Living Shorelines in Southern Ca
A Legacy of Shoreline Hardening

14% of U.S. shoreline is hardened

Southern Ca is most hardened
Coastal Hardening

- Necessary in certain locations
- **Physical** benefits
- Minimal to no biological benefits
- Begins **degrading** day after construction
- Costly
- Frequent **maintenance**
Impacts of Coastal Hardening

- Impacts to shorelines, wetlands, & subtidal habitats
  - Direct & indirect loss
  - Wave deflection & erosion
- Cuts off ecosystem processes & connectivity
- Shoreline access & use
Living Shorelines can include any shoreline management system that is designed to protect or restore natural shoreline ecosystems through the use of natural elements and, if appropriate, manmade elements.
Green-Grey Spectrum

**Green - Softer Techniques**

**Vegetation Only** - Provides a buffer to upland areas and breaks small waves. Suitable for low wave energy environments.

**Edging** - Added structure holds the toe of existing or vegetated slope in place. Suitable for most areas except high wave energy environments.

**Sills** - Parallel to vegetated shoreline, reduces wave energy, and prevents erosion. Suitable for most areas except high wave energy environments.

**Breakwater** - (vegetation optional) - Offshore structures intended to break waves, reducing the force of wave action, and encourage sediment accretion. Suitable for most areas.

**Coastal Structures**

**Revetment** - Lays over the slope of the shoreline and protects it from erosion and waves. Suitable for sites with existing hardened shoreline structures.

**Bulkhead** - Vertical wall parallel to the shoreline intended to hold soil in place. Suitable for high energy settings and sites with existing hard shoreline structures.
Multiple Co-Benefits

- Create Fish and Wildlife Habitat
- Maintain Coastal Processes
- Attenuate Wave Energy
- Accrete Sediment
- Reduce Erosion
- Adapt to SLR
- Can Provide Outdoor Recreation
- Sequester Carbon
- May Buffer Ocean Acidification
Shallow Subtidal
Upper Newport Bay Living Shoreline

Photo: Nick Sadrpour
• Very successful eelgrass restoration
• Initial target restoration 1,280 m² - Aerial extent in 2018 was 3,376 m² or .93 acres, 3 x the initial target!
• Difficult to keep eelgrass out of control plots
Oyster numbers:
Adult density by treatment

Control Eelgrass Oyster Oyster/Eelgrass

Ostrea lurida density (m²)

- Pre-Restoration
- 6 Months Post-Restoration
- 12 Months Post-Restoration

Treatment

Control Eelgrass Oyster Oyster/Eelgrass
Open Coast Is Different

- 5-7’ tidal range
- Storm surge 1-2 feet
- Beaches change seasonally
- Periodic El Ninos
- ~110 miles armoring
Outer Coast Gradient

Coastal Area
Beach
Littoral Zone
Breaker Zone
Zone of Nearshore Currents
Offshore Zone

Coast-line
Shore-line

Dunes
Backshore
Fore-Shore

MHWL
MSL
MLWL

Closure-depth
Los Angeles Living Shoreline
Surfer’s Point
Living Shoreline
WHAT'S THE PLAN?

During Phase 1, about half of the existing damaged parking lot will be removed and the materials recycled. The stretch of beach along this area will be widened by 60-feet and a new cul-de-sac on Shoreline Drive will be constructed 1,000-ft. east of the current turnaround. The multi-use bike path will be relocated inland along the beachfront adjacent to the new parking area that will be constructed just north of the existing lot.

Project Benefits:

- Beach restoration that protects our coastline from erosion
- Provides more beachfront area for recreational opportunities
- New multi-use bike path with lighting
- New storm water filtration system including a grass bioswale to treat runoff and prevent pollutants from reaching the Ventura River Estuary and ocean

Additional improvements will be made in future phases when funds are identified.
Hybrid Green-Grey Solution - Cardiff Living Shoreline Project

Pre-construction

Simulated Visualization
One Size Does Not Fit All

• Permitting
• Design for specific conditions
  – Substrate/soil
  – Wave energy
  – Adjacent infrastructure
• Local support
  – Government willingness
  – Community engagement
California needs demonstration projects

- Efficacy of natural habitats as shoreline protection
- Habitat potential for green-grey infrastructure
- Monitor for both physical & biological performance
- Public education
- Horizontal & vertical managed retreat
Thank You!

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