S.B. Riparian Canopy Coverage: Comparing Restored, Non-Urban, and Urban Sites

INTRODUCTION

This project looked at the potential success of riparian habitat restoration by calculating the percent canopy coverages (PCC) of trees within riparian zones. Riparian zones are classified as the interfaces between land and rivers. They provide a wide range of ecosystem services that include reducing runoff, increasing soil stability, improving water quality, and creating habitat space for native animal and plant species. Urban development in the Santa Barbara County has reduced riparian habitat abundance. These ecosystems are currently under threat.

It is important to restore riparian habitats to re-establish their ecosystem functions. Riparian canopy cover moderates stream temperature through shading. It also acts as an indicator for conditions that control bank stability and the potential input of particulate organic material. This project analyzed tree canopy coverage densities for urban and non-urban riparian habitats within Santa Barbara County; these canopy coverage densities were compared to the projected canopy coverage of a newly-restored riparian site. This information can be used to recommend spatial layouts for tree plantings in future riparian restoration sites.

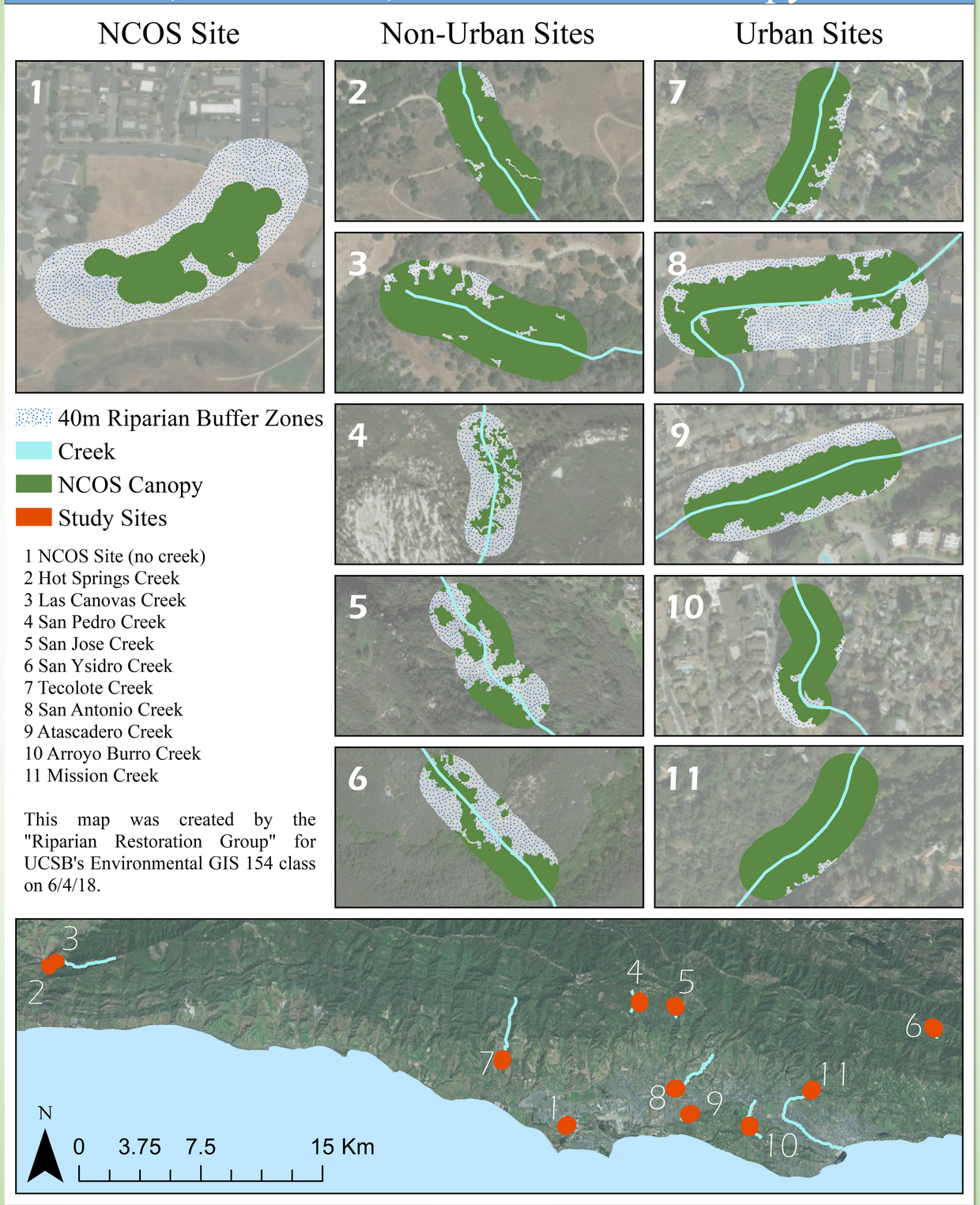
STUDY AREA

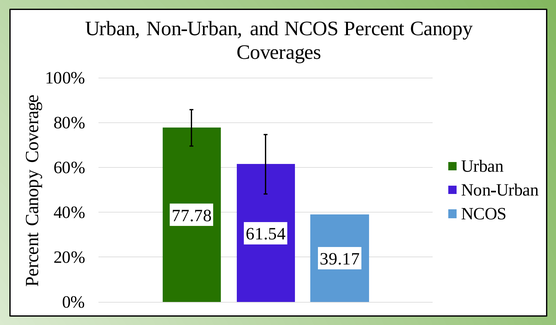
Our study focused on the riparian portion of the North Campus Open Space (NCOS) project near UCSB in Santa Barbara County. This area was originally the point at which several creeks flowed into a wetland, and is currently undergoing extensive restoration work after being developed into a golf course. The main wetland restoration effort is managed by the Cheadle Center for Biodiversity and Ecological Restoration (CCBER). A small portion of riparian restoration is being conducted by Your Children's Trees (YCT). YCT is a student organization and nonprofit that specializes in urban forestry and native trees. Trees are grown from seeds or locally collected cuttings, then planted by students and volunteers under the guidance of a certified master arborist. Our study site is just one part of the larger effort to create functional ecosystems composed of native plant species.

METHODS

1). Obtained the coordinates of 102 trees (six different species) planted at NCOS by YCT.
2). Generated predicted canopy cover buffers in ArcGIS for each individual full-grown tree based on species.
3). Identified five urban and five non-urban riparian creeks within Santa Barbara County.
4). Outlined 160 meter sections along each creek and created 40 meter buffer zones along these sections to define the riparian zones.
5). Within the zones, outlined non-forested areas by drawing polygons.
6). Used the "Erase" tool in ArcGIS to delete non-forested areas from their respective buffer zones to determine canopy coverage within the riparian zones.
7). Used statistical analysis to compare PCCs between urban sites, non-urban sites, and the NCOS site.

NCOS, Non-Urban, and Urban Site Canopy Covers





ANALYSIS

The bar graph depicts the mean PCC per site type. The mean PCC for urban sites was 78%, for non-urban sites 62%, and for the restored NCOS site 39%. Despite the urban mean being greater than the non-urban mean, the overlapping standard error bars on the bar graph qualitatively demonstrate that the PCCs of the urban and non-urban sites were not statistically significantly different. Although the standard error range spanning the mean PCC for the non-urban sites did not encompass the PCC value for the NCOS site, the PCC value for the NCOS site was closer to the mean PCC value for the non-urban sites than that of the urban sites.

Experimental error influencing the results could include having used small sample sizes; only five sites were used for the urban and non-urban categories and one site for the restored category. Another error could include variances in creek environmental factors (such as water availability, nutrient density, and slope steepness), which could bias a site's respective PCC.

The process of calculating PCCs based on satellite images may also have introduced errors. It was often difficult to differentiate between trees and shrubbery. Additionally, native and non-native plant species could not be differentiated.

CONCLUSIONS

This study found that while there was a lower PCC at non-urban sites, there was too much variation between sites and too low a sample size to draw any reliable statistical conclusions. Further, PCC alone is not an accurate estimation of restoration goals. There are other factors that must be taken into account such as differentiating between native and invasive species.

The NCOS PCC value was the lowest value and closer to the mean non-urban PCC value than the mean urban PCC value. Based on the results of this study, it is suggested that more trees or other vegetation be planted at the NCOS restoration site to make the projected NCOS PCC value closer to the mean PCC value of the non-urban sites.

LITERATURE CITED

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