

A Preliminary Viewshed Analysis of Archaeological Sites Near Coropuna from GeoPACHA Data



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Discussion

Introduction

This analysis asks if sites from the Late Intermediate (LIP) through early colonial period (1000-1600 CE) have larger or smaller viewsheds than viewsheds generated from randomly generated points. This question is important because Andean culture was highly intertwined with the natural landscape and lower-than-random visibility across a landscape and to prominent *apu* like Coropuna could indicate that political forces like the Spanish-directed resettlement to *reducciones* wrested Andeans away from their environment and thus part of their identity.¹

Data

A GeoPACHA (Geospatial Platform for Andean Culture, History and Archaeology) database query identified 105 archaeological sites dated to the Late Horizon or LIP that were within a 70 km radius of Coropuna. The suitability polygon was created from areas in the DEM (USGS 30m STRM resampled at 90m) that were between 2300masl-4800masl and had less than a 30% slope gradient.² 105 random points were generated within this suitability polygon. 105 additional points were generated within a 70km radius of Coropuna.

Methodology

I generated three cumulative viewsheds in QGIS: one for the Late Horizon/LIP points, one for the randomly generated points in the suitability polygon, and one for the randomly generated points within the 70km radius of Coropuna. I then calculated the total area observed by each viewpoint (Table 1) and the average number of viewpoints per viewshed that saw Coropuna (Table 2).

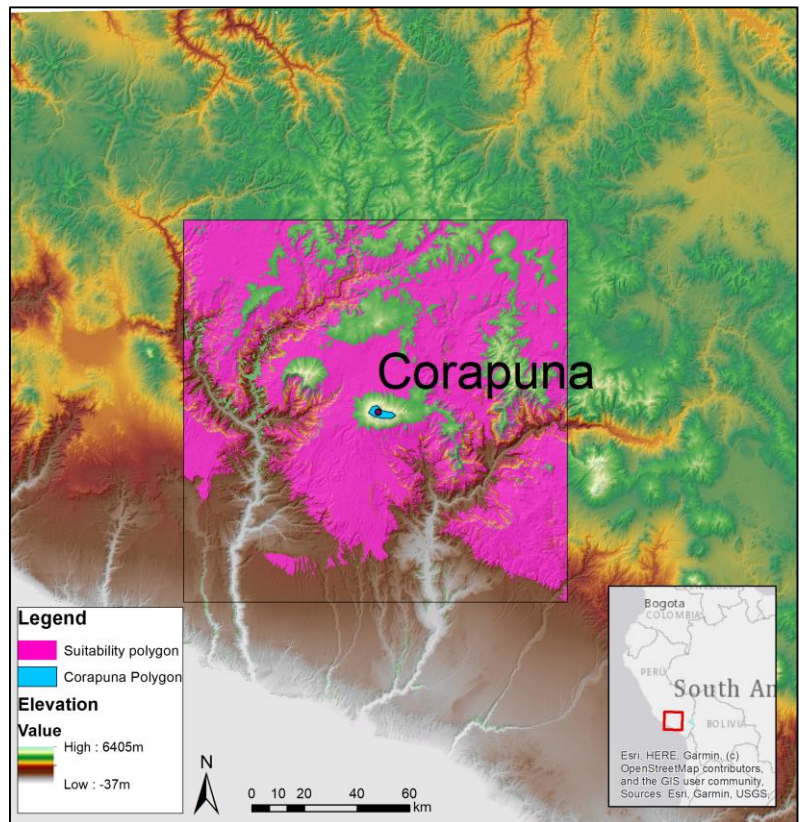


Fig. 1 Area Map

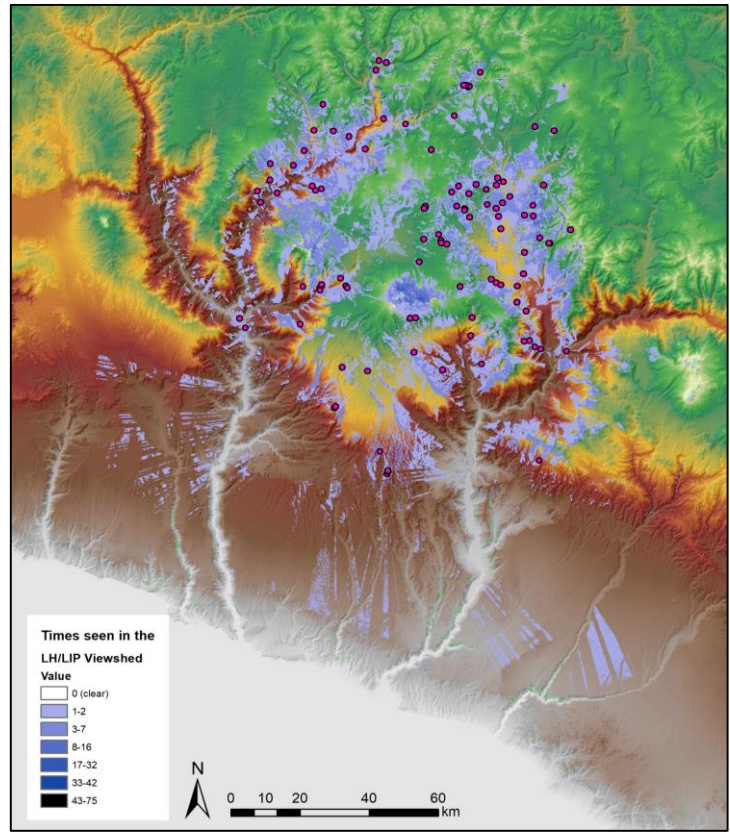


Fig. 2 LH/LIP Viewshed

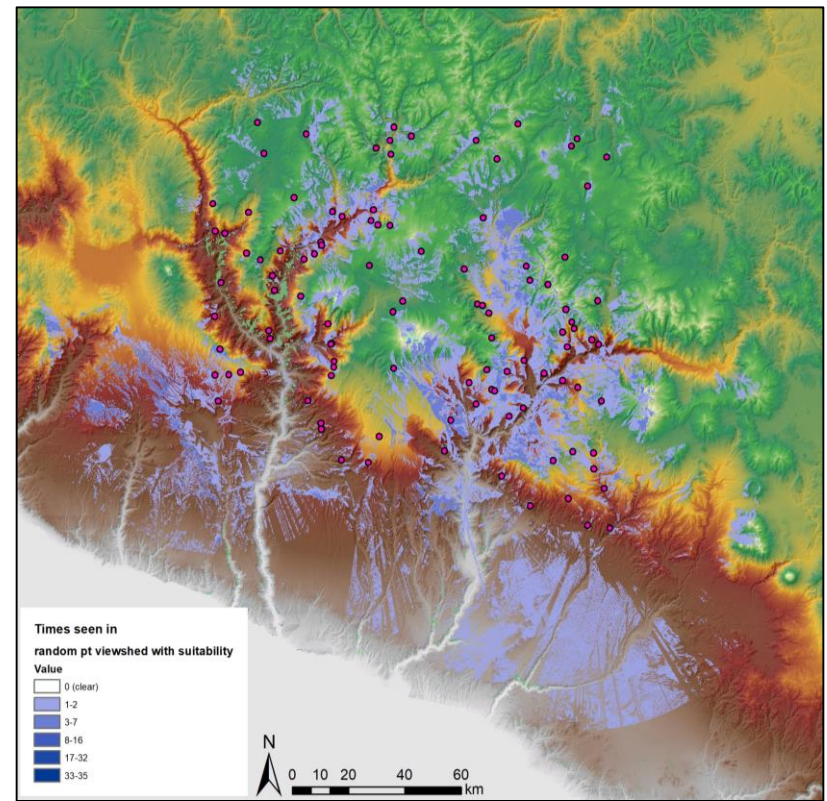


Fig. 3 Suitability Random Point Viewshed (SRPV)

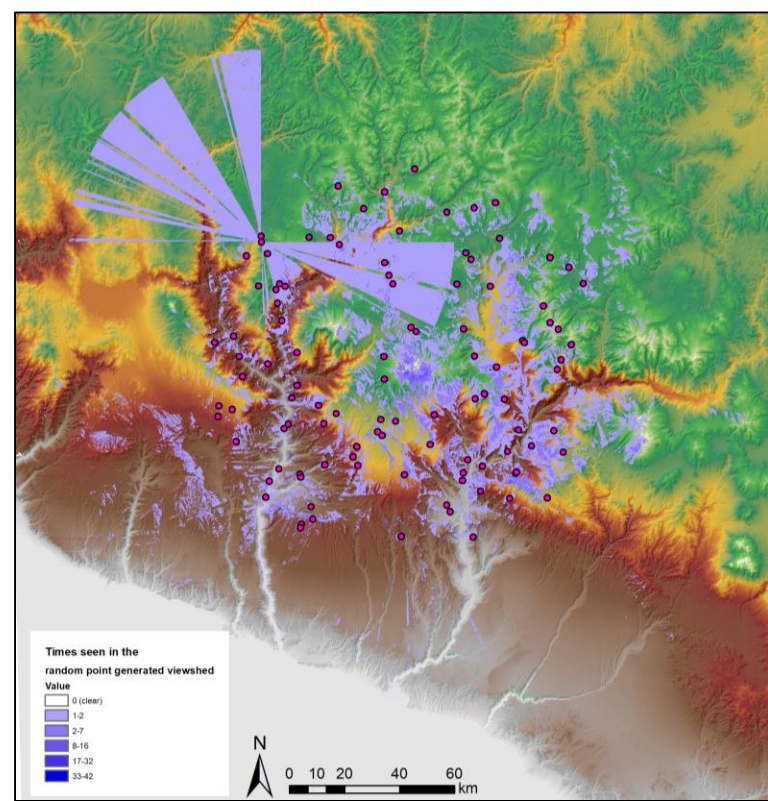


Fig. 4 Random Point Viewshed (RPV)

The SRPV was least likely to have areas seen by more than one viewpoint. Because it was optimized to exist away from steep landscape features like river gorges, I expected the SRPV to have better visibility than at least the RPV. However, this was not the case. The LH/LIP viewshed was the most likely of the three viewsheds to contain areas seen by 25 or more viewpoints. It was also the viewshed that had the most coverage of the Coropuna summit (Table 2). The LH/LIP viewshed also had the lowest total area seen by 1 to 9 points, which might indicate that settlements were built in places where they could not be easily seen by their neighbors. The LH/LIP viewshed also had the highest number of cells in the survey area seen by no viewpoints (Table 1).

Viewshed Area (km²) at Various Observer Point Thresholds (Table 1)

Point Threshold	LH/LIP	Random	Random with Suitability
25 or more points	13.75	4.65	2.26
10 to 24 points	61.09	40.29	24.49
1 to 9 points	4815.53	101098.5	9051.35
Area not in viewshed	96253.08	92282.51	92065.33

Average number of viewshed points able to see Coropuna (Table 2)

Viewshed	LH/LIP	Random	Random with Suitability
Number of points	7.07	3.49	0.96

References

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