Examining Indigenous Led and Non-Indigenous Led Burning on Herbivory in Plants

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Introduction

The land reflects the people, practices, and values which inform its stewardship. However, over time this can become skewed based on the people that call the land home. In the case of America's landscape, and the contribution from Indigenous peoples and groups, much of its history remains misrepresented or untold due to colonization, assimilation, and violence. One practice for which our understanding is growing in North America is cultural burning. Cultural burning is a practice done by numerous Indigenous groups in order to improve the qualities and densities of ecocultural resources central to subsistence and spiritual practices. This practice is a powerful, Indigenous-led tool for stewarding the landscape of North America, including California. Cultural burning has practical uses, like clearing sites, and spiritual uses, such as connecting and taking responsibility for the land, and ecological uses, including reducing pests populations within important plants. This greatly influenced pre-invasion vegetation in forests, which contradicts the belief that western forests were shaped primarily by wildfire.

Unfortunately, shortly after Euro-Americans arrived and began colonization in the 19th century, the fire suppression era began (Kimmerer & Lake, 2001). This was an influx of beliefs and subsequent legislation on behalf of colonists that fire is solely disastrous and dangerous and should therefore be suppressed (Arno, 1985; Lewis, 1982). This movement was also manifested in the removal and assimilation of Native American tribes, which resulted in the consequential absence of Indigenous land management practices (Kimmerer & Lake, 2001). It has been found that fire suppression promotes landscape homogeneity, which therefore leads to problems of disease and insect dominance. Thus, the once lush, mosaic land that was maintained by burning (Barrett 2000), is no longer visible. Now, we see the extension of the fire season, high forest

density, and a lack of biodiversity. In an effort to combat this, national forest policy now calls for forest managers to recreate forests that mimic pre-settlement (Babbitt, 1998).

With this shift comes an opportunity to mesh knowledge systems in order to help resolve land management and subsequent climate change issues. This includes Indigenous Knowledge, which is Indigenous communities' metaphysical and biophysical understandings of their environment. Within Indigenous Knowledge there are other knowledge systems, including Traditional Ecological Knowledge (TEK) and Traditional Fire Knowledge, which are ecological and fire-related beliefs and practices that Native individuals have about their environment. It is important to note that this is not a comprehensive list of Indigenous knowledge systems, nor are they a fixed body of teachings. They are constantly changing due to the interactions between Indigenous people and the environment, respective spiritualities, and also the generational oral transmission that occurs within tribes and families (Lake, 2021). Western science is rooted in empirical data and materialism and is taken more seriously in policy and academic spaces (Mazzocchi, 2006). I argue that combining both of these knowledge systems presents the best opportunity to battle land management and climate change issues. This is due to the fact that Indigenous people hold the Traditional Knowledge key to land management, formed from centuries of interacting with their environment, and westerners have a different set of quantitative tools that they use to examine ecological phenomena. In order to revert the landscape back to its original health, both methodologies should be used to implement informed land management techniques.

The purpose of this project is to collaborate with Indigenous people local to Davis, CA and understand the Indigenous Knowledge they have about plants and herbivores. The aim is to use both Traditional Knowledge and western science to understand the effect cultural fire might

have on local herbivore populations. In addition to understanding ecological implications, this project could be utilized to fight for Indigenous land autonomy, better understand Indigenous communities, and solve land management issues.

This pilot project will build upon past knowledge and utilize mixed qualitative and quantitative methods to show the effect of Indigenous and non-Indigenous led burning on herbivory in plants deemed culturally significant within the Cache Creek area. One of the many benefits of cultural burning recorded is the reduction of insect populations in specific and important plant species in hopes to eliminate herbivory, the consumption of plants by animals (Long et al, 2015). However, literature on specific effects is not common.

I will be using qualitative and quantitative methods, informed by TEK, to assess questions surrounding plants, herbivory, and their relationship. Community-based participatory research (CBPR) approaches will be the foundation of the research method framework in order to ethically and efficiently gather findings. Unethical research practices have taken advantage of Indigenous peoples over the course of history. Anthropology in particular has been critiqued by Indigenous scholars for biased interpretations and misconceptions during the research process (Deloria, 1988). Others have critiqued researchers for doing research without any useful implications or understandings. These research practices often resulted in Indigenous peoples being treated as objects for experimentation and observation instead of complex human beings (Deloria, 1988). It is vital to deconstruct the research done in the past by collaborating with Indigenous peoples in the research process and being transparent with findings and publications. CBPR provides an approach to do so and will therefore be integrated throughout the process of this research. The data collection for this project will include interviews with tribal and community members of this area in conjunction with the post-burn examination of herbivory

upon select plant species over different time intervals. Currently, interviews are beginning to take place, but fieldwork has yet to be started. Overall, this project aims to demonstrate the value of Traditional Ecological Knowledge (TEK) through CBPR approaches and translate this knowledge into western academia.

Methods

Overview

This project will use a combination of qualitative and quantitative research methods in order to accurately combine Traditional Ecological Knowledge with western science. Historically, Indigenous knowledge has been mostly displayed and communicated through qualitative and anecdotal sources (Kimmerer & Lake, 2001). In contrast, western ecological science tends to heavily rely on statistical findings and interpretations. However, both of these knowledge systems can delve into their qualitative and quantitative counterparts. The relationship of western science and Indigenous knowledge is complex, and it is important not to limit either approach to a sole form of data collection or perception. But, when looking at environmental information over the course of history, pre-invasion and post-invasion, one can notice these general trends within North America. Utilizing a mixed methods approach ensures that the information will be acquired efficiently and accurately.

Community Based Participatory Research (CBPR) Approaches

Community Based Participatory Research (CBPR) approaches will be the foundation of the research framework. CBPR intends to challenge the hierarchies of knowledge by including non-academic partners as legitimate experts (Israel et al, 2020). CBPR was determined to be embedded in this research in order to ethically acquire Indigenous knowledge by being in partnership with the Indigenous individuals themselves. Specifically, CBPR will be followed by

incorporating cultural practitioners, Indigenous leaders, and conservancy administrators as peers and leaders during the entire research process. CBPR has been implemented in the preliminary phase of this project. This includes establishing open communication with community leaders. To verify the interest of Indigenous community members, I attended community events where I was able to speak to Tending and Gathering Garden Steering Committee members and volunteers about the questions and concerns they have about the ecology of the garden. From those initial conversations, I formed a proposal and received feedback from a basket weaver and culture bearer in the garden. I have been in constant contact with Indigenous leaders and Conservancy administration in order to ensure that I am both respecting boundaries and working towards common goals. There has also been a continual submission of research documents and plans, and my own participation in community-building activities outside of research. CBPR has informed and guided both qualitative and quantitative research protocols.

Qualitative Methods

In order to observe ideas about the effect of Indigenous-led and non-Indigenous led burning on culturally significant plants, interviews will be conducted. The interview questionnaire centers around the central research question: How does Indigenous and non-Indigenous led burning affect herbivory in culturally significant plants of the Cache Creek area? Questions were constructed based on conversations with Indigenous individuals where I inquired about their research interests and how research can assist the community. It was also composed with the help of my research mentors, where they assisted me in editing the interview script. The participants of these interviews were chosen from personal connections, networking, and internet exploration. These individuals will include Indigenous peoples, non-Indigenous community members, and Cache Creek Conservancy administrators. Participants were also chosen because

of their knowledge on Indigenous Knowledge, ecology, and environmental studies. The research is currently in the process of reaching out to participants and scheduling zoom, phone call, and in-person interviews. I hope to record these interviews and then transcribe them in order to form conclusions at a later time. Analysis will focus on interviewees' perceptions of the effect of burning on plants and the differences between Indigenous-led and non-Indigenous led burning.

Quantitative Methods

The quantitative portion of this research will only focus on cultural burning effects on herbivory, since evaluating non-Indigenous fire is not feasible to measure based on time restraints and available resources. To encapsulate the effect of cultural burning using conventional western scientific methods, I plan to obtain fire records from the Cache Creek Conservancy of the Tending and Gathering Garden (TGG), which is a small portion of land where local Indigenous people gather to participate in cultural activities. A total of three quadrats, of different elapsed time since a cultural burn has occurred, will be randomly chosen within the TGG. They will be a size of 1 meter by 1 meter and herbivory will be measured within them. The percent of plant consumed by herbivores will be estimated and then Excel will be used to evaluate how herbivory changes over time since a burn has occurred. I hope to then form statistical conclusions and trends.

Discussion

Because this is a community-based process, the results thus far include the study itself which was collaboratively developed using Community Based Research Methods. The next phase is implementation. I predict qualitative results will involve the participants' discussion of the harsh effects of colonization that their communities are still experiencing. Including, the struggle for land autonomy, the bleak condition of the environment, and the dispossession of

culture and resources. I also strongly believe that interviewees will discuss how Indigenous and non-Indigenous fire differs on the basis of leadership, process, and outcome. These hypotheses are also formed from preliminary research conversations with Indigenous leaders and scholars. For the quantitative study, I believe that herbivory trends will heavily depend on the seasonality and insect populations during fieldwork. But I theorize that once a plant has been burned by Indigenous fire, young vegetation will show an absence of insect herbivory but a prevalence of mammalian herbivory. This could be the case because of a fire-induced elimination of insect populations and subsequent increase in young sprouting shoots. Over time, it is predicted that herbivory will increase as the plant ages and becomes susceptible to insect populations.

Conclusion

The research that is still in progress has significant potential to address land management issues, combat the effects of climate change, and support Indigenous land sovereignty. In my case study, I hope to interview Native individuals and community members, focusing on Indigenous-led burning, herbivory, and plants. In addition, herbivory will be quantitatively examined after a cultural burn has occurred. By connecting with communities and integrating knowledges, in terms of oral and numerical data and analyses, we can better understand each other and gain a better understanding of the environment's needs. It is ignorant to assume that either Indigenous Knowledge or western science separately hold the key to resolving environmental crises but combining wisdom and resources can encourage fast and powerful solutions. This holds true for other knowledge systems that were not discussed in this paper as well. Additionally, translating Indigenous Knowledge to western science can assist tribes in their fight for land autonomy by informing scientific and political communities of the transformative ecological improvement that Indigenous land management brings. On a larger scale, this could

present the grounds for the right to manage their own lands. However, academia and politics must not solely reap the benefits from Indigenous communities. There is a responsibility that comes with understanding Indigenous Knowledge, which is to be clear about intentions and understand that there are commitments to decolonization in exchange for this knowledge (Lake, 2021). The qualities of recognition, restoration, and reciprocity are deeply rooted in solving systemic issues, especially when it involves Indigenous and western communities.

Reflection

As an undergraduate scholar and Native American woman (Apache/Comanche) myself, I have found this research process extremely rewarding. Interacting with Indigenous members of my community and learning the knowledge and power they have has been incredibly inspiring. I have found myself more secure in my Indigenous identity and more empowered by the ancestral knowledge I now hold. The people at the Cache Creek Conservancy's Tending and Gathering Garden, including both Indigenous and non-Indigenous people, have treated me with kindness and a great willingness to collaborate on research. I understand that it is my responsibility to continue this legacy of oral tradition and making change through research and I hope to do that in this project and future research.

Works Cited

Arno, Stephen F. "Ecological effects and management implication of Indian fires." USDA Forest Service general technical report INT-Intermountain Forest and Range Experiment Station (USA) (1985).

Babbitt, Bruce E. Protecting Our National Treasures: A New Era in America's Conservation Legacy: a Report to the President and the Vice President. US Department of the Interior, 1998.

Barrett, Stephen W. "Fire history along the ancient Lolo Trail." Fire Management Today 60.3 (2000): 21-28.

Deloria, Vine. Custer died for your sins: An Indian manifesto. University of Oklahoma Press, 1988.

Israel, Barbara A., et al. "Measurement approaches to partnership success: Theory and methods for measuring success in long-standing CBPR partnerships." Progress in community health partnerships: research, education, and action 14.1 (2020): 129.

Kimmerer, Robin Wall, and Frank Kanawha Lake. "The role of indigenous burning in land management." Journal of Forestry 99.11 (2001): 36-41.

Lake, Frank K. "Indigenous fire stewardship: Federal/Tribal partnerships for wildland fire research and management." Fire Management Today. 79 (1): 30-39. 79.1 (2021): 30-39.

Lewis, Clifford E., Harold E. Grelen, and George E. Probasco. "Prescribed burning in southern forest and rangeland improves forage and its use." Southern Journal of Applied Forestry 6.1 (1982): 19-25.

Long, Jonathan W., et al. "Restoring California black oak to support tribal values and wildlife." Gen. Tech. Rep. PSW-GTR-251. Berkeley, CA: US Department of Agriculture, Forest Service, Pacific Southwest Research Station: 113-122 251 (2015): 113-122.

Mazzocchi F. (2006). Western science and traditional knowledge. Despite their variations, different forms of knowledge can learn from each other. EMBO reports, 7(5), 463–466. https://doi.org/10.1038/sj.embor.7400693