Assessing Vulnerability & Developing Adaptation Strategies for Key Southern California Habitats

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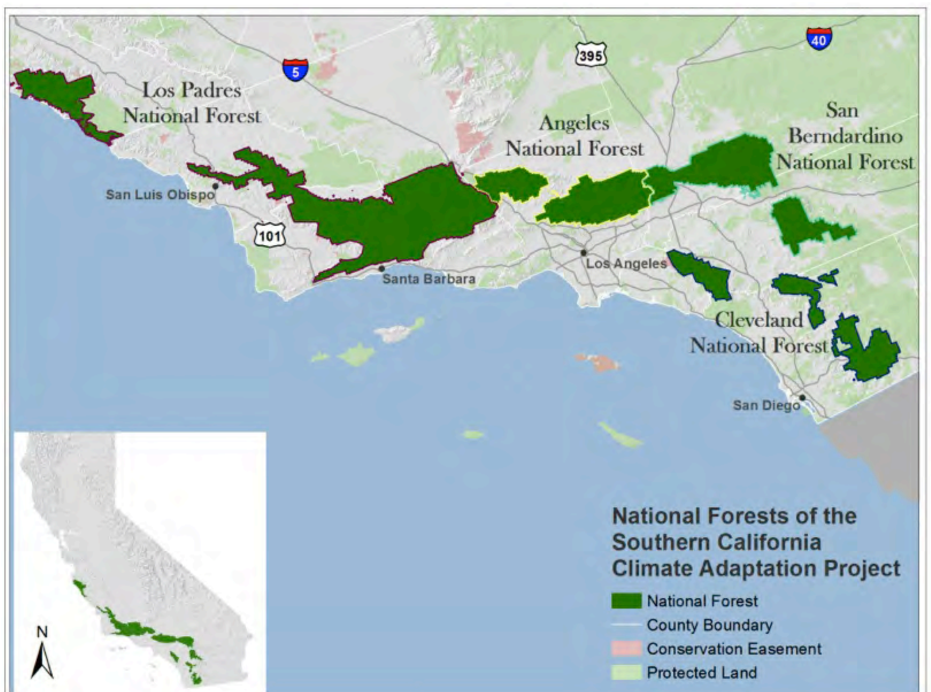
EcoAdapt™

Meeting the challenges of climate change

Project Overview

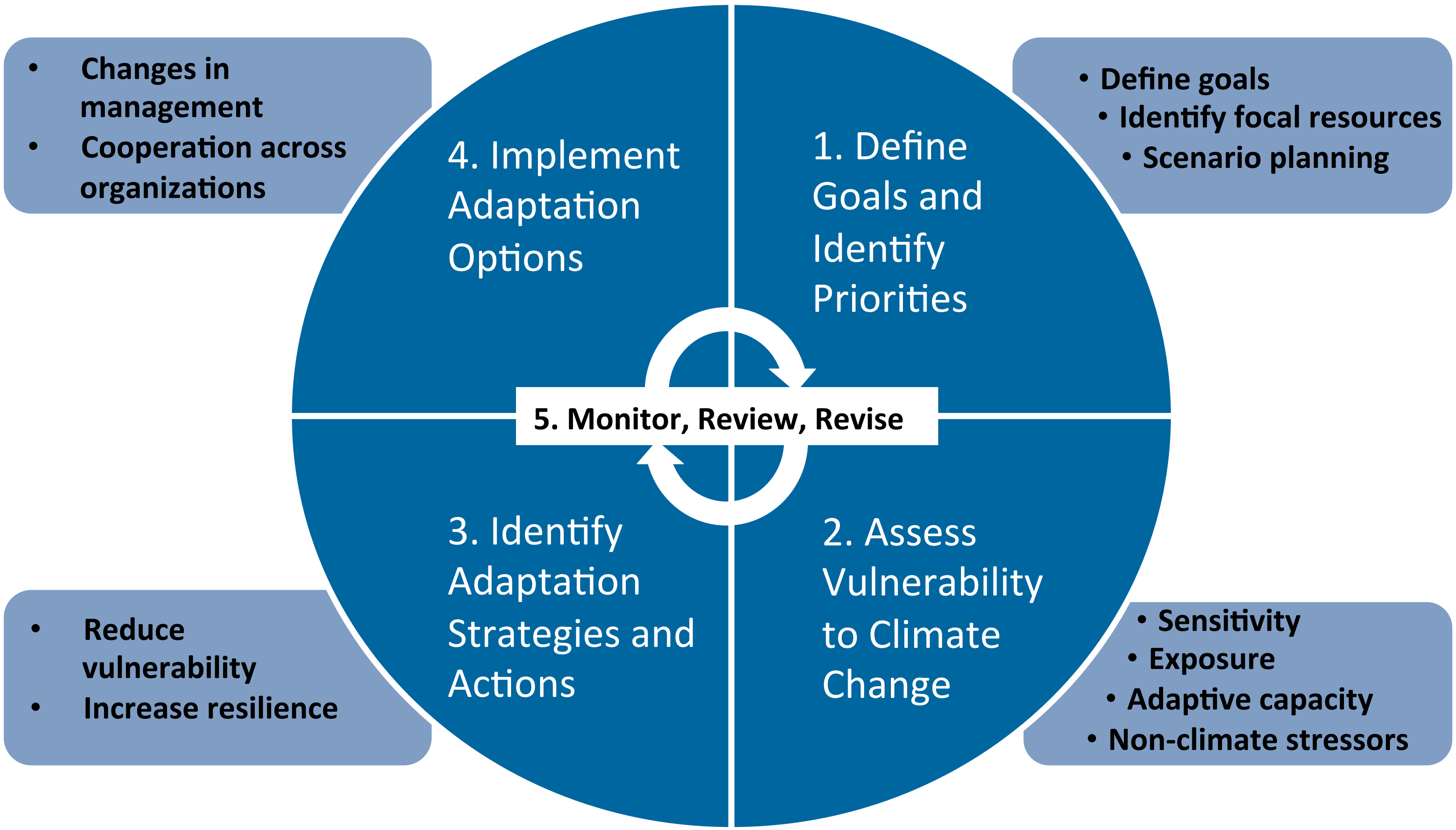
- Meet Climate Scorecard Goals
- Forest Plan revision (e.g. Monitoring program transition)
- Project planning and NEPA
- Facilitate partnerships & collaboration around climate change vulnerability and adaptation



The Forest Service Climate Change Performance Scorecard, 2011 (version 1.3)
To be completed annually by each National Forest or Grassland (Unit).

Scorecard Element	Unit Name	Yes/No
	Organizational Capacity	
1. Employee Education	Are all employees provided with training on the basics of climate change, impacts on forests and grasslands, and the Forest Service response? Are resource specialists made aware of the potential contribution of their own work to climate change response?	
2. Designated Climate Change Coordinators	Is at least one employee assigned to coordinate climate change activities and be a resource for climate change questions and issues? Is this employee provided with the training, time, and resources to make his/her assignment successful?	
3. Program Guidance	Does the Unit have written guidance for progressively integrating climate change considerations and activities into Unit-level operations?	
	Engagement	
4. Science and Management Partnerships	Does the Unit actively engage with scientists and scientific organizations to improve its ability to respond to climate change?	
5. Other Partnerships	Have climate change related considerations and activities been incorporated into existing or new partnerships (other than science partnerships)?	
	Adaptation	
6. Assessing Vulnerability	Has the Unit engaged in developing relevant information about the vulnerability of key resources, such as human communities and ecosystem elements, to the impacts of climate change?	
7. Adaptation Actions	Does the Unit conduct management actions that reduce the vulnerability of resources and places to climate change?	
8. Monitoring	Is monitoring being conducted to track climate change impacts and the effectiveness of adaptation activities?	
	Mitigation and Sustainable Consumption	
9. Carbon Assessment and Stewardship	Does the Unit have a baseline assessment of carbon stocks and an assessment of the influence of disturbance and management activities on these stocks? Is the Unit integrating carbon stewardship with the management of other benefits being provided by the Unit?	
10. Sustainable Operations	Is progress being made toward achieving sustainable operations requirements to reduce the environmental footprint of the Agency?	

Climate-Smart Planning Process



Project Methodology

Step 1	Step 2	Step 3A	Step 3B
Focal Resources Workshop	Vulnerability Assessment	Adaptation Workshop #1	Adaptation Workshop #2
Identify focal resources; gather relevant data and info	Assess vulnerability of focal resources	Apply assessment results in adaptation planning	Develop implementation plans for on-the-ground action

Phase 1: Vulnerability Assessment (Steps 1–2)

Phase 2: Adaptation Planning (Steps 3A–3B)

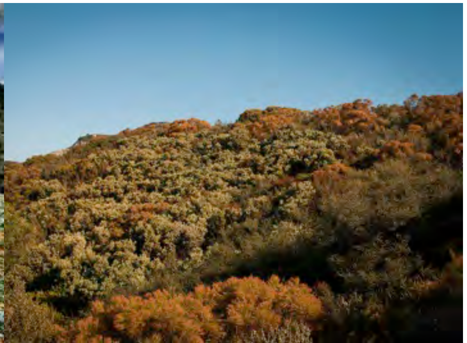
Step 1: Identify Priorities

GOAL: Collaboratively identify regionally important resources

– Habitats, Species/Species groups, Ecosystem services

- Form Stakeholder Working Group
  - Identify draft list of habitat types
- Create focal resource selection guidance
- Convene Focal Resources Workshop to finalize list of resources



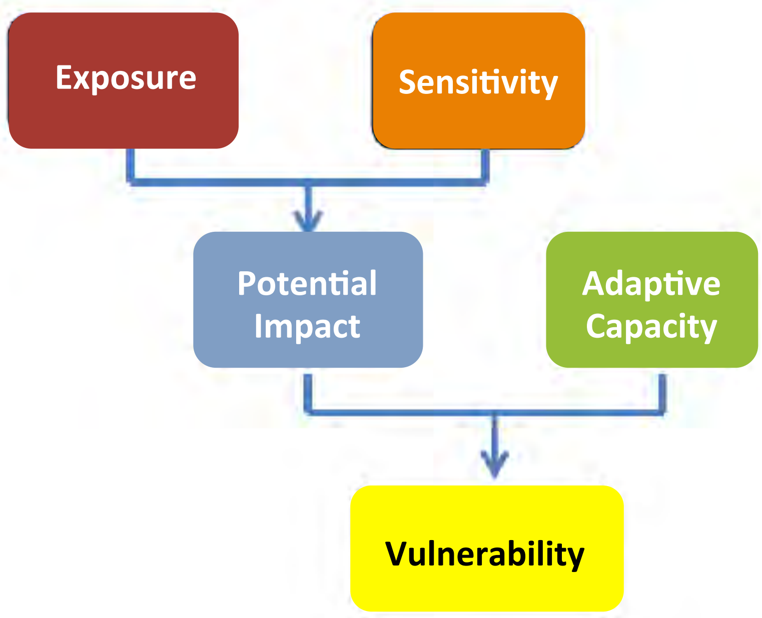
Step 1: Products

Coarse Filter (Habitat)
Alluvial Scrub
Chaparral
Conifer
Desert
Endemic
Grassland
Oak Woodlands
Pinyon-Juniper
Riparian
Rivers & Streams
Sage Scrub
Subalpine

Narrowed to Focal Habitats

Step 2: Assess Vulnerabilities

GOAL: Assess vulnerabilities of focal resources to climate and non-climate stressors by considering exposure, sensitivity, and adaptive capacity



- Scientists, managers, and other stakeholders evaluate resource vulnerabilities
- Add information from the scientific literature
- Stakeholders/Experts review draft vulnerability assessment results

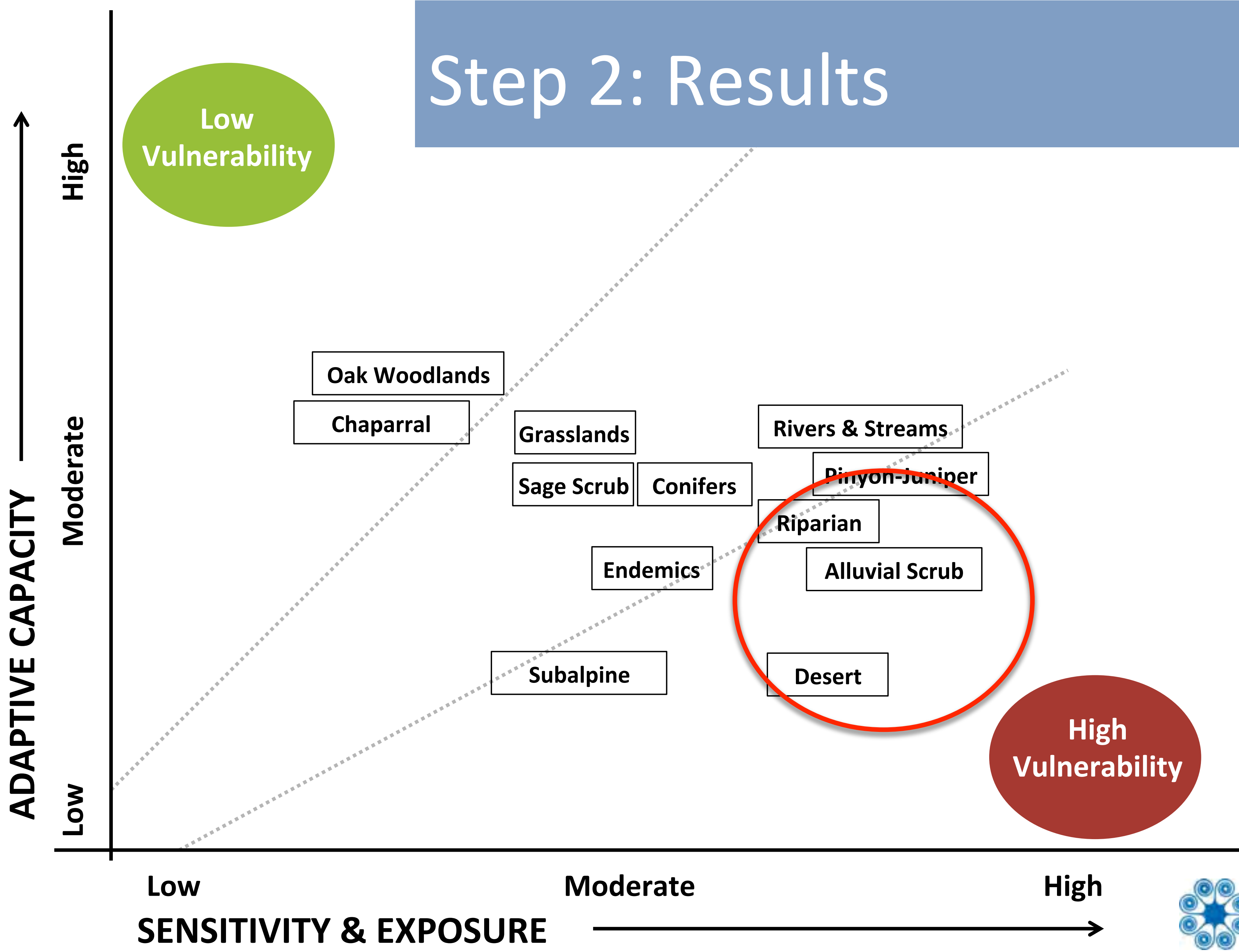
Which focal resources are most vulnerable to climate change, and why?

Step 2: Results

Low → High

HABITAT	VULNERABILITY SCORE	CONFIDENCE SCORE
Pinyon-Juniper	Moderate-High	High
Alluvial Scrub	Moderate-High	High
Riparian	Moderate	Moderate
Desert	Moderate	High
River & Streams	Moderate	Moderate
Endemics	Moderate	Moderate
Conifers	Moderate	High
Sage Scrub	Moderate	High
Grasslands	Moderate	Moderate
Subalpine	Low-Moderate	Moderate
Oak Woodland	Low-Moderate	Moderate
Chaparral	Low-Moderate	Moderate

Step 2: Results



Step 2: Generated Vulnerability Information

Vulnerability: Alluvial Scrub

Moderate-High (4)

High Confidence

Low → High

Exposure

HIGH (5)

High Confidence

↑ Air temperatures

△ Precipitation

↑ Wildfire

↑ Drought

↓ Soil Moisture

△ Stream flows

Sensitivity

MODERATE-HIGH (4)

High Confidence

Climate drivers:

- Precipitation
- Drought
- Soil moisture
- Low stream flows

Disturbance regimes:

- Flooding
- Wildfire

Non-climate stressors:

- Invasive species
- Dams & water diversions

Adaptive Capacity

MODERATE (3)

High Confidence

- Fairly degraded
- Low continuity
- Site restrictions
- Low-moderate diversity

\+ Moderate resistance and recovery

\+ Moderate-high societal value

Step 2: Products

What type of information do I need?

What level of information do I need?

Step 2: Products – Vulnerability Syntheses

Alluvial Scrub Habitats

Sensitivity

The overall sensitivity of alluvial scrub habitats to climate and non-climate stressors was evaluated to be moderate-high by habitat experts.[2]

Sensitivity to climate and climate-driven changes

Habitat experts evaluated alluvial scrub habitats to have moderate-high sensitivity to climate and climate-driven changes,[3] including: precipitation, snowpack depth and snowmelt timing, flow regimes (high and low flows), soil moisture, drought, and air temperature (including low temperature events).[4]

<u>Altered hydrology (soil moisture, precipitation, snowpack, drought,[5] flow regimes)</u>

Soil texture and subsurface moisture influence alluvial scrub species composition and distribution (Hanes et al. 1989). For example, annual precipitation typically increases with elevation, and field studies have shown pioneer alluvial scrub species to be associated with lower elevations and less annual precipitation and intermediate and mature alluvial scrub plant communities to be associated with higher elevations and higher annual precipitation (Buck-Diaz et al. 2011). Increased moisture deficits associated with climate change may prevent succession to mature vegetation (Hanes et al. 1989) and/or cause conversion to more xeric plant communities (e.g., coastal sage scrub), particularly in areas farther from the stream channel that are inundated less frequently (Smith 1980). Shifts in precipitation and hydrological changes are also likely to impact the abundance, germination, and seed production of annual species present (Allen 1996; Harris 1987; Sclafani 2013). For example, low precipitation years may reduce abundance and establishment of native annuals such as the slender-horned spineflower (*Dodecahema leptoceras*), while high precipitation years may favor establishment and result in

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[2] Confidence: High
[3] Confidence: Moderate
[4] Factors presented are those ranked highest by habitat experts. A full list of evaluated factors can be found at the end of this document.
[5] Habitat experts identified drought as a climate stressor, but did not provide any additional comments, and no supporting information could be found in the literature.

In-depth vulnerability information

Vulnerability Syntheses

- Long (15+ pages)
- Format: Narrative
- Examines key vulnerabilities and provides in-depth discussions of potential impacts

Step 2: Products – Vulnerability Summaries

Alluvial Scrub Habitats

Sensitivity **Moderate-High Sensitivity**

Low → High

High Confidence

Alluvial scrub habitats are sensitive to several climate drivers, including precipitation, soil moisture, low stream flows, drought, and air temperature. Spatial diversity in alluvial scrub communities is driven by periodic flooding,[1] erosion, and sedimentation,[6] as well as wildfire.[7,8] Species composition and distribution is also determined by sub-surface moisture[1] and air temperature. Non-climate stressors can destroy or alter habitat and enhance climate vulnerability by exacerbating hydrological changes and shifts in wildfire regimes.[1,2,8,15,16]

Habitat sensitivity factors and impacts*

CLIMATIC DRIVERS	Moderate-High Sensitivity · Moderate Confidence
Hydrology	Precipitation frequency and intensity, as well as snowpack and snowmelt timing, affect soil moisture, flow volumes, and scouring and sedimentation regimes, which control alluvial scrub composition, succession, and persistence.[1,9] Hydrological shifts may result in: • Altered distribution,[2,9] species composition, and productivity,[1,9] including impacts to annual species' germination, abundance, and seed production[8,10] • Altered invasive species pressure • Altered succession patterns (e.g., drier conditions may prevent succession to mature stands)[1] • Potential conversion to more xeric communities if moisture declines[6]
Air temperature	Minimum winter temperatures may affect alluvial scrub distribution on the landscape, and species composition at the local scale. Warmer temperatures drive shifts in rain/snow partitioning. Increased air temperature may cause: • Altered habitat distribution • Altered species composition; freeze-sensitive vegetation may have more growth opportunities
DISTURBANCE REGIMES	Low-Moderate Sensitivity · Moderate Confidence
Flooding	Flooding delivers new nutrients and organic matter, redistributes sediments, and facilitates alluvial scrub succession and spatial diversity.[1-3,11,12] Shifts in flooding regimes may cause: • Shifts in habitat distribution as alluvial fan and axial wash formation processes and substrate composition changes[1,6,9] • Altered seasons for colonization • Altered succession patterns[1,6] • Altered species composition[11,15] • Altered pollination and dispersal due to flooding impacts on native ground-dwelling insects[13,14]

Key vulnerability information

Vulnerability Summaries

- Shorter length (5-9 pages)
- Format: Tables w/ bulleted lists
- Highlights key vulnerabilities and summarizes potential impacts

Step 2: Products – Vulnerability Briefings

Alluvial Scrub Habitats

Habitat Description

Alluvial scrub habitats commonly inhabit outwash fans, river wash deposits, and riverine deposits at canyon mouths toward the base of mountain ranges, including the San Gabriel, San Bernardino, San Jacinto, and Santa Ana ranges. Alluvial scrub habitats can also be found on wash deposits of regional rivers, including the Santa Ana River and its tributaries. Alluvial scrub consists mainly of flood-adapted drought-deciduous subshrubs and evergreen woody shrubs.

Habitat Vulnerability

Sensitivity & Exposure

Alluvial scrub habitats are critically sensitive to climate drivers that alter hydrologic, flooding, and scouring regimes and/or that alter moisture availability, as these factors affect habitat distribution, composition, and survival. Other climate drivers (temperature, wildfire) affect habitat composition. Alluvial scrub habitats are also very sensitive to non-climatic drivers that exacerbate climate-driven changes. Dams, water diversions, and flood control structures compound hydrological alterations and habitat connectivity, while invasive species can directly compete with alluvial scrub vegetation for increasingly limited resources.

Moderate-High Vulnerability

Low → High

Drivers of Alluvial Scrub Habitats

- Climate sensitivities: Precipitation, soil moisture, drought, flow regimes (high/low flows), air temperature, snowpack depth, snowmelt timing
- Disturbance regimes: Flooding & erosion, wildfire
- Non-climate sensitivities: Dams, water diversions & flood control structures, invasive & problematic species

Projected Climate and Climate-Driven Changes	Potential Impacts on Alluvial Scrub Habitats
Altered precipitation & soil moisture *Variable annual precipitation volume and timing; increased climatic water deficit; longer, more severe droughts*	• Altered distribution, species composition, productivity, and succession patterns; drier conditions may inhibit succession, limit annual species' establishment, and/or cause conversion to more xeric communities • Altered invasive species pressure
Increasing temperatures *+2.5 to +9°C by 2100*	• Altered distribution • Altered species composition; freeze-sensitive species may have more growth opportunities, but hot conditions may impair success of annuals
Altered stream flow & flooding regimes *Increased winter flow/flood volume; earlier, shorter, lower volume spring runoff; decreased summer flow*	• Altered distribution • Altered succession patterns and species composition; more frequent flooding may increase habitat heterogeneity • Altered pollination/dispersal via impacts on ground-dwelling insects
Altered fire regimes *Increased fire size, frequency, and severity*	• Altered species composition and population structure • Impeded vegetation recovery with shorter fire return intervals • Altered pollination/dispersal via impacts on ground-dwelling insects

Adaptive Capacity

Factors that enhance adaptive capacity:

+ Disturbance-adapted community with diverse reproductive capabilities
+ Moderate spatial/successional and floristic diversity; provides habitat for many rare animals
+ Provides variety of ecosystem services: biodiversity, flood and erosion protection, and water supply/quality/sediment transport

Factors that undermine adaptive capacity:

- Eliminated from 90-95% of historical habitat area; currently fragmented and generally isolated along unaltered streams and alluvial outwashes
- Landscape barriers, specific soil requirements, and limited dispersal capacity may limit migration opportunities in response to climatic stressors
- Low-moderate functional group diversity

Vulnerability snapshot

Vulnerability Briefings

- One page
- Format: Informational flyer
- Lists key vulnerabilities, and provides brief description of overarching impacts

Step 3: Adaptation Planning

Adaptation strategies attempt to reduce the negative impacts of climate change

Decrease vulnerability	**↓ Exposure**
	↓ Sensitivity
Increase resilience	**↑ Adaptive Capacity**

Climate change adaptation *refers to natural or human adjustments in an ecosystem in response to changing climate conditions*

Step 3A: Identify Adaptation Strategies

Goal: Develop climate-smart adaptation strategies and actions to reduce vulnerabilities or increase resilience of focal habitats

Adaptation Workshops:

Generated adaptation strategies and specific actions to reduce climate change vulnerability for focal habitats within the context of regional management goals

- Where, when, and how those actions can be applied
- Implementation feasibility and effectiveness
- Ways to modify existing actions to reduce vulnerabilities and/or increase resilience

Step 3A: Products

Current Management Goal: Restoring disturbed areas with native species to prevent establishment of non-native species and to prevent erosion

Potential vulnerabilities:

- Reduced soil moisture
- Increased temperature
- Reduced precipitation

Current Management Action	Current Effectiveness	Current Feasibility	Does Action Ameliorate Effects of Any Vulnerabilities?	Continue to Implement Action Given Climate Vulnerabilities?	Where/How to Implement Given Climate Vulnerabilities	Other Resource Considerations
Planting or seeding with native species as soon as possible after the disturbance	High	Moderate	Maintain native ecosystems and habitats	Yes	**Where**: More effective in areas where higher chance of success such as high soil moisture, elevation ranges **How**: Combination of continuing to plant some species but also look into planting other natives which may be more hardy	**Other resources action benefits**: Habitat restoration to improve water storage, maintains native habitat, prevents conversion **Other resources with potential conflicts**: Do not foresee negative conflicts
Removing non-native species as soon as they are detected	High	High	Prevents conversion to non-natives	Yes	**Where**: This action can be applied most everywhere **How**: Continue to remove invasives and explore other methods which may be more effective	**Other resources action benefits**: Prevents conversion and establishment of non-natives, helps improve water storage **Other resources with potential conflicts**: Do not foresee negative conflicts
Watering plants to ensure establishment	Moderate	Moderate	Helps to ensure success and establishment of native species	Maybe	**Where**: North slopes or shaded areas to maintain soil moisture **How**: Continuing watering may not be feasible or effective	**Other resources action benefits**: Helps habitat restoration **Other resources with potential conflicts**: Do not foresee negative conflicts

Step 3A: Products

Adaptation Category	Adaptation Strategy	Specific Adaptation Actions
Enhance resistance	Restore fluvial processes to streams that support alluvial scrub vegetation	• *Remove dikes, mining operations, and recharge basins that obstruct the migration ability of streams and sediment deposition areas* • Require undeveloped buffers along streams • *Raise roads out of washes*
Promote resilience	Maintain and/or restore the natural and historical characteristics of a watershed	• Designate critical habitat where the most sensitive species are found, and in areas where the home ranges of several species overlap
	Promote species that are tolerant of climatic changes	• Build a reserve of seeds and plants that are tolerant of disturbed conditions • *Restore habitat with native species that are tolerant of disturbed conditions and climatic extremes*
Facilitate transition	Identify and protect refugia	• Protect areas that may be buffered from the effects of climate change, including microhabitats that may provide cooler temperatures or maintain higher soil moisture during periods of drought
	Improve habitat restoration tools to support the ability of plants and animals to respond to changing climate conditions	• *Conduct a common garden experiment to determine which species are most likely to persist under projected climate conditions* • Use species distribution modeling to improve understanding and acceptance of facilitated migration for plant species
Increase knowledge	Maintain the natural and historical characteristics of a watershed	• *Research alluvial scrub species that are tolerant of disturbed conditions* • *Compile information on species ecology, range, and genetics to create detailed profiles*
	Map species distributions to understand potential habitat loss or gain and improve restoration	• *Use species distribution modeling to look at multiple species within a habitat or community simultaneously, incorporating multiple threats* • *Survey the vegetation and environment to aid in the design of a plant palette with species suited for various positions within an alluvial fan or watercourse, then update survey as habitat suitability changes under future climate conditions*
Engage coordination	Work across jurisdictions	• Coordinate invasive species management and funding between agencies • Communicate about projects and coordinate on-the-ground activities • Align budgets and program work priorities with adjacent lands

Step 3A: Products

Management Activity	Adaptation Actions	Climate Stressors: ↑ Air temperature	Climate Stressors: Altered precipitation (timing & amount); ↓ Soil moisture	Disturbance Regimes: ↑ Flooding & soil erosion	Disturbance Regimes: Altered wildfire regimes	Non-Climate Stressors: Invasive & problematic species
Habitat Management and Restoration Activities	Designate critical habitat where the most sensitive species are found, and in areas where the home ranges of several species overlap		✔	✔	✔	✔
	Conduct a common garden experiment of plants from across the species' range in order to understand the level of adaptive variation within the population	✔	✔			
	Build a reserve of seeds and plants that are tolerant of disturbed conditions		✔	✔	✔	
	Restore habitat with native species that are tolerant of disturbed conditions and climatic extremes	✔	✔	✔	✔	✔
	Identify and protect areas that may be buffered from the effects of climate change, including microhabitats that may provide cooler temperatures or maintain higher soil moisture during periods of drought	✔	✔			
	Conduct a common garden experiment to determine which species are most likely to persist under projected climate conditions	✔	✔	✔	✔	
	Use species distribution modeling to improve understanding and acceptance of facilitated migration for plant species	✔	✔			
Watershed Improvement	Remove dikes, mining operations, and recharge basins that obstruct the migration ability of streams and sediment			✔		
	Require undeveloped buffers along streams			✔		
	Raise roads out of washes			✔		

Step 3A: Products

EFFECTIVENESS \ FEASIBILITY	Low	Moderate	High
High	**Low F/High E** Require undeveloped buffers along streams Remove dikes, mining operations, and recharge basins*	Raise roads out of washes* Survey the vegetation and design plant palette with suitable species for current and future conditions* Identify and protect areas that may be buffered from the effects of climate change	**High F/High E** Build a reserve of seeds and plants that are tolerant of disturbed conditions
Moderate		**Mod F/Mod E** Designate critical habitat where sensitive species are found Restore habitat with native species that are tolerant of disturbed conditions and climatic extremes*	Research alluvial scrub species that are tolerant of disturbed conditions Coordinate invasive species management, funding, and support between agencies
Low	**Low F/Low E**	Conduct a common garden experiment that includes plants from across the species' range to understand the level of adaptive variation Use species distribution modeling to look at multiple species within a habitat or community simultaneously, incorporating multiple threats	Compile information on species ecology, range, and genetics to create detailed profiles **High F/Low E**

Step 3B: Develop Adaptation Implementation Plans

Goal: Develop implementation plans for on-the-ground actions

ADAPTATION IMPLEMENTATION PLANS

1. Evaluated vulnerabilities of and developed adaptation implementation plans for management activities
   - Fire & Fuels, Grazing, Watershed Improvement, Restoration & Planting

Step 3B: Products

Adaptation Implementation Action Plan

Managers and stakeholders developed implementation action plans for some of the identified priority adaptation strategies in Table 1. These plans include a list of sequential steps needed to successfully implement the adaptation strategy, and identification of potential implementation barriers and potential solutions.

Adaptation Strategy

Incorporate climate and fire vulnerability into fire management plans; update fire management plans with climate and other stressor information.

Implementation Plan (actions listed in order of occurrence)

1. Identify and map valued resources at risk, most vulnerable sites, and high-value sites
    a. Gather fine scale spatial information and identify gaps in spatial information (FRID, climatic water deficit projections, species distribution)
2. Set clear goals for each location and site
    a. Acknowledge change and set potential trigger points for when new goals need to be developed (e.g. if conifer site converts to shrubs, may want to alter goals rather than fight to get trees back)
3. Identify actions/strategies to achieve site goals; for example:
    a. Protect key areas by reducing vulnerability of suppression activities
        i. Potentially mark areas as retardant drop sites
        ii. Build new fire stations in key locations
        iii. Add patrols in key areas
        iv. Make sure resources are available in key areas
    b. Determine risk/benefit of fire at various stages (e.g. if XX has burned within the last X years, and is sensitive to short return intervals, keep fire out for XX more years OR allow fire in areas that need it)
    c. Reduce fuels in strategic areas around these sites
        i. Rely more on mechanical treatments than fire (less constrained)
        ii. Find solutions to allow the removal of more biomass, rather than relying on prescribed fire to remove downed biomass
        iii. Seek alternative funding sources
        iv. Communicate with local land owners that they must treat their land or the Forest Service will not treat complementary public land
        v. Collaborate across agencies and work with community groups to increase enforcement and/or incentives for people to treat their own land within the WUI
        vi. Retrofit community structures to better tie with vegetation treatments because one is not effective without other; take advance of FEMA disaster grants
        vii. Focus on fine fuels and avoid treatments that increase fine fuel components

Step 3B: Fire & Fuels Implementation Plan

Implementation Steps	Challenges to and Solutions for Implementation
1. Identify and map valued resources at risk, most vulnerable sites, and high-value sites	
2. Set clear goals for each location and site	
3. Identify actions/strategies to achieve site goals; for example: • Protect key areas • Determine risk/benefit of fire at various stages • Reduce fuels in strategic areas around sites	
4. Integrate actions/strategies for specific locations into annual plan updates	
5. Ensure that specific information about actions and locations is given to firefighters	

Step 3B: Develop Adaptation Implementation Plans

Goal: Develop implementation plans for on-the-ground actions

ADAPTATION IMPLEMENTATION PLANS

1. Evaluated vulnerabilities of and developed adaptation implementation plans for management activities
   - Fire & Fuels, Grazing, Watershed Improvement, Restoration & Planting
2. Integrated climate change information into current forest projects
   - Chaparral fuelbreaks, Sage scrub restoration, Aquatic organism passage, Grazing allotments

Case Study: Ojai Community Defense Zone Project

Project Goals

Maintain existing fuel breaks and increase defensible space to:

1. Reduce the threat of wildfire to the urban interface
2. Create safer conditions for the public and firefighters
3. Protect watershed values and water quality
4. Reduce potential impacts of high intensity wildfire
5. Increase efficiency and cost effectiveness of fire suppression activities

Actions

1. Manage ground cover
2. Use irregular shapes in design
3. Expand width
4. Use mechanical treatments

Case Study: Ojai Community Defense Zone Project

Project Goals

Maintain existing fuel breaks and increase defensible space to:

1. Reduce the threat of wildfire to the urban interface
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4. Reduce potential impacts of high intensity wildfire
5. Increase efficiency and cost effectiveness of fire suppression activities



How might climate change affect the ability of the project to meet these goals?

↑ Wildfire, Extreme Precipitation Events, Invasive Grasses

Case Study: Ojai Community Defense Zone Project

Do current project actions reduce any vulnerabilities?

1. Manage ground cover to result in mixture of bare ground, native grasses and forbs
   - ✔ Reduces invasive grasses
2. Use irregular shapes in fuelbreak design
   - ✔ Reduces erosion potential
3. Expand width of fuelbreak
   - ✔ Increases response speed and/or tactics so less area burned



Wildfire, Extreme Precipitation Events, Invasive Grasses

Case Study: Ojai Community Defense Zone Project

What new actions could be added to further reduce vulnerabilities?

1. Plant native perennial grasses within fuelbreak

   ✔ Limits invasive grasses, decreases flashy fire behavior, reduces erosion potential and increases water infiltration

2. Establish trigger points for recreation closures and restrictions

   ✔ Reduces likelihood of human-caused ignitions

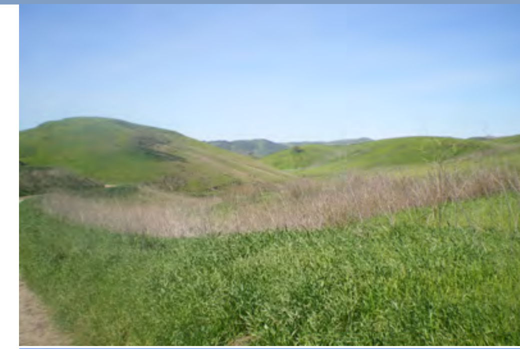


Wildfire, Extreme Precipitation Events, Invasive Grasses

Case Study: Lower Piru Rangelands Project

Project Goals

- Ensure that livestock grazing is managed in a manner that moves toward desired resource conditions consistent with multiple use goals;
- Mitigate livestock grazing impacts to threatened and endangered species' habitats;
- Determine the suitability of roads in Wilderness and Inventoried Roadless Area that provide management access within allotments;
- Make forage available; and
- Prevent livestock from impacting recreation.



Actions

1. Graze Piru, Pothole, Temescal allotments
2. Eliminate 0.1 mi road; convert 0.7 mi to trail
3. Reinstall and repair fencing in riparian areas
4. Consider adjusting season of use, stocking rate, and/or using temporary improvements (e.g., water troughs) to influence livestock distribution

Case Study: Lower Piru Rangelands Project

Project Goals

- Ensure that livestock grazing is managed in a manner that moves toward desired resource conditions consistent with multiple use goals;
- Mitigate livestock grazing impacts to threatened and endangered species' habitats;
- Determine the suitability of roads in Wilderness and Inventoried Roadless Area that provide management access within allotments;
- Make forage available; and
- Prevent livestock from impacting recreation.

How might climate change affect the ability of the project to meet these goals?

↑ Wildfire, Drought, Extreme Precipitation Events, Invasive Grasses

Case Study: Lower Piru Rangelands Project

Do current project actions reduce any vulnerabilities?

1. Graze Piru, Pothole, Temescal allotments

   ✔ Reduces fire risk by decreasing fine fuel loads

2. Eliminate road and convert road to trail

   ✔ Reduces erosion/sedimentation in riparian areas (if next to road)

   ✔ Reduces likelihood of vehicle-caused ignitions

3. Reinstall and repair fencing

   ✔ Reduces erosion/sedimentation in riparian areas

Wildfire, Drought, Extreme Precipitation Events, Invasive Grasses

Case Study: Lower Piru Rangelands Project

What new actions could be added to further reduce vulnerabilities?

1. Plant palatable and climate-resilient native species
   - ✔ Increases forage productivity
   - ✔ Promotes water infiltration and reduces erosion risk
   - ✔ Reduces invasive species risk

2. Practice invasive species management
   - ✔ Reduces invasive species risk
   - ✔ Promotes desired plant species composition

Wildfire, Drought, Extreme Precipitation Events, Invasive Grasses

Step 3B: Products

The Lower Piru Rangelands Project

A Southern California Climate Change Adaptation Case Study


Credit: I. Haykinson


Credit: Wikimedia (Public Domain)

Overview

Climate change may affect the ability to achieve on-the-ground project goals and objectives. The following case study demonstrates how climate change vulnerability and adaptation information can be integrated into existing and future regional grazing management projects to increase overall project resilience. For this example, resource managers and regional stakeholders worked together to evaluate: 1) how climate and non-climate vulnerabilities could impact the ability to achieve project goals, 2) what current project actions help to address or minimize vulnerabilities, and 3) what new actions could be added to the project to address remaining vulnerabilities. While this specific project has already been completed, developing and revising grazing management plans is a common activity in southern California, and this type of process could easily be replicated in future projects.

Lower Piru Rangelands Project Goals & Actions

The Ojai Ranger District within the Los Padres National Forest revised a grazing management plan for three allotments within the coastal scrub and annual grassland-dominated Lower Piru Rangelands. The goals of this project were to:

1. Ensure that livestock grazing is managed in a manner that moves toward desired resource conditions consistent with multiple use goals;
2. Mitigate livestock grazing impacts to threatened and endangered species' habitats at specific locations;
3. Determine the suitability of roads in Wilderness and Inventoried Roadless Area that provide management access within allotments;
4. Make forage available to qualified livestock operators that are suitable for livestock grazing; and
5. Prevent livestock from impacting recreation in the Lake Piru Recreation Area.

Primary project actions included:

- Graze Piru, Pothole, and Temescal allotments
- Eliminate 0.1 miles of road and convert 0.7 miles to trail (maintain 10 total road miles)
- Reinstall and repair fencing to prevent livestock from impacting riparian species and habitats
- Consider adjusting season of use, stocking rate, and/or temporary improvements (install water trough, salting) to influence livestock distribution and promote progress toward desired resource conditions

Step 1: Identify Climate & Non-Climate Vulnerabilities

How may climate change and non-climate stressors affect the ability to meet goals or implement project actions?

Increased drought/precipitation changes
- Impacts forage availability by decreasing forage productivity, altering plant composition, and reducing water sources

Altered wildfire regimes
- Reduces forage availability by temporarily increasing bare ground, altering planting composition, and promoting conversion to annual grassland
- Impacts ability to mitigate grazing impacts by damaging fencing

Increased extreme precipitation events
- Impacts ability to mitigate grazing impacts by increasing erosion in riparian areas and damaging/destroying fencing

Increased invasive plants (e.g., bromes, mustards)
- Undermines progress toward desired resource conditions and may decrease forage availability/productivity

Product of EcoAdapt's Awareness to Action Program, Southern California Climate Adaptation Project

Funded by the U.S. Forest Service and California Landscape Conservation Cooperative

Step 2: Reducing Vulnerabilities Through Existing Project Actions

Which existing project actions help address potential vulnerabilities?

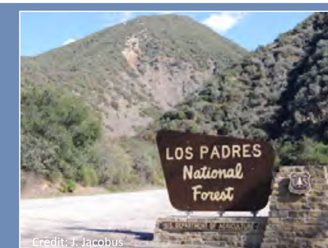
Action: Graze Piru, Pothole, and Temescal allotments
- ✔ Increases regional rangeland productivity and forage available to livestock operators
- ✔ Increases total available water sources by accessing additional riparian/water source areas
- ✔ Reduces fire risk by reducing fine fuel loads

Action: Eliminate 0.1 miles of road and convert 0.7 miles to trail (maintain 10 total road miles)
- ✔ Reduces riparian erosion (if road is adjacent to riparian areas)
- ✔ Reduces fire risk by reducing vehicular ignitions

Action: Reinstall and repair fencing to eliminate livestock from impacting riparian species and habitats
- ✔ Reduces riparian erosion

Action: Consider adjusting season of use, stocking rate, and/or installing temporary improvements
- ✔ Increases regional rangeland productivity by distributing grazing pressure temporally and spatially
- ✔ Increases total available water sources
- ✔ Promotes desired plant species composition (depending on management and grazing intensity)


Credit: D. Jackson



Credit: J. Jacobus

Step 3: Integrating New Project Actions to Address Remaining Vulnerabilities

What additional actions could be implemented in the future to further reduce identified vulnerabilities?

Action: Practice invasive species management (e.g., early detection/rapid response, treat/remove invasives)
- ✔ Reduces invasive species risk in rangeland and riparian areas
- ✔ Increases forage productivity
- ✔ Promotes desired plant species composition

Action: Seed/Plant palatable and climate-resilient native species (e.g., drought-tolerant species; perennials)
- ✔ Increases forage productivity
- ✔ Promotes water infiltration and reduces riparian erosion by stabilizing soil
- ✔ Reduces invasive species risk and promotes desired plant species composition

Action: Incorporate climate conditions, trends, and triggers into adaptive grazing management
- ✔ Utilizing planned grazing rotations during drought periods helps maintain long-term forage production

Action: Plan for and implement water development based on projected future water conditions
- ✔ Identifying proper areas for and installing stock ponds to capture runoff helps ensure water for cattle

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Applying Climate Information in Management Operations

Climate Adaptation Products

Vulnerability Assessment

Science synthesis of existing condition and projected changes/impacts

Adaptation Strategies & Actions

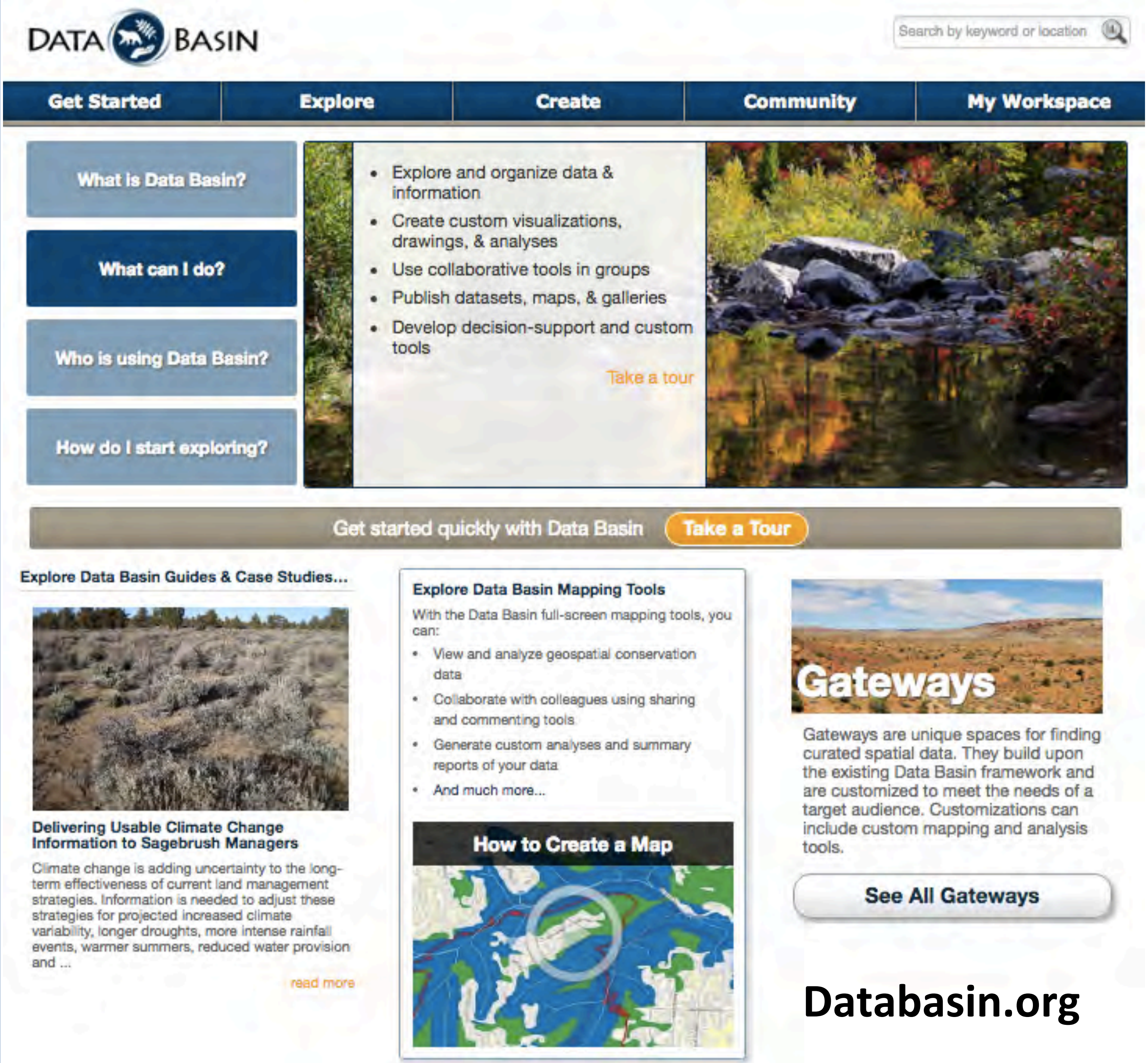
Menu of adaptation options based on vulnerabilities

How can climate adaptation products be applied to management operations?

Management Operations

- **Forest planning**
- **Landscape Assessments**
- **Resource Program Strategies**
- **Project NEPA analysis**
- **Project design/ implementation**
- **Monitoring plans**
- **Climate Scorecard**

Spatial Climate Tools

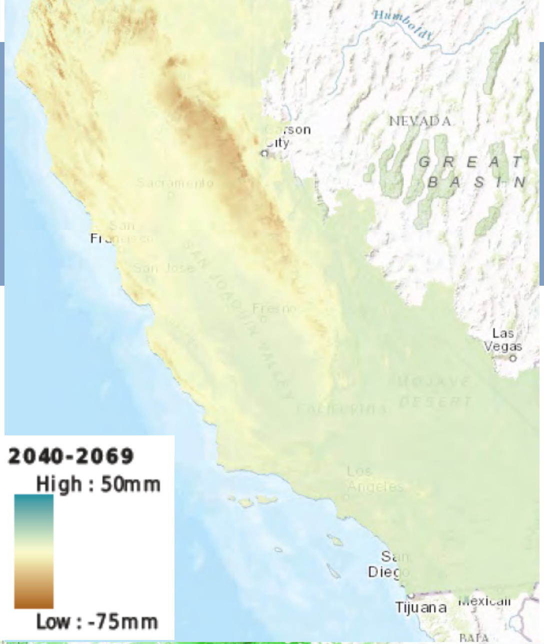


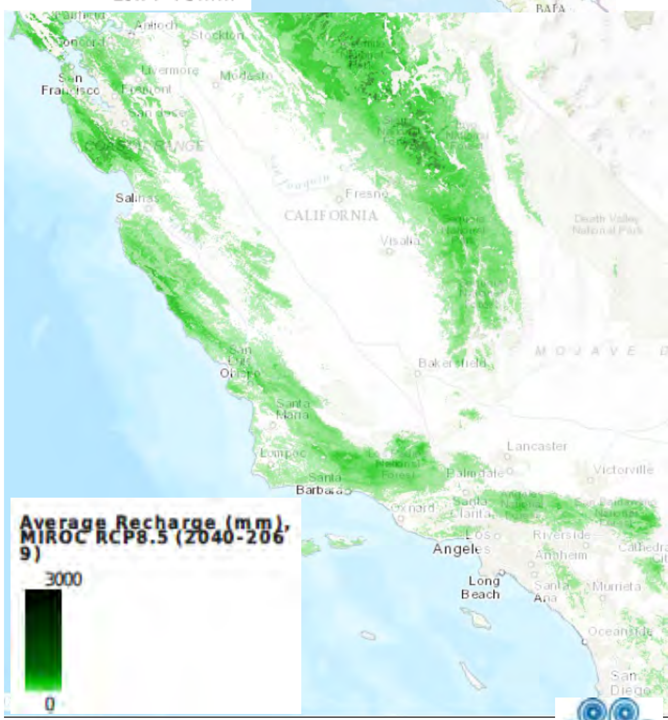
Databasin.org

Spatial Climate Tools

Spatial Climate Tools

- Southern California Climate Adaptation Project[1]
- Maps can help identify:
  - Projected climate changes for region
  - Where and why resources are vulnerable
  - Magnitude of change they are likely to experience





1. https://databasin.org/groups/0271e0425e8b4505a5a8ed694dbe8ad6

Acknowledgements

http://ecoadapt.org/programs/adaptation-consultations/socal

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