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The Differences in Vegetation Type on North and South-Facing Slopes

By: Andrew Villablanca, Katherine McCabe, and Daniel Galuhn

Abstract:

Our project investigated the relationship between climate change and vegetation type conversion in the Santa Monica Mountains on north and south facing slopes. Our hypothesis is that with a shift in climate towards dryer, hotter, and longer summers, and shorter and dryer winters, we will see a shift in the density of native chaparral in the Santa Monica mountains, and possibly an influx of non-native species. We tested this hypothesis by choosing three study sites that were on north/south ridgelines to simulate a dryer, harsher climate (south) and a more temperate climate (north). Using the point-quarter method to measure the prevalence of each type of plant in each study area we were able to determine what was growing on each slope. Our investigation is significant and relevant because if our hypothesis is correct, and there is a shift towards coastal sage and non-natives in areas that normally had chaparral, there would be serious consequences for the ecosystem and humans. An increase in smaller plants would decrease fire interval, which is dangerous to humans and is devastating to the plant infrastructure as it creates a positive feedback loop that promotes the influx of dry flash fuel invasive and exacerbates the decrease of the fire return interval.

Introduction:

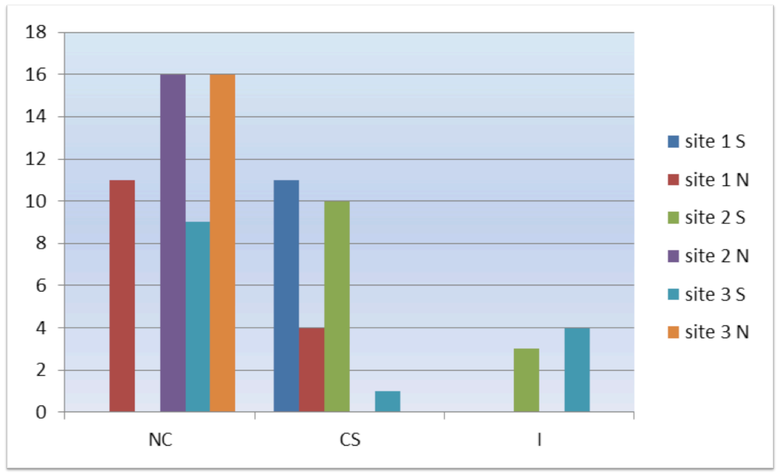
Currently, climate change is a pressing matter that affects more than just distant places; the impacts of global climate change are already visible in the Santa Monica mountains—plants are noticeably dryer, rainfall is down, and temperatures have risen. We aim to study the effects of this change on Vegetation-type conversion. This is the process by which non-native plant species are introduced to the environment and cause native species to die out. This poses a huge threat to the Santa Monica Mountains as a conversion of chaparral to coastal sage or invasive species has shortened the local fire return interval from 20 years to 6 years in some locations. This puts the health of the ecosystem, wildlife, and human lives in danger. Our hypothesis investigated whether or not the drier, hotter sides of slopes that mimic climate change have an increased prevalence of invasive plants due to vegetation-type conversion.

Materials and Methods:

For our study sites, we chose three north and south slopes in the Malibu area of the Santa Monica Mountains. These sites were carefully selected so they could best represent the effects of climate change. As for our method, we used the point-quarter method at each of our three locations to measure the plant-to-plant distance, the diameter at the ground of each plant, the height of each plant, as well as what type of plant was recorded (Native Chaparral (NC), Invasive (I) , or Coastal Sage (CS)). This process was repeated four times on each side of the slope at the three sites in order to establish a means of comparison.

Results:

Figure 1: Prevalence of Plant Type



Discussion:

It appears that Native Chaparral (NC) was more dominant on north facing slopes primarily because of sun exposure and amount of moisture. Adversely, Coastal Sage (CS) vegetation type conversion is occurring on south facing slopes, as there are almost no live chaparral species. These results reflect that while our hypothesis was wrong, our reasoning and consideration of all environmental factors were correct.

Conclusion:

Our results showed that chaparral was more prevalent, as well as more healthy on North facing slopes. On south slopes, there is an apparent vegetation type conversion to costal sage, which allows for the infiltration of invasive species.

Acknowledgements :

We'd like to thank Dr. Stephen Davis, Nicholas Huron, and Taylor Stucky for their contributions in our investigation.

Figure 2: Coastal Sage

Figure 3: Invasive grass

Figure 4: Native chaparral

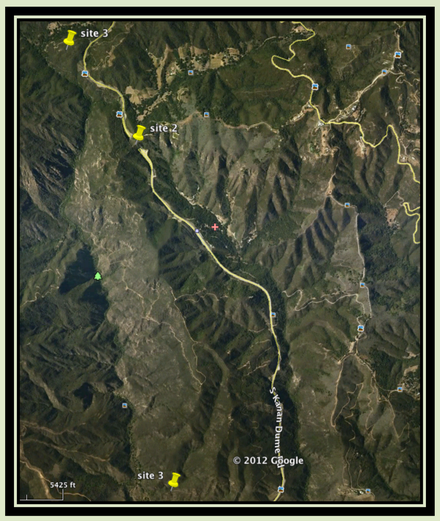


Figure 5:
Our study sites:

#1: 34°04'54.35" N
118°49'16.85" W

#2: 34°04'21.89" N
118°48'49.19" W

#3: 34°02'23.93" N
118°48'36.32" W

Literature Cited:

Jacobsen A.L., S.D. Davis, and S.L. Fabritius. Fire Frequency Impacts Non-Sprouting Chaparral Shrubs in the Santa Monica Mountains of Southern California. 2004. In Ecology, Conservation and Management of Mediterannean Climate Ecosystems. Eds. M. Arianoutsou and V.P.. Papanastasis. Millpress, Netherlands.

Keeley, J. E. (2000). Fire and invasive species in Mediterranean-climate ecosystems of California. In *Proceedings of the invasive species workshop: the role of fire in the control and spread of invasive species. Fire Conference* (pp. 81-94).

Ng, Edward and Philip Miller.1980. Soil moisture relations in the Southern California Chaparral. Ecology, 6(1) , pp.98-107

Poole, Dennis K. and Miller, Philip C. Water Relations of Selected Species of Chaparral and Coastal Sage Communities *Ecology* , Vol. 56, No. 5 (Late Summer, 1975), pp. 1118-1128

Riggan, Philip J., Goode, Suzanne, Jacks, Paula M., and Lockwood, Robert N.. Interaction of Fire and Community Development in Chaparral of Southern California. *Ecological Monographs* , Vol. 58, No. 3 (Sep., 1988), pp. 155-176