Nature-Based Solutions for Coastal Resiliency

Resilient coastlines.
Thoughtful planning.
Long-term solutions.

Nature-Based Solutions for Coastal Resiliency

The City of Santa Cruz, funded by the California Coastal Conservancy, is conducting outreach to educate residents and visitors on coastal resilience. We aim to engage the public on the use of nature-based solutions to improve coastline protections from erosion and flooding made worse by episodic events and climate change.

Nature-based solutions incorporate natural features and processes to protect, conserve, restore, and manage the coastline and its ecosystems. These solutions range from vegetation- and ecosystem-only to concrete constructed human systems with some habitat. Each solution has distinct benefits and tradeoffs. Your feedback on coastal adaptation is important to realize the community's vision for coastal management. The nature-based solutions project will be complete in 2025.

Want to learn more or get involved?

Sign up for the City Manager's Weekly Update!

Vegetation Only: Ecosystem Only

Assisted Natural Regeneration: Mostly Ecosystem

Green-Gray Infrastructure: Mixed Ecosystem + Human Built

Concrete with Some Habitat: Mostly Human Built

Concrete Infrastructure: Human Built Only

Understanding the Green to Gray Spectrum

All nature-based solutions incorporate features to protect, conserve, restore, and manage the coastline and its ecosystems. Solutions can be categorized along a "green to gray" spectrum. The greenest solutions consist of vegetation within an ecosystem — an example is adding native plants to wetlands. Gray solutions are human-built systems, typically concrete infrastructure — examples include seawalls and rip rap rock.

Some nature-based solutions are "green-gray" — these mix ecosystems with human built systems. An example is green stormwater infrastructure. Some gray solutions can be "greened up" by incorporating vegetation and ecosystem enhancements. An example is adding tidepool elements to rip rap.

The City of Santa Cruz and our partners prefer green nature-based solutions, but every solution has tradeoffs.

These include:

- Solution effectiveness
- Lifespan of each application
- Variable regulatory feasibility
- Initial and ongoing costs
- Community support

As we consider solutions for our environment, we will assess tradeoffs, working to build coastal resilience.

Coastal Conservancy

CITY OF SANTA CRUZ

Climate Resilient Santa Cruz

cityofsantacruz.com/resilientcoast

Photos courtesy of Groundswell Ecology, Central Coast Wetlands Group, ESA, Philipp Deus, Ron Whitaker, and Bien Labas

Habitat Restoration

Related terms: Habitat repair, revitalization, rewilding, rehabilitation, native revegetation

Function: Stabilize slopes, soil, and sediments, enhance natural processes, increase biodiversity, and provide essential ecosystem services

Location: Beach, bluff, wetland, or estuary

Local Example: Natural Bridges State Parks

Cobble Berms

Related terms: Beach stabilization

Function: Protect upper beach and/or dunes

Location: Beaches

Green Stormwater Infrastructure

Related terms: Bioretention, bioswales, rain garden, permeable pavement, stormwater planter, tree-planting, recontour

Function: Recharge aquifers to decrease salinization and reduce stormwater flows discharging at or near bluff or cliff edges

Location: Inland

Dunes

Related terms: Sand dunes

Function: Barrier from strong waves. Vegetation on dunes can trap sand

Location: Beach conserving or enhancing existing dunes or facilitating new dune development

Local Example: Seabright State Beach

Wetland

Related terms: Marsh

Function: Recharge ground water, filter storm-water, capture sediment, and absorb storm surge

Location: Coastal lagoon or river adjacent

Local Example: Jessie Street Marsh, Moore Creek

Sand Contouring

Related terms: Grading, bulldozing, sand management

Function: Beach recontouring to protect infrastructures and beach access

Location: Beach

Local Example: San Lorenzo River Mouth at Main Beach

Beach Nourishment

Related terms: Beach replenishment, sand replenishment, sand management

Function: Widening the beach

Location: Beach

Local Example: Harbor Dredge to Twin Lakes State Beach

Breakwater

Related terms: Artificial reef

Function: Reduce wave energy to protect shore and encourage sediment buildup

Location: Offshore structure

Jetty

Related terms: Sand retention, groin

Function: Trap sand and protect shore from waves

Location: Connects to shoreline

Local Example: West Harbor Jetty

Rip Rap

Related terms: Bulkhead, revetment, rock armor, shot rock, rubble

Function: Protect shore from waves

Location: Bluffs and cliffs

Local Example: 50% of West Cliff Drive