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REPORTS

FIELD HOUSES, VILLAGES, AND THE TRAGEDY OF THE COMMONS IN THE EARLY NORTHERN ANASAZI SOUTHWEST

Timothy A. Kohler

The first man, who after enclosing a piece of ground, took it into his head to say, *this is mine*, and found people simple enough to believe him, was the real founder of civil society. How many crimes, how many wars, how many murders, how many misfortunes and horrors, would that man have saved the human species, who pulling up the stakes or filling up the ditches should have cried to his fellows: Beware of listening to this impostor; you are lost, if you forget that the fruits of the earth belong equally to us all, and the earth itself to nobody!

Jean-Jacques Rousseau (1967 [1755]:211–212)

The appearance of field houses and villages in the early northern Anasazi Southwest is interpreted as containing information concerning inclusiveness of land ownership or control. Early northern Anasazi villages probably practiced patterns of resource control much like those documented historically in many pueblos, where agricultural lands were frequently controlled at an atomistic level (by individuals or households) so long as fields were in use, but remained communal property in theory and could be reallocated to other members of the community. The appearance of field houses may be an attempt to limit access to previously free and unregulated lands and the resources thereon in response to resource scarcity. This scarcity, in turn, may be the result of overexploitation of such lands, in part through shifting cultivation. The general process of overexploitation of commons leading either to their centralized regulation or to privatization has been described by Hardin (1968) as the "tragedy of the commons."

Se propone que la aparición de puestos agrícolas y aldeas en etapas tempranas de la historia de los Anasazi del norte dentro del suroeste de los Estados Unidos contiene información acerca de la posesión y control de la tierra. Las aldeas tempranas de los Anasazi del norte probablemente practicaban patrones de control de recursos similares a los documentados históricamente para varios pueblos, entre quienes las tierras agrícolas eran frecuentemente controladas a un nivel atomístico (por individuos o grupos domésticos) mientras los campos se encontraban en uso, pero permanecían siendo propiedad comunal a nivel teórico y podían ser reasignados a otros miembros de la comunidad. La aparición de puestos agrícolas puede ser un intento de limitar acceso a tierras y recursos previamente libres y sin regular en respuesta a una escasez de recursos. A su vez, esta escasez puede ser el resultado de la sobreexplotación de tierras, en parte a través del sistema de agricultura itinerante. El proceso general de sobreexplotación de las tierras comunales llevando a su regulación centralizada o a su privatización ha sido descrito por Hardin (1968) como la "tragedia de la propiedad comunal."

No professional social scientist would today be so reckless (or so fluent) in rehearsing the possible consequences of privatizing property. And yet, within the last decade, study of land-tenure systems has emerged as a vantage point from which archaeologists may profitably view the evolution of small-scale agricultural societies. This new interest in the prehistory of property rights stems from at least two factors. First, as noted by Upham (1990:11) (who is on this score a cautious follower of Rousseau), "The evolution of power relations in small-scale societies occurs when decision-making becomes linked to the use and possession of basic resources." Moreover, property rights constitute a key domain where the social world of production and reproduction overlay the landscape

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in such a way as to produce a social landscape that has interest and meaning for the structuralist, the Marxist, and the ecologically oriented archaeologist. Undoubtedly the study of these social landscapes will provide an important arena over the coming decade for weighing the insights provided by each of these perspectives.

Although no single article or author can be credited with opening up this field for study, Garrett Hardin caught the imagination of many disciplines in a short, powerful essay published some 25 years ago in *Science*. Therein, Hardin sketched a compelling metaphor for thinking about the central dilemma of human population growth in a world of ultimately finite resources. He invited us to imagine a commonly held pasture used by several herders whose numbers, as well as their stock, were normally kept low through war, poaching, and disease. But if for any reason population should increase, a "tragedy of the commons" plays itself out as the herders attempt to maximize their gain by adding animals to the commons. Since each herder reaps all the profits from his own additional animals, but suffers only a portion of the degradation to the commons caused by any overgrazing, the "rational" herder seeking to maximize his gain will "increase his herd without limit. . . . Freedom of the commons brings ruin to all" (Hardin 1968:1244). The tragedy of the commons is that that which belongs to all may be cared for by none. As described by McKay and Acheson (1987:3), "people are unlikely to restrain their own behavior when the immediate benefits of their actions are their own, but the costs are passed on to society as a whole . . . and any longer-term or external benefits that might accrue from an individual's self-instigated 'moral preventive checks' are undiscernable."

In fact, Hardin (1968:1247) did not consider such degradation to be inevitable, and offered "mutual coercion, mutually agreed upon" as a way out of the tragedy of the commons. Two possibilities that he foresaw, located at opposite poles along a continuum of social arrangements that could produce more responsible utilization than would open access, were privatization of the commons, or governmental control over access and appropriate use (McKay and Acheson 1987:5).

Hardin's essay remains widely read and cited despite much criticism of his formula. In the anthropological literature especially, criticism has focused on Hardin's failure to specify the many arrangements between the poles of privatization, and state ownership and control, whereby "mutual coercion, mutually agreed upon" could be achieved. For example, in a recent overview of the literature surrounding the tragedy of the commons, Feeny et al. (1990:10) note that

there is abundant evidence . . . [of] the ability of social groups to design, utilize, and adapt often ingenious mechanisms to allocate use rights among members. The medieval English commons featured in Hardin's paper, like many other historic and contemporary commons, were often subject to comprehensive systems of regulation. For example, stinting was often practiced, that is, limiting the number of head that each owner could graze. . . . A plethora of scholars have noted in passing that the commons operated successfully for several hundred years in medieval England, and have questioned if a tragedy of the sort described by Hardin (1968) ever occurred widely.

It is perhaps inevitable that, as a biologist addressing contemporary problems, Hardin would ignore or downplay the importance of the various arrangements available in small-scale societies for handling communal property, excluding outsiders, and regulating members. Yet even commentators such as Feeny et al. (1990) recognize the validity of Hardin's argument concerning the probability of degradation of finite resources held in open access. Given the probability that open access prevails as a system for at least some resources in conditions of low population and nonintensive land use (Johnson and Earle 1987:27-97; Smith 1988), one enduring value of Hardin's model for archaeologists is that it focuses our attention on degradation or depletion as possible problems in such situations, to which regulation of open-access resources appears as a possible solution.

RESOURCE CONTROL: GENERAL CONSIDERATIONS

According to Netting (1982:461) at least three axes of variability in resource-use rights and land tenure can be recognized cross-culturally, including (1) the length of time over which use rights may

be exercised; (2) the kinds of objects to which they apply; and (3) whose use is regulated, and how regulation is accomplished (this dimension could be further decomposed). Along this last axis, the diverse possibilities for land tenure in particular have been considered for hunter-gatherers in a recent article by Smith (1988:245–251). Smith finds it useful to recognize five points along a continuum of increasingly restrictive control of land and unharvested resources, as follows: (1) commons (no control over access); (2) reciprocal access (members of landowning groups allowed ready access to other groups' land, with membership between groups readily transferable); (3) territoriality (similar to [2], but with much less willingness to allow access to members of other groups on either a reciprocal basis or through transfer membership); (4) private property with ownership at the level of a kin group; and (5) private property with ownership at the level of the individual.

As Smith recognizes, mixes among these ownership regimes are possible and even common for different resources within societies; it should also be added that unexpected difficulties may be encountered in determining level of control. At Zia, for example, White (1974:96–100) reports that tillable land in practice belonged to individuals with inheritance to eldest sons, although belonging in theory to the pueblo (possibly a type 5 regime); grazing land, by contrast, is held communally (a type 3 regime). Among Western Pueblos, clans are traditionally conceived as holding joint estates (Dozier 1970:140)—a type 4 regime; but Whitely (1985) has argued that, at least among the Hopi, most cultivated land was individually owned, with other land, and ceremonial activity, controlled at the level of the household or lineage segment.

The causes for cross-cultural variability in inclusiveness of ownership have long been debated. One relatively clear dimension of variability relates form and level of control with degree of subsistence intensification, in turn driven by population increase (Adler 1990; Brown and Podolefsky 1976; Netting 1982:463–465; Plog 1990); this is, of course, one element of Hardin's thesis.¹ Another, independent dimension of variability appears to be associated with resource structure: Increasingly rigid exclusion of "others" is more likely as local resources become relatively more dense and predictable (Dyson-Hudson and Smith 1978).

In the Four Corners area of the North American Southwest, the population history and the distribution of productive resources are both relatively well understood. By late prehistory at least, prime agricultural land is *the* key productive resource. In what follows, I will discuss the emergence and distribution of field houses and villages for what they may reveal about the prehistory of property rights; and so, in the next section, we must consider what is meant by a "field house." We then turn to a consideration of the development of agricultural production in the Four Corners, accompanied by a case study from the Dolores area. The goal will be to determine what we can about the level of control or ownership over agricultural land, the reasons for any changes inferred in that control, and the possible consequences of those changes.

FIELD HOUSES: BRIEF HISTORY OF INTERPRETATION

Much progress has been made in the study of those very small, apparently seasonally occupied masonry sites in the Southwest that I will call field houses following Woodbury (1961), who coined that term to describe structures in the Point of Pines area of east-central Arizona. By at least the 1950s, Haury (1956) had identified field houses (which he called farmsteads) as connected with the process of "urbanization" (which I will call aggregation). Two decades later Moore (1978) noted that field houses also may accompany a nonaggregated settlement system if the distances between principal residence and fields are sufficiently large. And in an insightful paper in 1978, Wilcox proposed viewing field houses as symptoms of shifting cultivation, which created these inconvenient distances between residences and centrifugally receding fields in response to nutrient exhaustion, erosion, and changing distributions of rainfall (Wilcox 1978:27).

Wilcox (1978:28) also maintained that field houses represent an intensification of agricultural effort (in comparison with earlier field systems lacking them) that accompanied a reduction in the fallow cycle and perhaps signaled important changes in land-tenure practices. He noted, for example, that masonry field houses tend to appear at about the same time as various water- and soil-control devices, and that in one of the most intensively farmed portions of Woodbury's study area there

were also possible field-boundary markers. In effect, then, Wilcox hypothesized that field houses represented both the effects of shifting cultivation and the beginnings of its demise.

More recently, Preucel (1988) examined the role of seasonal agricultural sites on the Pajarito Plateau of north-central New Mexico. The field-house strategy is discussed by Preucel (1988:xix) as "seasonal agricultural circulation"; not unlike some of his predecessors, Preucel argues that the average farmer will travel farther to secure farmland as local villages grow in size. More generally, he considers the field-house strategy as a form of agricultural intensification that develops in response to "increasing competition over arable land due to population growth and aggregation." Field houses, says Preucel (1988:92), "develop in order to minimize the costs of transportation to and from distant villages" (cf. Wilcox's [1978:28] storeroom-field houses). (However, in a very useful review of historic field houses in the Southwest, Preucel shows that field houses are sometimes quite close to the principal residence.) With archaeological data (and of necessity relying on small ceramic samples for chronology) Preucel demonstrates that field houses were used on a large scale for the first time in his study area during the Late Coalition (A.D. 1275–1325), coinciding with a large increase in local population. Field houses and larger (but still seasonally occupied) "farming communities" increased in abundance in the following Early Classic (A.D. 1325–1450). The abundance of such sites began to decline in the Middle Classic, just prior to the abandonment of the area, and perhaps in response to dwindling population.

Preucel also found that distances between seasonal sites and associated residences increased from very slight ($\bar{x} = .14$ km, $s^2 = .41$ km) in the Early Coalition period to 1.62 km in the Late Coalition ($s^2 = .63$ km) to 2.28 km in the Early Classic ($s^2 = 1.62$ km) to 2.55 km in the Middle Classic ($s^2 = 3.14$ km). Although he clearly lays a premium on distance to fields as the generator for the field-house pattern, Preucel recognizes that the very slight distance from residence to field house in the Early Coalition may indicate that transportation costs were not an important consideration in this case. These seasonal residences, he suggests, "may have developed as a means of laying claim to especially good agricultural land. In this case, the founding of a field house may have been viewed as an overt symbol of ownership" (Preucel 1988:236).

Inspired by the insights of Wilcox and Preucel, I will suggest an interpretation of field houses and agricultural systems that I then examine with data from the Dolores Archaeological Project (DAP) area in southwestern Colorado. While freely admitting that field houses in fact probably had multiple systemic uses (Ebert and Kohler 1988:114), here I suggest we dwell on those aspects of field houses that imply an enlargement or extension of the concept of ownership.

FIELD HOUSES AND FIELD SYSTEMS IN EARLY ANASAZI PREHISTORY

Already by Basketmaker II times, maize constituted a significant and perhaps the major element in the diet of at least some Anasazi (Matson and Chisholm 1991). Using data from Cedar Mesa and Black Mesa together with postulated constraints on the adaptability of the earliest, Chapalote-related maize available to Anasazi farmers, Matson (1988) has pieced together a developmental sequence for Basketmaker II farming systems. This sequence begins with floodwater plots in canyon bottoms by 400 B.C., followed by farming of broad washes adjacent to flood plains on the mesa tops by A.D. 100, with dry farming of mesa tops appearing by A.D. 200. I would suggest that as each new farming strategy appeared, it was first as an adjunct to the earlier form, later becoming the dominant, but with the earlier form or forms not entirely disappearing. If so, then by A.D. 200, a diversity of farming strategies would have been present.

Still following Matson, in Basketmaker adaptations the location of the principal residence was responsive to the location of the principal farming strategy. Thus, for example, the site of Turkey Pen, in Grand Gulch, southeastern Utah, dates to the period of dominant canyon-bottom floodwater farming, and predates the local mesa-top pithouse occupation. Maize was already such a substantial portion of the diet that the welfare of the maturing plants in the area in which the principal strategy was prosecuted could not be left to chance, but had to be monitored closely. Agricultural areas removed from the residence could not be monitored so closely, but were less crucial to survival.

If this developmental scenario has any merit, then the appearance of mesa-top dry farming was a key turning point in Anasazi prehistory. Unlike canyon-bottom soils, mesa-top soils (except in swales and flood plains) are thin in many portions of the Colorado Plateau and support a vegetation (frequently piñon-juniper) that is removed fairly easily by fire. Matson et al. (1988:258) report studies suggesting that although the nutrients in aeolian, upland soils are not easily depleted by dry-land farming, nutrient levels beneath piñons in western Colorado are between 2 and 20 times higher than in adjacent, shrub-covered areas, and aeolian deposits that can act as a water-conserving mulch accumulate beneath such trees. It seems probable that shifting agriculturists could profitably burn the trees, plant, and take a few years of high yields until this mulch was dispersed and the nutrient levels (further elevated by burning) were reduced to the background condition. If burning killed the trees and shrubs then more water would be available for crops, especially if planting was near the base of dead trees where crops could benefit from tree stemflow. The reservoir of dead but incompletely consumed trees also would have provided a convenient supply of fuelwood for a few years. The mesa-top strategy is not locally sustainable, however, given the very slow regeneration rates for piñon-juniper on the Colorado Plateau (see Kohler and Matthews 1988), so mesa-top farming opened up an agricultural niche best exploitable through shifting cultivation. But the size of the area that could be exploited in this manner was much larger than either of the two areas that, according to Matson, nurtured the earliest Basketmaker crops. This model of agricultural development could be used to predict a rapid increase in population size and geographic extent following the opening of the mesa-top niche.

Reliance on this strategy could result in fields at a some distance from the principal residence, if residences were fairly stable in location. This may not be of critical importance where the population was low enough that the principal strategy for agriculture was centered on canyon bottoms or mesa-top "lowlands," since these would remain the most heavily monitored areas under those circumstances. But if the population were too large to be supported primarily by such areas, which in most places are limited in extent, *and* if there are socioeconomic reasons why the year-round residence cannot be in an isolated hamlet adjacent to these fields, field houses would become advantageous if for no other reason than to minimize the costs of constant trips between residence and field to protect ripening crops. Thus a pure cost-minimization argument for the construction of field houses in such locations appears plausible. Such field houses might be disproportionately located towards the periphery of the agricultural catchment.

Field houses of the latter type, constructed in piñon-juniper areas destined for, or already a mosaic of, impermanent fields, also constituted a visible, durable claim on the land and its resources on behalf of a household, lineage, or village. From this perspective, they may be viewed as a means of *temporally* broadening the scope of "use ownership" that, it is reasonable to believe, constituted the earliest form of land ownership in aboriginal North America and elsewhere. That is, the "field house" could have been built before the use of the surrounding land for a field, and could have outlasted its use as a field. Such structures probably experienced only very light use as seasonal residences and would be expected to have very few artifacts and features.

But another kind of field house can be imagined that would have received much heavier use. Other field houses may have been located so as to make a visible claim on those lands that were valuable precisely because agriculture *was* locally sustainable. Here, by contrast, the long expected use life of the structure was matched by the long expected use life of the local fields. And here, by contrast, the structure would have in fact received heavy use as a seasonal residence in the agricultural cycle. Agriculture may have been most readily sustainable in mesa-top swales and broad drainages, and canyon bottoms, at least where cold-air drainage did not limit their usefulness. These are, in fact, the same areas that according to Matson (1988) were of preeminent importance for earliest Basketmaker gardening. In many portions of the Colorado Plateau, such areas would naturally support a growth of sagebrush not amenable to removal by fire and possess deep soils not exposed to erosion. Although yields in such areas may not have been as high as in newly cleared piñon-juniper in years with adequate or abundant precipitation, they may have provided more reliable yields in dry years.

TOWARD A TESTABLE MODEL FOR THE RELATION OF FIELD HOUSES AND VILLAGES TO LAND OWNERSHIP

Field Houses

The general considerations for resource control cited above suggest that if field houses were constructed partly or primarily to make a statement about ownership, they should be most common when ownership might be contested; that is, in periods with relatively high population in which there may be competition (within or between villages) for agricultural lands. When combined with the historical sketch, above, of how agriculture may have developed in this particular area, these general considerations also can be used to predict that, eventually, there may have been more than one kind of field house, just as there may have been more than one possible placement for fields. These field-house types should differ in their placement relative to environmental features and in their intensity of use. In particular, it should be easier to assign a date to field houses on more sustainable sites than to field houses in other areas, since more ceramic materials, among other things, will be deposited in and around such structures.

To the extent that field houses mark the perceived value of agricultural lands, productivity, sustainability, lack of risk, and location near residence may all be potential factors increasing value. Therefore, the most intensively used field houses may be relatively close to habitations. However, any field houses associated with shifting agriculture, given the centrifugal nature of such systems, may be more distant from settlements than field houses associated with more permanent fields. Considering both classes of field houses simultaneously, then, if the agricultural system is some mix between shifting and more intensive regimes, field houses should exhibit a relatively uniform distribution in space with increasing distance from habitations.²

Village Formation

Wills and Windes (1989) argue that, with the exception of a few probably episodic aggregations at sites such as Shabik'eschee adjacent to Chaco Canyon, New Mexico, Basketmaker settlement strategy was fundamentally one of dispersed habitation. Presumably, most such habitations were directly adjacent to the most important fields in use; in the Dolores area, for example, Orcutt (1987) demonstrates that catchments of the predominately single-pithouse habitations of the earliest occupation (A.D. 600–720) differ from the background environment in having more Big sagebrush, and more “good” and “adequate” soil quality of low and moderate cold-air-drainage risk. Ownership of fields would have been obvious under such circumstances, and, following Adler (1990), was probably at the level of the household, given the low intensity of the agricultural systems. However, the duration of such ownership may have been no longer than the duration of their use as fields (Netting 1982:464).

Villages formed in many upland areas of favorable climate in the northern Southwest at some point during the following Pueblo I period (A.D. 700/750–900). With aggregation, most households no longer could be directly adjacent to their fields; likewise, the proximity argument for associating field ownership with households breaks down. De Montmollin (1989) argues that in the absence of communal or political control over land above that of the household, households ought to be located in the most spatially efficient fashion possible relative to their lands. Therefore, in agriculturally intensive societies without market economies, spatial inefficiency in location of households relative to fields ought to arise only when control over lands resides in decision makers above the level of the household. Of course, this argument requires eliminating other factors that might cause aggregation, such as defensive needs, access to resources other than agricultural land, and so forth. Orcutt et al. (1990) discuss and largely dismiss the possibility that either warfare or emerging elites were responsible for the appearance of villages in the Dolores area.

Summary

We may base interpretations of level of control over land on (at least) two kinds of archaeological evidence: the numbers, size, characteristics, and distribution of field houses relative to fields and

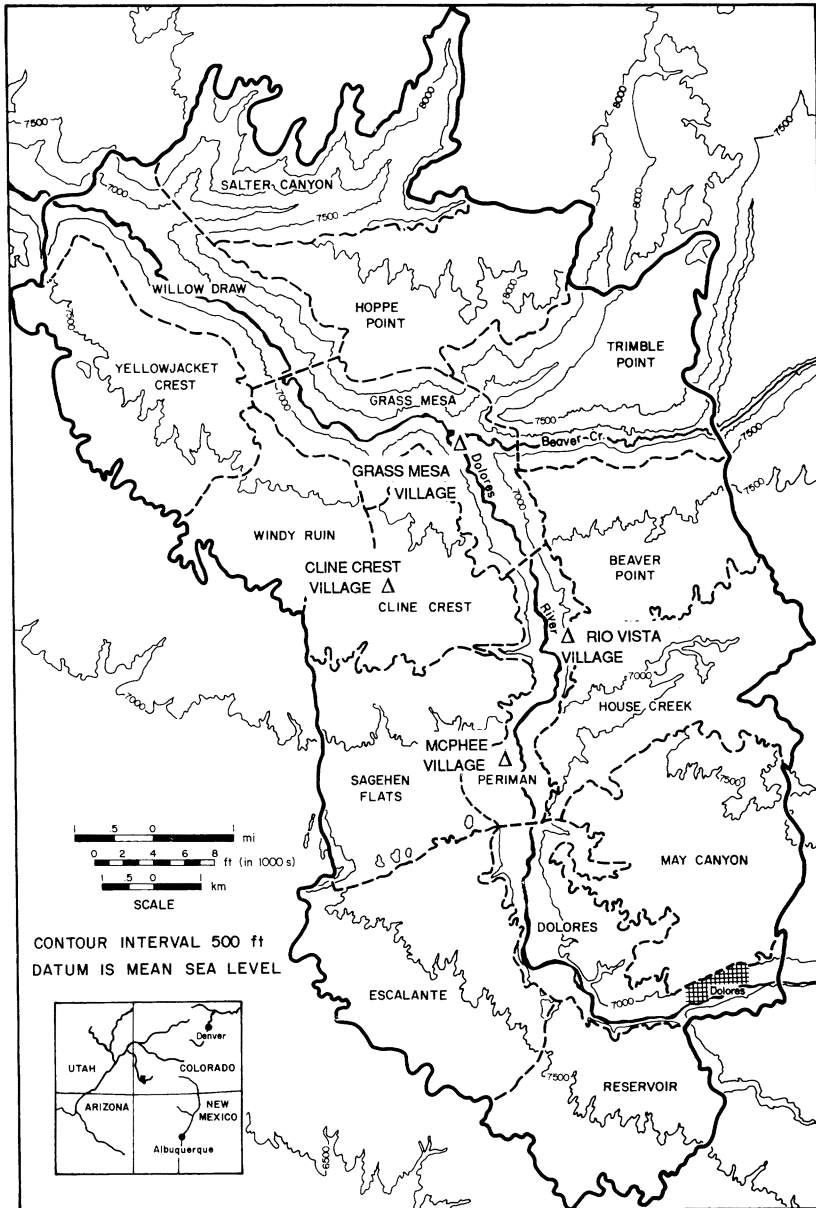


Figure 1. DAP operations were conducted within the Escalante Sector, bounded by the heavy black line. The sector was divided into localities (dashed lines) for administrative convenience. Pueblo I villages mentioned in the text are marked by a Δ .

relative to habitations; and the size and location of habitations relative to fields. Other kinds of evidence are certainly possible (for example, field size itself, putative boundary markers, and so forth) but are not discussed here because they do not figure in the case study, to which we now turn.

THE DOLORES ARCHAEOLOGICAL PROJECT: DATA AND RESULTS

Permanent Anasazi occupation in the uplands of southwest Colorado that were the focus of the Dolores Project from the late 1970s to the mid-1980s (Figure 1) began in the early A.D. 600s, grew

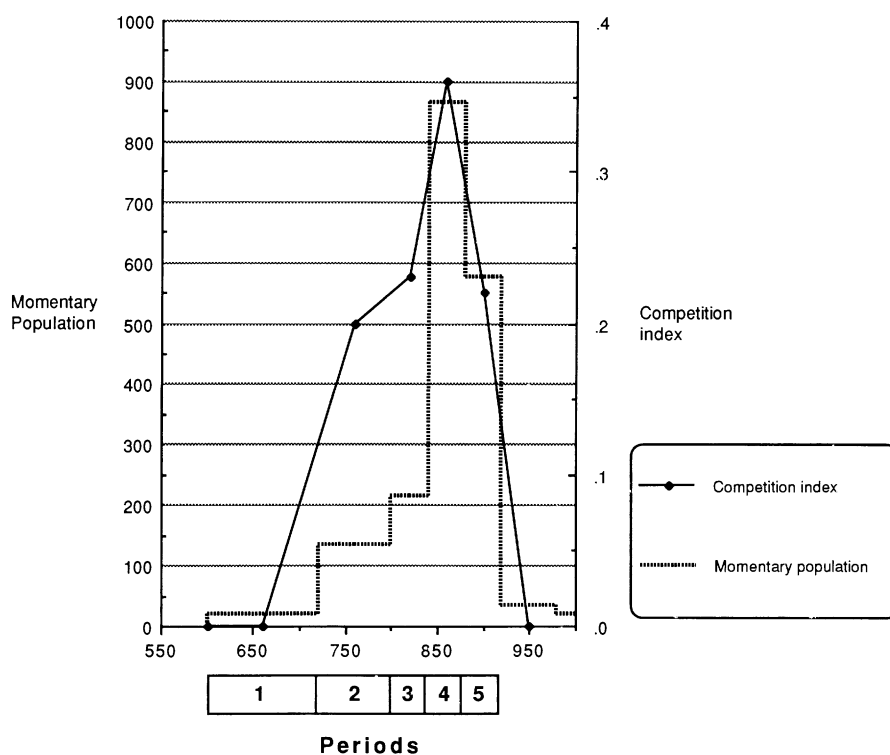


Figure 2. Estimated momentary population levels vs. competition (simulated) for agricultural land in the DAP area.

significantly through immigration in the mid-to-late 700s and again in the mid-800s, and declined drastically in the very late 800s or early 900s, never again to reach substantial population levels (Kane 1986; Schlanger 1988). DAP archaeologists divided this main occupation into five periods, with the fourth and fifth, together spanning the period from A.D. 840 to 920, encompassing the peak of the occupation as well as its sudden decline (Figure 2). Recent reinterpretations of the Dolores sequence have emphasized the suddenness of village formation. Small villages formed towards the end of the eighth century, followed first by near abandonment of the area, and then in the mid-ninth century by a boom in village construction (Wilshusen and Blinman 1992). Other Pueblo I villages between Durango, Colorado, and Alkali Ridge in southeastern Utah appeared in clusters, as in the Dolores area, and probably also experienced relatively brief use lives (on the order of 30 years or less [Wilshusen and Blinman 1992]).

Field houses (or seasonal sites, as they were called by the DAP) were identified in survey as those sites with no pithouse depression and with some evidence of surface building debris, but not more than could have been generated by a one- or two-room structure (Orcutt 1986:210). DAP field-house locations have been studied most extensively by Orcutt, but her treatments focus on a subset of the study area and use an earlier dating scheme (Orcutt 1986) or are oriented toward evaluating a specific model of resource use and change (Orcutt 1987).

Competition for Arable Land and Field-House Abundance

If field houses serve in part as visible marks of ownership of adjacent fields, then field-house abundance should be related to competition for agricultural lands. In an effort to construct an objective measure of resource competition, the DAP developed a simulation of changing agricultural catchment shape and size (reported in detail by Kohler et al. [1986] and summarized, in a slightly revised version, by Orcutt et al. [1990]). The surveyed area plus a 1-km border around it (altogether,

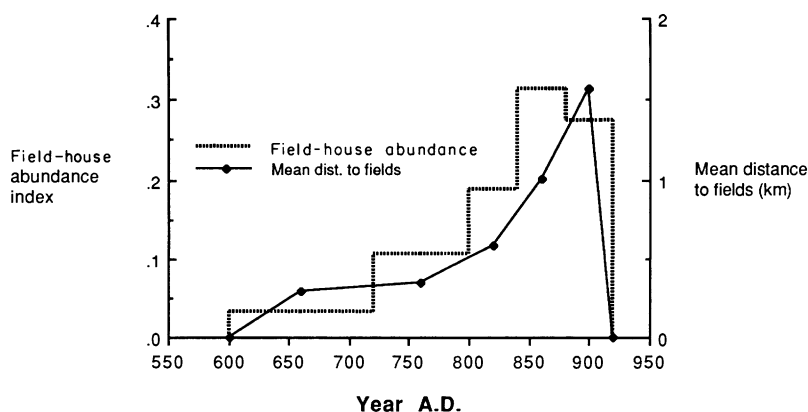


Figure 3. Field-house abundance vs. mean distance to fields (simulated) in DAP area.

13.7 sq km) was divided into 3,425 cells of 4 ha each (Orcutt 1987). Various environmental data, plus the population in each of the predefined periods where applicable, were coded for each of these cells. (For the present study I added the locations of field houses to this data base.) Then, for each period, using a set of rules which to the best of our ability took into account local variability in cold-air drainage, soil quality, and climate, unoccupied cells with some potential agricultural production were "claimed" by occupied cells in a sequential fashion governed by propinquity until each occupied cell (i.e., site) had a large enough agricultural catchment to meet its consumption needs. The resultant agricultural catchments are often highly distorted, especially in areas of dense population, and may surround (but do not include) cells that we believed to have no agricultural value. Frequently in this process, the simulation attempted to "claim" cells on behalf of some site that had already been "claimed" for some other site. The ratio of such contentious field locations to all cells in the combined agricultural catchments forms our measure of competition for agricultural land.

The history of population growth (dashed line) and the history of conflict over agricultural land (solid line) track each other fairly closely (Figure 2). The correlation would be even closer were it not for the process of aggregation; the "pulling in" of the population (primarily in periods 4 and 5) in fact helped to reduce intervillage conflict over agricultural lands (Orcutt et al. 1990).

Based on this measure of intervillage competition for agricultural lands, field houses ought to be absent in period 1, present in periods 2, 3, and 5, and most common in period 4. Unfortunately, the poverty of the archaeological record at many field houses precludes dating with precision. Of the 195 probable field houses in the DAP data base, 58 cannot be assigned to even the grossest of temporal categories, and are not discussed further here. The remaining 137 sites can be assigned to the period between A.D. 600 and 950, or to some subset thereof. The temporal distribution of those 45 field houses that can be dated with some confidence to two adjacent periods or better is shown in Figure 3. (Sites that could have been occupied in either of two adjacent periods were counted as .5 in each.) The number of field houses per period has been divided by the length of each period to create an index of field-house abundance (dashed line). As expected, the index of field-house abundance is highest in period 4 and negligible in period 1. Field-house abundance is somewhat better correlated with the competition index (from Figure 2; $r^2 = .79$) than with the estimates of average distance to fields from residence ($r^2 = .71$) as might be expected if field houses have more to do with laying claim to land than with minimizing travel time. (These r^2 values are not statistically distinguishable, however, although each is significantly nonzero.)

Village Formation and Level of Ownership

The increasing average distance of households (in habitations) to fields (Figure 3) provides a measure of the spatial inefficiency for the distribution of households relative to fields. It is worth

recalling that these distances were computed through simulation, since no actual field locations, other than those presumably adjacent to field houses, can be recognized in the local archaeological record. Distances are low in periods 1 and 2, increase notably in period 3, just after the appearance of the earliest villages, and then increase steeply in periods 4 and 5, with the formation of the largest aggregates.

Of course, some of this increase may be due only to the concomitant increase in population; even if households continued to be distributed in the most efficient manner possible relative to potential fields, distances to fields would still increase somewhat as space under and immediately around habitations became unavailable for cultivation. It is difficult to estimate the importance of this effect. We can note that settlement strategy changed little from period 1 to period 2; most sites were still small habitations close to arable land, but momentary population increased approximately 480 percent across these periods (Figure 2) whereas average distance from households to fields increased only 19 percent (Figure 3). Even though the relative importance of this effect is likely to increase as population increased, a substantial component of the increase in distance to fields in Figure 3 is certainly due to changing strategies of habitation location relative to fields, rather than being mechanical increases required to add more households to this particular landscape.

Considered in isolation from the field-house data, and following the logic developed by de Montmollin (1989), it is tempting to consider this increasing spatial inefficiency in location relative to fields as indicating increasingly strong communal control over agricultural land, presumably at the level of the village. Such a conclusion would also be in line with ethnographic regularities presented by Adler (1990), who has demonstrated tendencies for communal (vs. household) control to be associated with intermediate levels of agricultural intensification.

However, most field houses themselves are quite small, and could, at best, have housed a single household during some portion of the year. The cooccurrence of such field houses *along with* spatially inefficient location of households in large villages is probably best interpreted as "theoretical" control (*sensu* White [1974]) of agricultural lands at the level of the village (or possibly at the level of some suprahousehold but subvillage unit such as the clan) with practical control vested in households, perhaps only for the duration of field use. It is worth remembering that similar arrangements of households in pueblos, and seasonal structures near fields, were documented historically for many pueblos, and that similar, two-tier patterns of ownership (as was already noted at Zia, for example) also appear to have been quite common in those cases.

Agricultural Sustainability, Risk, and Field Houses

Portions of the DAP study area were surveyed over a number of years by several different groups. Some of this survey was conducted before the DAP itself was constituted. Consequently, what information is available on the intensity and percentage of surface collection is not entirely uniform. I have used our ability to place field houses in one or two adjacent periods as an estimate of the amount of material on each site, since for these small sites, dating precision was usually limited by small collection size. Two groups of field houses can be contrasted: the 42 that can be dated with some confidence to periods 4 and 5, and the 77 that can be dated only to somewhere within the A.D.600–950 interval. I assume that in fact most of these latter were also used during periods 4 and 5, based on the distribution of the datable field houses, but that the collections were too small to be diagnostic.

As expected, the well-dated field houses (dating to periods 4 and/or 5) exhibit a greater (but only marginally significant) tendency to be located in sagebrush (and also, unexpectedly, in the oak) zones than do the poorly dated field houses, which are located in piñon–juniper to a greater extent than are their well-dated counterparts (Table 1). The well-dated sites also show a slightly (but insignificantly) greater tendency to be located in those areas with the longest growing seasons—as controlled by local topography—and to avoid those areas with the shortest growing seasons (Table 2), than do their poorly dated counterparts. A Soil Conservation Service capability class for nonirrigated lands provides a rough measure of soil quality for comparing the two site classes. On this measure, the greatest difference between the classes is that the well-dated field houses show a stronger tendency

Table 1. Field-House Placement and Vegetation Class.

Vegetation Type	Cells without Field Houses	Cells with Field Houses Datable only to A.D. 600–950	Cells with Field Houses Datable to A.D. 825–910	Row Sum
Piñon/juniper	28	38	26	958
Big sagebrush	20	33	43	713
Oak	17	23	29	604
Ponderosa/oak	15	0	0	493
Riparian	8	7	0	283
Mountain brush	7	0	2	242
Other ^a	4	0	0	133
Column sum	3,307	77	42	3,426

Note: Cells contain column percentages rounded to the nearest integer; margins contain raw frequencies. In this and the two following tables, the χ^2 calculations are based on the raw frequencies. For the entire table, $\chi^2 = 55.79$; $df = 12$; $p < .001$. For the subtable formed by columns 2 and 3 only, $\chi^2 = 6.73$; $df = 4$; $p = .15$.

^a Includes the vegetation types mountain brush and Douglas fir; mountain brush and ponderosa; piñon/juniper, ponderosa, and oak; oak and Douglas fir; and aspen.

to be associated with the “good” soils, and to avoid the “marginal” soils, than do the poorly dated sites (Table 3). Taking these indications together, the well-dated field houses appear to occur in those places where a relatively sustainable and reliable variety of agriculture was practiced; they are well dated precisely because they *were* used over a longer period of time, or during a longer portion of the growing season, than were the poorly dated sites. The poorly dated field houses are more likely to be located in areas dominated by poorer soils, piñon–juniper vegetation, and greater risk of crop loss due to late spring or early fall frosts. I suggest that they represent the remains of a shifting agricultural strategy.

Distances to Field Houses

Analysis of distances from villages to field houses has been conducted for both well-dated and poorly dated field houses that fall within the simulated agricultural catchment of any residential site occupied in period 4 (A.D. 840–880).³ The total sample size of such field houses is only 21 (for those that are well dated) and 27 (for those that are poorly dated). In fact, only four villages (with a total of 19 field houses) had enough field houses in their simulated catchments to make this exercise meaningful. Therefore my examination will be restricted to these, and the two classes of field houses are pooled.

From McPhee Village (Figure 4)—the largest village in the DAP area at this time—the cumulative

Table 2. Field-House Placement and Cold-Air Drainage.

Growing Season Length	Cells without Field Houses	Cells with Field Houses Datable only to A.D. 600–950	Cells with Field Houses Datable to A.D. 825–910	Row Sum
60–90 days	28	12	5	951
90–120 days	22	30	26	751
> 120 days	50	58	69	1,724
Column sum	3,307	77	42	3,426

Note: Cells contain column percentages rounded to the nearest integer; margins contain raw frequencies. For the entire table, $\chi^2 = 22.41$; $df = 4$; $p < .001$. For the subtable formed by columns 2 and 3 only, $\chi^2 = 2.03$; $df = 2$; $p = .36$.

Table 3. Soil Quality and Field-House Placement.

SCS Soil Quality Class	Cells without Field Houses	Cells with Field Houses Datable only to A.D. 600–950	Cells with Field Houses Datable to A.D. 825–910	Row Sum
Best (SCS 3)	19	16	12	651
Good (SCS 4)	29	36	57	1,019
Marginal (SCS 6)	19	17	7	636
Poor (SCS 7)	33	31	24	1,120
Column sum	3,307	77	42	3,426

Note: Cells contain column percentages rounded to the nearest whole number; margins contain raw frequencies. For the entire table, $\chi^2 = 17.87$; $df = 6$; $p < .01$. For the subtable formed by columns 2 and 3 only, $\chi^2 = 5.38$; $df = 3$; $p = .15$.

distances to all cells in the agricultural catchment are shown with a solid line, while the cumulative distances to all field houses in the catchment are shown in a dashed line. In general there is little difference between the two lines, showing that field houses are located more or less randomly with respect to distance, within the area of the simulated agricultural catchment. The same is true for Cline Crest Village (Figure 5). For Grass Mesa Village (Figure 6), there is a suggestion that field houses are located slightly closer than the random eligible cell, though the sample size is small. Finally, for Rio Vista Village (Figure 7) field houses do appear to be located closer than expected under the random model, though the sample is much too small for this difference to be more than interesting. Overall, distance to fields per se does not appear to be a powerful generator of field-house location.⁴

Why Are There So Few Field Houses?

Given the patterns of ownership suggested above, it is noteworthy that there were apparently far fewer field houses in the agricultural catchments of each village than there were households in each village. Why should this be? Some field houses may have been so lightly built and used that they

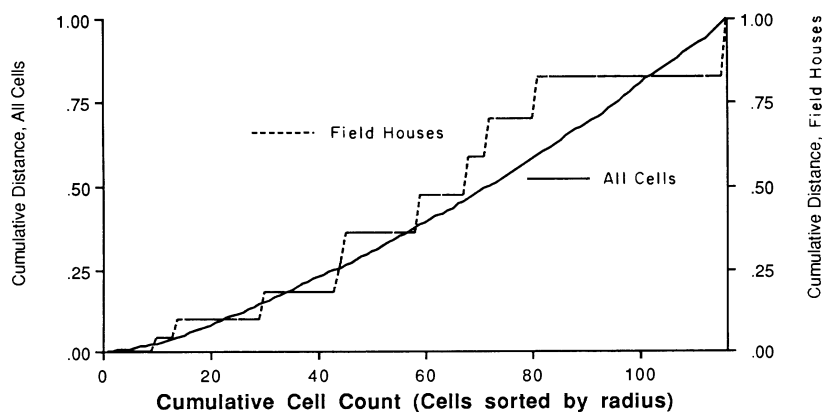


Figure 4. Cumulative distances between McPhee Village (various site numbers) and the field houses in its catchment, compared with distances to all cells within its simulated agricultural catchment. In this and the following figures, only those cells likely to have contained fields are counted as falling within the agricultural catchment; simulated catchments are irregular in shape because of nearby sites and unproductive areas not included in the catchment. The momentary population of this village in period 4 (A.D. 840–880) is estimated at 121 households distributed across some 20 room blocks. The period 4 catchment contained 119 4-ha cells (some as far as 2 km from the village) of which nine contained field houses.

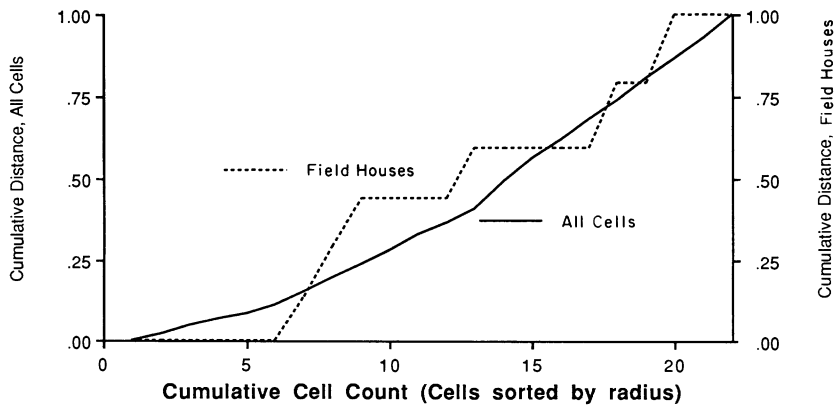


Figure 5. Cumulative distances between Cline Crest Village (SMT2663) and the field houses in its catchment, compared with distances to all cells within its simulated agricultural catchment. The momentary population of this village in period 4 (A.D. 840–880) is estimated at 26 households; there are 10 room blocks at the site, but probably not all were in use during the period 4 occupation. The period 4 catchment contained 21 4-ha cells (of which the most distant was within 1 km of the village); of these four contained field houses.

went unrecognized during survey. Field houses were the smallest class of the structural remains in the survey area, and therefore probably were missed more frequently than residences, regardless of their construction. Some households presumably had field houses outside the areas that could be securely associated with any single village. Some field houses were probably located on or within former hamlets or farmsteads, and such use may have gone unrecognized in the absence of excavation. Finally, if (in spite of my arguments to the contrary) field houses served primarily to minimize travel time between habitation and field, then some fields may have been located close enough to a village that no field house was necessary.

Yet even admitting that all these biases and processes may play some role, it seems unlikely that they can by themselves explain the entire discrepancy between numbers of field houses and numbers of households. We might first consider the possibility that field houses belonged to some intravillage division such as the clan, rather than to some particular household. There is a far closer match between the number of room blocks in each village and the number of field houses in each catchment

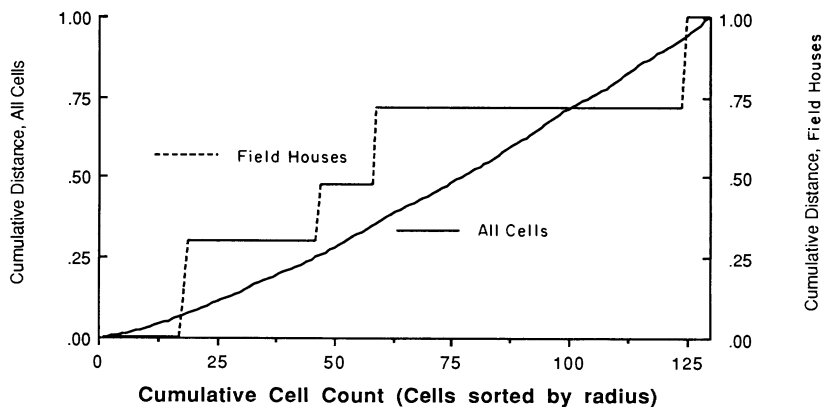


Figure 6. Cumulative distances between Grass Mesa Village (SMT23) and the field houses in its catchment, compared with distances to all cells within its simulated agricultural catchment. The momentary population of this village in period 4 (A.D. 840–880) is estimated at 92 households, distributed among six room blocks. The period 4 catchment contained 130 4-ha cells (some as far as 1.8 km from the village); of these four contained field houses.

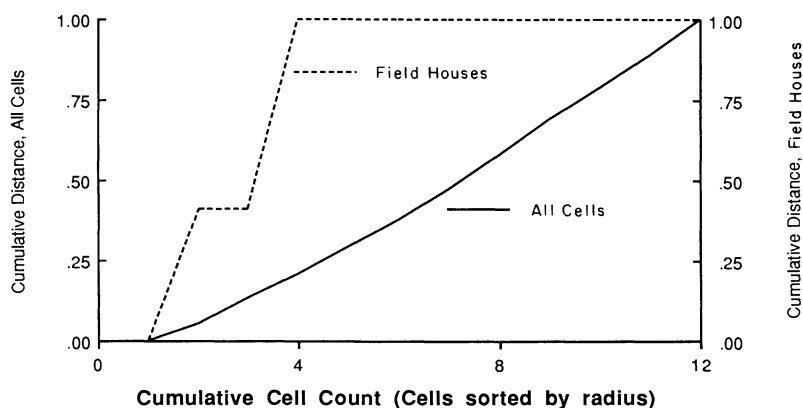


Figure 7. Cumulative distances between Rio Vista Village (5MT2182) and the field houses in its catchment, compared with distances to all cells within its simulated agricultural catchment. The momentary population of this village in period 4 (A.D. 840-880) is estimated at 10 households, most of which were distributed in two room blocks. The period 4 catchment contained 10 4-ha cells (some as far as 1 km from the village); of these two contained field houses.

than there is between numbers of households and field houses. In that case, given their small size, only a few representatives of each such division could possibly have used a field house simultaneously. This would further imply either that households within a single social division held fields very close to each other and conducted their fieldwork in a highly cooperative manner, or that the smallest unit of land ownership and production was not the household at all, but was some more inclusive social group.

Another possibility is that only certain privileged households (or other small social segments, such as lineages) were able, or were allowed, to claim land through field-house construction and maintenance.

Neither of these possibilities can be completely excluded, although on the whole I think the second is somewhat more likely. Ellis (1978) observed that, among the New Mexican pueblos at least, field houses generally belonged to specific individuals. Moreover, restricted ownership would help to explain the (admittedly slight) evidence marshaled by Kane (1989:360) that by the peak of the occupation of the Dolores Pueblo I villages, "certain individuals or groups participating in the sequential hierarchy decision process and residing within the largest villages probably had political power and probably influenced the direction of Dolores society. . . . The Dolores villages may have been on the threshold of a simple hierarchical society with an overt leadership class."

Summary of Results

As would be expected if field houses were in part constructed and maintained as visible symbols of ownership, field-house abundance in the Dolores area is strongly correlated with an index measuring intersettlement competition for agricultural land. The increasing inefficiency of household location relative to fields with aggregation suggests some (possibly "theoretical") control of agricultural land emerged at a communal level when villages formed. If so, given the small size of field houses, practical control of fields in use may have been vested in the household or the individual. Slight indications can be seen that those field houses in better agricultural locations were used more intensively; in general, the well-dated field houses tend to be in locations of potentially sustainable use, whereas the poorly dated structures tend to be in locations where agriculture was less rewarding, more risky, or more likely to have been of short duration. In examining the distribution of field-house distances from villages, no strong patterns emerge to suggest that minimizing distance was the driving force behind the placement of field houses. Data not completely presented here (but see Note 3) show that the ephemerally used field houses tend to be located somewhat farther away from villages than were the more intensively occupied field houses. The small number of field houses

relative to the village populations is especially striking when the set of field houses is narrowed to those generally well-used structures on the more attractive sites. Although other interpretations are possible, I suggest that the better field locations were beginning to be monopolized by some small proportion of the villagers by the time of maximum village size (ca. A.D. 860–880).

DISCUSSION AND CONCLUSIONS

Elsewhere (Kohler and Matthews 1988) I have argued that subgroups of the northern Anasazi, particularly prior to about A.D. 900 or 1000, moved in fairly regular cycles through a larger territory over a long period. During colonization of a particular area, agriculture was probably heavily weighted towards those low-risk, relatively high-return areas here called sustainable. With population expansion, the proportion of the mix out of necessity changed in favor of shifting agriculture in uplands soils. Like most such systems, it was efficient of labor but locally unsustainable in its use of land and vegetation. At some point in the cycle of ecosystem development and colonization this strategy results in depletion of fuel, wild food resources (Floyd and Kohler 1990), and, perhaps, useful agricultural land.

Early in cycles of colonization, the unfarmed mesa-top piñon–juniper expanses belonged to none, but were used by all as wild reserves for plant and animal food and fuel. With population expansion, they began to be used, probably in an unsustainable manner, for shifting agriculture. This recalls the pattern predicted by Hardin, and the field houses that appear in piñon–juniper—whether constructed on behalf of a household or the community—may represent an attempt to regulate a formerly open-access resource.

The high residential mobility of the DAP Anasazi during most of the sequence suggests that land ownership probably was limited to fields actually in use at any time, with no system of formalized land tenure needed to allow passage of lands from one generation to the next. Only in the last portion of the occupation, crystallizing around A.D. 845 when most people began living in one of the seven larger, relatively long-lived villages, does it seem likely that some system of controlled passage of lands from one generation to another may have been in place; this is also the period of greatest use of field houses. As long as fields were used discontinuously and were “owned” only by their users of the moment, differences in field productivity had little likelihood of leading to differential economic power for particular lineages or families. If differences did exist in one generation, they would likely be erased in the next as new fields were brought into production and old ones abandoned; residential mobility was a great leveler. Nine hundred years before the formation of the Dolores villages and thousands of miles away, the Germans told Caesar they were afraid, if they settled anywhere permanently, that the powerful would drive the weak from their possessions and eventually make great estates for themselves (in Ross 1971:22).

However, the more continuous field use, and the mix of village- and household-level control of land inferred for the last 40 to 50 years of the Dolores occupation might have eventually led to increased social inequality as wealth differences, based on differential agricultural production, accumulated across generations. In their discussion of the appearance of some of the New World’s first elites among the Olmec, for example, Coe and Diehl (1980:147–152) argue that certain lineages controlling highly productive river-levee soils came to enjoy an economic preeminence that also allowed them to sponsor festivals and long-distance trading expeditions that solidified their prestige and economic control. The Dolores area, however, was abandoned before any incipient tendency toward vertical differentiation became marked.

If the metaphor of the tragedy of the commons is helpful in understanding the timing of appearance, and the locations, of field houses, it may also help explain another peculiar feature of Anasazi colonization cycles: why population growth through immigration typically continues beyond the point at which marked agricultural intensification is necessary, but ceases with marked aggregation. (This pattern is evident on both the Pajarito Plateau [Orcutt 1988] and in the Dolores area, where population growth [Figure 2] ceases with the pronounced aggregation in period 4). McKay and Acheson (1987:4) note that it is a general characteristic of open-access systems that “when there is any profit to be made at all, new entrants are likely to be attracted despite evidence of decline in the productivity of the resource.”

In Anasazi colonization and ecosystem-development cycles, local population growth typically stops with aggregation, accompanied, incidentally, by field houses, both indications that the system of open access has been closed to prospective newcomers. In the Dolores case, this increased control over access checks further growth, but since the system is already at a very high level of intensification, it is inordinately exposed to climatic fluctuations and to opportunities for emigration, and the end of one local occupational cycle is at hand.

In closing, it is worth considering why no completely satisfactory distinction can be made between the expectations of models that view field houses as the result of attempts to minimize the cost of having to maintain fields at some remove from habitations, and models that view field houses as attempts by some corporate group to restrict access to resources. In the Mesa Verde region in general, village formation apparently had two important prerequisites. First, local populations had to be relatively dense (Orcutt et al. 1990); this entrained depletion of wild resources and agricultural intensification. Second, local agricultural production had to be generally high, but with high spatial variability within years and high temporal variability between years; this set up conditions under which households could maximize the value of their agricultural production by participating in sharing with other households (Van West and Kohler 1992). Such cooperation was better accomplished in aggregated than in dispersed settings. Therefore, the formation of villages—important in generating field houses in the first type of model—is in part caused by the same increases in local population and increasing competition for scarce agricultural land that are the presumed antecedents of field houses in the second model. As effects of partly overlapping causes, aggregation and the appearance of field houses should be strongly correlated; any instances where one appeared without the other should be especially illuminating for further study.

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REFERENCES CITED

- Adler, M. A.
 1990 Community, Aggregation and Land Tenure: The Search for a Common Ground. Paper presented at the 55th Annual Meeting of the Society for American Archaeology, Las Vegas.
 1992 Land Tenure Systems and Prehistoric Land Use: Perspectives from the American Southwest. Paper presented at the 57th Annual Meeting of the Society for American Archaeology, Pittsburgh.
- Brown, P., and A. Podolefsky
 1976 Population Density, Agricultural Intensity, Land Tenure and Group Size in the New Guinea Highlands. *Ethnology* 15:211–238.
- Coe, M. D., and R. A. Diehl
 1980 *The People of the River*. In *The Land of the Olmec*, vol. 2. University of Texas Press, Austin.
- de Montmollin, O.
 1989 Land Tenure and Politics in the Late/Terminal Classic Rosario Valley, Chiapas, Mexico. *Journal of Anthropological Research* 45:293–314.
- Dozier, E. P.
 1970 *The Pueblo Indians of North America*. Holt, Rinehart, and Winston, New York.
- Dyson-Hudson, R., and E. A. Smith
 1978 Human Territoriality: An Ecological Reassessment. *American Anthropologist* 80:21–41.
- Ebert, J. I., and T. A. Kohler
 1988 The Theoretical Basis of Archaeological Predictive Modeling and a Consideration of Appropriate Data-Collection Methods. In *Quantifying the Present and Predicting the Past: Theory, Method, and Application of Archaeological Predictive Modeling*, edited by W. J. Judge and L. Sebastian, pp. 97–171. USDI Bureau of Land Management, Denver.

- Ellis, F. H.
1978 Small Structures Used by Historic Pueblo Peoples and Their Immediate Ancestors. In *Limited Activity and Occupation Sites: A Collection of Conference Papers*, edited by A. E. Ward, pp. 51–59. Contributions to Anthropology No. 1. Center for Anthropological Studies, Albuquerque.
- Feeny, D., F. Berkes, B. J. McCay, and J. M. Acheson
1990 The Tragedy of the Commons: Twenty-Two Years Later. *Human Ecology* 18:1–19.
- Floyd, M. L., and T. A. Kohler
1990 Current Productivity and Prehistoric Use of Piñon (*Pinus edulis*) in the Dolores Archaeological Project Area, Southwestern Colorado. *Economic Botany* 44:141–156.
- Hardin, G.
1968 The Tragedy of the Commons. *Science* 162:1243–1248.
- Haury, E. W.
1956 Speculations on Prehistoric Settlement Patterns in the Southwest. In *Prehistoric Settlement Patterns in the New World*, edited by G. R. Willey, pp. 3–10. Viking Fund Publications in Anthropology No. 23. Wenner-Gren Foundation for Anthropological Research, New York.
- Johnson, A. W., and T. Earle
1987 *The Evolution of Human Societies: From Foraging Group to Agrarian State*. Stanford University Press, Stanford.
- Kane, A. E.
1986 Prehistory of the Dolores River Valley. In *Dolores Archaeological Program: Final Synthetic Report*, compiled by D. A. Breternitz, C. K. Robinson, and G. T. Gross, pp. 353–438. USDI Bureau of Reclamation, Engineering and Research Center, Denver.
- 1989 Did the Sheep Look Up? Sociopolitical Complexity in Ninth Century Dolores Society. In *The Sociopolitical Structure of Prehistoric Southwestern Societies*, edited by S. Upham, K. G. Lightfoot, and R. A. Jewett, pp. 307–361. Westview Press, Boulder, Colorado.
- Kohler, T. A., and M. H. Matthews
1988 Long-Term Anasazi Land Use and Forest Reduction: A Case Study from Southwest Colorado. *American Antiquity* 53:537–564.
- Kohler, T. A., J. D. Orcutt, E. Blinman, and K. L. Petersen
1986 Anasazi Spreadsheets: The Cost of Doing Agricultural Business in Prehistoric Dolores. In *Dolores Archaeological Program: Final Synthetic Report*, compiled by D. A. Breternitz, C. K. Robinson, and G. T. Gross, pp. 525–538. USDI Bureau of Reclamation, Engineering and Research Center, Denver.
- McKay, B. J., and J. M. Acheson
1987 Human Ecology and the Commons. In *The Question of the Commons: The Culture and Ecology of Communal Resources*, edited by B. J. McCay and J. M. Acheson, pp. 1–34. University of Arizona Press, Tucson.
- Matson, R. G.
1988 The Adoption of Agriculture in the Southwest: The View from Cedar Mesa, Utah. Paper presented at the 53rd Annual Meeting of the Society for American Archaeology, Phoenix.
- Matson, R. G., and B. Chisholm
1991 Basketmaker II Subsistence: Carbon Isotopes and Other Dietary Indicators from Cedar Mesa, Utah. *American Antiquity* 56:444–459.
- Matson, R. G., W. D. Lipe, and W. R. Haase IV
1988 Adaptational Continuities and Occupational Discontinuities: The Cedar Mesa Anasazi. *Journal of Field Archaeology* 15:245–264.
- Moore, B.
1978 Are Pueblo Fieldhouses a Function of Urbanization? In *Limited Activity and Occupation Sites: A Collection of Conference Papers*, edited by A. E. Ward, pp. 9–16. Contributions to Anthropological Studies No. 1. Center for Anthropological Studies, Albuquerque.
- Netting, R. McC.
1982 Territory, Property, and Tenure. In *Behavioral and Social Science Research: A National Resource (Part II)*, edited by R. McC. Adams, N. J. Smelser, and D. J. Treiman, pp. 446–502. National Academy Press, Washington, D.C.
- Orcutt, J. D.
1986 Site Catchment Composition and Resource Diversity. In *Dolores Archaeological Program: Research Designs and Initial Survey Results*, compiled by A. E. Kane, W. D. Lipe, T. A. Kohler, and C. K. Robinson, pp. 210–222. USDI Bureau of Reclamation, Engineering and Research Center, Denver.
- 1987 Modeling Prehistoric Agricultural Ecology in the Dolores Area. In *Dolores Archaeological Program: Supporting Studies: Settlement and Environment*, compiled by K. L. Petersen and J. D. Orcutt, pp. 649–681. USDI Bureau of Reclamation, Engineering and Research Center, Denver.
- 1988 Changes in Settlement Organization on the Pajarito Plateau, New Mexico. Paper presented at the 53rd Annual Meeting of the Society for American Archaeology, Phoenix.
- Orcutt, J. D., E. Blinman, and T. A. Kohler
1990 Explanations of Population Aggregation in the Mesa Verde Region Prior to A.D. 900. In *Perspectives*

- on *Southwestern Prehistory*, edited by P. E. Minnis and C. L. Redman, pp. 196–212. Westview Press, Boulder, Colorado.
- Plog, S.
1990 Agriculture, Sedentism, and Environment in the Evolution of Political Systems. In *The Evolution of Political Systems: Sociopolitics in Small-Scale Sedentary Societies*, edited by S. Upham, pp. 177–199. Cambridge University Press, Cambridge.
- Preucel, R. W.
1988 *Seasonal Agricultural Circulation and Residential Mobility: A Prehistoric Example from the Pajarito Plateau, New Mexico*. Unpublished Ph.D. dissertation, Department of Anthropology, University of California, Los Angeles.
- Ross, D. W.
1971 *The Early History of Land-Holding Among the Germans*. Reprinted. Lenox Hill, New York. Originally published 1883, Burt Franklin, New York.
- Rousseau, J.-J.
1967 [1755] Discourse on the Origin and the Foundation of Inequality Among Mankind. In *The Social Contract and Discourse on the Origin of Inequality*, edited by L. G. Crocker, pp. 175–258. Washington Square Press, New York.
- Schlanger, S. H.
1988 Patterns of Population Movement and Long-Term Population Growth in Southwestern Colorado. *American Antiquity* 53:773–793.
- Smith, E. A.
1988 Risk and Uncertainty in the 'Original Affluent Society': Evolutionary Ecology of Resource Sharing and Land Tenure. In *Hunters and Gatherers I: History, Evolution, and Social Change*, edited by T. Ingold, D. Riches, and J. Woodburn, pp. 222–302. Berg, Oxford.
- Upham, S.
1990 Decoupling the Processes of Political Evolution. In *The Evolution of Political Systems: Sociopolitics in Small-Scale Sedentary Societies*, edited by S. Upham, pp. 1–17. School of American Research Book, Cambridge University Press, Cambridge.
- Van West, C. R., and T. A. Kohler
1992 A Time to Rend, A Time to Sew: New Perspectives on Northern Anasazi Sociopolitical Development in Later Prehistory. Ms. on file, Department of Anthropology, Washington State University, Pullman.
- White, L. A.
1974 *The Pueblo of Sia, New Mexico*. Reprinted. Calvin Horn, Albuquerque. Originally published 1962, Bureau of American Ethnology, Bulletin No. 184, Smithsonian Institution, Washington, D.C.
- Whitely, P. M.
1985 Unpacking the Hopi "Clans": Another Vintage Model Out of Africa? *Journal of Anthropological Research* 41:359–374.
- Wilcox, D. R.
1978 The Theoretical Significance of Fieldhouses. In *Limited Activity and Occupation Sites: A Collection of Conference Papers*, edited by A. E. Ward, pp. 25–32. Contributions to Anthropological Studies No. 1. Center for Anthropological Studies, Albuquerque.
- Wills, W. H., and T. C. Windes
1989 Evidence for Population Aggregation and Dispersal During the Basketmaker III Period in Chaco Canyon, New Mexico. *American Antiquity* 54:347–369.
- Wilshusen, R., and E. Blinman
1992 Pueblo I Village Formation: A Reevaluation of Sites Recorded by Earl Morris on Ute Mountain Tribal Lands. *The Kiva* 57:251–269.
- Woodbury, R. B.
1961 *Prehistoric Agriculture at Point of Pines, Arizona*. Memoirs No. 17. Society for American Archaeology, Salt Lake City.

NOTES

¹ The relation between degree of subsistence intensification and the size of the group allowed access is not necessarily linear, however. Brown and Podolefsky (1976) and Adler (1992) present independent, complementary data suggesting that when the sample is restricted to agriculturists, the size of the "primary access group" (to use Adler's term) first increases, and then decreases, with increased agricultural intensification.

² At least one possible test implication for this model is not examined here. If much of the competition for prime agricultural land is among villages (rather than among clans, lineages, or households) then one of two rather different patterns in the spatial distribution ought to occur, depending on the degree of animosity underlying the competition. Given adequate agencies for defusing actual conflict, or in the event that competition was not severe, a pattern of field houses that is densest nearest the mutual boundaries of village agricultural catchments might be expected. Given more severe competition with potential for conflict, a pattern of avoidance of such areas might result. In neither case would we expect field houses to be distributed randomly relative to such boundaries.

³ Fifty percent (21) of the well-dated field houses lie within these catchments, and 21 lie outside the simulated catchments. I interpret this to mean that the predicted catchments delineate the core zone of agriculture around each settlement, with a larger zone surrounding that. Taking into account the number of cells inside and outside the simulated catchments in Period 4, the density of well-dated field houses is 5.8 times higher inside than outside the catchments. Only 27 (35 percent) of the poorly dated field houses lie within the catchments. The density of such sites is, nevertheless, 3.2 times higher inside than outside the catchments. The discussion in this article is limited to field houses within the simulated catchments; outside that area, the assignment of a field house to a particular habitation becomes more problematic.

⁴ There is a methodological point to be made in this analysis. I could have attempted to fit probability distributions to the distances from villages to field houses to characterize their spatial distribution, as done by Preucel (1988:56–63, 234–258). But of course, that procedure assumes that the villages are situated in a uniform plain, and that all locations are equally likely to be chosen for field houses except for their distance. That is clearly not the case here, and it is better to compare the distribution of the actual locations of field houses with our best estimate of the potential distributions for such features, *given the configuration of the local landscape*.

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STUDYING VARIABILITY IN THE ARCHAEOLOGICAL RECORD: AN ETHNOARCHAEOLOGICAL MODEL FOR DISTINGUISHING MOBILITY PATTERNS

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The identification of mobility patterns is important to issues of demography and sociopolitical organization. The ethnoarchaeological model of mobility discussed here attempts to provide relevant indicators of mobility strategies applicable to prehistoric data. The model provides an understanding of site variability at different scales or levels of mobility. It is possible to infer anticipated and actual mobility patterns by applying knowledge of a combination of site size, presence and number of formal storage facilities or their absence, artifact inventories, and diameter of huts. The model is used to distinguish short seasonal occupations from contemporaneous year-round sedentary occupations among five Mesa Verde Pueblo II sites located in the American Southwest. The ethnoarchaeological model provides an alternative approach for examining regional intersite variability.

La identificación de patrones de movilidad es importante para estudios de demografía y organización socio-política. El modelo etnoarqueológico de movilidad que se discute en este artículo intenta ofrecer indicadores relevantes de las estrategias de movilidad que puedan ser aplicados a datos prehistóricos. El modelo permite comprender variabilidad en sitios a diferentes escalas o niveles de movilidad. Es posible inferir patrones de movilidad anticipada y real mediante la aplicación de conocimientos sobre el tamaño de los sitios, la presencia y cantidad de estructuras formales de almacenaje, inventarios de artefactos y el diámetro de las viviendas. El modelo es utilizado para distinguir ocupaciones estacionales breves de ocupaciones sedentarias de tiempo completo contemporáneas en cinco sitios Pueblo II de Mesa Verde, en el suroeste de los Estados Unidos. El modelo etnoarqueológico ofrece un enfoque alternativo para analizar la variabilidad regional entre sitios.

It is important for archaeologists to understand regional site variation. I suggest that some site variability is the result of variability at two levels of mobility patterns. On the cross-cultural level, wherein differences between societies are contrasted, types of mobility patterns are often classified together as either nomadic or sedentary (e.g., Eder 1984). The various types of cross-cultural mobility patterns impact differently on a society's site structure, political and social organization, and other

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