Steepness, Elevation, and Distance: Archaeological Sites in the United Kingdom

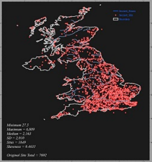
Introduction

Excavation is the most important feat in archaeology. Because geographical surfaces are considered the most stable material to garner information from, then, if there is a relationship with the terrain then there becomes a need to understand the relationship with known sites.

Historically, humanity, generally dwelt in less steep and elevated locations, hence, the assumption is that more sites are in these areas. If this is true, and people would dwell near water to survive, then how far an ancient site is from rivers, becomes as equally important.

Is this always true? Does the geographical layout of a study area have an effect on a sites locations? What is the steepness/elevation at those locations and why are certain type of sites located there? Do we assume that this is true or are there other reasons for their closeness? Does the steepness of the terrain effect the sites elevation or vis versa? Can we predict elevated sites?

Distance of All Sites



Most of the sites are clustered in the England.

Conclusion

The steepness analysis describes the locations of sites near and far from the river within 2163 meters. Is the assumption that more people would live near the rivers of less steeper terrain essentially true? Yes… however, because of the terrain there are just as many sites away as there are close.

In the analysis question of determining the predicted elevation, we observe that there are more sites closer to the river with a typical elevation < 100 meters and steepness < 1.542 degrees. When considering these two variables, the elevation seems to suggest that lower elevations would have lower steep values, therefore, the archaeologist would consider these areas rather than the darker blue as justification an initial excavation.

SOURCES:

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Photos: Castleshaw [illegible]
Hornron Edge Derwent: ESRI World Imagery
Hornron Edge Derwent: [illegible]

Coordinate System:

Create By: [illegible]

Date: [illegible]

Archaeological Site

HORNRON EDGE DERWENT (STONE CIRLE)

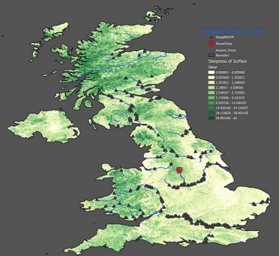
Ancient Water Name: Derventio (Dorvantium)
Latest Water Name: River Derwent
Latitude: 52.9144
Longitude: -1.4416

Ancient Site Name: (unknown)
Modern Site Name: Hornron Edge Derwent
Site Height: 428 m
Site Steepness: 8 degree angle
Site Distance: 1374 m

Basic Site and Coastal Facts:

The River Derwent was for navigation in the early 1700 but ceased later in that century. Afterward it was utilized mostly for powered textile mills, but today as hydro-electricity via turbines.

Stone Circles were utilized in some type of ritual ceremony. These stones seem to have some other usage, because there are no distinguishing features consistent with those types of stones. There are 11 upright stones, 0.1 to 0.5 meter high. Excavation is possible, because there are more then 6 potential stones that could be discovered underground.

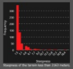


ANALYSIS OF STEEPNESS DISTANCE

Statistical Analysis:

Question: What is the probability that the average steepness will be within 2163 meters from river?

The total steepness of all sites, with a distance < 2163 meters is:
Minimum = 0
Maximum = 23
Mean = 1.394
SD = 2.021
Sites = 927
Skewness = 4.019
Confidence Level 95%: [1.2639, 1.5241]
ME 0.1301



Steepness of the terrain less than 2163 meters.

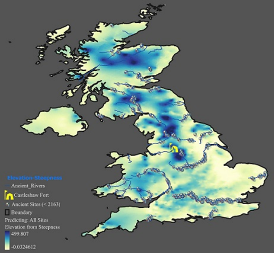
If X < 1.5241 expect,
z-score (95%) < 0.0643741, therefore,
p-value > 0.5251 then,
there is a 53% or greater chance that the average value of steepness or less will be along the river.
OR,
If X = 8 expect,
z-score (95%) > 3.26868, therefore,
p-value < 0.00054, then very unlikely to be along the river.

These values > 1.5241 would cause the null hypothesis to be rejected. There is an exceedingly small chance that the site will be along the river at this distance. Considering the "Hornron Edge Derwent", what is the cause of these types of anomalies?

If the distance from the terrain is 1374, the predicted value should be 1.4 angle. However, according to the graph this is not true, the value of steepness is 8 and the elevation is 428 meters. Although this value is implausible (p-value = 0.00054) it is not impossible. (Stone Circle)

Are there more sites along a river, less than the typical steepness value or further away?

There are around 67% of the sites less than 2163 meters away, such as waterholes, flints, scatter and roundhouse. Those sites that are exceedingly away from the river sites are such sites as stone structures and pits, at 54.7%. All of which are less than the typical value of steepness of known sites.



Archaeological Site

CASTLESHAW ROMAN FORT

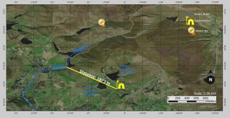
Ancient Water Name: River Tamus
Latest Water Name: River Tame
Latitude: -2.045
Longitude: 53.470

Basic Site and Coastal Facts:

The River Tame is named at two different locations in England, however, at the Greater Manchester location, it is noted as the historically boundary that divides Cheshire and Lancashire before it assists in the formation of the River Mersey.

The ancient site name, Rigodounon is not totally certain and has just been identified as the possible name for the fort name Castleshaw Roman fort, located on a hill. It was created in 79 AD. The fort was utilized as a defense mechanism by the Romans, in which, it assisted in guarding roads.

Ancient Site Name: Rigodounon
Modern Site Name: Castleshaw Roman Fort
Site Height: 6 degree angle
Site Steepness: 266 meters
Site Distance: 1873 meters
Latitude: -2.001 degrees
Longitude: 53.582 degrees



ELEVATION AND STEEPNESS

ELEVATION: Confidence Level 95%

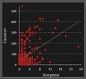
What is the probability that the confidence upper elevation of 65.172 or less will be within the distance 2163 meters from river?

If X < 65.172 expect,
z-score (95%) < 0.06444, therefore,
p-value > 0.5256 then,
there is a 53% or greater chance that the average site elevation value or less will be along the river.

If X > 100 expect,
z-score (95%) > 0.53974, therefore,
p-value < 0.2946 or 29.4%, then very unlikely for this value to be along the river.

Elevation - Steepness

Why are there anomalies at certain elevations or steepness at distance less than 2163? Does the height of an ancient site have an effect on the terrains steepness?



According to the graph, if steepness = X =18, then y = elevation = 268. Is this true? OR if, X = 1, then y = elevation = [4, 290]? Does this match the typical value?

Y = 38.9682 + 15.5890 x
Y = 318, if X = 18

This is reasonable to assume, because the higher the steepness the higher the elevation. The site at this type is a "Wall Cave". Caves are generally in steeper and more elevated places. But, if

Y = 54, X = 1

This is reasonable to assume and within the range of steep value, X=1, however, there a sites that are higher elevated, with low steepness, such as a "Round Cairn", with an elevation of 545m. These features are generally utilized as landmarks or some type of monument.

Predicting Elevation from Steepness

There are 87 of the total sites located at a steepness of 6 degrees. Of the 87 sites, 66% have elevations greater than 100 meters, suggesting a high level of anomalies at 6 degrees. Although not a typical value, considering the highlighted site that has a steepness of 6 and an elevation of 266, this would not be unreasonable for a "fort" type.

The Co-Kriging prediction map, to the left determines the prediction of the elevation via the correlation with the steepness. Overall, it states that the average distance is 99.89 meters, which is a considerable different than the typical 60.45 meters. However, based on the overall probability and relationships, we would expect that the lighter blue areas less than 99.89 to have lower steep values.