

LCC-VP

Landscape Climate Change Vulnerability Project



## Using NASA Resources to Inform Climate and Land Use Adaptation

*Ecological Forecasting, Vulnerability Assessment, and Evaluation of Management Options Across Two US DOI Landscape Conservation Cooperatives*



# Team

## Project Science Team

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## Collaborators

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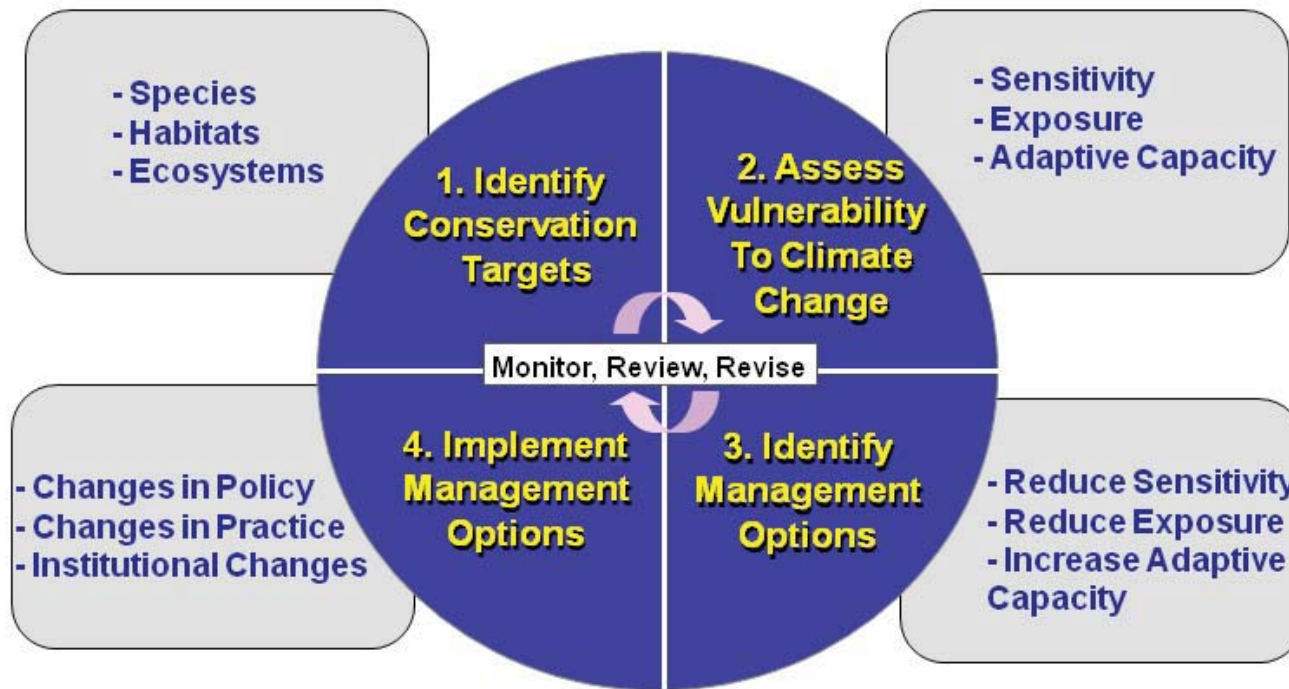
Supported by NASA Applied Sciences Program, National Park Service Inventory and Monitoring Program, and Great Northern Landscape Conservation Cooperative

Project Period: August 2011 – July 2015

# Background

**Goal: develop and apply decision support tools that use NASA and other data and models to assess the vulnerability of ecosystems and species to climate and land use change, and to evaluate management options.**

# Background

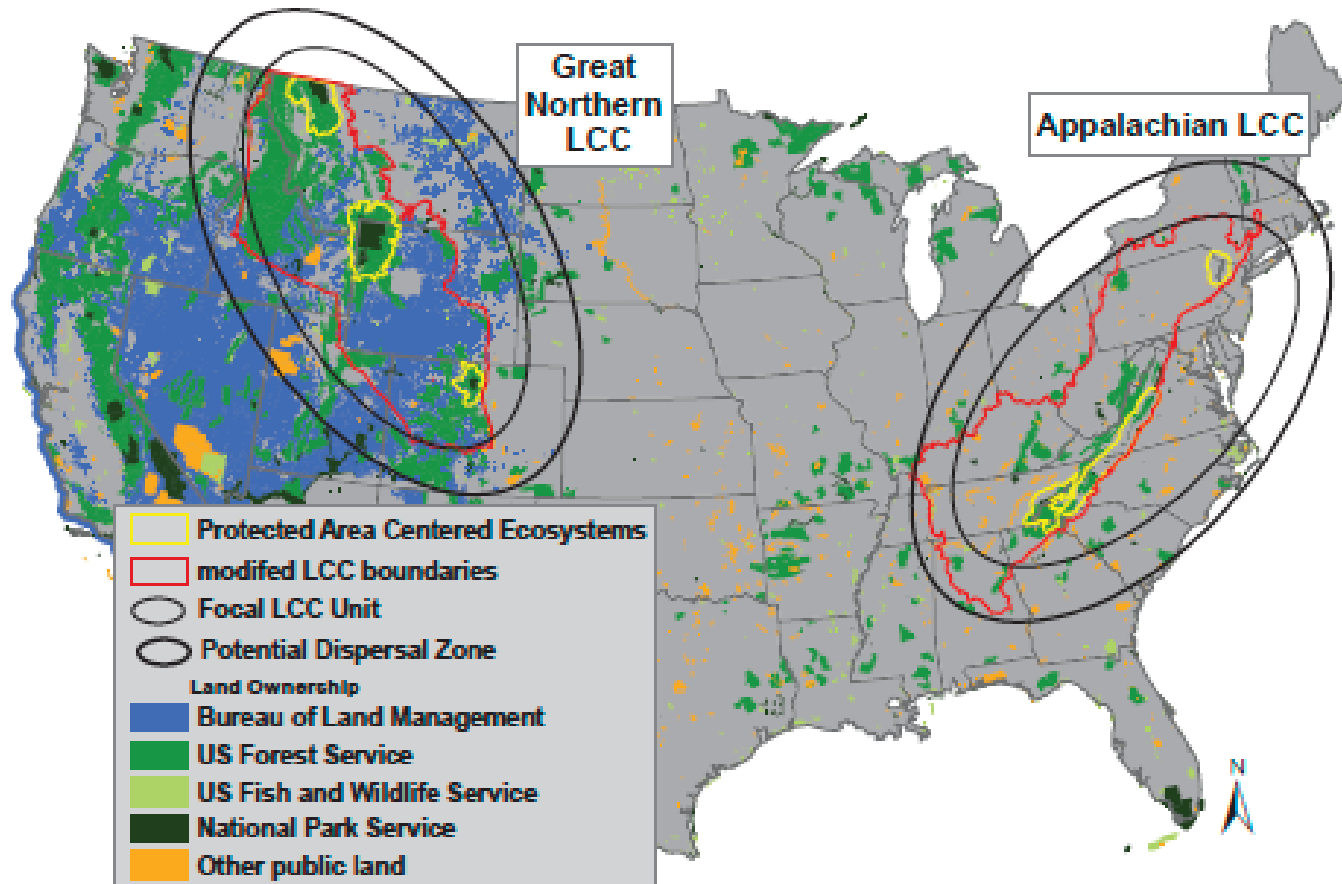


A framework for climate change adaptation planning. (Glick et al. 2011).

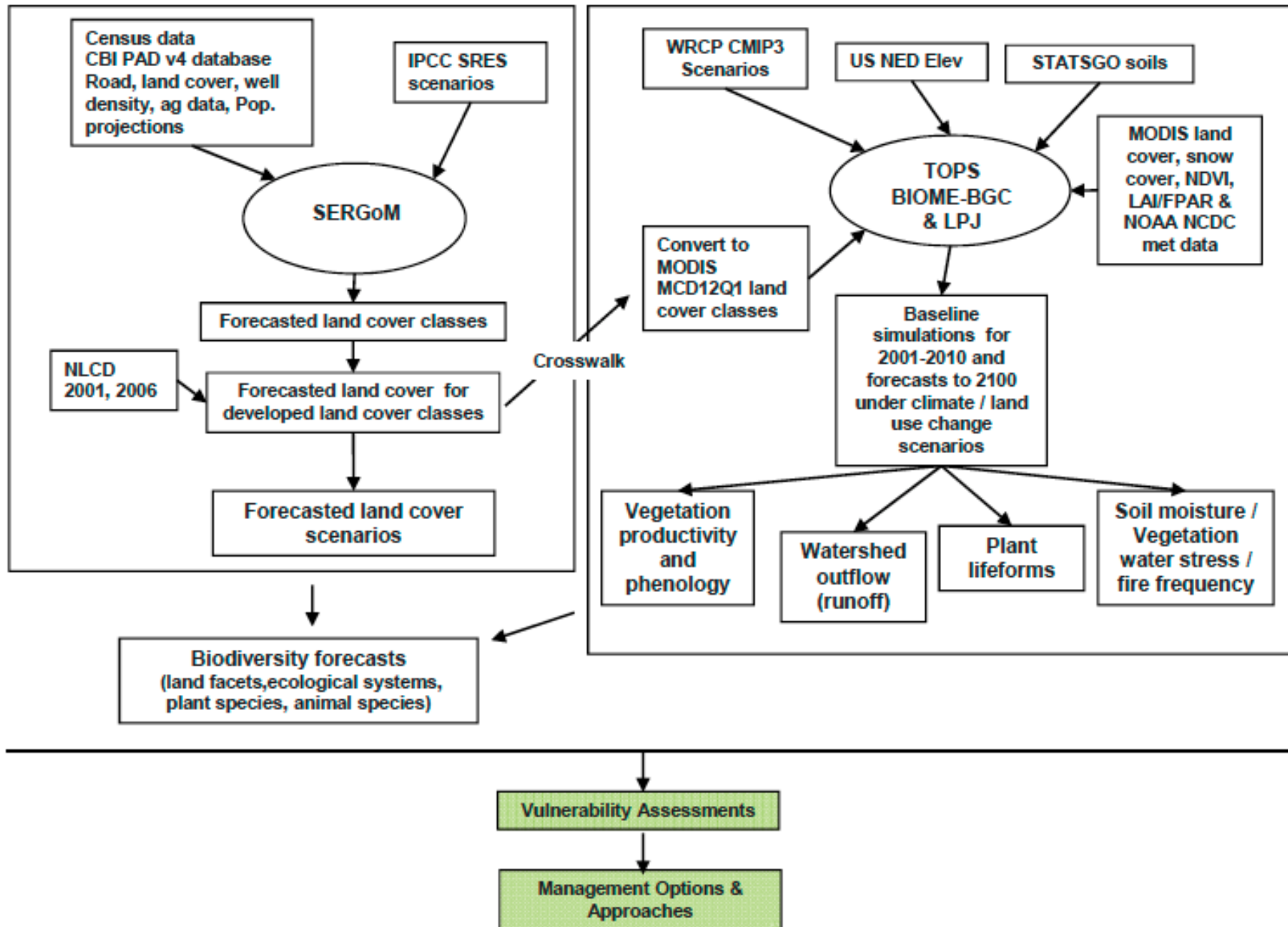
## Objectives

1. Hindcast and Forecast trends in ecological processes, ecosystem types, and dominant tree species from past to present and under projected future climate and land use scenarios using NASA and other data and models across two LCCs.
2. Assess the vulnerability of ecosystem types and dominant tree species to climate and land use change by quantifying exposure, sensitivity, adaptive capacity, and uncertainty in and around focal national parks within LCCs.
3. Evaluate management options for the more vulnerable ecosystems and species within these focal parks.
4. Design multi-scale management approaches for vulnerable elements to illustrate adaptation strategies under climate and land use change.
5. Facilitate technology transfer of data, methods, and models to federal agencies to allow the decision support tools to be applied more broadly.

# Study Areas



# Hindcasting and Forecasting



# Hindcasting and Forecasting

## Ecological system types (LANDFIRE Biophysical Setting Layer)

Northern Rocky Mountain Subalpine Woodland and Parkland

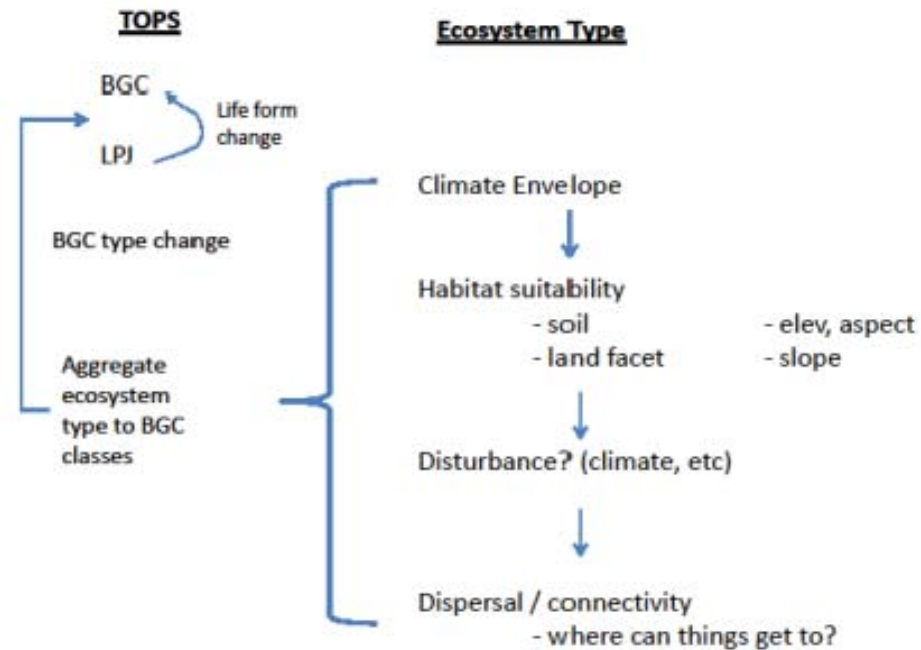
Rocky Mountain Lodgepole Pine Forest

Middle Rocky Mountain Montane Douglas-fir Forest and Woodland

Inter-Mountain Basins Big Sagebrush Shrubland  
- Wyoming Big Sagebrush

Rocky Mountain Montane Riparian Systems

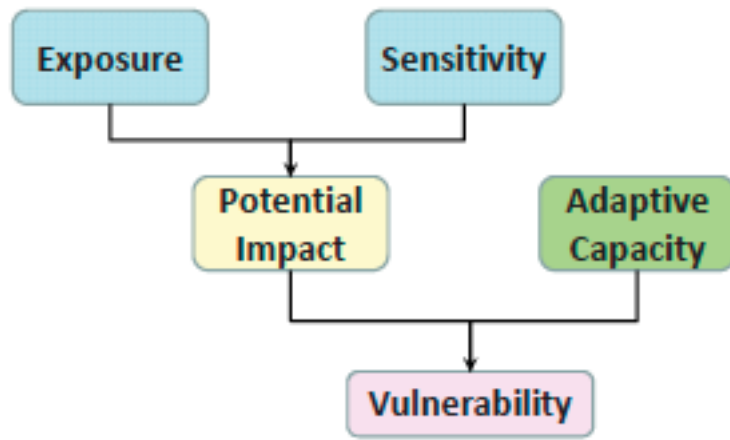
Framework to downscale BGC biome forecasting



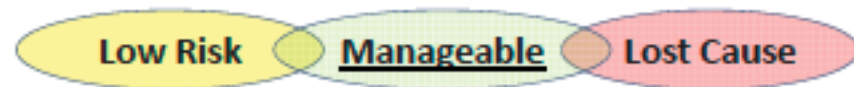
Constraints to Connectivity	Dispersal Ability
Climate	Dispersal mode
Land use	Dispersal distance
Land facets	Reproductive potential
Soils	
Distance	



# Vulnerability and Management Feasibility

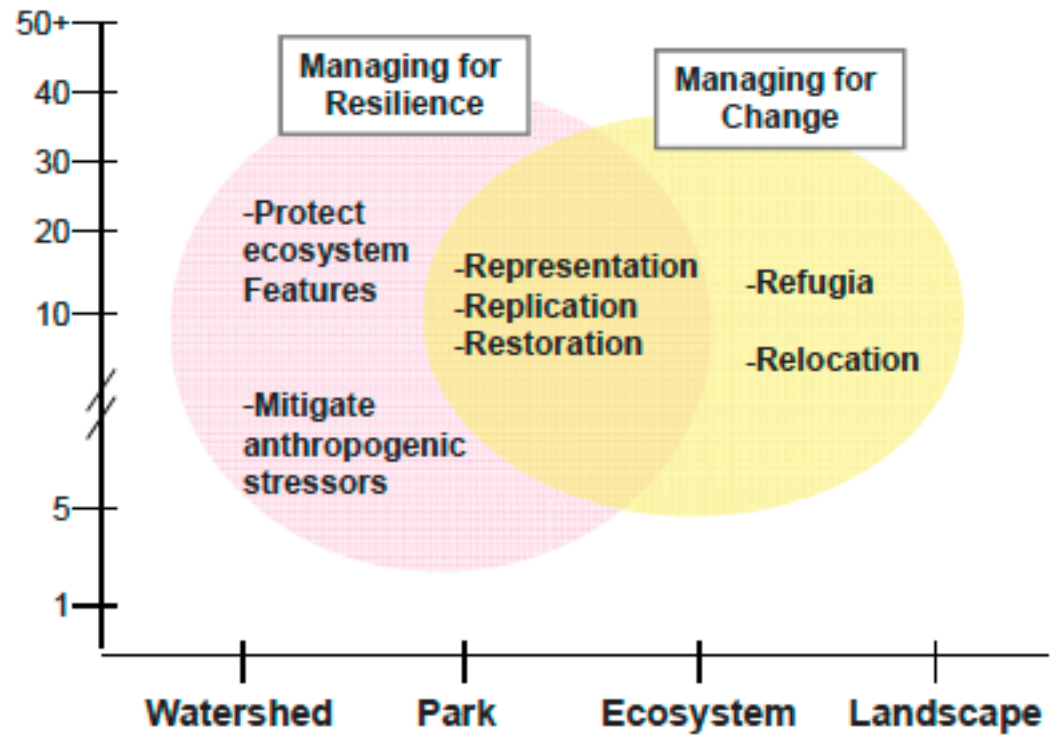


Evaluated by "Expert Panel"



	Low Risk	<u>Manageable</u>	Lost Cause
Management	None needed	Helpful	Not helpful
Change	Little	Moderate	High
Vulnerability	High	Moderate	High
Resiliency	High	Moderate	Low
Adaptability	High	Moderate	Low

# Management Implementation



Developed and implemented by management working groups

## Decision Support

- **TOPS outputs will be served via the internet-based interface Ecocast (and component data services) and databases maintained on NPS I&M servers.**
- **Our methods will be documented in the format of NPS I&M Standard Operating Procedures (SOPs).**
- **Workshops and training sessions will teach collaborators to develop, analyze, and/or interpret the products.**

## Potential GYCC Participation

- Identify ca 5 ecological system types and dominant tree species of high importance in GYA.
- Help conduct vulnerability assessment and evaluation of management feasibility.
- Devise management options and work towards implementation of the preferred options.

