The Trabuco Creek Watershed Improvement Project

Panoramic View of Saddleback and Surrounding Peaks of the Santa Ana Mountains by Nandaro licensed under CC BY-SA 3.0

A Southern California Climate Change Adaptation Case Study

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 watershed improvement 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 watershed improvement plans is a common activity in southern California, and this type of process could easily be replicated in future projects.

Trabuco Creek Project Goals and Actions

The Cleveland National Forest conducted a watershed improvement project in Trabuco Creek, a stream in the semi-arid Santa Ana Mountains with high recreation use, including multiple private recreation residences, and several instream dams and hardened road crossings (i.e., fords). The goals of this project were to:

1. Improve aquatic organism passage by increasing and maintaining stream habitat connectivity; and
2. Improve stream and riparian habitat quality, sustainability, function, and availability for fish, reptiles, amphibians, and birds.

Primary project actions included:

- Remove barriers to aquatic organism passage (e.g., small-scale, non-functioning instream fords and dams)
- Add channel complexity
- Remove invasive vegetation

Drop Structure on Trabuco Creek After a Rain by Shannon1 licensed under CC BY-SA 3.0

STEP ONE: Identifying Climate and Non-Climate Vulnerabilities

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

Increased drought

- Impacts stream habitat availability and connectivity by reducing or eliminating streamflow
- Impacts riparian habitat quality and composition by decreasing water availability, and may favor invasive species

Increased flooding

- Impacts stream habitat quality and function by increasing erosion, channel scour, and pollutant delivery
- Impacts riparian habitat quality, composition, and distribution by increasing disturbance

Increased air temperature

- May affect movement or survival of temperature-sensitive aquatic organisms by increasing water temperature

Increased invasive plants

- Impacts riparian and stream habitat quality by competing with native vegetation and increasing wildfire and associated erosion risk

Recreation

- Impacts stream habitat availability and connectivity by increasing surface water withdrawals
- Impacts stream habitat quality by increasing erosion

Roads, fords, bridges and culverts

- Impacts aquatic organism passage by blocking upstream migration

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STEP TWO: Reducing Vulnerabilities Through Existing Project Actions

Which existing project actions help address potential vulnerabilities?

ACTION: Remove barriers to aquatic organism passage

- ✔ Increases stream habitat connectivity and aquatic organism passage by removing physical barriers
- ✔ Increases stream habitat availability by allowing access to upstream areas

ACTION: Add channel complexity

- ✔ Increases stream habitat quality by slowing floodwaters to minimize channel scour and erosion
- ✔ Increases stream habitat availability and functioning by increasing habitat complexity
- ✔ Increases available refugia from high water temperatures by promoting pooling of cool, deep water
- ✔ Increases water availability for riparian habitats by slowing floodwaters
- ✔ Reduces potential for riparian habitat composition and distribution changes by slowing floodwaters

ACTION: Remove invasive vegetation

- ✔ Increases riparian habitat quality and functioning by reducing invasive species pressure
- ✔ Maintains riparian and stream habitat quality by reducing risk of wildfire and associated elevated erosion

STEP THREE: Integrating New Project Actions to Address Remaining Vulnerabilities

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

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ACTION: Build a system water budget to better manage water and multiple uses

- ✔ Increases stream habitat availability and connectivity and maintains water availability for riparian vegetation by mitigating potential harmful water extractions that could reduce streamflow

ACTION: Manage recreation in sensitive habitat areas

- ✔ Reduces erosion and unwanted sediment movement
- ✔ Maintains riparian water availability and increases stream habitat availability and connectivity by limiting recreational water use and extractions

ACTION: Manage erosion and sedimentation associated with roads and other infrastructure

- ✔ Reduces erosion and unwanted sediment movement

ACTION: Manage for fire (e.g., consider fire risk in restoration projects)

- ✔ Reduces likelihood of erosion and unwanted sediment movement by mitigating fire risk
- ✔ Reduces flood volumes by promoting a vegetated landscape that slows runoff

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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.