

RESEARCH PROPOSAL

CLIMATE CHANGE AND ECOSYSTEM RESTORATION IN THE WESTERN UNITED STATES



FES422 Research Methods in Social Sciences
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June 5, 2022

INTRODUCTION

The effects from climate change are being felt worldwide. In the western areas of the United States, one of the key issues from climate change is the increase in temperatures. This increase in temperatures cause more heat waves, more droughts, lowered agricultural yield, lowered water resources, and changes in biodiversity for plants and animals as they move to various locations to escape the heat. Will we be able to continue restoring damaged habitats and ecosystems in the western United States as climate change effects grow increasingly stronger?

Droughts cause an increase in more destructive wildfires in forests and grasslands due to dryer tree canopies and trunks, dryer understory plants; dryer soils, and much more accumulated leaf litter. Heat affects the climate system and causes an increase in intensity of storms, which in turn cause flash flooding, soil erosion, and landslides. Heat also causes a decrease in snow accumulation, which in turn lowers the amount of water availability in the spring. Scientists are now saying that there is 50% chance we will reach the 1.5°C increase in 5 years (Jaynes, 2022) ... not in 2040 or 2050 like they originally thought.

According to Harris et al. (2006), even back in 2006, the impacts on climate change on ecosystems and their plant and animal species were already being detected. It is believed that the use of historical references may no longer help when seeking how an ecosystem should be restored. Being able to model the future of habitats and ecosystems must be done to plan and restore correctly. Will we be able to model the future of our ecosystems and find ways to save forests, woodlands, grasslands, deserts, and their watersheds in the western United States?

Since the physical movement of both plants and wildlife is expected because of the effects of climate change, there will need to be new frameworks and restoration concepts on how to decide what is best for an ecosystem and its inhabitants.

Braidwood et al. (2018) believes that “protorefuges” and “protorefugia” – sites that have been restored for use by threatened and endangered animal and plant species – could be created to reduce the loss of many species. Butterfield et al. (2017) presents “prestation” – using plant species that will grow now and persist through climate change. Will these styles of restoration create new ecosystems based upon future climate and landscape models that will be more adaptive to climate change? Will this save our conservation restoration projects for both plants and wildlife?

Bradley et al. (2009) believes that “transformative” restoration is needed when native and non-native plants can no longer survive and reproduce. When choosing a site to be restored, novel plant species that can survive in the new climate conditions must be identified. These novel plant species must also be able to support the native wildlife, and even new animal species that relocate to this site. Will our knowledge and modeling skills be able to choose the proper novel plants for transformation restoration?

The Resist-Accept-Direct (RAD) Framework, written by Schuurman et al. in 2020 on behalf of the National Park Service, presents three response options to managing change: (1) resist by maintaining or restoring ecosystem function, composition, structure, and processes, (2) accept the course of change and not intervene in anyway, and (3) direct the course of change by altering the ecosystem function, composition, structure, and processes. This framework allows land managers to decide on the course of change in an ecosystem. Is this the best policy to follow?

Our research will gather information on the topics of climate change, restoration, climate and landscape modeling, theories and frameworks on restoration, and the planning and implementation of restoration in the western United States.

RESEARCH QUESTION(S)

This research project has one main question to be asked of both (1) scientists and (2) land managers and restorers. That question is:

How is climate change going to impact the way we currently do restoration and what strategies are out there that can be used for restoration in the western United States?

RESEARCH APPROACH AND DESIGN

Qualitative methods will be used as our research approach using one-on-one interviews with individual scientists (with knowledge of climate change, ecology, hydrology, and restoration), U.S. Forest Service (“Forest Service”) representative(s), U.S. Bureau of Land Management (“BLM”) representative(s), National Park Service (“NPS”) representative(s), and The Nature Conservancy (“TNC”) representative(s). This research will fall under basic qualitative research in that it includes the study of an activity (restoration) and a phenomenon (climate change). All interviewees will be considered “key informants” since their knowledge is more extensive than non-scientists and non-governmental persons.

UNIT OF ANALYSIS

The unit of analysis to be used in this research is:

- individual for each scientist interviewed (as to their knowledge and educated opinion), and
- organizational for the representatives of the Forest Service, BLM, NPS, and TNC as to their entities' ideas and principles on future restorations.

SAMPLING

Due to the representation needed on behalf of scientists and representatives of government and non-profit entities, the individuals to be sampled will be chosen under “purposeful sampling” based on their degrees and knowledge and/or the entity for which they work.

Contacting the Society for Ecological Restoration and the Ecological Society of America is imperative to locate the scientists most knowledgeable in restoration that can be interviewed. Contacting the Forest Service, BLM, NPS, and TNC to locate the best qualified personnel to represent them in interviews on climate change and restoration is also important. Finally, a review of research projects done by these three entities could also help identify people to interview.

The size of the sample should be finalized at a minimum total of seven. This would include at least three scientists, one representative for the Forest Service, one representative for the BLM, one representative for the NPS, and one representative for The Natural Conservancy.

DATA COLLECTION AND VARIABLES

Collection of Data

The only means of data collection for this research project is through one-on-one interviews. Appendix 1, attached, is the list of interview questions that will be asked of scientists, government agencies representatives, and the TNC representative(s).

The variables for each of these interview questions are broken down as shown below:

Variables	Interviewee
Changes to different biomes from climate change	Scientists, Forest Service, BLM, NPS, TNC
Knowledge of the Earth's systems and climate change	Scientists, Forest Service, BLM, NPS, TNC
Modeling the future of our ecosystems	Scientists, Forest Service, BLM, NPS, TNC
What different types of restoration will be used	Scientists, Forest Service, BLM, NPS, TNC
Change in restoration policies and procedures due to increase of effects from climate change	Scientists, Forest Service, BLM, NPS, TNC

TIMELINE

The timeline for this research is approximately six (6) to nine (9) months to schedule and conduct interviews, review and disseminate the data from these interviews, and put together the research paper.

OBJECTIVES

Our objectives from this research project are to obtain data about future climate change effects and how it will affect strategies for restoration in the western United States. This data will come from scientists, representatives from federal governmental agencies responsible for public land management in the western United States (Forest Service, BLM, and NPS), and a large nonprofit organization known for its collaboration with agencies on restoration projects (TNC).

This research paper, once completed, will provide the latest data and expectations of future ecological restoration from the damaging effects of climate change.

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APPENDIX

Appendix A – Interview questions

Appendix B – Letter of Formal Consent