



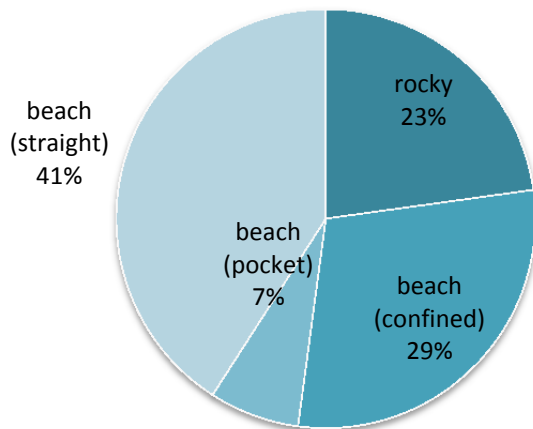
Los Angeles County

Coastal Zone



Los Angeles (LA) County includes 101 miles of mainland shoreline (encompassing the Ports of LA and Long Beach) as well as Santa Catalina Island (65 miles) and San Clemente Island (57 miles). The coastal zone area totals approximately 177,000 acres (about 276 square miles) and includes portions of the County of Los Angeles and 12 incorporated cities. The county includes the Santa Monica Mountains in the northwest, an area with significant natural resources and scenic qualities; a series of broad sandy beaches in several beach cities extending around Santa Monica Bay; the hills, rocky beaches and coves of the Palos Verdes Peninsula, industrial harbor complexes at San Pedro Bay; and sandy beaches from Long Beach to Alamitos Bay. There are also thousands of recreational and commercial boating slips at facilities throughout the county. Over 10 million residents (around 26% of the state) reside in the county and cities in Los Angeles, having some of the most diverse populations in the state. The coastal jurisdictions support significant urban development, beaches, visitor and commercial recreation and varied natural resources.

Outer Coast Shoreline



Coastal Zone Resources

Ports & Harbors: Los Angeles, Long Beach, San Pedro, Wilmington, Marina del Rey
Publicly Owned/Accessible: 82,000 acres
Public Access Coastal Areas: 217 locations
Coastal Zone Wetlands: 4,800 acres

Ocean Economy

2013 County Ocean Sectors GDP \$15.9 B

2013 Major Ocean Economic Sectors

Transportation GDP	\$6.40 B
Tourism and Recreation GDP	\$2.20 B
Minerals GDP	\$0.48 B

43%

of State Ocean Sector GDP

Source: National Ocean Economics Program, 2016

Los Angeles County is the largest ocean economy in the state, accounting for 43% of the state's total ocean sector gross domestic product (GDP). The Ports of Los Angeles and Long Beach are two of the busiest ports in California and the U.S. More than 40% of all imports arriving in the U.S. come through the Ports of Los Angeles and Long Beach [1], making the stability of these ports incredibly important to the U.S. economy. The tourism economy is also vital to LA County; certain assets that support tourism and recreation in the county (i.e. beaches) could be negatively impacted by rising sea levels without efforts to prepare and adapt.



Los Angeles County

Hazards and Vulnerability

Many vulnerability assessments have been completed or are currently underway for Los Angeles County. A comprehensive shoreline change and coastal erosion model for Los Angeles is being developed through the AdaptLA Program, which produced maps showing vulnerabilities from sea level rise that are viewable online [2]. Los Angeles County, the City of Los Angeles, the City of Hermosa Beach, and the City of Long Beach have all conducted vulnerability assessments or climate resiliency assessments using the National Research Council's (NRC) west coast projections of 2-12 inches of sea level rise by 2030, 5-24 inches by 2050 and 17-66 inches by 2100. Topic specific vulnerability assessments have also been conducted, such as the LA County Department of Beaches and Harbor's 2016 [1] assessment of public beach facility vulnerability. This study found that the Malibu beaches may lose significant width with some locations losing their entire sandy beach by 2100 using 39 to 79 inches of sea level rise. In addition, facilities between Dockweiler State Beach and Torrance County Beach may be reduced by at least half of their present day width.

Potential Bluff Erosion Risk w/ 1.5m SLR

1,100 properties | 1,600 people

Source: CoSMoS Phase 1 (2016), County parcel data, 2010 U.S. Census Data

The City of Los Angeles owns and maintains critical coastal infrastructure, including two power plants and two wastewater treatment plants. Currently, some of this infrastructure is vulnerable to flooding during high tides and severe storms. These events are expected to significantly worsen with rising sea levels [3]. The City of Los Angeles's Sea Level Rise Vulnerability Assessment found the city's roads, water systems (wastewater, stormwater, potable

water) and cultural assets (museums, cultural centers, parks and open space) are vulnerable to sea level rise and associated storm surge [4]. Many City assets are already very vulnerable to damages



Marine Stadium (Belmont Shore), Long Beach, CA - High Tide

occurring during high tide and large storm events. Specific areas that have the highest vulnerability to the impacts from sea level rise were found to be the low-lying San Pedro and Wilmington as well as Venice [4]. Venice has begun to experience flooding during El Nino conditions.

Since most of the City

of Los Angeles' coastal zone is highly urbanized, there appear to be fewer ecological vulnerabilities in the area. However, the Ballona Wetlands Ecological Reserve, the largest remaining coastal wetland within urban LA County, is at risk to saltwater intrusion and flooding over the current flood control levees that divide Ballona Creek from the wetlands [3].

Population at risk to 100yr Flood

3,700 = current risk | 14,000 = future w/
1.4m SLR

Source: Heberger et al., 2009

In the Santa Monica region, beaches are a critical asset and sea level rise will likely make it more difficult to maintain beach widths and associated economic, cultural, recreational, and ecological benefits. For example, the parking lot north of, and adjacent to, the Santa Monica Pier has experienced flooding in the past, and is expected to undergo more regular flooding with rising sea levels. The pier, coastal residences, and hotels have all sustained storm damage, which is expected to increase with sea level rise [3].



Los Angeles County

The City of Hermosa Beach's vulnerability assessment found that increased erosion, coastal flooding, higher storm surges and flood elevations, permanent inundation, reduced capacity to absorb runoff, and saltwater intrusion into coastal groundwater basins would be expected with rising sea levels [5]. Infrastructure vulnerabilities include the city's sewage system, city streets, and some iconic structures (i.e., the Pier, the Strand, and Land Motor Home Park) and associated business activities, particularly in the central and southern parts of the city where there is the greatest exposure to flooding in a future 100-year flood with 66 inches of sea level rise [5]. In addition, some communities or populations within Hermosa Beach were found to be more socially vulnerable to flooding than others communities in the city [5]. Some of the most important factors shaping social vulnerability include income and poverty, race, females as head of household, age, housing type, physical and mental illnesses and disabilities, and transient populations. Sea level rise planning should consider the additional needs associated with addressing vulnerabilities for these communities.

The City of Long Beach's Climate Resiliency Assessment Report's states that increased storm frequency and high tides combined with El Nino conditions [6] will have a large impact on coastal residents, development, and infrastructure along the highly developed coastline in the city. Increased coastal flooding, erosion, and permanent inundation has been predicted for low lying areas of Long Beach, and is already happening along the Peninsula and Alamitos Bay [6]. The Port of Long Beach is conducting work on sea level rise and coastal flooding impacts where the movement of goods might be impacted, in order to adequately prepare the port for these vulnerabilities in their Port Master Plan (PMP) update.

Vulnerabilities to sea level rise for the Cities of El Segundo, Manhattan Beach, Redondo Beach, Palos Verdes, Rancho Palos Verdes, Torrance, and Avalon are not well known. However, it is likely that some of these areas will experience similar vulnerabilities that occur county-wide because of the shoreline conditions in these areas, including saltwater intrusion and drowning of marsh habitat, loss of public access, and flooding risk to coastal development and infrastructure [3].

LCP and Sea Level Rise Planning

Local Coastal Programs (LCPs) are planning tools used by local governments to guide development in the coastal zone, in partnership with the Coastal Commission. LCPs specify the appropriate location, type, and scale of new or changed uses of land and water and include a land use plan and measures to implement the plan (such as zoning ordinances). The Coastal Commission has awarded three rounds of the Local Assistance Grant Program since January 2014 to support certification and updates of LCPs, with an emphasis on addressing the impacts of climate change. Within this county, the Cities of Santa Monica (Round 2), Los Angeles (Round 2) and Hermosa Beach (Round 1 and 3) have been awarded grants from the Coastal Commission to address the impacts of sea level rise within their LCP jurisdictions. Table 1 below shows whether jurisdictions have LCPs that address sea level rise. "In part" means an LCP segment has some explicit policy language addressing sea level rise and "In progress" refers to jurisdictions with LCP grants for addressing sea level rise.



Los Angeles County

Table 1. LCP Planning in Los Angeles County (as of Dec. 2016)

Jurisdiction/Segment	Certified LCP?	Grant?	Vulnerability Assessments ^[1]	Updated for SLR?	Shoreline by Jurisdiction
City of Malibu	2002	No	No	In Part	23%
Los Angeles County	No	No	Yes ^[1,2]	No	3%
Malibu Santa Monica Mountains Segment	2014	No	No	In Part	
Marina del Ray Segment	1990	No	No	In Part	
Playa Vista A Segment*	No	No	No	No	
Santa Catalina Island Segment**	1990	No	No	No	
City of Los Angeles	No	Yes	Yes ^[4]	No	14%
Pacific Palisades Segment	No	No	Yes ^[1]	No	
Venice Segment	No	CCC	Yes ^[1]	In Progress	
Playa Vista Segment*	No	No	No	No	
Del Rey Lagoon Segment	No	No	No	No	
Airport/Dunes Segment*	No	No	No	No	
San Pedro Segment	No	No	Yes ^[1]	No	
City of Santa Monica	No	CCC, OPC	Yes ^[1]	In Progress	3%
City of El Segundo	1982	No	No	No	1%
City of Manhattan Beach	1994	No	No	No	2%
City of Hermosa Beach	No	CCC	Yes ^[5] , In Progress ^[7]	In Progress	2%
City of Redondo Beach	2010	No	No	In Part	2%
City of Torrance	No	No	No	No	1%
City of Palos Verdes Estates	1991	No	No	No	5%
City of Rancho Palos Verdes	1983	No	No	No	8%
City of Long Beach	1980	No	Yes ^[6]	No	6%
City of Avalon	1981	No	No	No	***
Federal Lands and Ports					30%

* Santa Catalina Island shoreline = 64.6 miles, ** LCP segments are inland of shoreline, ***City of Avalon length = 6.76 miles

Coastal Act Management Priorities

Los Angeles County faces significant sea level rise vulnerabilities in every sector, especially for its extremely valuable beaches and ports. The county also must deal with flooding, continued shoreline erosion and increasing pressure for seawall development in the urban areas. Some top priorities by Coastal Act themes are presented below.

Coastal Development and Hazards (Coastal Act Sections 30235, 30236, 30250, 30253)

There is a need throughout Los Angeles County for shoreline management planning to address residential development vulnerable to sea level rise. To protect shoreline development in the county,



Los Angeles County

many jurisdictions have relied on sand replenishment projects and seasonal berms as storm defenses. For example, many beaches in the Santa Monica Bay region were historically narrow, but starting in the 1930s, they were artificially widened through large scale beach nourishment projects and the construction of sand retention structures such as breakwaters and groins. Understanding the viability of future reliance on seasonal berms and sand replenishment in the face of sea level rise will be pivotal for many jurisdictions, especially those in the Santa Monica Bay region. The Regional Sediment Management Plan for the LA Basin indicates that nourishment may be effective for the more urban beaches in Santa Monica and points south. Other important developed assets that need long-term sea level rise planning in the county are energy plants, wastewater facilities, railroads, and roads. This planning will require continued multi-agency coordination and collaboration with stakeholders like the State Lands Commission, Caltrans, utilities, and the railroad authority.

Public Access and Recreation (Coastal Act Sections 30210, 30211, 30213, 30220, 30221)

One of the highest priorities in the Coastal Act is the mandate to protect and maximize public access to the coast. Sea level rise could increase further loss of public access and recreational opportunities, especially for the many public beaches in LA County that are backed by parking lots. Some beach areas already have conflicts for space between recreational land and parking. With planning, funding, and collaboration, local governments can lay the groundwork for replacement of private vehicle access with public transit options, maintaining public access, and actions to preserve beach area as sea levels rise. In addition, as discussed above, many beaches in the county also receive seasonal sand replenishment – the viability of this practice and approach to maintaining beaches in the long term should be evaluated in light of sea level rise, changing wave conditions along the shoreline and other feasibility constraints (i.e., sand availability, costs of sand transport, ecological impacts, GHG emissions, etc.).

Coastal Habitats, ESHA, and Wetlands (Coastal Act Sections 30230, 30231, 30233, 30240)

Since most of the County of Los Angeles' coastal zone is highly urbanized, its few remaining ecological resources are important to sustain. Preserving existing and potential wetlands like those at the Ballona Wetlands Ecological Reserve and least tern nesting sites on Venice Beach, Santa Monica Beach, Dockweiler Beach should be a priority as sea level rise causes saltwater intrusion, drowning of habitat, and vegetation conversion. There is a need for additional study on how managing water flows with tide gates can affect shoreline habitats and their ability to migrate with sea level rise because understanding this relationship will be critical to informing options to preserve or restore coastal wetlands. Where environmentally sensitive lands are outside the jurisdiction of local government (e.g., military land, ports), coordination with federal agencies or other landowners will be very important.

Ports (Coastal Act Sections 30703 – 30708)

Sea level rise could cause a variety of impacts to ports, including flooding and inundation of port infrastructure and damage to piers and marina facilities from wave action and higher water levels. Sea level rise will not only affect port development and the port's economic viability, but if not properly planned for, it will also impact public access and how public access is planned for in the future. The Ports of Long Beach and Los Angeles should consider sea level rise when building new infrastructure or conducting major renovations of existing facilities. The Commission will need to work through these sea level rise planning issues with the Port through amendments to their Port Master Plans.

Additional Considerations

- Vulnerability studies are needed for communities of El Segundo, Manhattan Beach, Redondo Beach, Palos Verdes, Rancho Palos Verdes, Torrance, and Avalon. This information is crucial to inform long-term planning for these jurisdictions.



Los Angeles County

- To address the challenge of redevelopment, local governments should consider developing a comprehensive set of rules for redevelopment and reevaluation of existing seawalls, as well as strong land use policies to assure that private shoreline structure development on public lands fully mitigates for the impact these structures have on ecological function, public access and recreation, and other coastal shoreline resources.
- One potential accommodation strategy for developed areas (e.g., Malibu, Long Beach, or Hermosa Beach) is to create zoning overlays with specific design standards to ensure that modifications to existing buildings or construction of new buildings in vulnerable areas can withstand coastal flooding and tsunamis.
- Special attention should be paid to sea level rise planning for socially vulnerable populations such as those identified in Hermosa Beach [5], City of Long Beach [6], and City of Los Angeles [7] to ensure these communities have the awareness, information and support they need to prepare for sea level rise hazards.
- Beach communities in the county should analyze public transit opportunities and incentives to encourage beach users to reduce private vehicle use.
- For certain land use types and coastal-dependent uses (i.e. ports, breakwaters, piers) adaptation options to address sea level rise may be more limited.
- Adapt LA Program is helping to build local capacity throughout the region to help coastal jurisdictions to share and use best available science and information in their adaptation planning.

References

- [1] [Nobel Consultants - G.E.C., Inc. 2016. "Los Angeles County Public Beach Sea-Level Rise Vulnerability Assessment." Report prepared for the Los Angeles County Department of Beaches and Harbors.](#)
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- [3] California Coastal Commission South Coast District Staff Interview. July 22, 2016.
- [4] [Grifman, P. M., J. F. Hart, J. Ladwig, A. G. Newton Mann, M. Schulhof. 2013. "Sea Level Rise Vulnerability Study for the City of Los Angeles."](#)
- [5] [Ekstrom J. and S. Moser. 2014. "Vulnerability and Adaptation to Sea-Level Rise: An Assessment for the City of Hermosa Beach."](#)
- [6] [Aquarium of the Pacific. 2015. "City of Long Beach Climate Resiliency Assessment Report."](#)
- [7] [Geosyntec Consultants. 2016. "Assessment of Infrastructure Vulnerability to Sea-Level Rise Hermosa Beach, California."](#)