Climate Adaptation Project for the Sierra Nevada

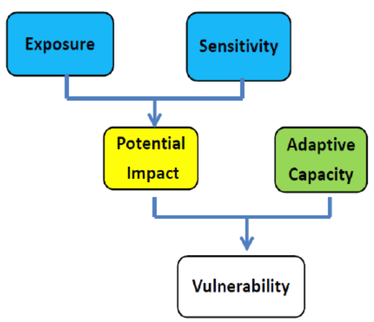
EcoAdapt™ — Meeting the challenges of climate change

GEOS INSTITUTE · CA LCC · CONSERVATION BIOLOGY INSTITUTE

1. Vulnerability Assessment

Climate change is the most pressing challenge of our time. Projected changes are likely to result in myriad impacts to species, habitats and physical processes, which will likely exacerbate current challenges. Vulnerability assessments are the first step in this process, and provide a clear path toward determining how key resources are threatened by climate change and improving management practice to better prepare for and respond to these changes.

Vulnerability Assessment Workshop

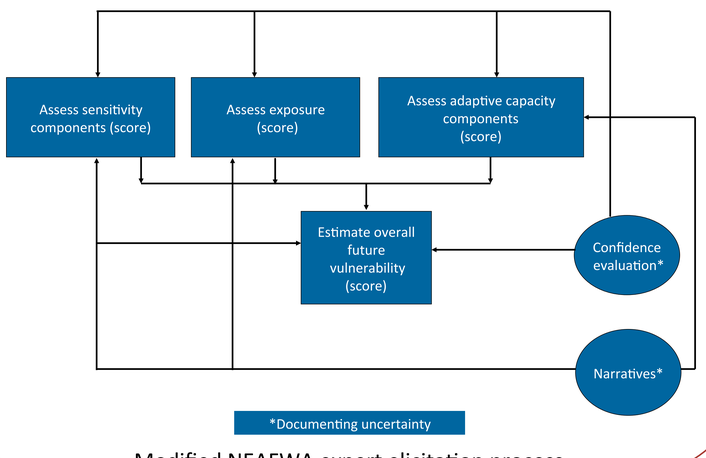


The goal of this workshop is to assess the vulnerability of a suite of focal resources (species, habitats, ecosystem services) to climate change. Land managers, regional planners, natural resource specialists, science and community partners, and conservation practitioners have been invited to participate. The workshop will include: (1) a review of climate trends and science for the region; (2) vulnerability assessment training, discussion and refinement of regional management goals and action opportunities, vulnerability assessment application for a suite of focal resources, and identification of spatial analysis needs to facilitate adaptation planning.

Pre-Workshop:

- Compile background info on sensitivity and adaptive capacity for focal resources
  → **Key partners: TACCIMO, USFS**
- Compile background info on exposure including temp, precip, snowpack, stream temp, runoff, high and low flows, fire, vegetation change, timing of flows, etc.
  → **Key partners: TACCIMO, USFS, Geos Institute**

Estimating Vulnerability through Expert Elicitation



Modified NEAFWA expert elicitation process

2. Spatial Analysis

Since the effects of climate change will vary across space, vulnerability assessments and adaptation planning can be improved by accounting for the threats posed to a target area or resource. Understanding where and how resources may be most vulnerable or resilient to climate impacts can help identify spatially explicit recommendations on the most suitable management options for a resource.

Spatial Analysis

Spatial and temporal data features (historic, current, modeled) and information from local experts will be compiled and analyzed to identify areas of conservation priority. Information gathered during the Vulnerability Assessment Workshop will help create mapping products such as:

→ Vulnerability maps that identify areas likely to be more or less impacted by climate changes

→ Comparative maps that overlay important ecological layers (e.g., species or habitat distributions) with key climate layers and other important layers likely to impact a resource (e.g., roads, predicted development patterns)

→ **Key partner: Conservation Biology Institute**

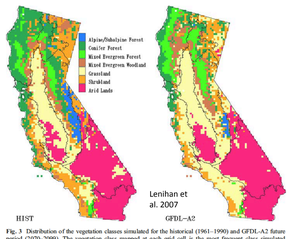
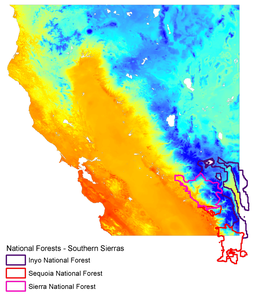


Fig. 3 Distribution of the vegetation classes simulated for the historical (1961–1990) and GFDL-A2 future period (2070–2099). The vegetation class mapped at each grid cell is the most frequent class simulated during the time period



Yale Framework

Adaptation Objectives:	Levels of Ecological Analysis: A. Landscapes	B. Ecosystems	C. Species and populations
1) Protect current patterns of biodiversity (baseline)	• Map genetic patterns across the landscape • Map biodiversity hotspots	• Map terrestrial and aquatic ecosystems and their associated services	• Map occurrences of rare species and plant communities • Map distributions of more common species
2) Project future patterns of biodiversity	• Forecast land-use change • Analyze climate-change projections	• Forecast vulnerability of ecosystems to climate change • Map areas that would support shifts in vegetation types	• Map areas that would support shifts in species distributions of vulnerable and/or indicator species or community types
3) Maintain ecological processes	• Analyze projected precipitation and temperature trends	• Map potential future patterns of fire, hydrology, carbon sequestration, and ecological integrity	• Forecast how climate change factors may impact the viability of particular species populations or function of rare plant communities
4) Maintain and restore ecological connectivity	• Map connections between land facets, ecological land units, refugia, or areas of high ecological integrity	• Map connections between current and projected future locations	• Identify areas that are critical for species movements in a changing climate
5) Protect climate refugia	• Map areas of high topographic complexity • Map locations projected to maintain stable climates	• Map areas projected to experience little change in vegetation	• Identify areas that would continue to harbor species in the future or areas where populations would be stable or increase with climate change
6) Protect the ecological stage (enduring features)	• Map ecological land units or land facets • Map areas of high ecological integrity	• Map ecological land units or land facets • Map areas of high ecological integrity	N/A

The Yale Framework assists conservation planners and land managers in selecting the assessment and modeling strategies that are most relevant to their specific needs. It provides simplified and flexible advice on models and data, as well as a structured menu of options (Matrix) to assist resource managers in determining the best possible approach to conservation. The Framework Matrix is built around the consideration of six major adaptation objectives for biodiversity conservation and climate adaptation and three levels of ecological analysis.

Workshop participants will be using the Yale Framework and Matrix to guide our spatial analysis so that mapping products will best meet their needs and/or address specific management objectives.

3. Adaptation Planning

Climate change and adaptation get discussed at great length but the value emerges at implementation. The only way for the field of adaptation to improve and effect better future outcomes is to start developing and testing on-the-ground actions. Adaptation actions tied to particular management objectives or outcomes have a better chance of being implemented than general adaptation strategies.

Adaptation Planning Workshop

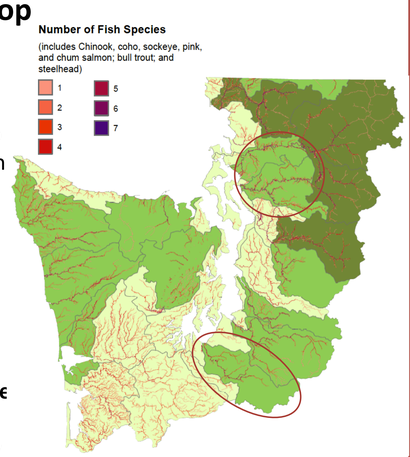
→ Explore and finalize results of the vulnerability assessment

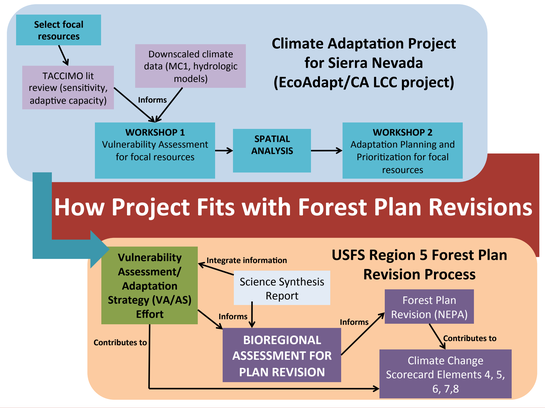
→ Explore spatial analysis results and demonstrate how they can be used to inform the development of adaptation actions

→ Provide training in basic adaptation planning and principles

→ Develop a portfolio of adaptation options for focal resources and the region, **making sure to identify adaptation actions that address or inform specific management objective or goals**

→ Prioritize who, where, when, and how to implement actions





Project results will be made available through the California Climate Commons and California LCC websites.

Find out more at: www.ecoadapt.org

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