

INTRODUCTION

The developing historic research design prepared for use on Delaware DOT cultural resource projects presents a model for regional settlement patterning and individual settlement development over time. The foundation of this developmental settlement pattern model is location theory used by social and economic geographers (see Hudson 1969; Lemon 1972; Morrill 1974). The model employs the transportation system as a general framework within the region since transportation has been considered a primary factor in historic site location due to the need for access to markets (see Lemon 1972:119; Morrill 1974:136; Swedlund 1975:28). Not only is this a viable research approach, but since the location of historic sites along transportation routes is a primary pragmatic concern of DelDOT, such a model facilitates the consolidation of our public and professional archaeological responsibilities.

The research design is tailored to be sufficiently general so that data previously obtained, and that yet to be acquired, in the Delmarva Peninsula can be utilized, but yet not so general that more specific research designs cannot be developed from it.

LOCATION THEORY

Basing his work in part on ecological studies, Hudson (1969) developed an explanatory model of rural settlement. This model assumes that the area under study is topographically uniform and homogeneous in terms of available resources, and that any differences in farm sizes are due to variables whose net effect is random. In addition, the model includes a temporal dimension, allowing for process oriented studies. Hudson (1969:366-371) defined three stages of development:

1. Colonization - A given population moves into a frontier area.

Settlements are few and dispersed, and population density is low.

2. Spread - As population density increases, the total frontier area becomes occupied. The spatial process is diffusion, manifested in "offspring" settlements clustered near the original colonizing settlements. If population growth is the result of natural increase, settlement locations tend to be clustered. If, however, population growth is due primarily to immigration, "it seems likely that new settlements could be somewhat repelled by the earlier settlements, under conditions of contiguous landholdings of approximately equal size typical of most homesteading" (Hudson 1969:370), then settlement spacing would tend toward regularity.
3. Competition - As population density increases, competition for resources (such as agricultural land and marketing areas) leads to regularity in settlement patterning, especially regarding settlements larger than individual farm holdings. However, a large variability in farm sizes can result in a clustered pattern, and moderate size variability tends toward random spacing, while small variability in farm sizes produces a regular settlement pattern.

Hudson (1969) tested his locational model in rural Iowa, hypothesizing that the general long term trend would be toward regular settlement patterning. His results indicate that through a 90 year-period, farm settlements exhibited an initial clustered patterning, then randomness, and finally regularity (Hudson 1969:380), thus supporting his location model.

Since the majority of the Delmarva Peninsula is coastal plain with fairly uniform topography and homogeneous distribution of resources, Hudson's location

model is particularly relevant. Northern Delaware and northeastern Maryland, however, contain fall line and piedmont topographic variability which may preclude utilizing Hudson's model with validity in this area. A study conducted in northwestern Massachusetts (Swedlund 1975) has particular relevance to this problem. Swedlund (1975) applied Hudson's location model to the settlement pattern in three Massachusetts Counties. Despite topographic variability, Swedlund's (1975:31) results support Hudson's (1969:386) findings regarding the tendency toward regular settlement spacing through time. Thus, the location model should have utility in the piedmont areas of Delaware and northwestern Maryland.

Swedlund (1975), however, did note some variations from Hudson's (1969) location model. Since there are several factors that affect settlement patterning thru time other than population density, these should be taken into consideration when applying the model and analyzing results. The following are several important factors that affect settlement pattern:

1. Economics
2. Transportation system
3. Geography
4. Population size and density
5. Technological innovations
6. Governmental action
7. Social concerns

All these factors function inter-relatedly, but any factor may exert greater or lesser influence at any one time or place. In general, however, it appears that economic and transportation factors are the most influential, with the others acting as secondary pressures. A discussion of each factor will illustrate how settlement pattern is affected.

1. Economics - Of primary importance in the western market economy is the ability of a producer to distribute his commodities to consumers as efficiently as possible to permit profit (realization). Commodity distribution normally occurs in a market, whether it be a store or weekly (fair). For each commodity, there is a spatial area within which it is profitably marketable, however, this commodity range is not the same for all commodities. The size of a commodity range depends upon (a) demand for the item (usually expressed in terms of population size); (b) purchasing power (roughly equivalent to social status); (c) transportation efficiency (ease of movement); and (d) competition from other markets (Beavon 1977:19). In addition, perceived value of the item and perceived distance to obtain it are important factors. As the distance from this market increases, consumer access is more difficult in terms of time, effort, and cost. (Beavon 1977:138; Morrill 1974:210). Consequently, smaller markets will become established in outlying areas to serve these consumers (Beavon 1977:138). This is the basic reasoning behind central place theory, which describes settlement location in terms of retail marketing areas (see Beavon 1977; Crumley 1979). Central place theory includes a hierarchy of equidistant market centers based upon the largest range of any of the commodities which it marketed. (Beavon 1977:22-23).
2. Transportation System - Transportation has been termed the major factor in settlement development (Morrill 1974:136). Not only is transportation of primary economic importance in moving produce and consumers to markets, but transportation also provides avenues for social interaction. The transportation system includes the means of transport (i.e., foot, horseback, wagon, railroad, shipping) and the

transportation network, the physical routes upon which movement occurs. Changes in any part of the transportation system are factors in changes in the settlement pattern and in internal settlement pattern (Morrill 1974:127, 136). Many transportation routes are built in response to existing demand (often, but not always, economic), although the location of many routes may determine the location of future settlements (Morrill 1974:140). In terms of the volume of transportation and the efficiency (time vs. cost) of a route, major routes connect larger settlements, while lesser routes serve smaller places (Morrill 1974:132).

3. Geography - Geographic features provide avenues for and barriers to movement. For example, a river may on the one hand provide easy access for transportation, but on the other hand serve to divide an area through which it flows. Some geographic features, such as marshes and steep slopes are not conducive to settlement, while others, such as fertile coastal plains encourage settlement. One aspect of geography is not apparent by viewing a landscape or examining a topographic map - perceived travel distance to achieve a goal. Environmental resources available for exploitation, either for subsistence or production purposes also influence settlement pattern. Areas of prime agricultural land were the first to be settled in southeastern Pennsylvania (Lemon 1972:104), and deposits of raw materials for manufacturing (such as a rich coal seam) will encourage settlements (Blouet 1972:7). In addition, non-economic geographic features such as socially perceived landscape aesthetics may also affect choice of settlement location (Henry 1980:7), although such socio-geographic factors may be more relevant at the individual site level.

4. Population Size and Density - Effects of changes in population size and density have been discussed in terms of Hudson's (1969) location model.
5. Technological Innovations - Technological innovations in transport and/or manufacturing that permit commodities to be made for less cost and transported to market more efficiently will affect settlement pattern. For example, the introduction of the steam engine allowed for more efficient industrial production which lowered consumer costs, while the introduction of railway lines into less inhabited areas previously served only by wagon roads, permitted more efficient ease of movement for population expansion and social interaction.
6. Governmental Action - Intentional regional planning by governments can have a profound effect on settlement pattern (if such is the case, Hudson's model is superficial (Hudson 1969:381). Hudson (1969:380-381) found however, that despite a planned grid system of roads in Iowa, the changing settlement pattern supporting his model was apparent. Additionally, Lemon (1972:88-104) noted that although Penn had required a rectangular configuration of townships, roads, and villages in southeastern Pennsylvania, the homesteaders and surveyors disregarded Penn's plans. The resultant settlement pattern through time supports Hudson's (1969) model.
7. Social Concerns - Social variables such as religion, kinship ties, social status, and perhaps ethnicity also affect settlement pattern. For example, Lemon (1972:43) found that "the distributional patterns of nationalities and religious denominations (in southeastern Pennsylvania) seem to indicate that settlers were strongly attracted by their own cultural groups." However, these variables may be more apparent in internal settlement patterning (e.g., upper class neighborhoods or ethnic ghettos) than at the regional level.