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# *Classifying Sites in the Ventura Hillsides for Acquisition by the Ventura Hillsides Conservancy*

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## Significance

The Ventura Hillsides represent one of a few areas in and around the City of Ventura, California, where natural open space exists. In recent years, the Ventura Hillsides have experienced increasing political pressure for development.

After Ventura voters defeated a measure in 2002 to develop the Hillsides, a group of citizens were inspired to take action by creating an organization with the goal of acquiring hillside property for permanent preservation as open space. This group established the Ventura Hillsides Conservancy (VHC) in 2003. The VHC has established a Priority Acquisition Area (PAA) located just north of the City of Ventura **(Figure 1)**.


Figure 1. The VHC's Priority Acquisition Area (PAA) in the Ventura Hillsides, Ventura, CA.

## Problem Statement

The VHC intends to acquire hillside land to protect areas that provide: (i) Biological Resources (native plant or wildlife value, native habitat value, and restoration potential); (ii) Recreational Resources (public access, trail connectivity, and interpretive value); and (iii) Visual Resources (ridgelines, viewsheds, and vistas). If the VHC acquires the land, management and restoration practices can be incorporated to improve the habitat, recreational, and scenic resources of the Ventura Hillsides.

The goal of this group project is to assist the VHC in making future acquisition decisions within the Ventura Hillsides. The process of making acquisition decisions is challenging, given the variety of factors that must be considered when determining which parcels to acquire. Factors to be considered include the resource quality of sites, the opportunity for acquisition, the threat of development, and the level of funding and public support. To address these factors, we developed a framework of decision-making tools that the VHC can utilize to guide their acquisition and prioritization decisions.

## Method and Approach

Our framework consists of three decision-making tools: 1) a criteria-scoring system that ranks sites according to resource quality, 2) a portfolio analysis that considers the synergistic value of multiple sites, and 3) a parcel checklist that takes into account the socioeconomic considerations of acquiring parcels **(Figure 2)**.

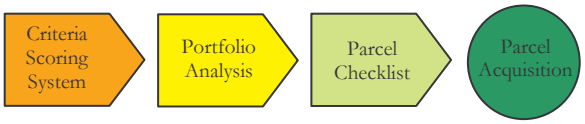


Figure 2. A conceptual model of the comprehensive acquisition framework developed for the VHC.

These tools are the result of an extensive literature review, meeting with leaders in the conservation planning field, and consultation with non-profit organizations ranging from global conservation groups to local land trusts.

*Criteria Scoring System*

The VHC's Acquisition Strategy specifies that all proposed acquisitions should include one or more of the following rubrics:

1. Native Plant or Wildlife Value, Native Habitat Value, and Restoration Potential
2. Public Access and Recreation (PAR)
3. Scenic Resources, such as Ridgelines and Viewsheds [1]

The criteria scoring system is based on the three rubrics above. These resources are significant to the VHC's mission, and after consultation with the VHC and professionals in the conservation field, we developed detailed criteria for each of these three rubrics that would assist us in evaluating sites within the Hillsides **(Table 1)**.

We then developed a scoring methodology that was modeled after The Nature Conservancy's method of scoring and ranking the biodiversity status at sites.[2] After evaluating the biological, recreational, and scenic resources of the Hillsides using ArcGIS software, we assigned a score for each of the criteria ranging from 1 to 4, with a 4 having the highest resource quality and a 1 having the lowest resource quality. Scores for all criteria were combined to produce a score for each of the three rubrics **(Figure 3)**.

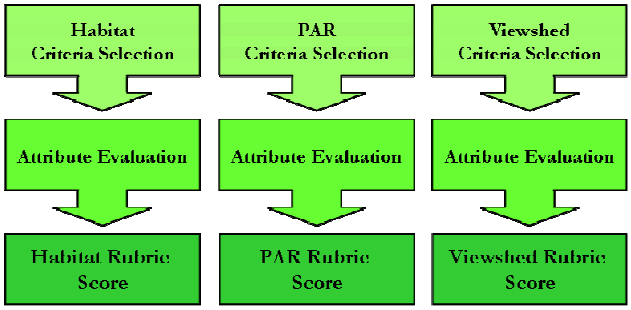


Figure 3. A conceptual model of the criteria scoring system.

After developing our criteria, we determined the data sources that would be necessary to evaluate the resource quality of the Hillsides. For example, a high resolution vegetation map would be necessary to assess many of the individual criteria layers. Because such data did not exist, we delineated vegetation series from aerial photographs taken in July 2002 **(Figure 4)**.

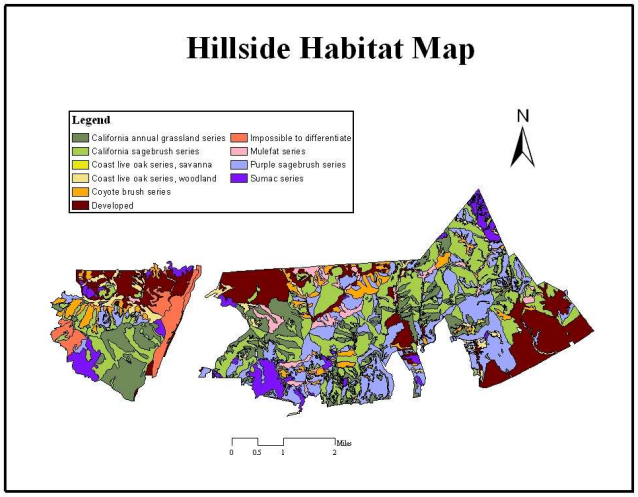


Figure 4. Map of the vegetation series for the Ventura Hillsides.

Access to the Hillsides was limited, so many of our analyses relied heavily on remotely sensed data. In addition, we incorporated city roads, political and property boundaries, a digital elevation model (DEM), a wetlands map, and existing roads and trails into a Geographic Information System (GIS) database.

Using our criteria scoring system, we assigned scores to criteria layers within the GIS. These layers contained the scores of habitat attributes, trail characteristics, and visual resource qualities. We evaluated criteria at the one-acre level to provide sufficient detail in evaluating small and large parcels alike.

Table 1. Criteria layers scored in the Criteria Scoring System.

| Habitat, Wildlife, and Restoration Potential | Public Access and Recreation | Visual Resources |
|---|---|---|
| Sensitive Habitat | Public Access | Disturbance |
| Wetlands | Habitat Diversity | Distinguishing Landforms |
| Sensitive Species | Grade Variability | Contiguity |
| CNDDB Occurrence | Cultural Significance | |
| Development Threat | Connectivity | |
| Human Disturbance | Scenic Resources | |
| Restoration | | |
| Corridors | | |

Using a simple additive weighting (SAW) procedure, we overlaid the one-acre grids for each criterion layer to form total score layers for each rubric, and then the three rubric layers to create the combined rubric result **(Figure 5)**. The adjustable weighted overlay function of ArcGIS allowed us to weight all rubrics equally for

[1] The Ventura Hillsides Conservancy, 2004. Acquisition Strategy. An internal document forwarded by the Conservancy in April 2004.
[2] The Nature Conservancy, 2000. The Five-S Framework for Site Conservation: A Practitioner's Handbook for Site Conservation Planning and Measuring Conservation Success, Washington, DC.

this example, yet design a system that would allow the VHC to change the rubric weights to meet their conservation priorities. This was accomplished by assigning percentage importance (0-100%) to each input layer in the SAW process. This parameter can make one layer very important, or of little influence, dependent on the priorities of the user.

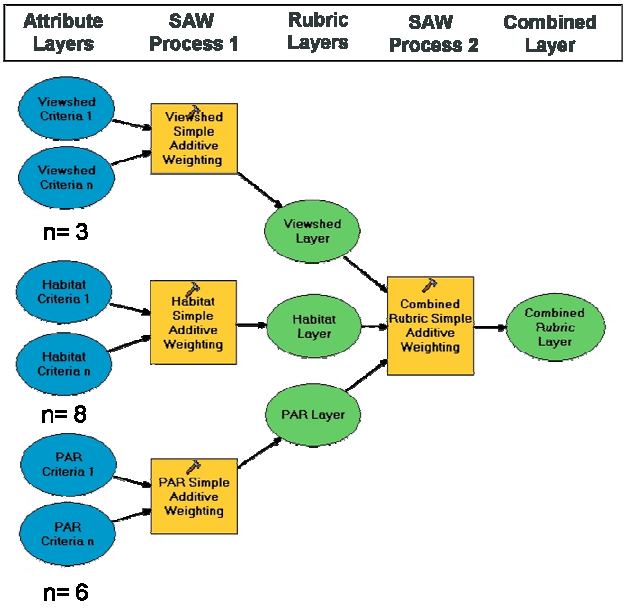


Figure 5. Adjustable weighted overlay model using simple additive weighting to combine criteria layers within rubrics (with n=number of criteria layers from Table 1), and to combine the rubric layers to create a final result.

## Results

We created maps showing total rubric scores and highlighted regions of high-scoring sites for each resource category **(Figure 6)**. Our scoring results for the one-acre units are displayed on maps of the VHC's PAA, showing areas with a score of 4 in green, 3 in yellow, 2 in orange, and 1 in red.

Figure 7 illustrates the scoring distribution for the three rubrics combined. The highest scoring areas (scores of 4 and 3 designating higher resource quality) mainly occurred along the frontal slopes, adjacent to the city limits **(Figure 7)**. This result was not unexpected due to the importance of visibility and ease of access for the viewshed and PAR rubrics, respectively.

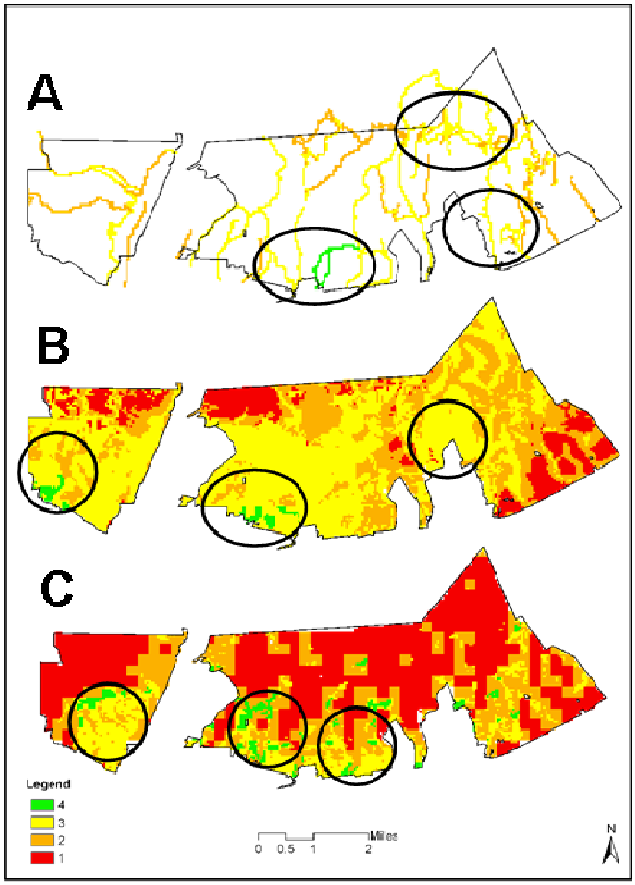


Figure 6. Maps of the VHC's PAA showing high-scoring regions for the rubrics (A) Public Access and Recreation, (B) Habitat, and (C) Viewshed. Regions with high scores are indicated by circles.

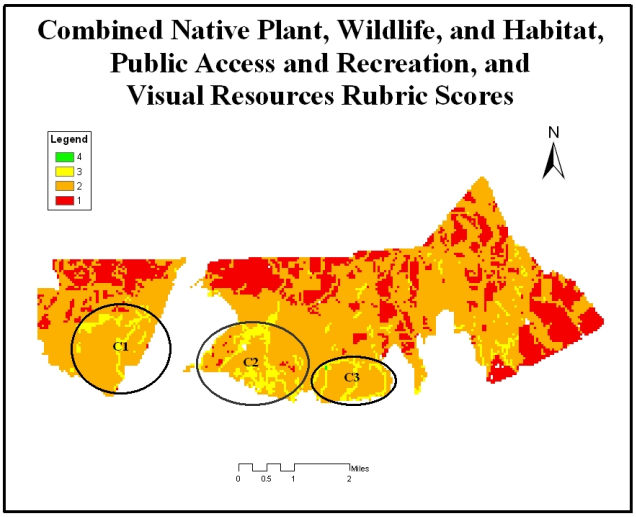


Figure 5. A map of the VHC's PAA showing high-scoring regions for the three resource rubrics combined. Regions with high scores are enclosed in circles C1, C2, and C3.

**Additional Analysis**

Our method produced a scoring distribution on a one-acre level. We also saw the usefulness in providing scores on the parcel level, since this is the scale at which the VHC will ultimately make acquisition decisions. We calculated parcel statistics by averaging the area weighted score. Additionally, using an alternative combination technique, we squared the score range, and then summed the results like the previous technique. This method gives added weight to areas that score above average.

The criteria scoring system is based upon a snapshot of information about the quality of natural resources within the Hillsides at a given time. However, the process of acquiring parcels is dynamic and cannot simply be achieved by acquiring individual sites based solely on resource quality. Therefore, we provided the VHC with two additional tools, a portfolio analysis and a parcel checklist, to complete their acquisition framework.

*Portfolio Analysis*

The portfolio analysis takes into account the value of sites from a system perspective. While a parcel by itself may not have any resource value, it may serve as an important connector between two parcels that have significant resource value. Therefore, we selected groups of parcels that provide habitat connectivity, trail connectivity, and viewshed connectivity. For each portfolio, we chose parcels by locating high-scoring sites for each rubric and determining which parcels would maximize the connectivity of high-scoring sites. If multiple parcels become available for acquisition, the VHC will be able to choose groups of parcels that have synergistic value when acquired together.

*Parcel Checklist*

Finally, we developed a parcel checklist, modeled after the checklist used by The Land Trust for Santa Barbara County.[3] The objectives of the parcel checklist are to determine whether a site meets a minimum threshold for acquisition, to ensure that sites provide benefits for the public, and to certify that sites do not have any undesirable qualities. Furthermore, the checklist accounts for information, such as social and economic factors, that could not be determined through the scoring method.

**Conclusion**

The VHC is faced with the challenge of forming an acquisition strategy that encompasses a variety of considerations. Our comprehensive acquisition framework considers scientific, social, and economic factors and provides the VHC with a systematic process for making acquisition decisions.

The criteria scoring system and GIS database synthesize information for the VHC's PAA and provide a general understanding of the resource quality of sites. We anticipate that resource quality will change through time and that additional assessments will provide more accurate information about the sites. Therefore, to supplement the GIS, we also recommend an on-site assessment once parcels become available so that current information about sites can be evaluated. We created the criteria scoring system so that the VHC can update criteria scores when more information is provided.

In addition, we generated the criteria scoring system so that the VHC can apply weights to criteria or rubric scores. This will allow the VHC to identify sites with high scores in a particular resource and will assist the VHC in gaining funding for protecting individual resources.

With the criteria scoring system, portfolio analysis, and parcel checklist, the VHC is well positioned to succeed in their mission of preserving "the hillsides, canyons, and open space that contributes to the unique character and natural environment of the City of San Buenaventura and the surrounding region for the benefit of present and future generations."[4]

[3] Land Trust for Santa Barbara County, 2003. Land and Conservation Easement Project: Selection Criteria and Checklists (Rev. Draft). An internal document forwarded by the Land Trust in November 2004.

[4] The Ventura Hillsides Conservancy, Acquisition Strategy.