A GIS-based analysis of plantation spatial organization: Stewart Castle, Jamaica

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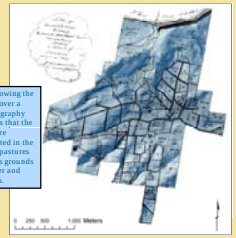
1. Models of Plantation Spatial Organization

Archaeologists and historians have traditionally employed one of two basic models to identify and analyze influential factors for spatial organization of plantation sites:

1. The **centrality of production** model: Interprets the organization of plantation space primarily based on the minimization of movement of laborers and raw materials for economic efficiency.
2. The **centrality of control** model: Interprets the same organization based on the direct surveillance of slaves and the incorporation of slave housing and slave workspaces into the planters' spatial order.

To assess the strength of the centrality of control model, GIS-based viewshed analyses are applied to determine the degree of visibility between important elements on the plantation landscape.



This image showing the 1799 plat laid over a hillshade topography map illustrates that the cane fields were primarily located in the valleys, while pastures and provisions grounds occupied hillier and steeper terrain.

2. Stewart Castle Estate

The focus of this analysis is a late 18th century plantation in northwest Jamaica known as Stewart Castle. Located on the north coast of the parish of Trelawny, the estate of James Stewart encompassed 1,230 acres, nearly 500 of which were planted with sugar cane (Panning 1995: 172).

The key elements for this analysis identified on the plat are the **slave village**, **sugar works**, **overseer's house** and the **Castle** itself. The particular locations of these points on the landscape can reveal whether the plantation was organized to maximize production or control.

Drawing by J. B. Kidd detailing the works complex and the **Castle** in the upper left corner (1815). Courtesy of DAACS.

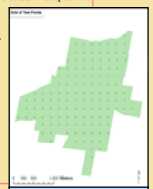
3. Why Viewshed Analysis?

→ Viewshed analysis is a valuable tool within the ArcGIS suite of functions that analyzes cells from a particular observer point and creates an output that identifies visible and non-visible areas from that point.

→ By processing elevation and topography data, viewshed analysis reveals the locations which maximize surveillance.

→ The similarity between these locations and the actual position of the elements is evaluated by the extent to which they are intervisible. If the points are not intervisible, the correspondence between actual and ideal is not significant, and surveillance was not the dominant factor of plantation spatial organization.

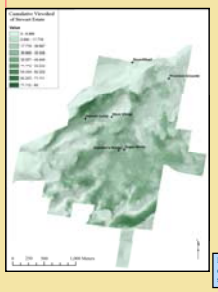
→ Thus, the viewshed function is a useful tool to judge the validity of the surveillance hypothesis using acquired data from an historic plantation rather than presumed conditions of an archetypal plantation.



A grid of points was produced to create a base set of data to test visibility across the estate. This grid contains 123 points, approximately 200 meters apart in geographic space.

4. Cumulative Viewshed

Each value generated in the cumulative viewshed for a given cell is determined by the visibility surfaces of the 123 grid points. However, given the total number of cells, this viewshed is only a sample of the estate, and all hypotheses are based on this sample.



The ranked outcome of the cumulative viewshed reveals the areas that are ideal for maximum visibility. The regions shaded according to the highest range (71.1 – 80) represent the cells from which the greatest number of points are visible, as well as the cells that are highly visible from other areas.

Castle: Cumulative viewshed value of **22**
3rd range of values (17.7 – 26.6)
5 categories from the ideal range

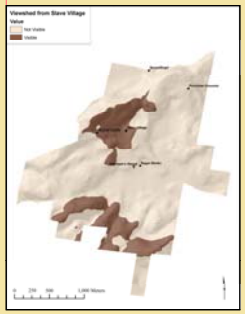
Overseer's house: Value of **27**
4th value category (26.7-35.5)
4 categories from the ideal range

This viewshed map illustrates that, while the Castle and the overseer's house had the highest visibility values out of the six identified elements, their positions on the estate were not ideal for maximum surveillance given the estate's topography.

Many singular viewsheds (from one observer point) can be combined to create a cumulative, rather than a simple Boolean, viewshed.

5. Single Viewsheds of Principal Plantation Elements

To determine the degree of **intervisibility** between elements on the landscape, individual viewsheds were created that identify which areas are visible or not visible from a specific observer point. These three viewsheds provide the most information about the intervisibility of plantation elements.



← The viewshed output from the **slave village** provides insight into what the slaves could see from their domestic space.

Visible: Stewart Castle; Southern slope of the NW ridge

Not visible: Overseer's house; Sugar works; Majority of the sugar cane fields and provision grounds

Without the influence of direct surveillance, slaves may have made their own choices about division of labor, time management and use of space in the village.

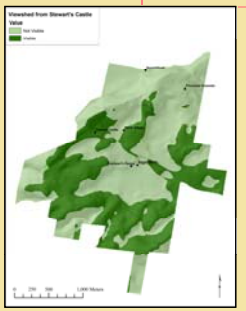
← The **overseer's house** viewshed demonstrates that, although the total amount of area visible is less than that of the Castle, the overseer could readily observe the slaves in their daily work spaces.

Visible: Sugar works; Cane fields adjacent to the works complex

Not Visible: Slave village; Provision Grounds

This location suggests that the demands of economic production were more important compared to surveillance of domestic areas.

Stewart Castle wharf.



← The **Stewart Castle** output indicates that the Castle's position does not allow for maximum surveillance of the slaves' off-hours activities.

Visible: Partial slave village; Area surrounding the Castle; Estate's western property line

Not Visible: Sugar works; Overseer's house

Given this limited visibility, Stewart must have expected his overseer to observe the processing of sugar cane and trusted him to manage it efficiently.

It is possible that the Stewarts chose a location that provided a prominent view of the surrounding area for defensive purposes, adding to the protection of its bastions and walled enclosure.

Castle courtyard wall with imbedded wine bottle glass shards.

Castle walls with tower and **gunports**.

6. Evaluating the Surveillance Model

The results of the **cumulative viewshed** and **single viewshed** analyses contrast with the surveillance argument, which presumes that the great house and the overseer's house were centers of observation designed to maintain plantation hierarchy.

- The **Castle** was in a less than ideal location for observation of slaves in the village and the works. While the house's structure offers defense from bands of maroons or the estate's slave population, its location does not provide for daily observation.
- The **overseer's house** near the sugar works was not in a position to see the **slave village**. Thus, while surveillance was involved in the daily management of production, it was not the organizing principle of the slaves' domestic space.
- The surveillance model clearly does not hold for the spatial organization of Stewart Castle estate. Other factors such as economic efficiency, topography and agricultural requirements governed the placement of key plantation elements.
- Any model of plantation landscapes should acknowledge the significance of space to the perpetuation of the plantation system, and its role in the relationships between planter, overseer and slaves.

References

Panning, Steven (1995) "Exploring Stewart Castle Estate." Pp. 172-179 (Part 1), 198-205 (Part 2). *Jamaican Historical Journal*. Courtesy of DAACS.

Wheatley, David (1995) Cumulative Viewshed Analysis: a GIS-based method for investigating intervisibility, and its archaeological application. *Archaeology and Geographical Information Systems: a European Perspective*, G. Lock and Z. Stancic, pp. 171-186.

Acknowledgements

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