The settlement pattern analysis published by Matson, Lipe, and Haase (1988) contributed basic understandings of the distribution of the many small dispersed sites on the Cedar Mesa area of SE Utah, and of the environmental factors that influenced these settlement behaviors. This project aims to expand on previous works and investigate relationships between Ancestral Pueblo site location and environmental variables through application of geographic information systems, web-accessible environmental datasets, and satellite imagery.

Project goals:
- Use site centroids and random points to assess potential relationships between environmental variables and site location.
- Examine associated environmental variables and site location.
- Examine site location relationship to environmental variables in close proximity.

INTRODUCTION

PART I. COMPILING THE DATA

Aerial imagery of survey work completed during the late 1960s – early 1970s was georeferenced to obtain site location. Individual environmental category maps were built using collected environmental data. Vegetation and soil raster data of the region were pulled from accessible, existing datasets and a Landsat digital elevation model (DEM) was used to create aspect, slope and elevation rasters.

Random points were created to match the number of sites in each drainage. To create consistency across sites and random points, a single, central point was used rather than the entire site area. Environmental variable data was extracted at the central site points and random points. Extracted data was grouped by environmental category and the proportion of each variable within the category was calculated.

PART II. TESTING FOR SIGNIFICANT VARIATION

The goal of initial analysis was to discern evidence of environmental variable influence on sites selection. A z-test (.05 level) was conducted on the environmental variable proportions of the site points and the random points. The environmental variables found to have proportions with statistically significant difference are listed below. The dissimilarity of environmental variable proportions supports the hypothesis that site locations may have been influenced by environmental factors.

PART III. MULTIPLE FAVORABLE VARIABLES

The environmental variable with the highest proportion was designated the favorable variable for that environmental category. Environmental variables in the ‘Aspect’ category were similar in proportion and a favored variable was not assigned. Within each drainage, a map was created showing regions containing all of the favored environmental variables. The number of site points and random points that fell within the favored zones were compared and tested for statistical significance. Bullet, North Road, and West Johns canyons were found to be statistically significant at the .05 level.

PART IV. RESIDENTIAL SITE LOCATION

If site location is influenced by environmental variables, residential sites would be established near, but not on areas favorable to farming.

Two variables were used to designate regions favorable to farming. The first variable was the presence of sagebrush, as sagebrush is believed to represent soils with attributes conducive to dry farming. Slope chosen as the second variable. Regions with 0-5 degree slope were identified as preferable for farming, due to the potential decrease in soil erosion due runoff. Individual variable maps were layered to define regions where both variables were present. These regions were designated ‘favorable farmland.’

To test proximity, the distance from points to favorable farmland was calculated in 100 meter increments.

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REFERENCES


Table 1: Proportion of points within environmental variable for random drainage and site centroids. Green highlights indicate significant difference between drainage and site points as tested by z-test (.05 level).

Table 2: Favored environmental variable by drainage and environmental category. *Difference significant at the .05 level.

Table 3. Number of random points and site centroids that fell within regions with all favored site points.