually patterned routes to limit pressure placed on grazing areas during critical growth periods in the vegetation and on the provision of stored fodder. In addition, Koster's (1977) study has indicated that various biological, social, and economic mechanisms ensure that uncultivated vegetation communities are not overexploited.

Furthermore, mobility strategies utilized to increase the spatial resource base are also associated with the complementary use of resource zones noted by Christodoulou (1959) and Stanley Price (1979) in the first half of this century. The economic specialization of villages (particularly in the higher altitudes) necessitated the cultivation of cereal crops at a significant distance from the home village often requiring temporal residence to be maintained in neighboring villages. Economic specialization has been considered an additional buffering mechanism by Minnis (1996:64) and with respect to complementary resource zones in Cyprus, it highlights a mutually stabilizing response in the form of social networks and exchange relations as an additional strategy to mitigating the effects of environmental variability. The development of exchange relations enlarges the resource base providing for a more reliable supply of resources. As evidenced by this ethnoarchaeological study, highly visible relations have traditionally occurred in the religious context of the paneyiri. According to Minnis (1985), social and economic relationships may be the most effective strategy for risk reduction; however, they incur the greatest cost in the form of obligation to others.
6.3 The Patterning of Responses and the Implications for Rethinking the Aceramic Neolithic

The identification of environmental variability and the evaluation of corresponding responses to resource availability in prehistory allows for a more thorough consideration of the factors related to socioeconomic variation among settlements in the archaeological record. However, different strategies are effective for a range of problems and the investigation of these responses in prehistory can be strengthened if their patterning can be demonstrated in the prehistoric record (Minnis 1996:67). The observation and recording of information on agropastoral strategies on the present landscape reveals the presence of various strategies traditionally associated with the subsistence economy of Palia Kholetria despite the fact that agricultural and pastoral production is presently market-oriented and, with the exception of full-time pastoral households, conducted only on a part-time basis to provide the household with supplemental income. Furthermore, government assistance has become an acknowledged and effective mechanism in mitigating risk associated with the temporal and spatial variability of the natural and social environment through improved infrastructure, the introduction of improved varieties of crops and chemical fertilizers, subsidies for mechanized agriculture, the expansion of irrigation methods, the provision of veterinary services, social and agricultural insurance, and loans. Yet, despite the state’s involvement, traditional risk-reducing mechanisms considered “inefficient” and “irrational” by agricultural policy analysts, such as land fragmentation and multiple cropping, are still utilized in agricultural and pastoral production strategies in Kholetria. The perseverance of these strategies in light of the transformation of the economy from subsistence-oriented to market-oriented poses an
analogous conceptual dilemma with respect to the Aceramic Neolithic. An understanding of
the processes related to the tenacity of these strategies on the present landscape necessarily
requires a brief consideration of the conceptual frameworks surrounding the patterning of
cultural responses to economic uncertainty and risk.

Various conceptual frameworks and models have been developed for distinguishing
the order of responses from low-level to high-level mechanisms based on the premise that the
“magnitude of the response should match the severity of the perturbation” (Minnis 1985:19;
1996:67). In addition, these frameworks have included a consideration of social criteria in
defining “resource cost” and its relation to the severity or intensity of the risk encountered (cf.
to the short duration of this ethnoarchaeological study, responses to relatively intense periods
of variability posed by the natural and social environment are anecdotal or periods of severe
risk that are relatively well known have not been documented adequately in terms of the
ordering of responses. This is particularly evident with respect to the high incidence of urban
migration known to have occurred between 1953 - 1968 when risks were presumably severe
enough to employ migration as a mechanism due to compounded economic uncertainty posed
by the natural environment (destruction of habitations over time due to earthquake and later
subsidence and slumping and the loss of fields due to hailstorms and heavy rains), as well as
the social environment (political instability and intercommunal violence). Hence, the model
proposed by Forbes (1989) is of particular interest to the present study for his consideration
of the patterning of similar responses and the processes underlying the perseverance of specific
strategies.
Forbes' (1989) model of response patterning is based on the identification of three levels of hazard response mechanisms (HRMs) from research conducted on the Greek peninsula of Methana. The ordering of responses range progressively from low-level to high-level mechanisms and are defined by frequency of operation, resource cost, and social cost (Forbes 1989:90). These responses include first defense mechanisms (polycropping, land fragmentation, and overproduction), safety-net mechanisms (storage), and emergency mechanisms (begging, use of low-preference foods, and marrying off eligible dependents). Forbes defines lower-level responses (or first defense mechanisms) based on the following characteristics: continuous or frequent operation, energetically expensive, and well integrated into other aspects of culture with a low visibility as a hazard response mechanism to both participant and observer. In contrast to low-level responses, he characterizes higher-level mechanisms (emergency mechanisms) on the basis of infrequent operation, low energy expense, and high social expense since they are counter to social rules; therefore, they have high visibility (Forbes 1989:90).

Of particular interest in this model is the method by which particular responses become embedded into sociocultural systems. Forbes found a high degree of embeddedness to occur in the lower-level (or continuously operating) mechanisms rather than higher-level mechanisms. Furthermore, those mechanisms that were found to be highly-embedded in other systems of society or culture were considered powerful factors for long-term stability and not for social change (Forbes 1989:96). Hence, the tenacity of seemingly “irrational” strategies such as land fragmentation and multiple cropping are, in fact, maintained and legitimized within the cultural norms and social rules dictating dowry and partible inheritance practices.
that have traditionally ensured access to fields with variable soil and topographic characteristics (Forbes 1976, 1989; Shutes 1977:241).

Furthermore, Forbes (1989:96, 97) distinguishes between the tendency towards stasis of lower-level mechanisms that are well integrated within cultural institutions identified at the household level and the tendency towards deviation or change of correspondingly well integrated high-level mechanisms identified at varying scales of analysis (up to the state level) and discussed by Halstead and O’Shea (1989). According to Halstead and O’Shea (1989:5), high-level mechanisms are prone to falling into disuse because of the infrequency with which they are activated. However, their use during extreme shortages in resources reveals a strong selective pressure to embed the more powerful (and in effect most costly) high-level responses that cope with risks of unusual severity. As these high-level responses become increasingly embedded within more regular cultural practices, the existing low-level mechanisms are undermined triggering a chain reaction in many other aspects throughout the social system with change occurring as catastrophic, cyclical, or directional (Halstead and O’Shea 1989:125).

With respect to the Aceramic Neolithic, the conceptual dilemma posed by the “bizarre” must be reconsidered in light of such frameworks designed to discover the patterning of cultural responses to economic uncertainty. The traditional preoccupation of comparing the Aceramic Neolithic record of Cyprus with surrounding developments in the Near East and Mediterranean can only continue to emphasize the “consequent preservation of archaic, bizarre, or possibly ill-adapted forms” (Fosberg 1963:5). However, a more thorough investigation of the patterning of cultural responses in the Aceramic Neolithic...
record may reveal that the tenacity of these “bizarre” aspects are in fact related to highly-embedded strategies for buffering the variability associated with the natural and social environment.

6.4 Conclusions

The belief that a single ethnoarchaeological study can overturn the entrenched notions of the “bizarre” during the Aceramic Neolithic on Cyprus is naive. However, if one person reviewing this paper perceives the identification of environmental variability and the corresponding patterns of responses as a method for tracking variation in the Aceramic Neolithic record my purpose has been achieved. Frameworks are intended to assist researchers in making new or greatly refined observations and for developing more accurate models of the world we strive to discover (Cordell 1996:259). Conceptual frameworks designed to discover how humans interact with their environments can lead researchers away from facile characterizations of the Aceramic Neolithic as “bizarre” or contemporary societies as “irrational” and towards a more realistic understanding of how socioeconomic choices were made in the past and present.
APPENDIX I

DATA COLLECTED ON AGROPASTORAL STRATEGIES DURING THE ETHNOARCHAEOLOGICAL STUDY
<table>
<thead>
<tr>
<th>Pastoral Strategies</th>
<th>Household 195</th>
<th>Household 012</th>
<th>Household 351</th>
<th>Household 216</th>
<th>Household 038</th>
<th>Household 130</th>
<th>Household 650b</th>
<th>Household 191b</th>
<th>Household 641b</th>
</tr>
</thead>
<tbody>
<tr>
<td>FT vs. PT</td>
<td>FT</td>
<td>FT</td>
<td>FT</td>
<td>FT</td>
<td>PT</td>
<td>PT</td>
<td>PT</td>
<td>PT</td>
<td>PT</td>
</tr>
<tr>
<td>Location of mandra</td>
<td>S.A.I (originally located at Palia Kholetria)</td>
<td>Monovazipion (originally located at Palia Kholetria)</td>
<td>Latzi (originally located at MTK)</td>
<td>Latzi (originally located at MTK)</td>
<td>Latzi (originally located at MTK)</td>
<td>S.A.I (originally located at Palia Kholetria by owner 009)</td>
<td>Petrovozous (originally located at MTK)</td>
<td>S.A.I (originally located at Palia Kholetria by owner 009)</td>
<td></td>
</tr>
<tr>
<td>Localational criteria, if any</td>
<td>Village relocation; Field aspects: sloped, killup</td>
<td>Village relocation; Field aspects: sloped, killup</td>
<td>Government relocation (rent)</td>
<td>Government relocation (rent)</td>
<td>Government relocation (rent)</td>
<td>Government relocation (rent)</td>
<td>Field aspect: dowry, sloped</td>
<td>Govt. relocation; Field aspect: dowry, sloped</td>
<td></td>
</tr>
<tr>
<td>Materials used in the construction of mandra</td>
<td>Wood, rocks, wood beams, metal siding, cement blocks</td>
<td>Wood beams, aluminum siding, barrels, cement blocks</td>
<td>Cement block construction (govt. design)</td>
<td>Cement block construction (individual owner's design)</td>
<td>Cement block construction (govt. design)</td>
<td>Cement block construction</td>
<td>Wood beams, aluminum siding, barrels, wire fencing and cement blocks</td>
<td>Aluminum siding, wood, and mud</td>
<td></td>
</tr>
<tr>
<td>Time period animals kept in mandra</td>
<td>October to January. Young (0-5 mos)</td>
<td>October to January coincides with births and rainy season. Young</td>
<td>September to January, young and pregnant animals</td>
<td>Rainy season</td>
<td>September to January, young (0-5 mos) and pregnant animals</td>
<td>October - February/March</td>
<td>October/November - March</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Method of transportation to and from mandra</td>
<td>Mule (as &amp; from mandra and milk transport)</td>
<td>Mule (as &amp; from mandra and milk transport)</td>
<td>Walk and automobile</td>
<td>Automobile</td>
<td>Mule, automobile (belonging to family member for milk transport)</td>
<td>Walk, automobile</td>
<td>Walk, automobile</td>
<td>Automobile</td>
<td></td>
</tr>
<tr>
<td>Management of herd</td>
<td>Husband/wife</td>
<td>Husband/wife</td>
<td>Husband/daughter</td>
<td>Entire household</td>
<td>Husband/wife</td>
<td>Husband/wife</td>
<td>Entire household</td>
<td>Husband/wife and son</td>
<td>Entire household</td>
</tr>
<tr>
<td>Composition of herd</td>
<td>60 goats (3) 100 sheep (4)</td>
<td>11 goats (1) 100 sheep (2/3)</td>
<td>100 goats 100 sheep (3/4)</td>
<td>100 goats 500 sheep (15)</td>
<td>140 sheep (4) 70 goats (2)</td>
<td>40 goats (1) 310 sheep (7)</td>
<td>60 goats (3)</td>
<td>120 sheep (4) 70 goats (2)</td>
<td>40 goats (1) 310 sheep (7)</td>
</tr>
<tr>
<td>No. of males</td>
<td>60</td>
<td>11</td>
<td>100</td>
<td>100</td>
<td>140</td>
<td>40</td>
<td>60</td>
<td>120</td>
<td>40</td>
</tr>
</tbody>
</table>

Approximate construction date of mandra:
- Originally built in 1974, expansion date unknown
- 1978-1982
- 1992
- 1992
- 1992
- 1984
- 1992
- Originally built in 1974, Expanded in 1984

Location of mandra:
- S.A.I (originally located at Palia Kholetria)
- Monovazipion (originally located at Palia Kholetria)
- Latzi (originally located at MTK)
- Latzi (originally located at MTK)
- Latzi (originally located at MTK)
- S.A.I (originally located at Palia Kholetria by owner 009)
- Petrovozous (originally located at MTK)
- S.A.I (originally located at Palia Kholetria by owner 009)

Village relocation:
- Location criteria, if any
- Field aspect: dowry, sloped
- Govt. relocation; Field aspect: dowry, sloped

Materials used in the construction of mandra:
- Wood, rocks, wood beams, metal siding, cement blocks
- Wood beams, aluminum siding, barrels, cement blocks
- Cement block construction (govt. design)
- Cement block construction (individual owner's design)
- Cement block construction (govt. design)
- Cement block construction
- Wood beams, aluminum siding, barrels, wire fencing and cement blocks
- Aluminum siding, wood, and mud

Time period animals kept in mandra:
- October to January. Young (0-5 mos)
- October to January coincides with births and rainy season. Young
- September to January, young and pregnant animals
- Rainy season
- September to January, young (0-5 mos) and pregnant animals
- October - February/March
- October/November - March

Method of transportation to and from mandra:
- Mule (as & from mandra and milk transport)
- Mule (as & from mandra and milk transport)
- Walk and automobile
- Automobile
- Mule, automobile (belonging to family member for milk transport)
- Walk, automobile
- Walk, automobile
- Automobile

Management of herd:
- Husband/wife
- Husband/wife
- Husband/daughter
- Entire household
- Husband/wife
- Husband/wife
- Entire household
- Husband/wife and son
- Entire household

Composition of herd:
- 60 goats (3) 100 sheep (4)
- 11 goats (1) 100 sheep (2/3)
- 100 goats 100 sheep (3/4)
- 100 goats 500 sheep (15)
- 140 sheep (4) 70 goats (2)
- 40 goats (1) 310 sheep (7)
- 60 goats (3)
<table>
<thead>
<tr>
<th>Pastoral Strategies</th>
<th>Household 195</th>
<th>Household 012</th>
<th>Household 351</th>
<th>Household 216</th>
<th>Household 036</th>
<th>Household 130</th>
<th>Household 650b</th>
<th>Household 191b</th>
<th>Household 641b</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Young</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>45 kids at time of study; lambs - unknown</td>
<td>50 lambs at time of study</td>
<td>Lambs - 80 in April, 40 at time of study; Kids-40</td>
<td>Unknown</td>
<td>Unknown</td>
<td>Unknown</td>
<td>30 kids</td>
<td>150 lambs</td>
<td>Ideally 80/year. Remain only 20 of the young, all females</td>
</tr>
<tr>
<td><strong>Mating</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Once a year (1/2)</td>
<td>Once a year (1/2)</td>
<td>Once a year (1/2)</td>
<td>Once a year (1/2)</td>
<td>Once a year (1/2)</td>
<td>Once a year (1/2)</td>
<td>Once a year</td>
<td>Once a year</td>
<td>Once a year</td>
</tr>
<tr>
<td><strong>Births</strong></td>
<td>Goat kids: 2 peaks - Sept. and Nov, and lambs Dec./Jan</td>
<td>October through February</td>
<td>October through January</td>
<td>September-November and January</td>
<td>September/October and January</td>
<td>September/October and January</td>
<td>September/October and January</td>
<td>September/October and January</td>
<td>September/October and January</td>
</tr>
<tr>
<td><strong>Time involved in daily summer herding activities</strong></td>
<td>8-10 am milk &amp; feeds 11-5.5 pm feeds 5-7 pm feeds</td>
<td>7:45-9:30 am milk, feeds 11:30-5:30 pm feeds 5:30-7:00 pm feeds</td>
<td>6:30-10 am milk, feeds 11:30-5:30 am milk, feeds 5:30-7:00 pm feeds</td>
<td>2:30-3 hours milking depending on the time of the year 2:3 hours herding 2 hours feeding in the morning and evening</td>
<td>7:00 am feeds 11:00-4 pm feeds 4:30 pm feeds</td>
<td>5:45-6:30 am feeds 4:00-7:30 pm feeds, feeds, feeds</td>
<td>5:00-6:00 am feeds 4:00-6:00 pm feeds, herds, milks</td>
<td>5:00-6:00 am feeds 4:00-6:00 pm feeds, herds, milks</td>
<td></td>
</tr>
<tr>
<td><strong>Milking</strong></td>
<td>Once a day in the summer; February to June</td>
<td>Two times a day, February to June</td>
<td>Once a day</td>
<td>Once a day</td>
<td>Once a day</td>
<td>Once a day</td>
<td>Once a day</td>
<td>Twice a day</td>
<td>Milk only once every two days when pregnant</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Tall/Features for milking</strong></td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td></td>
</tr>
<tr>
<td><strong>Secondary Products</strong></td>
<td>Milk (sale) balumi, &amp; anar (sale and household)</td>
<td>Milk, balumi, &amp; anar (sale and household)</td>
<td>Milk (sale) and balumi (sale and household)</td>
<td>Milk (sale) and balumi (household)</td>
<td>Milk (sale) and balumi (household)</td>
<td>Milk (sale) and balumi (household)</td>
<td>Milk (sale) and balumi (household)</td>
<td>Milk (sale) and balumi (household)</td>
<td>Milk and balumi (household)</td>
</tr>
<tr>
<td><strong>Distances travelled in the summer</strong></td>
<td>3 km (varies with time of year, location of fields, and agricultural activities)</td>
<td>5-3 km (varies with time of year, location of fields, and agricultural activities)</td>
<td>Average of 2.5 km daily (varies with time of year)</td>
<td>1.5 - 3 km (varies with time of year)</td>
<td>500 m - 2 km (varies with time of year, occupation requirements, agricultural activities)</td>
<td>500 m - 2 km (varies with time of year, occupation requirements, agricultural activities)</td>
<td>500 m - 1 km (varies with occupation requirements and household labor supply)</td>
<td>Unknown</td>
<td>500 m - 3 km (varies with occupation requirements and time of year)</td>
</tr>
<tr>
<td><strong>Pattern of movement in summer observed</strong></td>
<td>✓ Variance noted with respect to agricultural activities</td>
<td>✓ Variance noted with respect to agricultural activities and daily household needs.</td>
<td>✓</td>
<td>✓</td>
<td>✓ Variance noted with respect to the pattern dictated by growth after harvested fields</td>
<td>✓</td>
<td>Observe only with respect to pattern dictated by resource within habitka and surrounding mandas</td>
<td>✓</td>
<td>Not observed</td>
</tr>
<tr>
<td>Pastoral Strategies</td>
<td>Household 195</td>
<td>Household 012</td>
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<td>Household 216</td>
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<td>--------------</td>
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<td>--------------</td>
</tr>
<tr>
<td><strong>Summer water sources</strong></td>
<td>Water deposit, Lakhous near mandra, and watering hole #168</td>
<td>Water deposit, watering hole #168</td>
<td>Water deposit and wells at late and MTX</td>
<td>Water deposit and wells at late and MTX. Observed at #168 on 2 occasions due to field locations.</td>
<td>Water deposit, one of water tank located near raised fields, and wells at late.</td>
<td>Water deposit and 2 wells to a field he rents from Govt. near the mandra</td>
<td>Water deposit</td>
<td>Well near the mandra</td>
<td>Water deposit</td>
</tr>
<tr>
<td><strong>Food</strong></td>
<td>Grass after field is harvested with barley, esoro, and hay from fields used as supplemental feed/crops.</td>
<td>Grass after harvest at fields. Supplements feed/food from raised fields (150 skales) include vikko, barley and hay</td>
<td>Grass after harvest at fields. Supplementary food from raised fields for grazing, and pasture. 52 sq. miles. 15 sq. hay used as supplemental feed and for water.</td>
<td>Grass after harvest at fields. Vikko, barley, hay, esoro, and local in used as supplemental food.</td>
<td>Grass after harvest at fields. Barley and koukie. Grass after harvest at the fields.</td>
<td>Grass in surrounding area (balikia). Purchases barley and hay, plants vikko in rented fields.</td>
<td>Barley and hay. Grass at fields after harvest</td>
<td>Barley and hay. Grass at fields after harvest</td>
<td></td>
</tr>
<tr>
<td><strong>Crops involved in agricultural activities, if any</strong></td>
<td>Wheat, barley and vetch; vineyards, oordax and olives.</td>
<td>Wheat, hay, vetch, barley, vineyards and almonds.</td>
<td>Vikko and barley.</td>
<td>Vineyard, olives and barley/veitch.</td>
<td>Rents all fields. Vetch and koukie.</td>
<td>Barley.</td>
<td>Barley and koukie.</td>
<td>Vineyard; rents fields for fodder crops such as vetch. (Requires supplemental purchases)</td>
<td>Barley.</td>
</tr>
<tr>
<td><strong>Manure</strong></td>
<td>Utilized in fields (broom-daily) and sale in the summer.</td>
<td>Utilized in fields (broom-daily) and sale in the summer.</td>
<td>Utilized in fields (tractor and sale).</td>
<td>Fields (tractor) and sale.</td>
<td>Fields (tractor) and sale.</td>
<td>Fields (tractor) and sale.</td>
<td>Fields (tractor) and sale.</td>
<td>Fields (tractor) and sale.</td>
<td>Field (tractor) and sale.</td>
</tr>
<tr>
<td><strong>Shearing</strong></td>
<td>March, April</td>
<td>April</td>
<td>April</td>
<td>April</td>
<td>April</td>
<td>April</td>
<td>April</td>
<td>April</td>
<td>April</td>
</tr>
<tr>
<td><strong>Carass disposal</strong></td>
<td>Argiki (natural)</td>
<td>Argiki (natural)</td>
<td>Latzi (chemical)</td>
<td>Latzi (chemical)</td>
<td>Latzi (chemical)</td>
<td>Latzi (chemical)</td>
<td>Unknown</td>
<td>Burn</td>
<td>Unknown</td>
</tr>
<tr>
<td><strong>Veterinary Assistance</strong></td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td><strong>Observed</strong></td>
<td>No</td>
<td>No</td>
<td>No</td>
<td>No</td>
<td>No</td>
<td>No</td>
<td>No</td>
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</table>
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