

Coastal California Adaptation Policy Briefs

A compilation of adaptation strategies, tradeoffs,
considerations, and examples

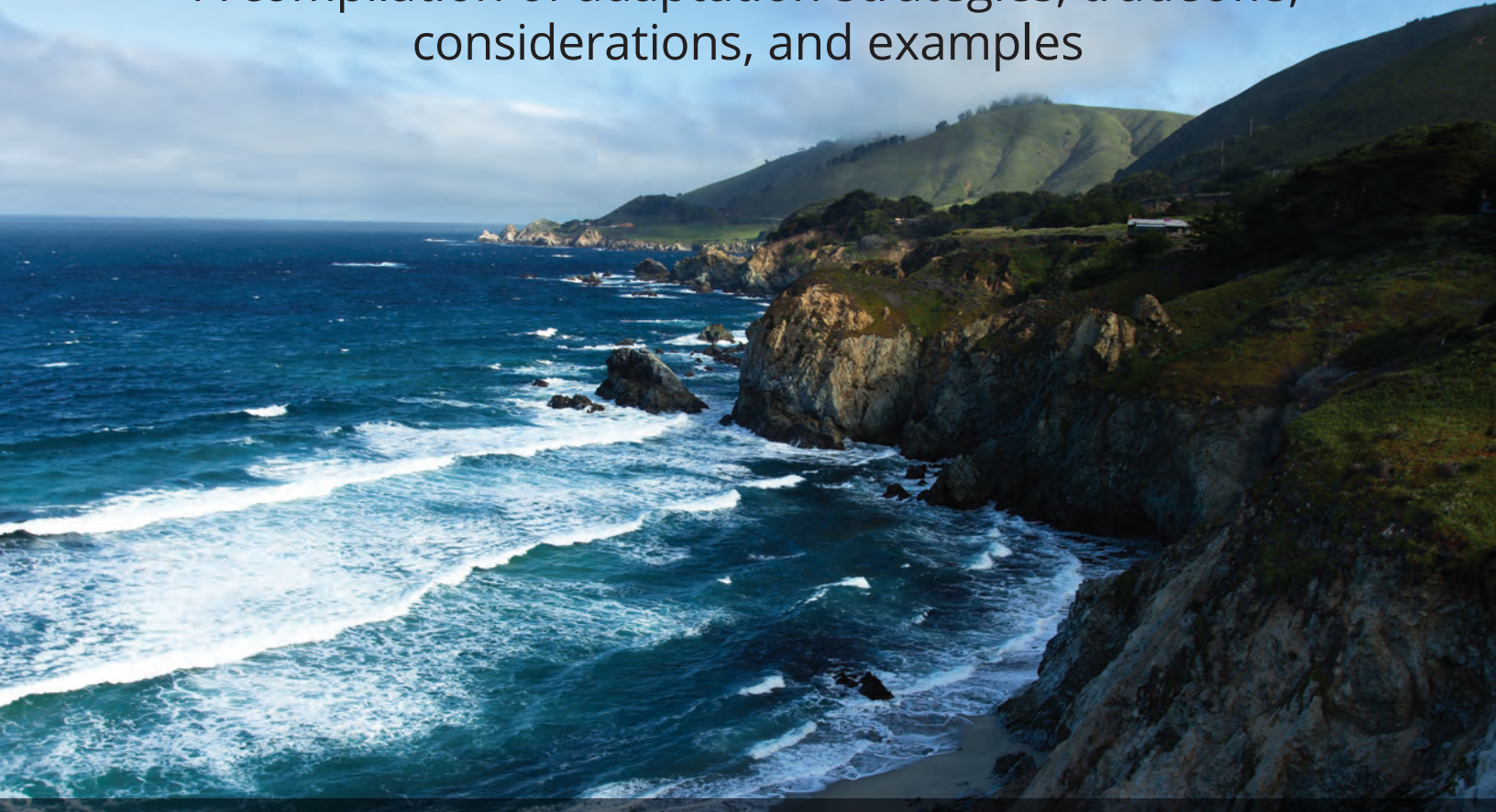




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Introduction

California's beautifully dynamic coastline is treasured by residents and visitors alike. It is a mecca for beachgoers and a boon for the state's economy. Yet rising seas, increasingly intense winter storms and a changing climate are reshaping California's coastline and threatening public beaches and coastal properties. Demand is now on the rise for nimble responses from coastal resource managers and local governments, charged with protecting their constituents from coastal hazards while ensuring that California's majestic coastline remains protected and accessible.

To address this need for a nimble response, the Stanford Center for Ocean Solutions collaborated with the Natural Capital Project and Stanford Law School to foster a transition from adaptation planning to implementation. Our team engaged planners, managers and others at the city, county and state levels to identify policy and decision-making gaps in the coastal adaptation context. We specifically targeted local communities currently updating their planning documents, such as Local Coastal Programs. This evolved into an investigation of a wide range of legal, financial and engineered strategies, including legal considerations, potential tradeoffs, and key examples of these strategies when possible.

Our engagements with local communities revealed that, while there is momentum at the California state and local levels to advance resilience planning, local governments seek more information and guidance for future adaptation endeavors. Uncertainty pervades these opportunities and will drive the need for more work to be done in this space in the future. Our research culminated in two resources designed to inform coastal adaptation planning and decisionmaking: the following **policy briefs**, and a beta **online viewer** designed to spatially link policy and legal considerations with California's dynamic coastline.

This compilation of coastal adaptation policy briefs on topics we co-identified with local communities throughout California reflects our research on these topics. Our work aims to provide clarity and information regarding the implementation of particularly salient adaptation strategies and topics. While these compiled resources were developed with a particular focus on local decisionmaking in California, the information can inform similar adaptation work elsewhere.



Beach Nourishment

Introduction

Beach nourishment is the engineered process of pumping or dumping sand on a beach to replace eroded sand, or to protect against future erosion. Beach nourishment can also be used to widen a naturally narrow beach.¹ Its drawbacks discussed below notwithstanding, nourishment is most suitable on beaches that provide natural protective services and culturally or economically important coastal access. Beach nourishment might also be apt for beaches that are the most susceptible to erosion due to rising sea levels or increased storm impacts.

Tradeoffs

One advantage of nourishment is that it can maintain the width of an eroding beach. Nourishment can also replace sediment supply loss, such as from sand mining or from dammed rivers.² Nourishment is also environmentally preferable to armoring a beach with seawalls, especially in the short term.³ Beach nourishment might also increase public access to beaches by maintaining or expanding the beaches themselves. Proponents of beach nourishment argue that it is less expensive than competing strategies, such as retreat.⁴ Regardless, it is still very expensive, perhaps even more so than other options, depending on what backs the beach.⁵

However, beach nourishment is known to have deleterious impacts on environmental conditions.⁶ For instance, nourishment can cause increased turbidity and sediment suspension in surrounding waters. Murky, turbid water can threaten the affected marine species and habitats. Nourishment can also cause environmental impacts to the areas from which the sand is sourced, especially if dredging is involved.⁷ In California, beach nourishment can cause sediment to unnaturally accumulate in the submarine canyons offshore of the coastline.⁸ Beyond direct environmental concerns, beach nourishment has had the effect of encouraging development in certain especially hazardous areas.⁹ Another drawback of beach nourishment projects is that they can be politically unpopular and can prompt public opposition.¹⁰

Further, beach nourishment alone will not safeguard beaches, especially those impacted by reduced sediment supply from dammed rivers upstream. Similarly, sand mines can reduce sediment supply, prompting more beach nourishment in affected areas than would otherwise be required.¹¹ Detractors also argue that nourishment is a misnomer because the name does not reflect the potential damage these projects can do to the coast.¹²

1 Gary Griggs et al., *Living with the Changing California Coast* 72 (Gary Griggs et al. eds., 2005).

2 *Id.* at 301 (“Another major historical loss of sand in southern Monterey Bay was due to the sand mining in the Marina and Sand City areas.”).

3 Charles Lester, *An Overview of California's Coastal Hazards Policy*, in *LIVING WITH THE CHANGING CALIFORNIA COAST* 138, 161 (Gary Griggs et al. eds., 2005) (recommending investigating beach replenishment strategies as a way of avoiding shoreline armoring); see also Jared Whitlock, *Coastal Commission Approves Scaled Back Sand Project*, THE COAST NEWS GROUP, Nov. 19, 2013, <http://www.thecoastnews.com/2013/11/19/coastal-commission-approves-scaled-back-sand-project/> (“To manage sea level rise, Solana Beach Mayor Mike Nichols said that beach nourishments are preferred over seawalls.”).

4 *San Diegans v. City of San Diego*, D046603, 2006 Cal. App. Unpub. LEXIS 4521, at *66 (Ct. App. May 25, 2006) (“Delaware published a study showing ‘retreat is 3 to 5 times more expensive than beach nourishment over a fifty year period’”).

5 See, e.g., Bianca Kaplanek, *Federal Funding for 50-year Sand Project Approved*, THE COAST NEWS GROUP, Dec. 15, 2016, <http://www.thecoastnews.com/2016/12/15/federal-funding-for-50-year-sand-project-approved/> (estimating the costs of a fifty-year beach nourishment project “to be \$100.1 million in Encinitas and \$64.7 million in Solana Beach, with average annual costs of \$2.1 million and \$1.6 million, respectively.”).

6 For instance, biologists have found that beach nourishment leads to long-lasting declines in invertebrate abundances due to beach replenishment. See Tyler Wooldridge et al., *Effects of Beach Replenishment on Intertidal Invertebrates: A 15-month, Eight Beach Study*, 175 ESTUARINE, COASTAL & SHELF SCIENCE 24 (2016).

7 See NAT'L RESEARCH COUNCIL, *BEACH NOURISHMENT AND PROTECTION* 97–99 (1995).

8 For example, Monterey Bay has a submarine canyon. ECOSYSTEMS OF CALIFORNIA 393 (Harold Mooney & Erika Zavaleta eds., 2016) (explaining that littoral cell sand losses can include “loss to submarine canyons”).

9 Scott B. Armstrong et al., *Indications of a Positive Feedback Between Coastal Development and Beach Nourishment*, 4 EARTH'S FUTURE 626 (2016).

10 See, e.g., Deirdra Funcheon, *Divers Protest Beach Renourishment Project in Broward*, BROWARD PALM BEACH NEW TIMES, Feb. 5, 2016, <http://www.browardpalmbeach.com/news/divers-protest-beach-renourishment-project-in-broward-7557047>.

11 But see Paul Rogers, *Controversial Beachfront Sand Mining Operation Along Monterey Bay to Close*, THE MERCURY NEWS, June 27, 2017, <http://www.mercurynews.com/2017/06/27/controversial-beachfront-sand-mining-operation-along-monterey-bay-to-close/>.

12 *Beach Fill*, BEACHAPEDIA, http://www.beachapedia.org/Beach_Fill (last visited Aug. 25, 2017) (“Many coastal experts believe the term ‘beach nourishment’ is a misleading term and that these projects should be called ‘beach dredge and fill projects’ to reveal their true impact on the beach.”).

Finally, beach nourishment is sometimes disfavored because it benefits a few landowners at the expense of the public at large. Specifically, public funds are typically used to finance nourishment projects under the guise that they will increase beach access or at least maintain existing public beaches. But nourishment projects typically act to protect the few wealthy landowners whose homes are imperiled by eroding beaches and rising seas instead, with limited protective benefits for public property.

Legal Considerations

Beach nourishment projects require several permits and are subject to several state and federal laws. Projects are typically subject to California Environmental Quality Act, National Environmental Policy Act, and other environmental impact analyses.¹³ After the applicable environmental review processes are complete, permits must be granted by the U.S. Army Corps of Engineers and the California Coastal Commission, among other agencies.¹⁴ Depending on the project, more permits may be required.¹⁵

Beach nourishment projects might face legal opposition for a variety of reasons. In New Jersey, homeowners filed lawsuits challenging nourishment projects that obstructed their views of the ocean.¹⁶ In Florida, beachfront property owners sued to stop a beach nourishment on the grounds that it unlawfully infringed upon their rights to the beach.¹⁷ In California, lawsuits over nourishment have even challenged the routes that trucks carrying sand to nourish the beach were to take.¹⁸ Another lawsuit challenged a Malibu beach nourishment project on environmental grounds.¹⁹

Examples

Beach nourishment is a common strategy that has been employed throughout California and the United States. In California, the Encinitas and Solana Beach storm damage reduction project includes beach nourishment in its plan.²⁰ There are several previous examples of beach nourishment along California's coastline as well, including Crescent City, Bolinas Bay, Ocean Beach in San Francisco, Seabright Beach in Santa Cruz Harbor, Twin Lakes Beach in Capitola, and Morro Bay.²¹

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¹³ CAL. PUB. RES. CODE §§ 21000–21189; 40 C.F.R. §§ 1500–1508.28.

¹⁴ For a thorough review of the permitting process, see EVEREST INTERNATIONAL CONSULTANTS prepared for CALIFORNIA STATE COASTAL CONSERVANCY, CALIFORNIA COASTAL SEDIMENT MASTER PLAN: BEACH RESTORATION REGULATORY GUIDE (Dec. 2006), available at http://www.dbw.ca.gov/CSMW/PDF/BBRG_Final.pdf.

¹⁵ Incidental take permits from the National Marine Fishery Service for projects in or near critical habitat, or from California's State Lands Commission, for example. See, e.g., 16 U.S.C. § 1539(a)(1)(B).

¹⁶ Tara Nurin, *Beach Replenishment: War on the Jersey Shore*, NJ SPOTLIGHT, Aug. 31, 2012, <http://www.njspotlight.com/stories/12/0831/0007/>.

¹⁷ *Stop the Beach Renourishment v. FL Dep't. of Envtl. Prot.*, 560 U.S. 702 (2010); see also Andrew Rice, *A Stake in the Sand*, THE NEW YORK TIMES, Mar. 19, 2010, <http://www.nytimes.com/2010/03/21/realestate/keymagazine/21KeyBeachfront-1.html?mcubz=1>.

¹⁸ Emily Sawicki, *Broad Beach Residents Sued Over Beach Restoration Project*, THE MALIBU TIMES, Apr. 7, 2016, http://www.malibutimes.com/news/article_f4da9d1c-fc24-11e5-a769-3300ec937d2f.html.

¹⁹ Gary Baum, *Malibu's \$20 Million Sand War*, THE HOLLYWOOD REPORTER, Nov. 27, 2012, <http://www.hollywoodreporter.com/news/malibus-20-million-sand-war-394381>.

²⁰ See U.S. ARMY CORPS OF ENG'RS LOS ANGELES DISTRICT, ENCINITAS-SOLANA BEACH COASTAL STORM DAMAGE REDUCTION PROJECT, available at <http://www.spl.usace.army.mil/Missions/Civil-Works/Projects-Studies/Solana-Encinitas-Shoreline-Study/>.

²¹ Lisa M. Krieger, *Lines in Sand Don't Last*, SAN JOSE MERCURY NEWS, Nov. 4, 2003, at F1, F6.



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Dune Restoration

Introduction

California's sand dunes are relatively limited due to its young, tectonically active coastline.¹ However, restoring or rebuilding the persistent and previously existing dune habitats can be a "green" coastal adaptation opportunity, offering protective benefits and ecosystem services that enhance the natural landscape.²

Dunes provide a number of ecological and human benefits, including wildlife habitat, recreation, water purification, and beach access.³ Dunes also act as a coastal barrier to storm surge and flooding and can buffer against rising seas.⁴ The sand stored in dunes functions as a reservoir during storm events for beaches that dissipate storm wave energy and protect areas landward of the dune complex.⁵

Dune restoration projects seek to recapture the naturally protective benefits of these systems and reestablish the storm surge buffer that existed prior to the loss or impairment of the dune system. Depending on the location and breadth of existing dune systems, dune restoration may take two forms: rehabilitating eroded or biologically impaired dune systems ("dune rehabilitation"),⁶ or artificially constructing a dune system which has been lost entirely either by construction or erosion ("dune rebuilding").⁷ Each form has certain methodologies, costs, and benefits.

Tradeoffs

Dune rehabilitation is an engineered process whereby native plant revegetation, non-native plant removal,⁸ organic dune thatching, and dune fencing are used to stabilize dunes and propagate enduring dune recovery.⁹ California's Department of Parks and Recreation has completed several successful dune rehabilitation projects with the goal of protecting coastal park lands, but they have not yet been applied to protect other properties.¹⁰ Dune rehabilitation is generally less expensive than dune rebuilding. However, it relies on natural processes and a steady supply of accumulated sand; thus, this process may take many years to produce a functioning and protective restored dune system.

Dune rebuilding requires the artificial deposition and formation of sand, either piped in from dredge sites offshore or transported from nearby sand mines.¹¹ This method can be achieved more quickly than an augmented dune rehabilitation project, but the necessary planning, costs, and resulting environmental impacts from heavy machinery and non-native sediments may prove prohibitive.

Dune restoration efforts face similar hurdles as other engineered strategies in coastal areas. For instance, "coastal squeeze" might make rebuilding dunes impractical, especially in front of coastal private property where limited space exists to adequately restore or rebuild dune systems.

1 GARY GRIGGS, INTRODUCTION TO CALIFORNIA'S BEACHES AND COAST 249 (2010).

2 CALIFORNIA COASTAL COMMISSION, SEA LEVEL RISE POLICY GUIDANCE 185 (2015), available at http://documents.coastal.ca.gov/assets/slr/guidance/August2015/0_Full_Adopted_Sea_Level_Rise_Policy_Guidance.pdf.

3 PETER ALPERT, *Coastal Dunes*, in ECOSYSTEMS OF CALIFORNIA, 409, 418 (Harold Mooney & Erika Zavaleta eds., Univ. of Cal. Press 2016) (explaining that "nearly one-third of the city of San Francisco sits atop a Holocene dune system that was once one of the largest in the state.").

4 *Id.*

5 WOODS HOLE SEA GRANT & CAPE COD COOPERATIVE EXTENSION, COASTAL DUNE PROTECTION & RESTORATION 1 (2008), available at <https://www.whoi.edu/files/server.do?id=87224&pt=2&p=88900>.

6 *Dune Construction and Strengthening (2015)*, EUROPEAN CLIMATE ADAPTATION PLATFORM, <http://climate-adapt.eea.europa.eu/metadata/adaptation-options/dune-construction-and-strengthening> (last visited Oct. 2, 2017).

7 WOODS HOLE SEA GRANT & CAPE COD COOPERATIVE EXTENSION, *supra* note 5, at 2.

8 *Coastal Dune Habitat Restoration Projects: Why is Dune Restoration Important?*, NATIONAL PARK SERVICE, https://www.nps.gov/pore/learn/management/planning_dunerestoration_importance.htm (last visited Oct. 2, 2017) ("Coastal dunes offer a buffer against storm extreme tides and storm surges. This buffering capacity, however, is minimized and potentially eliminated when dunes are over-stabilized by invasive plant species or other alterations. Over-stabilization makes dunes more susceptible to loss from erosion by not enabling them to move or migrate naturally in response to sea level rise and changes in erosional patterns.").

9 *Dune Construction and Strengthening (2015)*, *supra* note 6.

10 MOLLY LOUGHNEY MELIUS AND MARGARET R. CALDWELL, CALIFORNIA COASTAL ARMORING REPORT: MANAGING COASTAL ARMORING AND CLIMATE CHANGE ADAPTATION IN THE 21ST CENTURY 12 (2015).

11 WOODS HOLE SEA GRANT & CAPE COD COOPERATIVE EXTENSION, *supra* note 5, at 3.

Legal Considerations

Dune restoration projects require a coastal development permit (CDP) under the California Coastal Act.¹² Depending on the location of the project, the proximity of state-owned public trust lands, and the existence of a certified Local Coastal Program (LCP), either the California Coastal Commission or a delegated local government authority will be the responsible permitting authority for the CDP process.¹³ To be issued a CDP, a dune restoration project must be consistent with the policies of the jurisdiction's LCP, the Coastal Act, and any conditions imposed by the permitting authority.¹⁴ Additionally, given the rarity of intact California coastal dune systems and the reduced occurrence of the flora and fauna they support, dune restoration projects are likely to trigger the environmentally sensitive habitat area requirements under the Coastal Act¹⁵ or the consistency requirements of the California Environmental Quality Act.¹⁶

A dune restoration project would also likely require federal U.S. Army Corps of Engineers permits. For instance, a permit would be required for dune restoration projects that involve filling navigable waters or other waters of the United States.¹⁷ Further permits might also be required, depending on where the dune material is sourced.¹⁸ Dune restoration projects on California state lands would be subject to any additional requirements from California's State Lands Commission (SLC) under their authority as land owner. Additionally, the SLC would require a lease agreement for dune restoration projects on state lands.¹⁹

Examples

Many of the major cities in California have lost their protective dunes, and therefore, the protective benefits of coastal dunes on their seaward boundary. To date, there have been several notable dune restoration projects in Northern California.²⁰ The success of future restoration projects will likely be affected by a changing climate and rising sea levels.

The Lanphere Dunes in Humboldt County is the first dune restoration project on the Pacific coast—dating back to the early 1980s. This project has become a template for restoration best practices with a focus on not just biotic and abiotic components, but also in supporting the underlying processes sustaining the dunes.²¹ Monitoring efforts have shown that the first restoration projects have replenished the dunes to a health that matches that of neighboring systems.²² Additionally, Return of the Natives, the U.S. Fish and Wildlife Service, and California State Parks have partnered together to complete a new dune restoration project at Monterey State Beach.²³

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¹² See CAL. PUB. RES. CODE §§ 30600-01.

¹³ CAL. PUB. RES. CODE §§ 30600-01. For more information, see <https://www.coastal.ca.gov/cdp/cdp-forms.html>.

¹⁴ See CAL. PUB. RES. CODE §§ 30200-65.5.

¹⁵ CAL. PUB. RES. CODE § 30240(a).

¹⁶ CAL. PUB. RES. CODE § 21080.5(d)(2)(A).

¹⁷ 33 U.S.C. § 1344.

¹⁸ Sand can be sourced from mined sites or offshore sites. See, e.g., WRA ENVIRONMENTAL CONSULTANTS CONCEPTUAL FOREDUNE CREATION AND ENHANCEMENT PLAN 11-12 (2013), available at http://www.slc.ca.gov/Info/Reports/Broad_Beach/Appendix/C-1.pdf.

¹⁹ See, e.g., STATE LANDS COMMISSION, GENERAL LEASE – BEACH REPLENISHMENT AND PROTECTIVE STRUCTURE USE, available at http://archives.slc.ca.gov/Meeting_Summaries/2016_Documents/08-09-16/Items_and_Exhibits/56.pdf.

²⁰ ALPERT, *supra* note 3, at 423.

²¹ *Dune Restoration*, U.S. FISH & WILDLIFE SERVICE, https://www.fws.gov/refuge/Humboldt_Bay/wildlife_and_habitat/DunesRestoration.html (last visited Oct. 2, 2017).

²² *Id.*

²³ *Coastal Dune Restoration*, CALIFORNIA STATE UNIVERSITY MONTEREY BAY, <https://csumb.edu/ron/coastal-dune-restoration> (last visited Oct. 2, 2017).



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Elevation of Structures

Introduction

“Elevating structures” is an engineered coastal adaptation strategy where a structure is raised in response to a current or expected flooding hazard. This strategy employs stilts, columns, or piles to move the living area of a dwelling above a base flood elevation (BFE). Additional buffer requirements above the BFE is called “freeboard.” The primary way that this strategy functions in the long-term coastal adaptation planning context is through amendments to zoning ordinances and building codes that require new or rebuilt structures to be elevated to a height that includes a buffer freeboard elevation that reflects the anticipated sea level rise over a predetermined duration.¹

Elevating existing structures can be an attractive short-term solution for developed areas seeking to accommodate sea level rise for some duration. Moreover, it might be a particularly useful strategy for coastal dependent structures or critical infrastructure that cannot be moved according to a short-term retreat adaptation plan. The decision to elevate should be made after all the relevant environmental and regulatory requirements have been considered. Finally, property owners should consult certified engineers to assist with such a project and hire qualified contractors to perform the construction.²

Tradeoffs

Elevating structures provides a flexible solution for certain existing development prioritized for remaining in the same place while planning for a potential managed retreat plan in the future. Specifically, this strategy provides a way to “accommodate” sea level rise in the interim. This strategy might also be useful for properties where

“takings” concerns are the most challenging.³ Similarly, elevation might provide relief in locations where the local constituents are most opposed to short-term retreat from the coastline.

This strategy also has several practical advantages, such as bringing previously non-complying existing buildings into compliance with National Flood Insurance Program requirements, reducing flood insurance premiums, and not requiring the additional land that protective structures would require.⁴ Further, individuals elevating structures might qualify for financial assistance to do so.⁵ Finally, elevating structures saves money and provides a favorable return on investment for programs providing grants to mitigate flooding events.⁶

Despite its practical application and proven effectiveness to date, this strategy has certain drawbacks. For instance, elevating existing structures is not a long-term solution. Instead it merely delays removing structures from increasingly perilous coastal locations. It is also not applicable everywhere, because some buildings cannot be elevated or would be impractical to elevate.⁷ This strategy might also be cost-prohibitive, despite possible

1 Homeowners can also voluntarily elevate existing structures, either through the federal hazard mitigation program, or merely to reduce their flood insurance premiums.

2 Maine's Sea Grant has compiled a list of steps for homeowners considering elevating their structures. *Move up by Elevating Structures*, MAINE SEA GRANT, <https://www.seagrants.umaine.edu/coastal-hazards-guide/coastal-wetlands/elevate-structures> (last visited Sept. 26, 2017).

3 *See, e.g., Penn Cent. Transp. Co. v. City of New York*, 438 U.S. 104, 124 (1978) (explaining that one of the factors for determining whether a taking has occurred is “[t]he economic impact of the regulation on the claimant and, particularly, the extent to which the regulation has interfered with distinct investment-backed expectations.”).

4 FEMA's Coastal Construction Manual features a list of advantages and disadvantages of elevation. FEMA P-55, COASTAL CONSTRUCTION MANUAL: PRINCIPLES AND PRACTICES OF PLANNING, SITING, DESIGNING, CONSTRUCTING, AND MAINTAINING RESIDENTIAL BUILDINGS IN COASTAL AREAS, 4TH EDITION 15-9 (2011).

5 42 U.S.C. § 5170c.

6 LOSS AVOIDANCE STUDY: SONOMA COUNTY CALIFORNIA STRUCTURE ELEVATION MITIGATION (2017), available at https://www.fema.gov/media-library-data/1492193978634-8b228ed3251229b6a86dac730e56e925/FEMA_Factsheet_Sonoma_County_LAS_508.pdf.

7 *See* FEMA, REDUCING FLOOD RISK TO RESIDENTIAL BUILDINGS THAT CANNOT BE ELEVATED (2015).

grant assistance.⁸ Furthermore, elevating structures might affect access to the building, possibly violating Americans with Disabilities Act accessibility requirements.⁹

Elevating structures instead of removing them also has potentially damaging effects on ecosystem and surrounding properties. Similar to protective shoreline structures such as seawalls, elevated structures can impede longshore drift along a shoreline and increase erosion. The California Coastal Commission has identified several possible negative impacts to coastal resources caused by elevating structures, including blocking coastal views and affecting community character.¹⁰

Legal Considerations

There are several legal considerations for local communities and coastal landowners who elevate existing structures. First, elevated structures should be elevated to the heights established by local law, usually in their building codes. While the Federal Emergency Management Agency's National Flood Insurance Program standards are usually considered the minimum height that a structure should be raised, local ordinances can require elevating to a height above this minimum.¹¹

A landowner who elevates an existing property in a jurisdiction with a "view ordinance" might be challenged for blocking a neighbor's view of the coastline.¹² Furthermore, elevating structures might conflict with certain provisions of a local community's Local Coastal Program (LCP),¹³ particularly those implementing the visual resources section of the Coastal Act.¹⁴

Other potential legal considerations include possible additional requirements under the California Environmental Quality Act, especially where cultural or archaeological resources are present.¹⁵ Elevating a structure might trigger coastal development permit requirements, unless the construction falls into an exception.¹⁶ Similarly, elevating structures listed on the National Register of Historic Places—or eligible for listing—are subject to requirements under the National Historic Preservation Act of 1966.¹⁷ Finally, elevated structures that cause neighboring properties to erode could face nuisance claims.

Examples

Currently, this strategy is typically used in coastal regions to meet requirements under FEMA's BFE minimums. In California, Marin County attempted to prompt the use of this strategy through updates to its local coastal program.¹⁸ There are many ad hoc examples of this strategy in California and elsewhere, usually prompted by FEMA requirements.¹⁹

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8 Grants to elevate homes are available through FEMA's Hazard Mitigation Grant Program (HMGP), the Pre-Disaster Mitigation (PDM) Program, and the Flood Mitigation Assistance (FMA) Program. As the names suggest, they encompass both preventative "pre-disaster" grants, as well as grants in the wake of disasters. See, e.g., FEMA, HOMEOWNER'S GUIDE TO THE HAZARD MITIGATION GRANT PROGRAM, available at https://www.fema.gov/media-library-data/1478272128411-2eca27a89d418bb73e817edfb702cc15/HMA_HO_Brochure_508.pdf ("Generally, FEMA pays up to 75 percent for hazard mitigation projects. The remaining 25 percent is the responsibility of the homeowner, unless the subapplicant has identified an alternative payment method.").

9 42 U.S.C. §§ 12101 *et seq.*

10 CALIFORNIA COASTAL COMMISSION, SEA LEVEL RISE POLICY GUIDANCE 124 (2015).

11 Homes secured by federally funded mortgages must be insured under the National Flood Insurance Program. Participation in this program requires elevation to FEMA BFE heights.

12 See, e.g., SAN FRANCISCO CITY PUBLIC WORKS CODE §§ 820-29.

13 For instance, public view and community character provisions of an LCP might conflict with adaptation policies advocating elevation. LCPs will typically feature provisions for how to resolve such conflicts, usually under the priorities set forth by the Coastal Act. See, e.g., SANTA BARBARA COUNTY COASTAL LAND USE PLAN 14 (1982).

14 CAL. PUB. RES. CODE § 30251.

15 CAL. PUB. RES. CODE §§ 21000 *et seq.*; CAL. PUB. RES. CODE § 30244.

16 See, e.g., CAL. PUB. RES. CODE § 30610 (the Coastal Act's "repair and maintenance" exception).

17 54 U.S.C. §§ 300101 *et seq.*

18 Marin County proposed requiring three feet of freeboard, but later withdrew this policy from its proposed LCP amendments after receiving comments from the Coastal Commission. *Amendment 5: Specific Chapters and Sections of the Marin County Development Code comprising a portion of the IPA for the LUPA Environmental Hazards Chapter*, MARIN COUNTY, available at https://www.marincounty.org/~media/files/departments/cd/planning/local-coastal/letters/2016/attachment-5_16-4-6_final_eh_ipa.pdf?la=en.

19 See, e.g., LOSS AVOIDANCE STUDY: SONOMA COUNTY CALIFORNIA STRUCTURE ELEVATION MITIGATION, *supra* note 6.



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Living Shorelines

Introduction

Living shorelines use “plants or other natural elements, sometimes in combination with harder shoreline structures, to stabilize estuarine coasts, bays, and tributaries.”¹ Living shoreline projects utilize the physical characteristics of biological structures, such as oyster reefs and marshes, to achieve both ecological and protective benefits for an area. Some living shoreline projects add biological components to already existing hard structures, such as seawalls and breakwaters.

While somewhat common in the eastern United States, west coast living shoreline projects have increased dramatically in the last decade. As communities seek protective, engineered structures to impede wave energy and slow coastal erosion, there has been a growing desire to incorporate ecological benefits into these projects. Living shorelines can range from major wetland restoration projects to smaller-scale inclusion of natural plants into a revetment. Regardless of scale, there has been a policy push by the National Oceanic and Atmospheric Administration, the Army Corps of Engineers, and the California Coastal Commission to engineer greener mechanisms that maintain the protective nature of a gray structure while incorporating natural ecosystem benefits.²

Living shorelines include oyster and eelgrass restoration projects intended to mimic the protective benefits of a breakwater. A breakwater is an artificial “gray” structure, often comprised of an installation of rocks or concrete.³ They are generally built parallel to shore in shallow waters, but can also be submerged further offshore to avoid interfering with a view.⁴ A living shoreline oyster reef

project provides similar protective benefits, but does so by employing all or some natural stabilizing elements, such as marsh grass, coir logs, or oyster balls/bags.⁵ They can take the conventional shape of a breakwater wall offshore or focus on restoring and maintaining naturally-buffering wetland and intertidal ecosystems.⁶ These protective structures usually fall somewhere between these two extremes, utilizing a mixture of rocks, oyster bags, and vegetative elements to create the sought-after wave buffer.⁷

Tradeoffs

Living shorelines can provide flood protection to the communities or harbors located upland of the structure. By reducing wave action, flooding events can be minimized, and beach erosion reduced, at rates consistent with the decrease in longshore and cross-shore sediment transport.⁸ Modern living shoreline designs featuring fully natural or semi-natural components can maintain these benefits and even improve them. Oyster bags have been used to repair existing artificial breakwaters,⁹ while salt marsh restoration projects have been shown to provide more protection during hurricanes than manmade breakwaters.¹⁰

One advantage of these efforts is their cost effectiveness, since these nature-based infrastructures are expected to sustainably stabilize themselves as they grow and, therefore, will likely require less maintenance.¹¹

1 *What is a Living Shoreline?*, NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION, <https://oceanservice.noaa.gov/facts/living-shoreline.html> (last visited Oct. 12, 2017).

2 NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION, GUIDANCE FOR CONSIDERING THE USE OF LIVING SHORELINES 4 (2015) [hereinafter NOAA GUIDANCE]; CALIFORNIA COASTAL COMM’N, SEA LEVEL RISE POLICY GUIDANCE 39 (2015); U.S. ARMY CORPS OF ENGINEERS, COASTAL RISK REDUCTION AND RESILIENCE: USING THE FULL ARRAY OF MEASURES 6-7 (Sept. 2013) [hereinafter USACE COASTAL RISK REDUCTION].

3 NOAA GUIDANCE, *supra* note 2, at 5.

4 USACE COASTAL RISK REDUCTION, *supra* note 2, at 6-7.

5 ORRIN H. PILKEY, NORMA LONGO, ROB YOUNG & ANDY COBURN, *RETHINKING LIVING SHORELINES 2* (Mar. 2012), available at http://www.wcu.edu/WebFiles/PDFs/PSDS_Living_Shorelines_White_Paper.pdf.

6 WORLD BANK, *MANAGING COASTS WITH NATURAL SOLUTIONS: GUIDELINES FOR MEASURING AND VALUING THE COASTAL PROTECTION SERVICES OF MANGROVES AND CORAL REEFS* 45 (Michael W. Beck and Glenn-Marie Lange eds., 2016).

7 PILKEY ET AL., *supra* note 5, at 4.

8 USACE COASTAL RISK REDUCTION, *supra* note 2, at 6.

9 Susan Bence, *Army Corps Collaborates with UWM to Create Breakwater Habitat in Milwaukee*, UW-M MILWAUKEE PUBLIC RADIO, Nov. 4, 2016, <http://wuwfm.com/post/army-corps-collaborates-uwm-create-breakwater-habitat-milwaukee#stream/0>.

10 NOAA GUIDANCE, *supra* note 2, at 11.

11 MARILYN LATTA, *LIVING SHORELINES: MULTI-OBJECTIVE APPROACH AND PILOT PROJECTS 2* (May 2016).

Incorporating natural elements into these projects can also create important intertidal connectivity and reduce some of the ecological detriments, such as habitat fragmentation, that develop from implementing purely gray armoring techniques.¹²

Engineered living shoreline structures can also produce negative unintended consequences. Breakwaters incorporating living shoreline attributes can increase shoreline erosion down shore from where they are installed.¹³ Further, impeding wave action in an area can hinder sediment transport, viability of sediment-dwelling organisms, and natural movement of nutrients throughout the wave column.¹⁴ Breakwaters and installed oyster reefs can negatively affect beachgoers by impairing surfbreaks and threatening beach access. Consequently, the orientation, materials, and location of living shorelines should be analyzed—especially how each might adversely affect the ecological, social, and economic functions of the surrounding areas.¹⁵ Littoral cell processes should be analyzed for an area of interest to determine the feasibility of proposed living shoreline approaches.¹⁶

The term “living shorelines” itself has potential drawbacks. For instance, the term has the potential to be misused or misappropriated because it has traditionally been used to describe a wide array of adaptation approaches, ranging from gray to green. Similarly, the term might be used to “greenwash” the environmental impacts of a structure that is more gray than green.

Legal Considerations

Living shoreline projects are subject to the California Coastal Act and require Coastal Development Permits (CDP) to undertake.¹⁷ Local communities hoping to utilize living shoreline components in an already-standing shoreline protective structure, such as a breakwater, must get a CDP if fifty percent or more of the breakwater is replaced.¹⁸ Regardless of whether the project is a new installation or repair, CDPs are generally conditioned on environmental mitigation techniques; however, utilizing natural components can serve to alleviate some mitigation requirements. Additionally, proximity to dune, tidal, or wetland areas is likely to trigger the environmentally sensitive habitat area requirements of the Coastal Act.¹⁹

In addition to Coastal Act requirements, living shorelines are also subject to a number of other permitting and coordinating agency requirements, depending on their design. Among the possible requirements are: Clean Water Act permits and consultation with the Army Corps of Engineers for activities related to dredge, fill, and sediment alteration;²⁰ a State Lands Commission lease for work on public trust lands;²¹ regional water quality control board approval; consultation or a certified biological assessment with the National Oceanic and Atmospheric Administration under the Endangered Species Act; and compliance with substantive and procedural provisions of the California Environmental Quality Act.²² Furthermore, because living shoreline projects often incorporate new designs and, therefore, new potential impacts, these permitting processes may not be as uniform, or as well known, as the permit process necessary for traditional gray armoring techniques.

12 NOAA GUIDANCE, *supra* note 2, at 9-11.

13 USACE COASTAL RISK REDUCTION, *supra* note 2, at 7.

14 *Id.* at 11-12.

15 See generally *Groynes, Breakwaters, and Artificial Reefs* (2015), EUROPEAN CLIMATE ADAPTATION PLATFORM, <http://climate-adapt.eea.europa.eu/metadata/adaptation-options/groynes-breakwaters-and-artificial-reefs> (last visited Oct. 12, 2017).

16 For the statewide compilation of Coastal Regional Sediment Management Plans, see COASTAL REGIONAL SEDIMENT MANAGEMENT PLANS, CALIFORNIA SEDIMENT MANAGEMENT WORKGROUP, available at <http://www.dbw.ca.gov/csnw/crsmp.aspx>.

17 CAL. PUB. RES. CODE §§ 30200-30265.5.

18 CAL. PUB. RES. CODE § 30624.7; CAL. CODE REGS. tit. 14, §13252(b). For an example of a breakwater restoration which did not require a CDP, see CALIFORNIA COASTAL COMMISSION, NORTH COAST DISTRICT DEPUTY DIRECTOR'S REPORT OF DE MINIMIS WAIVERS (July 2015), available at <https://documents.coastal.ca.gov/reports/2015/7/w8-7-2015.pdf>.

19 CAL. PUB. RES. CODE § 30240.

20 33 C.F.R. § 322.

21 *Application for Lease of State Lands*, STATE LANDS COMMISSION, <http://www.slc.ca.gov/Forms/LMDApplication/LeaseApp.pdf> (last visited Oct. 12, 2017).

22 CAL. PUB. RES. CODE §§ 21000 *et seq.*

Examples

The San Francisco Bay Living Shorelines Project, sponsored by the Coastal Conservancy and seventeen other partners, is at the forefront of living shoreline design and monitoring projects in California. This project utilizes oyster shell-bag mounds and rejuvenated eelgrass beds to produce physical and biological benefits.²³ The Coastal Conservancy has also been involved in oyster and eelgrass shoreline, marsh restoration, and cobble and sand dune restoration efforts as part of their larger living shorelines initiative. Living shoreline projects in California have also

been implemented at Cardiff State Beach,²⁴ San Diego Bay,²⁵ Newport Bay,²⁶ and Humboldt Bay.²⁷ These examples highlight how living shorelines are increasingly being integrated into sea level rise planning actions, especially those designed to protect an area while conserving its ecological integrity.²⁸

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²³ *San Francisco Bay Living Shorelines Project*, STATE OF CALIFORNIA COASTAL CONSERVANCY, <http://scc.ca.gov/climate-change/climate-ready-program/san-francisco-bay-living-shorelines-project/> (last visited Oct. 12, 2017).

²⁴ STATE COASTAL CONSERVANCY, STAFF RECOMMENDATION: CARDIFF STATE BEACH LIVING SHORELINE CONCEPTUAL PLAN PROJECT NO. 15-003 (Mar. 2015).

²⁵ MERKEL & ASSOCIATES, INC., SAN DIEGO BAY NATIVE OYSTER RESTORATION PLAN (May 2015).

²⁶ *Shifting Towards Living Shorelines in Newport Bay*, ORANGE COUNTY COASTKEEPER, http://coastkeeper.nationbuilder.com/living_shorelines (last visited Oct. 12, 2017).

²⁷ Matt Baun, *Living Coastline Project Will Restore Tidal Salt Marsh at Humboldt Bay*, U.S. FISH & WILDLIFE SERVICE FIELD NOTES (Mar. 14, 2017), <https://www.fws.gov/FieldNotes/regmap.cfm?arskey=36946>.

²⁸ SAN FRANCISCO BAY CONSERVATION AND DEVELOPMENT COMMISSION, DRAFT FINAL SAN FRANCISCO BAY CONSERVATION AND DEVELOPMENT COMMISSION STRATEGIC PLAN UPDATE 2017-2020 8 (June 2017); see also Latta, *supra* note 11, at 2.



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Riprap

Introduction

Riprap is a type of shoreline armoring structure that consists of stacks of large boulders and smaller rock fill, designed to mitigate wave impact and prevent erosion. These structures are often placed parallel to the shoreline in front of a cliff or along a beach to prevent further erosive events and wave overtopping during large storms. Because of its design, riprap requires the most space of all the armoring strategies and, therefore, leads to the largest placement loss.¹

Riprap is the most common armoring strategy on California's coastline.² Its popularity stems from the fact that riprap requires less engineering expertise to design and construct than seawalls or revetments.³ To successfully deflect wave impacts and protect coastal development, riprap must be built with heavy enough rocks to remain stable, tall enough to withstand overtopping, wider than it is tall by a 2:1 ratio, and constructed in such a way that wave scour will not remove the sand beneath it.⁴

Riprap could be a suitable engineered protection strategy in an area where the coastline near critical assets is eroding from wave energy. Riprap is a particularly popular strategy in emergency situations. The availability of rock, space for construction, and planning and engineering resources are all relevant considerations for riprap placement.⁵

Tradeoffs

Riprap protects a very localized region in the short term. For private property owners and public entities, adequately-constructed riprap can protect structures from storm surge and flooding impacts. For local governments, permitting riprap (or other protective structures) may ensure that the property tax revenue generated by some of that community's highest value properties is sustained. Regardless of these positive attributes, longer-term effects of any coastal armoring project should be analyzed.

The construction and maintenance costs and comparisons with similar protective structures is another consideration. Riprap tends to cost between \$1,200 and \$4,000 per foot to construct, based on the characteristics listed above.⁶ Additionally, maintenance costs per year can range from 2-15% of the initial cost per foot.⁷ These figures reflect two realities. First, riprap is often susceptible to wave scouring and, during extreme storm events, rock dislodgement which requires replacement. Some of these concerns can be alleviated by the construction of a more durable protection structure, such as a revetment—a carefully engineered shoreline protection structure similar to riprap that utilizes a durable filter cloth or cemented base—instead.⁸ Second, much of the riprap that protects the California coast was not adequately constructed because it was placed during an emergency.⁹ Because homeowners can quickly place riprap, it is frequently chosen when a large storm event or storm season is anticipated. In these scenarios, project specification recommendations and design principles are often not adequately considered.¹⁰

6 *Id.* at 112.

7 REBECCA STAMSKI, THE IMPACTS OF COASTAL PROTECTION STRUCTURES IN CALIFORNIA'S MONTEREY BAY NATIONAL MARINE SANCTUARY 11-13 (2005), available at <http://aquaticcommons.org/2325/1/stamski.pdf>.

8 Megan M. Herzog & Sean B. Hecht, *Combating Sea Level Rise in Southern California: How Local Governments Can Seize Adaptation Opportunities While Minimizing Legal Risk*, 19 HASTINGS W.-NW. J. ENVTL. L. & POL'Y 463, 472 n.41 (2013).

9 GRIGGS ET AL., *supra* note 1, at 150 ("A significant amount of permit activity for shoreline structures occurs under emergency or extreme winter conditions. Studies . . . illustrate how most of the new and extended riprap on beaches was placed during two significant storm events: the El Niño years of 1978-79 and 1982-83.")

10 *Id.*

1 GARY GRIGGS ET AL., LIVING WITH THE CHANGING CALIFORNIA COAST 112 (Gary Griggs et al. eds., 2005).

2 *Id.* ("Riprap protects more of California's coastal property (roughly 65 miles) than any other type of armor.")

3 *Id.* at 114 (explaining that "a revetment is a more carefully engineered and constructed rock structure" than riprap).

4 *Id.* at 113.

5 *Id.*

Often, hastily deployed riprap can cause geophysical and ecological problems. Like all armoring, patchwork placement leads to the “peninsula effect”—in which an armored area stays protected while either side erodes away.¹¹ These erosive events might then prompt neighboring property owners to protect their own property, perpetuating a cycle of armoring that has occurred on the California coast in recent decades. This escalation negatively affects ecological processes in the area. For instance, sessile (non-mobile, rock-clinging) tidal species depend upon the porosity, dampness, and heat content of the substrates on which they settle. Likewise, introducing non-native rocks to an area can negatively impact these coastal population dynamics.¹²

Riprap protective structure projects in California have focused limited attention on design and project impact mitigation techniques.¹³ This hastiness is partly a result of the time constraints of a real emergency. It is also representative of reactive rather than proactive community planning—waiting until a threat is imminent to act to protect an area.¹⁴

Legal Considerations

Constructing a protective riprap structure requires a coastal development permit (CDP), except in the limited circumstances where an emergency necessitates protection in the face of a disaster.¹⁵ The California Coastal Commission (CCC) retains jurisdiction over most areas where riprap would be feasible and suitable.¹⁶ Accordingly, an applicant would need to seek a CDP directly from the Commission.¹⁷

The Coastal Act allows construction of shoreline protection structures like riprap for existing structures, while requiring that new development be built in such a way so as not to require protective structures.¹⁸ The Coastal Act further mandates that riprap is only allowed when mitigation measures ensure that it is the least environmentally-damaging, feasible alternative.¹⁹ This requirement allows the CCC the breadth to include that certain conditions be met in exchange for a CDP to construct a protective structure. These conditions have included materials and discharge construction plans, sensitive habitat mitigation, and temporal expirations of permits to reconsider their effects at a later date, amongst others.²⁰

Legal battles sometimes challenge the unpermitted riprap, usually placed by private property owners without consultation with the CCC or a local government.²¹ Unpermitted structures can be particularly problematic for local governments, because they are difficult and costly to remove, and because they can cause public access and aesthetic issues.²²

11 MOLLY LOUGHNEY MELIUS & MARGARET R. CALDWELL, 2015 CALIFORNIA COASTAL ARMORING REPORT: MANAGING COASTAL ARMORING AND CLIMATE CHANGE ADAPTATION IN THE 21ST CENTURY 9 (2015).

12 STAMSKI, *supra* note 7, at 11-12.

13 Jesse Reiblich & Eric H. Hartge, *The Forty-Year-Old Statute: Unintended Consequences of the Coastal Act and How They Might Be Redressed*, 36 STAN. ENVTL. L.J. 63, 81 (2016).

14 *Id.* at 81-83.

15 CAL. PUB. RES. CODE § 30600(a)-(c).

16 CAL. PUB. RES. CODE § 30601.

17 CAL. PUB. RES. CODE § 30601.

18 CAL. PUB. RES. CODE § 30235; CAL. PUB. RES. CODE § 30253(b). There has been debate over what “existing” in the Coast Act means, however. CAL. COASTAL COMM’N, SEA LEVEL RISE POLICY GUIDANCE 165 (2015) (“Read together, the most reasonable and straight-forward interpretation of Coastal Act Sections 30235 and 30253 is that they evince a broad legislative intent to allow shoreline protection for development that was in existence when the Coastal Act was passed, but avoid such protective structures for new development now subject to the Act.”); *see also generally* Todd T. Cardiff, *Conflict in the California Coastal Act: Sand and Seawalls*, 38 CAL. W. L. REV. 255 (2001).

19 CAL. PUB. RES. CODE § 30235. This requirement is also in line with the California Environmental Quality Act’s provisions requiring feasible mitigation measures to be incorporated into all state-permitted construction activities to substantially lessen the adverse effects said project would have on the environment. CAL. PUB. RES. CODE §§ 21000-06.

20 *See, e.g.*, CALIFORNIA COASTAL COMMISSION, SUMMARY OF STAFF RECOMMENDATION APPLICATION NUMBER 5-06-160 (2006), *available at* <https://documents.coastal.ca.gov/reports/2006/11/Th15c-11-2006.pdf>.

21 *See* CAL. COASTAL COMM’N COASTAL STAFF REPORT TH 11A, DEVELOPMENT PERMIT APPLICATION NO. 2-02-028 (HALF MOON BAY GOLF LINKS SEAWALL) (2005), *available at* <https://documents.coastal.ca.gov/reports/2005/7/Th11a-7-2005.pdf>; Barry Parr, *Half Moon Bay Golf Course to Remove Controversial Seawall*, COASTSIDER, June 9, 2005, http://coastsider.com/%20site/news/half_moon_bay_golf_course_will_remove_controversial_seawall.

22 GRIGGS ET AL., *supra* note 1, at 150.

Examples

Riprap has been used by federal, state, and private parties to protect areas from encroaching seas. The State of California recently constructed 900-feet of riprap to protect an access road and parking lot on Surf Beach at San Onofre State Park. This project is being challenged by the Surfrider Foundation for failing to enact a long-term protection plan, instead focusing on a short-term fix like riprap.²³

Areas of Santa Cruz are so armored with riprap in front of private homes that it is now difficult to notice the natural features of the coastline.²⁴ Broad Beach in the City of Malibu features extensive riprap as well, but has caused such high degrees of passive erosion that a beach restoration plan has been needed to mitigate its effects.²⁵

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²³ Mandy Sackett, *Why the Temporary Seawall at San Onofre State Beach Should Not Become Permanent*, SURFRIDER, <https://www.surfrider.org/coastal-blog/entry/why-the-temporary-seawall-at-san-onofre-state-beach-should-not-become-perma> (last visited Aug. 17, 2017).

²⁴ Ranger Gaudinski, *The Huge Boulders Along the Santa Cruz Shoreline: A Common Coastal Story*, MOBILE RANGER, <http://www.mobileranger.com/santacruz/the-huge-boulders-along-the-santa-cruz-shoreline-a-common-coastal-story/> (last visited Aug. 17, 2017).

²⁵ Emily Sawicki, *Broad Beach Residents Sued Over Beach Restoration Project*, THE MALIBU TIMES, Apr. 7, 2016, http://www.malibutimes.com/news/article_f4da9d1c-fc24-11e5-a769-3300ec937d2f.html.



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Seawalls

Introduction

A seawall is a shoreline protection structure engineered to protect against encroaching seas. Seawalls are used to protect built infrastructure, directly or indirectly, by absorbing wave impact, reducing erosion, and serving as retaining walls which keep cliff-sides and posterior fill from eroding with each storm.¹ They are typically built parallel to the shoreline with vertical, concave, or stepped faces and usually consist of concrete, wood, steel, or a mixture of these materials.² Depending on their designated purposes, seawalls have been built to protect individual properties or larger communities from coastal flooding and storm surge.³

Seawalls are potentially suitable protective structures where local governments want to protect areas in the short term.⁴ Particularly, seawalls might be suitable for areas that are already developed, such as those with a high amount of valuable infrastructure areas, and areas that are not adjacent to beaches. Any local governments contemplating building seawalls should weigh the private (e.g., cost, lifespan, effectiveness) and public (e.g., aesthetics, access, beach space, sand supply) effects of these structures versus the expected benefits they will provide.

Tradeoffs

Seawalls protect discrete areas in the short term. They can protect public and private investments in buildings, homes, and other infrastructure from storm surge and flooding. Seawalls also serve local governments' interests by protecting property tax revenue generated by some of that community's most expensive homes. One possible advantage seawalls might have over competing protective structures is that they often require smaller footprints to construct than comparable protective structures, such as riprap or revetments.⁵

Constructing a durable seawall requires careful planning and engineering, which can increase capital and maintenance costs.⁶ Seawalls must be designed to effectively address wave overtopping, undermining, outflanking, and extreme impacts during the largest storm and flood events.⁷ Wave overtopping and undermining are particularly concerning, as seawater intrusion behind a seawall can often wash away the supportive fill and create a "weak link" in the seawall.⁸ This phenomenon often occurs in areas where seawalls have been permitted on an ad-hoc basis, thereby prompting neighboring properties to armor in kind in order to avoid patchwork, risk-prone seawalls.⁹ In areas where seawall protection is deemed necessary, communal and uniform planning are necessary to alleviate some of these risks.¹⁰

In addition to the engineering concerns, seawall development also prompts issues of public availability and access to California's beaches. Seawalls impair beaches

1 GARY GRIGGS ET AL., *LIVING WITH THE CHANGING CALIFORNIA COAST* 117 (Gary Griggs et al. eds., 2005).

2 *Id.*

3 U.S. ARMY CORPS OF ENGINEERS, *COASTAL RISK REDUCTION AND RESILIENCE: USING THE FULL ARRAY OF MEASURES* 6-7 (2013).

4 GRIGGS ET AL., *supra* note 1, at 123 ("There is no such thing as permanent protection, and there is no guarantee today that a seawall permit will be approved.")

5 CAL. COASTAL COMM'N, STAFF REPORT ADDENDUM FOR F8B CDP APPLICATION NUMBER 2-11-009 (CITY OF PACIFICA SHORELINE PROTECTION) 26 (2014), available at <https://documents.coastal.ca.gov/reports/2014/7/F8b-7-2014.pdf> ("A seawall is often preferable to a riprap revetment because it can occupy a smaller area of beach.")

6 MOLLY LOUGHNEY MELIUS & MARGARET R. CALDWELL, 2015 CALIFORNIA COASTAL ARMORING REPORT: MANAGING COASTAL ARMORING AND CLIMATE CHANGE ADAPTATION IN THE 21ST CENTURY 8 (2015).

7 GRIGGS ET AL., *supra* note 1, at 111.

8 *Id.* at 123.

9 Jesse Reiblich & Eric H. Hartge, *The Forty-Year-Old Statute: Unintended Consequences of the Coastal Act and How They Might Be Redressed*, 36 STAN. ENVTL. L.J. 63, 85 (2016) (explaining how formation of a GHAD can help avoid this patchwork of armoring).

10 GRIGGS ET AL., *supra* note 1, at 123.

through “passive erosion”—i.e. they prevent the beach from migrating inland as seas rise and erosive events occur.¹¹ This effect, in combination with impoundment, sand supply loss,¹² and rising sea levels, will gradually narrow public beaches until they disappear completely.¹³ The physical barrier of a seawall also diminishes accessible entry points for non-coastal residents.¹⁴ These concerns represent the tradeoffs between protection of upland property and protection of public uses of coastal lands.¹⁵

Legal Considerations

Constructing a protective seawall requires a coastal development permit (CDP), except in the limited circumstances where an emergency necessitates protection in the face of a disaster.¹⁶ The California Coastal Commission (CCC) retains jurisdiction over most areas where a seawall would be feasible.¹⁷ Accordingly, an applicant would need to seek a CDP directly from the Commission.¹⁸

The Coastal Act allows the construction of protective structures to protect existing structures, and it requires that new development be built so as not to need protective structures, such as seawalls.¹⁹ Even when seawalls are

permitted, they must be built so that they are the least environmentally damaging, feasible alternative available.²⁰ Furthermore, the CCC might require certain mitigating conditions in exchange for permitting the construction of a protective seawall.²¹ Examples of these conditions have included materials and discharge construction plans, sensitive habitat mitigation, and temporal expirations of permits to reconsider their effects at a later date, amongst others.²²

Examples

California’s coastline features over 100 miles of seawalls and other protective structures.²³ In many southern cities, individual seawalls have proliferated along the coastline in population-dense urban areas. Additionally, large-scale seawalls, such as the O’Shaughnessy Seawall completed in 1928 in Ocean Beach, have been established for community- and road-building purposes.²⁴

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11 MELIUS & CALDWELL, *supra* note 6, at 8.

12 Impoundment loss occurs when cliff or beach sand that would have supplied the beach through erosion becomes impounded behind a seawall, leading to increased rates of erosion on downdrift properties. MELIUS AND CALDWELL, *supra* note 6, at 8; GRIGGS ET AL., *supra* note 1, at 134 (“This has also been called the peninsula effect because the armored area becomes a peninsula over time.”).

13 MELIUS AND CALDWELL, *supra* note 6, at 8.

14 *Id.* at 9.

15 GRIGGS ET AL., *supra* note 1, at 133-4.

16 CAL. PUB. RES. CODE § 30600(a)-(e).

17 CAL. PUB. RES. CODE § 30601.

18 CAL. PUB. RES. CODE § 30601.

19 CAL. PUB. RES. CODE §§ 30235, 30253(b); CAL. COASTAL COMM’N, SEA LEVEL RISE POLICY GUIDANCE 165 (2015) (explaining that 30235 and 30253 to “evince a broad legislative intent to allow shoreline protection for development that was in existence when the Coastal Act was passed, but avoid such protective structures for new development now subject to the Act.”).

20 CAL. PUB. RES. CODE § 30235; This aligns with the California Environmental Quality Act’s provisions requiring feasible mitigation measures to be incorporated into all state-permitted construction activities to substantially lessen the adverse effects said project would have on the environment. CAL. PUB. RES. CODE §§ 21000-06.

21 The *Nollan* and *Dolan* cases comprise the two-prong test for determining whether these conditions are constitutionally permissible. *Nollan v. California Coastal Commission*, 483 U.S. 825, 837 (1987) (requiring a nexus between the burdens imposed by the development and the permit condition); *Dolan v. City of Tigard*, 512 U.S. 374, 391 (1994) (requiring a rough proportionality between the conditions and the development’s impact).

22 CALIFORNIA COASTAL COMMISSION, SUMMARY OF STAFF RECOMMENDATION APPLICATION NUMBER 5-06-160 (2006), available at <https://documents.coastal.ca.gov/reports/2006/11/Th15c-11-2006.pdf>.

23 Gary Griggs, *The Effects of Armoring Shorelines – The California Experience*, in *PUGET SOUND SHORELINES AND THE IMPACTS OF ARMORING – PROCEEDINGS OF A STATE OF THE SCIENCE WORKSHOP 77, 77* (H. Shipman et al. eds., 2010).

24 See generally BILL MCLAUGHLIN, A HISTORY OF COASTAL EROSION AT OCEAN BEACH, SURFRIDER FOUNDATION SAN FRANCISCO CHAPTER (2012).



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Wetland Restoration

Introduction

Development and filling in of wetlands has significantly reduced their historic footprint along the California coast.¹ Surviving wetlands, primarily found within the San Francisco Bay, have been negatively impacted by the introduction of invasive grasses and shifting water and sediment inflows.² Rising sea levels exacerbate these issues, squeezing existing wetlands between coastal development, and preventing them from naturally migrating inland.³ Wetland restoration projects can be pursued in areas where wetlands persist or previously existed. Specifically, restoration can allow tidal wetlands to proliferate in areas that have been diked or otherwise altered from their original condition.⁴

Wetland restoration is intended to reestablish or rehabilitate an impaired wetland.⁵ Once restored, operative wetlands provide a range of ecosystem services based upon their salinity, temperature, and geomorphic gradients. These services include increasing floodwater storage capacity, buffering storm surge, limiting saltwater intrusion into freshwater aquifers, and reducing coastal erosion, as well as increasing habitat in the region.⁶ Wetland restoration is suitable where wetlands, such as salt ponds, have been converted to agricultural lands or altered for other human use, but that remain largely undeveloped, allowing them the possibility of returning to their previous state. Additionally, conserving adjacent areas for wetlands to migrate landward is a strategy embraced by state

agencies, such as the Bay Conservation and Development Commission, for dealing with sea level rise.⁷

Tradeoffs

Wetland restoration is considered a “green” engineering solution, meaning that it can carry with it certain environmental co-benefits. The Clean Water Act,⁸ the Emergency Wetlands Resources Act,⁹ and similar laws, acknowledge the water quality, recreational, economic, flood, and erosion control benefits of wetlands. Wetlands’ protective benefits and buffering characteristics are even more important in light of rising seas and extended storm surge events, as restored tidal wetlands can buffer coastal communities and sequester carbon.¹⁰

Wetland restoration can be a less-expensive alternative to competing “gray” armoring alternatives.¹¹ Even so, these comparisons often only represent construction costs, and therefore do not account for the additional economic benefits that healthy wetlands bring about. These benefits can include local tourism, recreation, and flood protection revenues.¹² Restored wetlands can typically sustain themselves without much additional maintenance and operations costs. This cost savings is a huge consideration for choosing wetland restoration projects over competing armored solutions. Still, depending on the project design, its expanse, and any necessary land acquisition, wetland

1 Walter G. Duffy et al., *Wetlands*, in ECOSYSTEMS OF CALIFORNIA, 669, 673 (Harold Mooney & Erika Zavaleta eds., 2016).
2 *Id.*
3 *Id.* at 674.
4 B.J. Grewell et al., *Estuarine Wetlands*, in TERRESTRIAL VEGETATION OF CALIFORNIA 124 (Michael Barbour et al. eds., 3rd ed. 2007).
5 Mary E. Kentula, *Wetland Restoration and Creation*, U.S. GEOLOGICAL SURVEY, <https://water.usgs.gov/nwsum/WSP2425/restoration.html> (last visited Aug. 14, 2017).
6 *See generally* MATTHEW HEBERGER ET AL., THE PACIFIC INSTITUTE, THE IMPACTS OF SEA-LEVEL RISE ON THE CALIFORNIA COAST (2009).

7 *Climate Change Policies Fact Sheet*, SAN FRANCISCO BCDC, <http://www.bcdc.ca.gov/BPA/SLRfactSheet.html> (last visited Aug. 14, 2017).

8 33 U.S.C. §§ 1251 *et seq.*

9 16 U.S.C. §§ 3901 *et seq.*

10 Laura Tam, *Climate Adaptation and Sea-Level Rise in the San Francisco Bay Area*, AMERICAN PLANNING ASSOCIATION, <https://www.planning.org/planning/2012/jan/waterwarriorsside2.htm> (last visited Aug. 14, 2017).

11 *Reducing Climate Risks with Natural Infrastructure*, THE NATURE CONSERVANCY, <https://www.nature.org/ourinitiatives/regions/northamerica/unitedstates/california/ca-green-vs-gray-report-2.pdf?redirect=https-301> (last visited Aug. 14, 2017).

12 MOLLY LOUGHNEY MELIUS & MARGARET R. CALDWELL, 2015 CALIFORNIA COASTAL ARMORING REPORT: MANAGING COASTAL ARMORING AND CLIMATE CHANGE ADAPTATION IN THE 21ST CENTURY 12 (2015) (“The value of wetlands protecting coastal communities globally has been estimated at \$6,923 per hectare per year.”).

restoration projects may have a higher initial capital cost than armored strategies.

The success of wetland restoration projects can depend on their specific locations. These projects might also take decades to be fully realized.¹³ This time horizon can be problematic as some wetlands may be lost to sea level rise before their functions can be fully restored. These realities compel planners to act soon and focus on feasible wetland sites that anticipate future sea level changes and have enough space to migrate landward as seas rise.¹⁴

Legal Considerations

Wetlands have a specific legal definition in the California Coastal Act.¹⁵ Development and restoration projects within these defined areas are subject to California Coastal Commission (“CCC”) permit and environmental mitigation requirements.¹⁶ As conditions of permitting a wetland restoration project, the CCC may require additional measures, such as promoting public access, including, for example, interpretive educational programs and construction limitations.¹⁷

Wetlands restoration will also require compliance with a number of federal and state environmental laws.¹⁸ Environmental impact statements and consultations with state wildlife managers will be required for locations

featuring threatened or endangered species.¹⁹ Wetlands that have been designated as environmentally sensitive habitat areas (ESHAs) are governed by more stringent state wetland protection provisions.²⁰

Examples

The California State Coastal Conservancy has conserved or restored wetlands across 50,000 acres of California’s coast through various partnerships.²¹ Some of these projects have included vital wetland remnants along California’s south coast and the U.S. west coast’s largest wetland restoration project in San Francisco Bay’s South Bay Salt Ponds.²² Other wetlands restoration projects have included the Giacomini Wetlands within Point Reyes National Seashore²³ and the Sears Point Wetland Restoration Project in Sonoma County.²⁴ Wetlands restoration projects have been undertaken by state actors, non-governmental organizations, and private businesses alike, demonstrating the wide range of benefits they may provide.

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13 Successfully restoring the functions of a wetland system can take as many as ten to fifty years. See Kentula, *supra* note 5.

14 See generally *Principles of Wetland Restoration*, ENVIRONMENTAL PROTECTION AGENCY, <https://www.epa.gov/wetlands/principles-wetland-restoration> (last visited Aug. 14, 2017).

15 See CAL. PUB. RES. CODE § 30121 (“‘Wetland’ means lands within the coastal zone which may be covered periodically or permanently with shallow water and include saltwater marshes, freshwater marshes, open or closed brackish water marshes, swamps, mudflats, and fens.”).

16 CAL. PUB. RES. CODE § 30601(2); CAL. PUB. RES. CODE § 30233.

17 CAL. COASTAL COMM’N, STAFF REPORT TH19A APPLICATION No. 4-07-098 (MALIBU LAGOON STATE PARK), available at <https://documents.coastal.ca.gov/reports/2010/8/Th19a-8-2010.pdf>.

18 For a list of compliance requirements prepared by the California State Water Resources Control Board see *Nonpoint Source Encyclopedia 6B – Restoration, Rehabilitation and Mitigation of Wetlands and Riparian Areas*, CALIFORNIA ENVIRONMENTAL PROTECTION AGENCY, https://www.waterboards.ca.gov/water_issues/programs/nps/encyclopedia/6b_restr_mit.shtml (last visited Nov. 4, 2017).

19 16 U.S.C. §§ 1531–1544.

20 *Bolsa Chica Land Trust v. Super. Ct.*, 83 Cal. Rptr. 2d 850, 862-63 (Cal. Ct. App. 1999).

21 *California’s Coastal Wetlands*, STATE OF CALIFORNIA COASTAL CONSERVANCY, http://scc.ca.gov/webmaster/brochures/Wetlands_Brochure.pdf (last visited Aug. 14, 2017).

22 *Id.*

23 See NAT’L PARK SERV., CASE STUDY 12: RESTORING THE GIACOMINI WETLANDS FROM AGRICULTURAL LANDS, POINT REYES NATIONAL SEASHORE, CALIFORNIA, available at https://www.nps.gov/subjects/climatechange/upload/CAS_Case_Study_12.pdf.

24 Press Release, Sonoma Land Trust, Sonoma Land Trust and Ducks Unlimited Kick off Construction of Sears Point 960-acre Wetland Restoration Project on San Pablo Bay, (June 6, 2014), available at https://www.sonomalandtrust.org/news_room/press_releases/1406-sears-point.html.



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Buyout Programs

Introduction

Buyouts,¹ leasebacks,² and land acquisition³ (collectively “buyout programs”) are government programs whereby a government purchases and attains ownership rights of private property for some long-term planning purpose. Historically, these programs have been used to obtain lands in disaster-prone areas or to protect environmentally or culturally important resources. While there are no documented examples of a government entity purchasing land specifically due to the risk of sea level rise, there are examples of purchase programs acquiring low-lying coastal lands at risk of heavy storm-surge and flooding events.⁴ As coastal governments prepare for rising sea levels and expected increases in storm surge and flooding danger,⁵ these traditional purchase programs are an option for reducing community vulnerability and future disaster expenditure while providing a natural buffer for landward development.⁶

Buyout programs can be tailored to provide incentives—whether financial or otherwise—for the government purchaser and private seller.⁷ For coastal communities addressing sea level rise, the purchase of entire street blocks or neighborhoods is generally the most effective way

to create large, natural buffer zones that reduce storm surge impacts. There are also notable success stories in the flood-mitigation context of public purchase programs acquiring and restoring risk-prone lands for public use or ecosystem conservation.⁸ Leasebacks—buyout programs in which properties are leased back to their previous owners for some specified period—may be useful planning tools for a property owner who is willing to sell property but wants to maintain use of the land in the near-term. However, these acquisition programs should be additionally scrutinized to ensure that they are being used in the right context and for the correct time period.

Funding Considerations

A general criticism of buyout programs is that they are often not pursued until post-disaster scenarios have already made it clear (sometimes repeatedly) that human occupation within certain areas is unsustainable. Accordingly, local governments should work early in the planning process to build relationships with affected property owners. Achieving some sort of consensus is also important to avoid the “checkerboard effect” resulting from the acquisition of separate but disconnected coastal properties.⁹ A fiscal challenge of this proactive approach is that it potentially reduces the government’s funding by reducing the community’s tax base.¹⁰

1 A buyout program is a specific type of acquisition program in which the government purchases private land, demolishes any existing structures, and maintains the property as open space for public use. ANNE R. SIDERS, MANAGED COASTAL RETREAT: A LEGAL HANDBOOK ON SHIFTING DEVELOPMENT AWAY FROM VULNERABLE AREAS 109 (2013), available at https://web.law.columbia.edu/sites/default/files/microsites/climate-change/files/Publications/Fellows/ManagedCoastalRetreat_FINAL_Oct%2030.pdf.

2 Leasebacks are acquisitions, with the added condition that the government leases the property back to the previous owner for some period. *Coastal Subregional Planning Project Appendices*, ASSOCIATION OF BAY AREA GOVERNMENTS, <http://www.abag.ca.gov/planning/subregional/cspp/cspp7.html> (last visited Oct. 9, 2017).

3 An acquisition can be any program where the government purchases private land for public use. ANNE R. SIDERS, ANATOMY OF A BUYOUT: NEW YORK POST-SUPERSTORM SANDY 2 (Vermont Takings Conference, 2013).

4 Press Release, FEMA, For Communities Plagued by Repeated Flooding, Property Acquisition May Be the Answer (May 28, 2014), available at <https://www.fema.gov/news-release/2014/05/28/communities-plagued-repeated-flooding-property-acquisition-may-be-answer>.

5 GARY GRIGGS ET AL., RISING SEAS IN CALIFORNIA: AN UPDATE ON SEA-LEVEL RISE SCIENCE, CALIFORNIA OCEAN SCIENCE TRUST 17 (Apr. 2017).

6 SIDERS, MANAGED COASTAL RETREAT, *supra* note 1, at 109.

7 These incentives could range from tax incentives for conservation easement dedications to “bonus payments” for relocating homeowners who agree to stay in the community. *Id.* at v & 7.

8 *Id.* at 117; see also *Land Acquisition Program*, STATE OF CALIFORNIA WILDLIFE CONSERVATION BOARD, <https://wcb.ca.gov/Programs/Acquisition> (last visited Oct. 9, 2017).

9 ROBERT FREUDENBERG ET AL., BUY-IN FOR BUYOUT: THE CASE FOR MANAGED RETREAT FROM FLOOD ZONES, LINCOLN INSTITUTE OF LAND POLICY 26 (2016), available at <https://www.lincolninst.edu/sites/default/files/pubfiles/buy-in-for-buyouts-full.pdf>.

10 For a discussion of the fiscal impacts buyout programs can have on communities, and how to mitigate those impacts by combining purchase programs with other adaptation mechanisms such as relocation, see *id.* at 34-42.

Funding is a paramount challenge for implementing purchase programs. The outright purchase of land can be costly, even if the eventual ownership of land provides coastal governments with the most flexibility and control over those properties at risk of sea level rise hazards. Post-disaster acquisition programs can be funded through Federal Emergency Management Agency's (FEMA) Hazard Mitigation Grant Program in communities with a FEMA-approved Local Mitigation Plan in place.¹¹ In these circumstances, federal dollars generally provide around 75% of the upfront costs while state and local sources are required to provide 25% of the purchase cost, alleviating some cost concerns.¹²

A Local Coastal Program (LCP) can include policies that encourage buyout programs.¹³ Regardless of funding and planning, a major obstacle for local communities initiating buyout programs will be holdout property owners. In these cases, governments might need to use eminent domain to acquire the holdout properties. Other legal considerations for implementing a buyout program might include working with state agencies and utility companies to safely move assets away from the coast. Buyouts can also be used in tandem with other coastal adaptation strategies, such as downzoning and transfers of development rights, to prompt successful voluntary retreat from rising seas and coastal hazards.

Federal and state law provide some funding options for communities seeking to preemptively acquire land. The California Coastal Commission is authorized to provide funds via Section 309 of the Coastal Zone Management Act for projects which specifically enhance the proactive mitigation of coastal hazards in light of sea level rise.¹⁴ As mentioned above, purchase programs can enable buying and restoring sensitive ecosystems such as wetlands and dune habitats.¹⁵ Where land characteristics are suitable, purchase programs using conservation grants may result in a triple bottom line of "risk reduction, natural

resource enhancement, and economic cost reduction."¹⁶ Furthermore, funds used for buyout programs should be considered investments in communities because they mitigate future disasters.¹⁷ This point is underscored by estimates that, on average, every \$1 spent mitigating future losses reduces those future losses by \$3.¹⁸

Examples

The devastation from Hurricane Sandy in 2012 precipitated several of the existing examples of buyout programs in the United States. There are a handful of case studies that are illustrative of factors that enable or limit the success of a buyout strategy. Two of these case studies are examined below.

Milford, Connecticut is a coastal town with the highest concentration of repetitive loss properties in the state.¹⁹ In an evaluation of the coastline of the North Atlantic coast, the U.S. Army Corps of Engineers noted that some engineered options may have limited success in areas constrained by available space and that, in these cases, land acquisition paired with relocation may be more effective as a long-term strategy to reduce the consequences of coastal hazards.²⁰ However, even with available funds from FEMA Hazard Mitigation Grants and U.S. Department of Agriculture (USDA) Floodplain Easement Programs, local stakeholders noted the loss of a municipal tax base as a major deterrent for accepting the buyouts as coastal property owners pay the highest property taxes.²¹

Mastic Beach, New York is a small coastal community on the south coast of Long Island, located just inland of a protective barrier island.²² Historic flooding events in recent decades have caused decisionmakers to look to buyout programs as a possible solution since at least the late 1990s.²³ After Hurricane Sandy, some residents investigated pursuing a buyout program, yet no local

11 See generally SIDERS, MANAGED COASTAL RETREAT, *supra* note 1; see also FEMA, LOCAL MITIGATION PLANNING HANDBOOK 9-4 (Mar. 2013), available at http://www.fema.gov/media-library-data/20130726-1910-25045-9160/fema_local_mitigation_handbook.pdf.

12 But local communities might pass these costs on to individual homeowners. FEMA, *supra* note 11, at 9-4.

13 CALIFORNIA COASTAL COMMISSION, SEA LEVEL RISE POLICY GUIDANCE 135 (2015).

14 See NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION, COASTAL ZONE MANAGEMENT ACT SECTION 309 PROGRAM GUIDANCE 2016 TO 2020 ENHANCEMENT CYCLE (2014), available at https://coast.noaa.gov/czm/enhancement/media/Sect-309_Guidance_June2014.pdf.

15 See *Land Acquisition Program*, *supra* note 8.

16 MOLLY LOUGHNEY MELIUS AND MARGARET R. CALDWELL, CALIFORNIA COASTAL ARMORING REPORT: MANAGING COASTAL ARMORING AND CLIMATE CHANGE ADAPTATION IN THE 21ST CENTURY 35 (2015), available at <http://law.stanford.edu/wp-content/uploads/2015/07/CalCoastArmor-FULL-REPORT-6.17.15.pdf>.

17 SIDERS, MANAGED COASTAL RETREAT, *supra* note 1, at 111.

18 CONGRESS OF THE UNITED STATES CONGRESSIONAL BUDGET OFFICE, POTENTIAL COST SAVINGS FROM THE PRE-DISASTER MITIGATION PROGRAM 2 (2007).

19 ROBERT FREUDENBERG ET AL., *supra* note 9, at 47.

20 USACE MAIN REPORT. NORTH ATLANTIC COAST COMPREHENSIVE STUDY: RESILIENT ADAPTATION TO INCREASING RISK at 70 (2005).

21 ROBERT FREUDENBERG ET AL., *supra* note 9, at 47.

22 *Id.* at 48.

23 SUFFOLK COUNTY DEPARTMENT OF PLANNING, NARROW BAY FLOODPLAIN PROTECTION AND HAZARD MITIGATION PLAN 29 (1997).

community consensus on the topic could be reached.²⁴ However, the county where Mastic Beach lies, Suffolk, applied for buyout funding through the USDA Emergency Watershed Protection-Floodplain Easement Program.²⁵ Suffolk's application helped Mastic Beach property owners bypass resistance from local municipal officials.²⁶ Some of the properties implemented deed restrictions so that they would remain open space in perpetuity.²⁷

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²⁴ ROBERT FREUDENBERG ET AL., *supra* note 9, at 50.

²⁵ *Emergency Watershed Protection Program – Floodplain Easement Option*, USDA RESOURCES CONSERVATION SERVICE, https://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/programs/financial/ewp/?cid=nrcs143_008225 (last visited Oct. 31, 2017).

²⁶ ROBERT FREUDENBERG ET AL., *supra* note 9, at 50.

²⁷ *Id.*



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Conservation Easements

Introduction

An easement is a property right that allows access or use of a property to a third party. Environmentalists and enterprising property owners have adopted “conservation easements” to conserve land. These easements are voluntary legal agreements between a landowner and a qualifying organization (usually a land trust) in which the land owner places permanent limitations on the use of the owner’s property, often in exchange for money or a tax incentive, in order to sustain the natural function of the land.¹ These limitations typically promote a variety of conservation interests, such as scenic views, open space, wildlife habitat, etc., while maintaining other property rights like the right to farm or build a home.² Once created, the land trust is responsible for maintaining the stewardship and conservation values of the land as outlined in the contract.³

Conservation easement programs incentivize the conservation of private property in return for tax credits. California’s Natural Heritage Preservation Tax Credit Program,⁴ and the federal government’s Federal Conservation Tax Deduction,⁵ both grant tax benefits to property owners who choose to preserve all or parts of their land with a qualified conservation easement. Land trusts may also pay money or exchange something else of value in exchange for a conservation commitment from a landowner. This structure allows landowners to initiate conservation trusts by approaching land trusts, and vice versa.

Land trusts have utilized conservation easements to protect open space and agricultural properties throughout California’s central coast. Conservation easements provide

benefits to both parties. For instance, agriculturalists can ensure that their lands are utilized solely for agriculture in the future, while land trusts can maintain view sheds, remove the threat of future development, or even guarantee that future farming practices are organic.⁶ As governments plan for sea level rise, these types of agreements can provide a means of prohibiting further development or protecting upland, migratory areas in a less expensive manner than outright land acquisition.

Tradeoffs

Perhaps the greatest advantage of conservation easements is their flexibility. Conservation agreements can range from an outright ban on development to the preservation of sensitive habitat on one portion of a property. This flexibility allows conservation easements to be used to proactively plan for sea level rise by tailoring specific property agreements to their current and future risks, suitability for industry, and values.⁷ For instance, conservation easement agreements can include prohibitions against shoreline armoring, preclusions against erosion-inducing agricultural activities, or the conservation of natural buffer areas.⁸

Because of their flexibility and because they can be tailored to specific properties and parties, conservation easements are an extremely useful tool in engaging private landowners who wish to benefit from the conservation of their individual parcels and the tax benefits that these easements provide. However, from a broader conservation perspective, conservation easements can be less than ideal because such individualized agreements tend to

1 *Conservation Easement Guide*, CALIFORNIA ASSOCIATION OF RESOURCE CONSERVATION DISTRICTS, http://carcd.org/conservation_easements_guide0.aspx#whatCE (last visited Nov. 2, 2017).

2 *Conservation Easement*, CALIFORNIA COUNCIL OF LAND TRUSTS, <https://www.calandtrusts.org/conservation-basics/conservation-tools/conservation-easement/> (last visited Nov. 2, 2017).

3 *Id.*

4 CAL. PUB. RES. CODE §§ 37000 *et seq.*

5 26 U.S.C. § 170.

6 Jane Ellen Hamilton, *Beyond Agricultural Conservation Easements: Ensuring the Future of Agricultural Production*, LAND TRUST ALLIANCE, <https://www.landtrustalliance.org/news/beyond-agricultural-conservation-easements-ensuring-future-agricultural-production> (last visited Nov. 2, 2017).

7 *Conservation Easements*, GEORGETOWN CLIMATE CENTER, <http://www.georgetownclimate.org/adaptation/toolkits/adaptation-tool-kit-sea-level-rise-and-coastal-land-use/conservation-easements.html> (last visited Nov. 2, 2017).

8 *Id.*

create fragmented “patchworks” of protected properties.⁹ While this potential drawback is less of a concern in rural undeveloped areas, prohibiting development of individual properties in largely residential communities will not create the unified front of open coastal areas sought to confront rising seas. Additionally, landowners or third-party monitors might not be the environmental stewards that the conservation easement agreement requires.¹⁰ These concerns have led some critics to question the efficiency of purchasing easements to protect lands.¹¹

Legal Considerations

California law requires conservation easements to be created with the purpose of retaining land “predominantly in its natural, scenic, historical, agricultural, forested, or open-space condition.”¹² It also requires conservation easements to run with the land, meaning they are tied to the land by deed restrictions, in perpetuity.¹³

Legally, only certain nonprofit and governmental organizations are permitted to acquire and hold conservation easements.¹⁴ These qualifying organizations, in partnership with the private landowner, then determine the individual obligations and protective covenants to include within the conservation contract. The protective nature of these provisions, as well as the overall change in the uses of the property before and after the easement applies, will determine the extent to which tax credits are granted.¹⁵ Generally, conservation easements which fully cede development rights in an area are subject to the largest tax benefits.¹⁶

Examples

There are several notable examples of conservation easements throughout California. In 2005, the State of California and the Hearst Ranch agreed to a \$95 million deal to conserve 80,000 acres of coastal habitat that was previously in danger of development in San Luis Obispo County.¹⁷ Elsewhere, land trusts like the Peninsula Open Space Trust and The Nature Conservancy are actively involved in acquiring scenic and agricultural lands along the California coast.¹⁸

In 2013, a first-of-its-kind “coastal resilience” easement was created in Maryland as a response to sea level rise.¹⁹ The state and a coalition of land trusts set aside 221 acres of wetlands near the Blackwater National Wildlife Refuge specifically to address the threats of climate change.²⁰ This coastal resilience form of conservation easement contained specific provisions “permanently eliminating development, restricting impervious surfaces, [and] protecting areas that allow wetlands to migrate...all of which can help natural areas more quickly recover from flooding.”²¹

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9 JUSTIN GUNDLACH & P. DANE WARREN, LOCAL LAW PROVISIONS FOR CLIMATE CHANGE ADAPTATION 9 (2016) (“Like land acquisition, however, conservation easement programs can result in a fragmentary approach to improving climate adaptation.”).

10 Kathe Tanner, *Hearst Ranch Conservation Project Marks 10-year Anniversary*, THE TRIBUNE, Feb. 18, 2015, <http://www.sanluisobispo.com/news/local/community/cambrian/article39512742.html>.

11 See, e.g., Nancy A. McLaughlin, *Amending Perpetual Conservation Easements: A Case Study of the Myrtle Grove Controversy*, 40 U. RICH. L. REV. 1031 (2006); see also Duncan M. Greene, *Dynamic Conservation Easements: Facing the Problem of Perpetuity in Land Conservation*, 28 SEATTLE L. REV. 883 (2005).

12 CAL. CIV. CODE § 815.1.

13 CAL. CIV. CODE § 815.2.

14 CAL. CIV. CODE § 815.3.

15 See generally TIMOTHY LINDSTROM, A TAX GUIDE TO CONSERVATION EASEMENTS (2016).

16 *Conservation Easements: Tax Consequences*, THE NATURE CONSERVANCY, <https://www.nature.org/about-us/private-lands-conservation/conservation-easements/all-about-conservation-easements.xml> (last visited Nov. 2, 2017).

17 CALIFORNIA NATURAL RESOURCES AGENCY, THE HEARST RANCH CONSERVATION PLAN, *available at* http://resources.ca.gov/hearst_ranch.html.

18 Press Release, Peninsula Open Space Trust, 313 Acres Protected on San Mateo Coast (Mar. 9, 2016), *available at* <https://openspacetrust.org/post-news/post-protects-313-acre-on-san-mateo-coast/>; *The Nature Conservancy*, California Council of Land Trusts, <https://www.calandtrusts.org/members/the-nature-conservancy/> (last visited Nov. 2, 2017).

19 *First-of-Its-Kind Easement Protects Historic Area from Sea Level Rise Impacts*, MARYLAND DEPARTMENT OF NATURAL RESOURCES, <http://news.maryland.gov/dnr/2013/08/21/first-of-its-kind-easement-protects-historic-area-from-sea-level-rise-impacts/> (last visited Nov. 2, 2017).

20 *Id.*

21 *Id.*



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Geologic Hazard Abatement Districts

Introduction

A Geological Hazard Abatement District (GHAD) is a special district formed to prevent, mitigate, abate, or control a geologic hazard or a structural hazard partly or wholly caused by a geologic hazard.¹ GHADs function as political subdivisions of the State of California and can encompass both private and public lands in hazardous areas.²

GHADs are established in one of two ways: through a petition signed by owners of at least ten percent of the real property in the district, or through a majority vote in the local legislative body.³ A petition for a GHAD must include a “plan of control,” a detailed hazard assessment plan, prepared by a certified California engineering geologist, that explains how the proposed district and its constituents will tackle the hazardous problem they face.⁴

Once established, GHADs are independent government entities controlled by an elected board of five land-owning directors. They are then empowered to acquire, construct, operate, manage, or maintain improvements on the lands within their district. Perhaps most significantly, GHADs can levy and collect assessments for the associated costs of projects enacted pursuant to the purpose of the GHAD.⁵ These assessments attach as liens on a property and are collected simultaneously and in the same manner as general property taxes.⁶

For coastal adaptation hazard purposes, GHADs have been formed in areas facing increased rates of bluff erosion, beach loss, or storm surge. As sea levels rise, GHADs may be suitable where a citizen coalition or local government agrees on the need for a self-funded and mostly

autonomous adaptation program, tailored to its particular needs and goals.

Tradeoffs

In certain situations, GHADs can benefit both private landowners and local governments. For example, a local government can establish a GHAD in order to ensure that private property owners internalize the costs of maintaining existing development in a hazard-prone area.⁷ Relatedly, private landowners can combine their resources and utilize a GHAD to divide the costs of vulnerability assessments, project engineering costs, and any necessary or voluntary mitigation efforts.⁸ Under these scenarios, the utility of a GHAD is enhanced by the cooperation of neighboring landowners and local governments securing funding together.⁹ Existing GHADs can also act swiftly and effectively to address hazards as they happen, with authority and resources already in place, in ways local governments might not.¹⁰ GHADs also enjoy a degree of immunity from liability for tortious claims.¹¹

GHADs do, however, raise equitable and democratic concerns based on how they are organized. First, the voting authorities utilized during the establishment of a GHAD are premised upon assessed property value instead of mere membership.¹² This distribution gives homeowners with higher value homes more voting sway than their neighbors, regardless of other relevant factors, such as relative risks from coastal hazards.¹³ Second, those

1 CAL. PUB. RES. CODE § 26525.

2 CAL. PUB. RES. CODE §§ 26530-70.

3 CAL. PUB. RES. CODE §§ 26550-60.

4 CAL. PUB. RES. CODE §§ 26509, 26553.

5 CAL. PUB. RES. CODE § 26650.

6 CECILY TALBERT BARCLAY & MATTHEW S. GRAY, CALIFORNIA LAND USE & PLANNING LAW 369 (35th ed. 2016).

7 *Id.* at 367.

8 CALIFORNIA TAX DATA, CALIFORNIA PROPERTY TAX INFORMATION: WHAT IS A GEOLOGIC HAZARD ABATEMENT DISTRICT?, available at <https://www.californiataxdata.com/pdf/GeoHazard.pdf>.

9 For a detailed list of financing opportunities for GHADs, see CALIFORNIA ASSOCIATION OF GHADS, GEOLOGICAL HAZARD ABATEMENT DISTRICT OVERVIEW, available at <http://ghad.org/ghad-resources/99-geologic-hazard-abatement-districts-ghads-overview.html>.

10 BARCLAY & GRAY, *supra* note 6, at 369.

11 *Id.*

12 CAL. PUB. RES. CODE § 26564; See also Gary Taylor, *Neptune Avenue on Edge*, 12 CALIFORNIA COAST & OCEAN 18, 21 (Spring 1996), available at http://scc.ca.gov/webmaster/coast_ocean_archives/1201.pdf.

13 *Id.*

seeking to establish a GHAD only need signatures from homeowners representing 10% or more of the assessed land value within the proposed GHAD to recommend it to the local legislative body for adoption; however, the local legislative body will deny the petition if 50% of the landowners oppose it. Consequently, a small portion of citizens can form a GHAD in an area where many of the homeowners do not approve of its formation.¹⁴

There are other disadvantages to GHADs. They cannot be easily dissolved after they are formed.¹⁵ The fact that they can be sued might also increase their operating costs.¹⁶ Finally, while they can help protect physical property, they cannot mitigate other losses caused by hazards, such as emotional distress or reduced property values.¹⁷

Legal Considerations

GHADs are statutorily authorized by the 1979 Beverly Act.¹⁸ This act sets out the purpose, power, procedures, voting and election rules, development projects, and financial components of GHADs. As independent political subdivisions of the state, GHADs possess many of the same legal authorities as local government agencies. These include: the power to tax, bond, and borrow money from lenders, certain legal immunities from the California Environmental Quality Act¹⁹ and Local Agency Formation Commissions, the ability to sue and be sued in a court action,²⁰ and eminent domain.²¹ The capacity to

levy taxes against landowners within the GHAD provides the district with the revenue needed to maintain project cost and establish reserve funds for large-scale hazard repairs.²² GHADs impose these taxes in proportion to the special benefits they will provide to each landowner. This tax and spend structure also allows GHADs to respond to hazardous events such as landslides as single events affecting the entirety of the area.

Examples

There are currently thirty-five GHADs organized in California. Most of these are concentrated in the San Francisco bay area and coastal Los Angeles County.²³ The Broad Beach GHAD is one Los Angeles County example comprised of 123 homeowners in the Broad Beach area of Malibu, California. This GHAD was formed to restore the protective and aesthetic nature of Broad Beach and has the goal of privately self-funding the deposition and creation of a 65–75-foot-wide beach renourishment and 40–60-foot-wide dune system.²⁴ Santa Cruz County also manages a GHAD in its jurisdiction.²⁵

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14 *Id.*

15 *Geological Hazard Abatement Districts Report*, SANTA CRUZ COUNTY, <http://www.co.santa-cruz.ca.us/grandjury/GJ2003/Content/6-2GHad.htm> (last visited Sept. 21, 2017).

16 *Id.*

17 *Id.*

18 CAL. PUB. RES. CODE §§ 26500 *et seq.*

19 CAL. PUB. RES. CODE § 26601; See Daniel J. Curtin, Jr. & Shawn J. Zovod, *Geologic Hazard Abatement Districts: California's Experience with Hazard Mitigation through Special Purpose Districts*, 55 LAND USE LAW & ZONING DIGEST 3 (2003).

20 CAL. PUB. RES. CODE § 26576. See, e.g., Emily Sawicki, *Broad Beach Residents Sued Over Beach Restoration Project*, THE MALIBU TIMES, Apr. 7, 2016, http://www.malibutimes.com/news/article_f4da9d1c-fc24-11e5-a769-3300ec937d2f.html.

21 CAL. PUB. RES. CODE § 26576.

22 CAL. PUB. RES. CODE § 26650.

23 CALIFORNIA GHADs, <http://ghad.org/wp-content/uploads/2017/08/California-GHADs-Map.pdf>.

24 *About the Project*, BROAD BEACH GHAD, <http://www.bbghad.com/about-the-project/> (last visited Sept. 21, 2017).

25 *Geological Hazard Abatement Districts Report*, *supra* note 15.



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Transfer of Development Rights

Introduction

Transfers of Development Rights (TDRs) are a financial adaptation strategy used to steer development away from areas deemed unsuitable for intensive development, including coastal areas expected to be impacted by rising seas. TDRs operate via markets where development rights that have been separated from parcels in certain “sending areas” can be bought and sold as credits that can then be used to develop in “receiving areas.” These credits can also be used to increase the development density permissible in a receiving area location. TDRs can help foster coastal adaptation, yet they can also help maintain farmland, protect ecologically sensitive areas, preserve historic districts, promote low income housing, and help achieve other planning and preservation objectives.¹

Establishing a TDR market generally follows several steps. First, a local community establishes the bounds of the “sending” and “receiving” areas.² Next, the underlying zoning restrictions of these sending and receiving areas should be identified and evaluated to determine whether they should be amended to incentivize transfers under the new market.³ Finally, certain calculations should be done to make sure the TDR market functions properly, including determining the TDR allocation rate, the density bonus, and other pertinent values.⁴

Tradeoffs

TDRs offer several advantages for the local communities that implement them. For instance, they offer a market-based approach to foster voluntary retreat from the coastline and other areas over the long term. Further, they provide a flexible and legal way to extinguish development rights for areas deemed unsuitable to develop. This characteristic is likely to become increasingly important

as sea levels rise and as areas available for conservation become scarcer.

TDRs can function in tandem with other coastal adaptation strategies. For example, the “sending” areas can be converted into conservation easements after their development rights have been extinguished. Alternatively, sending areas can be downzoned to less intensive uses to bolster the effectiveness of TDR markets. Another advantage of TDRs is that they are an effective planning tool to preserve open spaces and other uses regardless of who owns particular properties. TDRs also offer another tool to mitigate the effects of development.⁵

Despite these strengths, TDRs also pose some potential drawbacks. One weakness is that TDR programs typically do not prompt retreat for parcels already developed.⁶ TDR programs also require functioning markets with voluntary participants. This requirement has been problematic for some areas where TDR schemes have been developed but ignored by their intended audiences.⁷ Additionally, because these programs are voluntary, achieving intended hazard reduction goals might be a challenge. Further, TDR markets can lead to unintended consequences. For instance, they might foster development in areas that would have remained undeveloped but for the TDR markets. This outcome is problematic if these receiving areas should have remained undeveloped for ecological or other reasons. Accordingly, receiving areas should be chosen only after taking these considerations into account, particularly the future needs and goals of conservation in the areas.

There are also practical barriers to implementing TDR markets. For instance, determining the allocation rate

1 CECILY TALBERT BARCLAY & MATTHEW S. GRAY, CALIFORNIA LAND USE & PLANNING LAW 588 (35th 2016).

2 RESOURCES FOR THE FUTURE, TRANSFER OF DEVELOPMENT RIGHTS IN U.S. COMMUNITIES 21 (2007).

3 For instance, downzoning the sending area. *Id.*

4 *Id.*

5 CALIFORNIA COASTAL COMMISSION, STAFF REPORT APPLICATION No. 4-09-037 13 (2010), available at <https://documents.coastal.ca.gov/reports/2011/3/W22c-3-2011.pdf> (requiring mitigation that permanently extinguishes development rights in the Santa Monica Mountains Coastal Zone).

6 Instead, these properties and their existing uses will be “grandfathered” in as nonconforming uses. See BARCLAY & GRAY, *supra* note 1, at 586 (defining nonconforming use).

7 TRANSFER OF DEVELOPMENT RIGHTS IN U.S. COMMUNITIES, *supra* note 2, at 18.

can be a challenge.⁸ Further, TDRs are less flexible than competing zoning tools and are potentially more permanent than those tools.⁹

Legal Considerations

TDR programs are most likely to be challenged on the grounds that they impermissibly take property. But the United States Supreme Court has addressed TDRs in numerous cases.¹⁰ Voluntary TDR programs will have a better chance of evading takings concerns than mandatory programs.¹¹

The base zoning requirements will still apply to sending and receiving areas unless they are amended. Care should be taken that these base zoning requirements do not conflict with the TDR program.

Examples

The California Coastal Commission has used TDR markets to retire antiquated subdivision lots in the coastal zone. Specifically, the Commission has granted coastal development permits in exchange for retiring development rights in the coastal zone portion of the Santa Monica Mountains.¹² Malibu's Local Coastal Program includes procedures for transferring development credits to encourage this process.¹³

There are other proposed and existing TDR programs in California. The Tahoe Regional Planning Agency hosts a TDR exchange on their website.¹⁴ The Nature Conservancy and the Center for the Blue Economy have proposed instituting a tradable credit scheme for coastal protection along California's coastline.¹⁵ Under this program, the sending and receiving areas would both be coastal properties, with the aim of reducing armoring along the coastline.

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⁸ *Id.* at 21-22.

⁹ Deed restrictions and conservation easements are generally more permanent than zoning regulations. UNIVERSITY OF FLORIDA CONSERVATION CLINIC, TRANSFERABLE DEVELOPMENT RIGHTS AND DENSITY TRANSFERS 3, available at https://www.law.ufl.edu/_pdf/academics/centers-clinics/clinics/conservation/resources/tdrs.pdf.

¹⁰ *See, e.g.*, Penn Central Transportation Co. v. New York City, 438 U.S. 104 (1978); *see also* Suitum v. Tahoe Regional Planning Agency, 520 U.S. 725 (1997).

¹¹ TRANSFERABLE DEVELOPMENT RIGHTS AND DENSITY TRANSFERS, *supra* note 9, at 3.

¹² CALIFORNIA COASTAL COMMISSION, *supra* note 5.

¹³ CITY OF MALIBU LOCAL COASTAL PROGRAM LAND USE PLAN 80 (2002).

¹⁴ *Transferring Development Rights*, TAHOE REGIONAL PLANNING AGENCY, <http://www.trpa.org/permitting/transfer-development-rights/> (last visited Nov. 2, 2017).

¹⁵ *Coastal Marketplaces*, MIDDLEBURY INSTITUTE OF INTERNATIONAL STUDIES AT MONTEREY, CENTER FOR THE BLUE ECONOMY, <http://centerfortheblueeconomy.org/coastal-adaptation-marketplace> (last visited Nov. 2, 2017).



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Development Moratoria

Introduction

Development moratoria are temporary prohibitions on development, or certain kinds of development, in a location while planning or studies can be completed.¹ Moratoria function to preserve the status quo while these processes proceed. A local government might implement a moratorium while an environmental study proceeds, for example. Similarly, a moratorium could be used to pause development while a general plan is completed for an area. A community might also use a moratorium while it reconsiders its existing floodplains after a flooding event.² For coastal adaptation purposes, a moratorium would be useful while a community implements new zoning restrictions to address rising seas.

Procedurally, a local community can adopt a forty-five-day “urgency measure” to initiate a moratorium.³ This measure can then be extended after notice and public hearing for another twenty-two months and fifteen days.⁴ Moratoria can be implemented by resolution or ordinance, or may be precipitated by voter initiative. Moratoria face certain substantive limitations, which are discussed below.

Tradeoffs

Moratoria allow local communities time to thoughtfully, effectively, and comprehensively undertake planning measures while maintaining the status quo. They also pause development so planners can consider the long-term implications of recent and future development and how they fit with the values and goals of the community.

One drawback of moratoria as a coastal adaptation strategy is that they are only temporary. Accordingly, moratoria are not ends themselves. Instead, they are a means of ensuring comprehensive long-term planning. Another drawback is that moratoria are often unpopular. They will likely face opposition from affected property owners wishing to develop their parcels during the moratorium.

Legal Considerations

The power of a local community to temporarily halt all development in order to meet planning objectives derives from California’s State Planning and Zoning Law and its inherent powers to protect health and safety of its citizens.⁵ The United States Supreme Court has upheld moratoria as valid land use planning tools.⁶ Nonetheless, moratoria need to meet the minimum constitutional threshold for government actions, specifically that they advance a legitimate state interest.⁷

1 CECILY TALBERT BARCLAY & MATTHEW S. GRAY, CALIFORNIA LAND USE & PLANNING LAW 585 (35th 2016).

2 FEDERAL EMERGENCY MANAGEMENT AGENCY, NATIONAL FLOOD INSURANCE PROGRAM (NFIP) FLOODPLAIN MANAGEMENT REQUIREMENTS: A STUDY GUIDE AND DESK REFERENCE FOR LOCAL OFFICIALS 6-24 (2017), available at <https://www.fema.gov/floodplain-management-requirements>.

3 An urgency measure can proceed without following the procedures otherwise required prior to the adoption of a zoning ordinance. CAL. PUB. RES. CODE § 65858.

4 CAL. PUB. RES. CODE § 65858.

5 CAL. PUB. RES. CODE § 65000 *et seq.*; see also U.S. CONST. amend. X.

6 Tahoe-Sierra Preservation Council, Inc. v. Tahoe Regional Planning Agency, 535 U.S. 302 (2002).

7 Nollan v. California Coastal Comm’n, 483 U.S. 825, 834 (1987).

Moratoria may be found to impermissibly “take” property without just compensation, in violation of the U.S. Constitution, if they deprive a property of all economic uses.⁸ Moratoria may avoid this fate by being limited in time.⁹ Moratoria have survived takings challenges when they are for a limited time period and not indefinite in duration, but time limits alone will not necessarily shield moratoria from takings claims.¹⁰

If a moratorium is challenged and determined by a court to have been invalid or unlawful, the time period it was in effect might constitute an impermissible temporary taking.¹¹ In such a case, the local community that issued the invalid moratorium would be liable to pay just compensation for the time period the invalidated provision prohibited development and temporarily “took” their property without compensation.¹² Local communities should ensure that moratoria comply with all substantive and procedural legal requirements to avoid this fate.

California has specific restrictions on moratoria. For instance, California law limits interim ordinances to a maximum of two years.¹³ Further, moratoria ordinances require “legislative findings that there is a current and immediate threat to the public health, safety, or welfare” of a community.¹⁴

Examples

Marin County instituted a development moratorium for a third of Stinson Beach while it finalized an update to its Local Coastal Program (LCP).¹⁵ The County cited safety concerns as well as the need to analyze projected sea level rise in the area for instituting the moratorium. The moratorium is planned to last until the Coastal Commission approves Marin’s updates to its LCP.

There are additional recent examples of development moratoria in California. Redondo Beach adopted a temporary ban on mixed-use projects while it updates its General Plan.¹⁶ A proposed moratorium on developments that required zone changes failed when it was put on the ballot in Los Angeles.¹⁷ East Palo Alto’s City Council imposed a development moratorium based on that city’s limited water supply.¹⁸

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8 U.S. CONST. amend. V.

9 *Tahoe-Sierra Preservation Council, Inc.*, 535 U.S. at 332 (“Logically, a fee simple estate cannot be rendered valueless by a temporary prohibition on economic use, because the property will recover value as soon as the prohibition is lifted.”).

10 535 U.S. at 342 (“In our view, the duration of the restriction is one of the important factors that a court must consider in the appraisal of a regulatory takings claim, but with respect to that factor as with respect to other factors, the ‘temptation to adopt what amount to per se rules in either direction must be resisted.’”) (citation omitted).

11 *See generally* BARCLAY & GRAY, *supra* note 1, at 307-08.

12 *First English Evangelical Lutheran Church v. County of Los Angeles*, 482 U.S. 304, 320 (1987).

13 CAL. PUB. RES. CODE § 65858.

14 CAL. PUB. RES. CODE § 65858.

15 Beau Evans, *County Halts Development for a Third of Stinson*, POINT REYES LIGHT, Sept. 10, 2015, <https://www.ptreyeslight.com/article/county-halts-development-third-stinson>.

16 Megan Barnes, *Redondo Beach Adopts Temporary Ban on Controversial Mixed-use Projects*, THE DAILY BREEZE, Aug. 16, 2017, <http://www.dailybreeze.com/business/20170816/redondo-beach-adopts-temporary-ban-on-controversial-mixed-use-projects>.

17 Emily Alpert Reyes, et al., *Measure S Defeated After a Heated, Costly Battle Over Future L.A. Development*, L.A. TIMES, Mar. 8, 2017, <http://www.latimes.com/local/lanow/la-me-ln-measure-s-20170307-story.html>.

18 Kaitlyn Landgraf, *East Palo Alto Imposes Development Moratorium Due to Lack of Water*, SAN JOSE MERCURY NEWS, July 20, 2016, <http://www.mercurynews.com/2016/07/20/east-palo-alto-imposes-development-moratorium-due-to-lack-of-water/>.



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Overlay Zones

Introduction

An overlay zone is a land use planning area where additional zoning requirements “overlay” the original requirements of the underlying district. Property owners within an overlay zone must conform to the provisions of both sets of development restrictions.¹ Traditionally, these zones have been used to create preservation areas, buffer airports and military institutions, demarcate building preservation districts in historic spaces, or require additional safety provisions in steep, erosion, or flood-prone areas.² “Recovery” overlay zones have also been used post-disaster to install temporary regulations which prevent redevelopment as damage assessment takes place.³ Municipalities aiming to preserve or shape an array of areas of special concern have also employed overlay zones to this end.

Advances in Geographic Information System (GIS) software, improved sea level rise projections, and more detailed coastal hazard mapping might make overlay zones a useful coastal adaptation zoning tool in the future. Specifically, detailed coastal hazard mapping may now make it possible for coastal planners to determine the expected extent of sea level rise inundation and combined storm surge risks. Sea level rise and flooding overlay zones might then be implemented according to these projected sea level rise rates, time horizons, and locations.

A sea level rise overlay zone designation would notify landowners of potential danger to their properties and then include specified “triggers” based on observable hazard events requiring some change or assessment in

light of the prevalent danger.⁴ Over the shorter term, this notice provides landowners with the warning that they are currently, or will soon be, in the crosshairs of rising seas or flooding waters. Over the longer term, the added conditions of an overlay zone can reduce or stop rebuilding in hazardous areas through rebuilding restrictions. In the meantime, an overlay zone remains “transparent” and does not affect the property until the triggering event requires the prescribed land use change.⁵

Tradeoffs

A primary advantage of an overlay zone is its flexibility in implementing multiple sea level rise adaptation efforts.⁶ Overlay zones can be used to prompt retreat via redevelopment restrictions or buyout programs, or strengthen accommodation efforts by incentivizing smart, proactive planning. Moreover, a community can tailor them to its specific needs to ensure political feasibility and land use equity.⁷ In highly developed areas subject to intense development and redevelopment, overlay zones may include building design considerations, increased flood elevation requirements, or required mitigation for project development. In more rural areas, they may require the use of natural “green infrastructure” such as dune and wetland habitats, or permanently ban the use of seawalls for new development. This flexibility allows communities to implement overlay zones based on their unique needs, allowing them to delineate areas prioritized for protection, accommodation, and retreat.⁸

1 CECILY TALBERT BARCLAY & MATTHEW S. GRAY, CALIFORNIA LAND USE & PLANNING LAW 586 (35th ed. 2016) (defining “overlay zone”).

2 INSTITUTE FOR LOCAL GOVERNMENT, UNDERSTANDING THE BASICS OF LAND USE AND PLANNING: GUIDE TO LOCAL PLANNING 29 (2010), available at http://www.ca-ilg.org/sites/main/files/file-attachments/2010_-_landuseplanning.pdf.

3 ANNA SCHWAB, DYLAN SANDLER & DAVID BROWER, HAZARD MITIGATION AND PREPAREDNESS: AN INTRODUCTORY TEXT FOR EMERGENCY 8.5.1.4 (CRC Press, 2nd ed. 2016).

4 CITY OF GOLETA, CA, DRAFT COASTAL HAZARDS VULNERABILITY ASSESSMENT AND FISCAL IMPACT REPORT ES-6 (2015), available at <https://www.conservationgateway.org/ConservationPractices/Marine/crr/library/Documents/GoletaCoastalVulnerability.pdf>. This draft report was officially adopted through Resolution No. 15-55 of the City Council of the City of Goleta.

5 SCHWAB, SANDLER & BROWER, *supra* note 3.

6 FLORIDA CLIMATE INSTITUTE, PLANNING FOR SEA LEVEL RISE IN THE MATANZAS BASIN: OPPORTUNITIES FOR ADAPTATION, APPENDIX H1, Section V.a.i. (June 2015).

7 *Property Topics and Concepts*, AMERICAN PLANNING ASSOCIATION, <https://www.planning.org/divisions/planningandlaw/propertytopics.htm> (last visited Aug. 15, 2017).

8 FLORIDA CLIMATE INSTITUTE, *supra* note 6, at Section VII.

Overlay zones will likely face opposition, as well as several policy hurdles. Demarcating certain areas will inherently create inequities by applying restrictive regulations to some properties and not others.⁹ This approach is often a challenge for land use planners, and any overlay zone should be scrutinized for how it will affect the appraisal of individual private properties and the municipality's tax base as a whole. Additionally, new restrictions affecting the value or allowed use of private properties may spur challenges from homeowners. These challenges will be discussed in the next section.

Legal Considerations

Developing overlay zones will require adopting new land use regulations that must be consistent with the applicable General Plan and relevant Local Coastal Programs. Local governments instituting overlay zones are most likely to be challenged by private property owners as potential regulatory takings. Like traditional zoning, overlay zone regulations based on improving the health, safety, and welfare of the population are generally allowed.¹⁰

However, the Fifth Amendment of the United States Constitution provides a check to these broad land use powers. Specifically, its Takings Clause requires that the government pay just compensation when a regulation becomes so onerous that it has the practical effect of a direct physical appropriation of that property.¹¹ Overlay zone changes that go so far as to deprive a parcel of nearly

all economic value will likely be challenged as a taking by its owner, while regulations under this threshold will be considered according to certain judicially mandated factors.¹²

Local governments that adopt overlay zones should also be cognizant of the procedural due process rights of affected property owners. Because overlay zone changes may alter the allowed uses of a land parcel, local governments may incur liability for failing to apprise a homeowner of an ordinance which affects a protected property interest (i.e. an affirmative development right).¹³

Examples

Sea level rise overlay zones are suitable in areas where coastal erosion, storm surge, sea water inundation, and/or coastal squeeze events are expected to challenge land use planning and development. Cities along the California coast are considering or have already utilized overlay zones for flood-prone and environmentally sensitive areas.¹⁴ For example, the City of Goleta is evaluating overlay zones as part of their suite of future coastal adaptation strategies.¹⁵

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⁹ *Property Topics and Concepts*, *supra* note 7.

¹⁰ "The legal basis for all land use [and building code] regulations is the police power of the city to protect the public health, safety, and welfare of its residents." *See* BARCLAY & GRAY, *supra* note 1, at 1, *citing* Berman v. Parker, 348 U.S. 26, 32-33 (1954).

¹¹ INSTITUTE FOR LOCAL GOVERNMENT, REGULATORY TAKINGS AND LAND USE REGULATION: A PRIMER FOR PUBLIC AGENCY STAFF 6 (2006).

¹² *See* Penn Cent. Transp. Co. v. New York City, 438 U.S. 104, 124 (1978) ("In engaging in these essentially ad hoc, factual inquiries, the Court's decisions have identified several factors that have particular significance. The economic impact of the regulation on the claimant and, particularly, the extent to which the regulation has interfered with distinct investment-backed expectations are, of course, relevant considerations.")

¹³ *See* Moreland Properties v. City of Thornton, 559 F.Supp.2d 1133 (D. Colo. 2008).

¹⁴ SANTA BARBARA CTY., CAL. CODE, §§ 35.28.090-120, *available at* <http://sbcountyplanning.org/pdf/forms/LUDC/LUDC.pdf>; CARLSBAD, CAL. MUN. CODE § 21.82.010-070, *available at* <http://www.qcode.us/codes/carlsbad/?view=desktop&topic=21>; SANTA CRUZ, CAL. MUN. CODE §§ 24.10.625.0-7, *available at* <http://www.codepublishing.com/CA/SantaCruz/html/SantaCruz24/SantaCruz2410.html#24.10.625.0>.

¹⁵ CITY OF GOLETA, *supra* note 4, at ES-6.



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Rebuilding and Redevelopment Restrictions

Introduction

Property owners whose homes and other structures are damaged or destroyed by coastal hazards typically want to rebuild on their properties. Similarly, coastal landowners, responding to rising seas or merely wanting modernized, larger homes, sometimes redevelop them into more permanent, fortified structures.¹ As rising seas increasingly make these locations dangerous to inhabit, local governments can respond by amending their laws and ordinances to regulate the rebuilding and redevelopment of structures on these increasingly vulnerable coastal properties.²

Rebuilding and redevelopment restrictions encompass a broad range of regulatory tools local governments can use to place progressive restrictions on structures when they are rebuilt and renovated. They might allow rebuilding the destroyed structures where they were, but with certain additional conditions or safety mandates.³ Similarly, they might allow rebuilding, but only on a portion of a property.⁴ Where rebuilding concerns are the most acute, regulations can completely prohibit rebuilding in an area.⁵ Likewise, redevelopment restrictions can regulate the expansion and fortification of existing structures in perilous coastal locations. Rebuilding restrictions can also take the form of downzoning—i.e. rezoning an area to allow lower densities or less intensive uses.⁶

These tools are useful where redevelopment is undesirable, such as areas currently in floodzones or predicted to be impacted by future sea level rise. Rebuilding and redevelopment restrictions can be particularly useful in locations with many “grandfathered” structures that are not meeting current zoning regulations, and perhaps where there is a danger of repetitive loss.⁷ Because redevelopment restrictions affect projects that are rebuilt or modified in some way only after adoption of the restriction, their effectiveness requires early adoption.⁸

Rebuilding and redevelopment restrictions can be implemented in areas looking to accommodate sea level rise in the short to mid term and areas looking to move out of harm’s way in the long term. Specifically, these restrictions can prompt planned retreat from a coastal region by incrementally restricting new and modified structures in an area that is currently hazardous or is expected to become hazardous in the near future. These strategies could also accommodate sea level rise by requiring that redeveloped or rebuilt buildings be elevated to a certain height or incorporate other resilient engineering approaches.

1 Trends in redevelopment in the California coastal zone have generally shown that “aging structures do not really die so much as metamorphose into ‘new and improved’ structures in the same place.” Charles Lester, *An Overview of California’s Coastal Hazards Policy*, in *LIVING WITH THE CHANGING CALIFORNIA COAST* 138, 148 (Gary Griggs et al. eds., 2005).

2 *Id.* at 160.

3 JESSICA GRANNIS, ADAPTATION TOOL KIT: SEA-LEVEL RISE AND COASTAL LAND USE 32 (2011).

4 *Id.* This option might be achieved through setbacks.

5 *Id.*

6 *Id.* Under this scenario, existing nonconforming uses in an area will typically be allowed to continue, but will be required to be brought into compliance if they need to be rebuilt or redeveloped.

7 See 42 U.S.C. § 4121(a)(7) (defining repetitive loss structures). California’s Sonoma County is home to the most repetitive loss properties west of the Rockies. See SONOMA CNTY. PERMIT AND RES. MGMT. DEP’T., SONOMA COUNTY LOCAL COASTAL PLAN: SONOMA COUNTY HAZARD MITIGATION PLAN 109 (2011), available at http://www.sonoma-county.org/prmd/docs/hmp_2011/chapters/full_chapters.pdf.

8 ANNE R. SIDERS, MANAGED COASTAL RETREAT: A LEGAL HANDBOOK ON SHIFTING DEVELOPMENT AWAY FROM VULNERABLE AREAS 89 (2013), available at https://web.law.columbia.edu/sites/default/files/microsites/climatechange/files/Publications/Fellows/ManagedCoastalRetreat_FINAL_Oct%2030.pdf.

Tradeoffs

One advantage of redevelopment and rebuilding restrictions is that they can help a community combat nonconforming uses.⁹ Specifically, they can require that redevelopment or large-scale modification of a property brings all current uses and building designs into compliance with updated zoning and building regulations. Another advantage is their compatibility with other adaptation strategies. For instance, restrictions can apply specifically to overlay zones based on sea level rise projections or they can also work to downzone an area to less intensive uses.

Current redevelopment policies have allowed property owners to fortify their coastal homes indefinitely.¹⁰ Engineering advances have contributed to these issues, persistently extending the economic life of buildings and homes, while the ground beneath them erodes.¹¹ Rebuilding and redevelopment policies can be updated to reduce this phenomenon, prompting thoughtful long-term coastal land uses and even eventual retreat from rising seas and flood areas.

These strategies also feature certain economic advantages and disadvantages. Redevelopment restrictions work to internalize the costs associated with rebuilding by placing the financial burden on a property owner who wishes to remain in an area that is or will soon be subject to sea level rise hazards. For instance, a homeowner who wants to remain in a location might be required to pay to elevate the buildings on its property. Conforming to these ordinances can prove extremely costly. Alternatively, implementing a rebuilding or redevelopment restriction can reduce tax revenues from coastal property for a local community, thus externalizing the financial loss.¹²

Legal Considerations

Rebuilding and redevelopment policies can take several forms, but they are all premised on a local jurisdiction's power to promote public safety and welfare by reducing individual property risk.¹³ Implementing redevelopment restrictions will generally require changes to existing local ordinances or the creation of guidance which more accurately delineates when a property is legally redeveloped.¹⁴

As discussed, a major advantage of these strategies is their ability to phase out nonconforming uses. But there are certain legal considerations for achieving this outcome. Generally, nonconforming uses are permitted to continue because it would be unconstitutional to immediately disallow a lawfully established business or use.¹⁵ However, general California land use policy promotes the elimination of nonconforming uses by requiring that grandfathered-in structures come into compliance with all regulations upon being rebuilt or substantially modified.¹⁶

Furthermore, redevelopment restrictions designed to bring nonconforming properties into legal conformance generally only apply once some type of regulatory threshold has been met. These thresholds often vary from jurisdiction to jurisdiction and can comprise square footage additions, property value changes, or the number of previous rebuilds as the defining requirement for what constitutes redevelopment. Private landowners and government regulators often differ over their appraisal of whether major repairs cross these thresholds. Accordingly, thresholds should be clearly defined to avoid legal arguments and misunderstandings over what does and does not constitute “rebuilt” or “substantially modified” and similar terms.

Another issue that these restrictions can help address are existing legal loopholes. For instance, the California Coastal Act currently incentivizes rebuilding destroyed buildings in their previous footprint. The Coastal Act's “repair and maintenance” exception to its coastal development permit (CDP) requirements allows certain rebuilding and redevelopment to proceed without a CDP.¹⁷ Another section allows a structure destroyed by

9 A building or property use which was appropriately established at the time of construction yet has since fallen out of legal compliance is said to be “nonconforming.” CECILY TALBERT BARCLAY & MATTHEW S. GRAY, CALIFORNIA LAND USE & PLANNING LAW 60 (35th ed. 2016).

10 MOLLY LOUGHNEY MELIUS & MARGARET R. CALDWELL, CALIFORNIA COASTAL ARMORING REPORT: MANAGING COASTAL ARMORING AND CLIMATE CHANGE ADAPTATION IN THE 21ST CENTURY 24 (2015).

11 *Id.*

12 GRANNIS, *supra* note 3, at 33.

13 *Berman v. Parker*, 348 U.S. 26, 32-33 (1954).

14 MELIUS & CALDWELL, *supra* note 10, at 24.

15 *Id.*

16 *Id.*; see also B.E. Witkin, WITKIN SUMMARY OF CALIFORNIA LAW § 1040 (2005).

17 CAL. PUB. RES. CODE § 30610(d).

a disaster to be rebuilt in the same location without a permit—even if it would be safer to rebuild further upland on the same property.¹⁸ Local Coastal Programs under the Coastal Act might also allow renovations beyond the permissible legal threshold (usually 50%) if completed in stages, thus allowing them to avoid certain added permit requirements.¹⁹ Redevelopment and rebuilding restrictions can be implemented to address these and other loopholes and exceptions.

Examples

Several California communities feature redevelopment restrictions with varying requirements. Sonoma County redevelopment restriction ordinance requires that all commercial and industrial rebuilt structures must comply with current regulations if the rebuild exceeds “more than fifty percent (50%) of the replacement value of the structure.”²⁰ This means that a property owner interested in rebuilding that requires over 50% of the property value to do so will need to conform with current basefloor

elevations and other requirements. Monterey County features a very similar requirement,²¹ and Marin County has proffered amendments to its local coastal program to make its redevelopment policies more stringent by defining and measuring “redevelopment” cumulatively since 1977, when the Coastal Act went into effect.²²

State and federal sources have begun recommending rebuilding and redevelopment restrictions for dealing with sea level rise. California recommends instituting them when structures are damaged by sea level rise or coastal storms.²³ Florida highlighted this issue in its climate action plan as well.²⁴ The U.S. Environmental Protection Agency has also recommended progressive updates to redevelopment policies.²⁵

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18 CAL. PUB. RES. CODE § 30610(g).

19 See generally Jesse Reiblich & Eric H. Hartge, *The Forty-Year-Old Statute: Unintended Consequences of the Coastal Act and How They Might Be Redressed*, 36 STAN. ENVTL. L.J. 63, 75-81 (2016).

20 SONOMA CNTY., CAL., CODE OF ORDINANCES § 26C-351 (2017), available at https://www.municode.com/library/ca/sonoma_county/codes/code_of_ordinances?nodeId=CH26CCOZOREDI_ARTXXXVNOUS_S26C-351RE.

21 MONTEREY CNTY., CAL. CODE OF ORDINANCES § 18.01.020 (2017), available at https://library.municode.com/ca/monterey_county/codes/code_of_ordinances?nodeId=TIT18BUCO_CH18.01BUSTADCO_18.01.020AP.

22 MARIN COUNTY LCP IP AMENDMENTS 2015-#3 AND 2016 #5, #6, #7 COMPILED IMPLEMENTING PROGRAM (2016), available at https://www.marincounty.org/~media/files/departments/cd/planning/local-coastal/newdocs/161102_ccc_approved_ipa_web.pdf?la=en.

23 CALIFORNIA NATURAL RESOURCES AGENCY, 2009 CALIFORNIA CLIMATE ADAPTATION STRATEGY 77 (2009).

24 GOVERNOR'S ACTION TEAM ON ENERGY & CLIMATE CHANGE, FLORIDA'S ENERGY & CLIMATE CHANGE ACTION PLAN F-9 (2008).

25 EPA, ANTICIPATORY PLANNING FOR SEA-LEVEL RISE ALONG THE COAST OF MAINE Summary-9 (1995).



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Triggers

Introduction

The use of “trigger language” is an emerging approach to adaptation planning where planning entities declare that an observable event will “trigger” an adaptation management response. This approach, also known as initiating “adaptation pathways,” provides a sequential planning framework to manage uncertainty and address projected hazards under changing environmental and societal conditions.¹

This sequential framework requires first identifying thresholds that would motivate a local planning body to take a more ambitious adaptation stance. For instance, trigger events that transition the policy approach throughout an adaptation pathway might include observed annual sea level above a threshold height, coastal erosion beyond a determined amount, financial harm exceeding a threshold cost, duration of inundation exceeding historic observations, or an increase in recurrence rate of storm events.

Initially, adaptation pathways might include an early phase of “no-regret” or “low-regret” strategies to minimize present risks, such as ceasing development in high hazard locations identified in a vulnerability assessment or requiring localized hazard assessments for any new development.² Once an initial threshold has been met or exceeded, the next phase might include more stringent controls on new development for designated “hazard zones.” This stage might also require relocation plans for critical infrastructure, such as utilities. Local planning agencies can designate any number of triggering events and associated responses—such as managed relocation and other retreat measures—according to the unique circumstances and priorities of the local community.

1 Marjolijn Haasnoot et al., *Exploring Pathways for Sustainable Water Management in River Deltas in a Changing Environment*, 115 *CLIMATE CHANGE* 795, 797 (2012).

2 CALIFORNIA COASTAL COMMISSION, DRAFT RESIDENTIAL ADAPTATION POLICY GUIDANCE 29 (July 2017), available at <https://www.coastal.ca.gov/climate/slr/vulnerability-adaptation/residential/>; see generally Jon Barnett et al., *A Local Coastal Adaptation Pathway*, 4 *NATURE CLIMATE CHANGE* 1103 (2014).

Tradeoffs

A key advantage of the hazard “trigger” approach is that it alleviates uncertainty in adaptation planning that stems from the use of projections that can shift due to new information or a revised methodology. Tying possible adaptation responses to observable future events can help reduce the effects of this scientific uncertainty on the coastal adaptation planning process. This approach also allows long-term planning to occur now rather than during or shortly after some catastrophic flooding event or storm season. Pre-disaster recovery planning has proven that establishing pathways for action before an event allows for more resilient, rational decision making after.³

While one strength of this approach is its flexibility, it is also a potential pitfall. Specifically, allowing action to occur at a future date could potentially increase a community’s susceptibility to near-term risks. For example, delaying the removal of shoreline armoring until after some observed trigger, may allow a window for unwarranted damage to the coastline to occur or allow costs for removal to increase significantly. Another potential drawback of this approach is that it requires significant coordination amongst planning processes, including General Plans, Local Coastal Program updates, as well as modifications to Local Hazard Mitigation Plans.

3 FEDERAL EMERGENCY MANAGEMENT AGENCY, PRE-DISASTER RECOVERY PLANNING GUIDE FOR STATE GOVERNMENTS 1 (2016), available at <https://www.fema.gov/media-library-data/1485202780009-d5c48b2774665e357100cc69a14da68/Pre-DisasterRecoveryPlanningGuideforStateGovernments-1.pdf>.

Considerations

A key consideration for incorporating trigger language into adaptation planning is that it requires a thorough vulnerability assessment. Information gleaned from this assessment will aid in identification of locations where triggers may be necessary and the relevant timeline by which hazards may increase. Planning timelines are another key factor. For instance, determining trigger event milestones will ensure alignment between projected hazard events and the ability to successfully, proactively respond to them.

In many cases, local coastal communities are hesitant to implement policies that could be perceived as too aggressive or burdensome to property owners. In these situations, a stepwise approach that involves pre-determined actions and thresholds, combined with a prescriptive monitoring schedule, can make this strategy more palatable. Likewise, incorporating observable triggers can aid the process of making difficult decisions under uncertainty.

The specific adaptation pathway should be a function of a community's vision for their coastline, and its thresholds for social, economic, and environmental harm. Placing "no regret" strategies in place allows the coastal community to maintain adaptive capacity—the ability of a system to moderate potential damages, take advantage of opportunities, or cope with consequences—under future scenarios.⁴ By maintaining the capacity to pursue a variety of adaptation responses, the community would be better able to achieve their coastal vision throughout a range of hazards.

Examples:

The City of Pacific Grove in Monterey County included sea level rise triggers in their draft Land Use component of their proposed Local Coastal Plan update.⁵ The "trigger" the City identified is an observation of greater than 3" rise in sea level on average for an entire year above the updated 2020 tidal epoch mean high water level at the Monterey Tide Gage.⁶ This change in sea level would trigger a policy warranting a site-specific hazards study in locations indicated as potential hazard areas from a vulnerability study.⁷

The Thames Estuary 2100 project in London, England was initiated to provide a plan for tidal flood risk management in the Thames Estuary for the next century.⁸ The project planning process was hindered by the uncertainty inherent in climate projections.⁹ To address this uncertainty, the project included a "route map" featuring decision points and monitoring indicators that identify when new information (primarily sea level heights) will be considered in an iterative risk management framework.¹⁰ This framework—comparable to an adaptive management framework with pre-determined trigger events—can be a model for long-term, high investment infrastructure projects that can incorporate decision points and a thorough monitoring system into their operations.

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⁴ INTERGOVERNMENTAL PANEL ON CLIMATE CHANGE, WORKING GROUP II: IMPACTS, ADAPTATION, AND VULNERABILITY, ANNEX B: GLOSSARY OF TERMS (2001).

⁵ CITY OF PACIFIC GROVE, DRAFT LAND USE PLAN: A COMPONENT OF THE LOCAL COASTAL PROGRAM (2017).

⁶ Policy HAZ-2. *Id.* at 36.

⁷ Policy HAZ-12. *Id.* at 39.

⁸ Nicola Ranger et al., *Addressing 'Deep' Uncertainty Over Long-Term Climate in Major Infrastructure Projects: Four Innovations of the Thames Estuary 2100 Project*, 1 EURO J. DECISION PROCESSES 233 (2013).

⁹ *Id.* at 234.

¹⁰ *Id.* at 252.



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Public Trust Doctrine

Introduction

The public trust doctrine is a background principle of state property law reflecting the supreme importance of public values, resources, and uses along California's coastline.¹ Under the public trust doctrine, California has a duty to protect and sustain its coastal tidelands and submerged lands for public purposes ranging from navigation and commerce to recreation, access, and conservation, as well as the authority to defend the public's interests when they are at risk.² This duty can extend to uplands, where construction and regulation of private or state-owned properties has the potential to adversely affect public interests near the shoreline.³ The public trust doctrine likewise obligates California to proactively manage and protect public trust resources, and the uplands areas that affect them, in response to sea level rise.⁴

Geographic Scope

The public trust doctrine protects tidelands, submerged lands and the beds of navigable waterways. On the coast, all lands seaward of the ordinary high water mark are encumbered by the public trust doctrine.⁵ In California, the ordinary high water mark—generally located with reference to the mean high tide line⁶—is a boundary between state-owned tidelands and alienable uplands. This boundary is highly ambulatory, meaning that the public-private boundary line moves as the shoreline

naturally accretes or erodes (Figure 1).⁷ The boundary also moves to reflect long-term fluctuations in the plane of mean high water, which is expected to rise due to rising seas.⁸ Consequently, the boundary between uplands and publicly-owned tidelands will continue to fluctuate due to seasonal erosion and accretion, and will likely move landward over the long term in light of increased rates of sea level rise and coastal erosion.

Public Trust Doctrine Consensus Statement

The Center for Ocean Solutions convened a working group of public trust and coastal land use experts to understand how sea level rise will implicate the public trust doctrine and, by extension, future coastal decisionmaking. In summer 2017, the group produced a Consensus Statement and a longer legal background document (Footnote 1).

Changing Coastline

Sea level rise and climate change effects are expected to combine to create higher baseline sea levels and more extreme weather events, resulting in increased flooding and erosion.⁹ Coastal towns throughout California are ill-prepared for these changes, as historic public and private development has occurred in close proximity to its public trust lands. This development is poised to impede the natural landward migration of the land-sea boundary, where the collision of natural environments with coastal infrastructure may result in the loss of public coastal

1 CENTER FOR OCEAN SOLUTIONS, STANFORD WOODS INSTITUTE FOR THE ENVIRONMENT, THE PUBLIC TRUST DOCTRINE: A GUIDING PRINCIPLE FOR GOVERNING CALIFORNIA'S COAST UNDER CLIMATE CHANGE 4 (2017), available at http://www.centerforoceansolutions.org/sites/default/files/publications/The%20Public%20Trust%20Doctrine_A%20Guiding%20Principle%20for%20Governing%20California_Report.pdf.

2 *Id.*

3 *Id.* at 28 ("The limits on how far into the future, or how far down the causal chain the requirement to consider effects to trust resources from activities on adjacent lands extends, are not clearly defined.")

4 *Id.* at 9.

5 Early common law established the boundary between uplands and state-owned tide and submerged lands as the ordinary high water mark. In 1935, the Supreme Court declared that the ordinary high water mark is equated to the mean high tide line, a plane of reference for elevations developed by the U.S. federal government. CENTER FOR OCEAN SOLUTIONS, *supra* note 1, at 17, citing *Borax Consol., Ltd. v. Los Angeles*, 296 U.S. 10, 22-23 (1935).

6 *Lechuza Villas West v. Cal Coastal Comm'n*, 60 Cal. App. 4th 218, 236-37 (1997).

7 CENTER FOR OCEAN SOLUTIONS, *supra* note 1, at 18.

8 The mean high tide line is legally defined as the 18.6-year average. *Borax*, 296 U.S. at 27. Under current practice, changes to the mean high tide elevation—one component of boundary determinations—will not be gradual, but instead will reflect sudden changes within the context of the national tidal epoch.

9 GARY GRIGGS ET AL., RISING SEAS IN CALIFORNIA: AN UPDATE ON SEA-LEVEL RISE SCIENCE 17 (2017), available at <http://www.opc.ca.gov/webmaster/ftp/pdf/docs/rising-seas-in-california-an-update-on-sea-level-rise-science.pdf>.

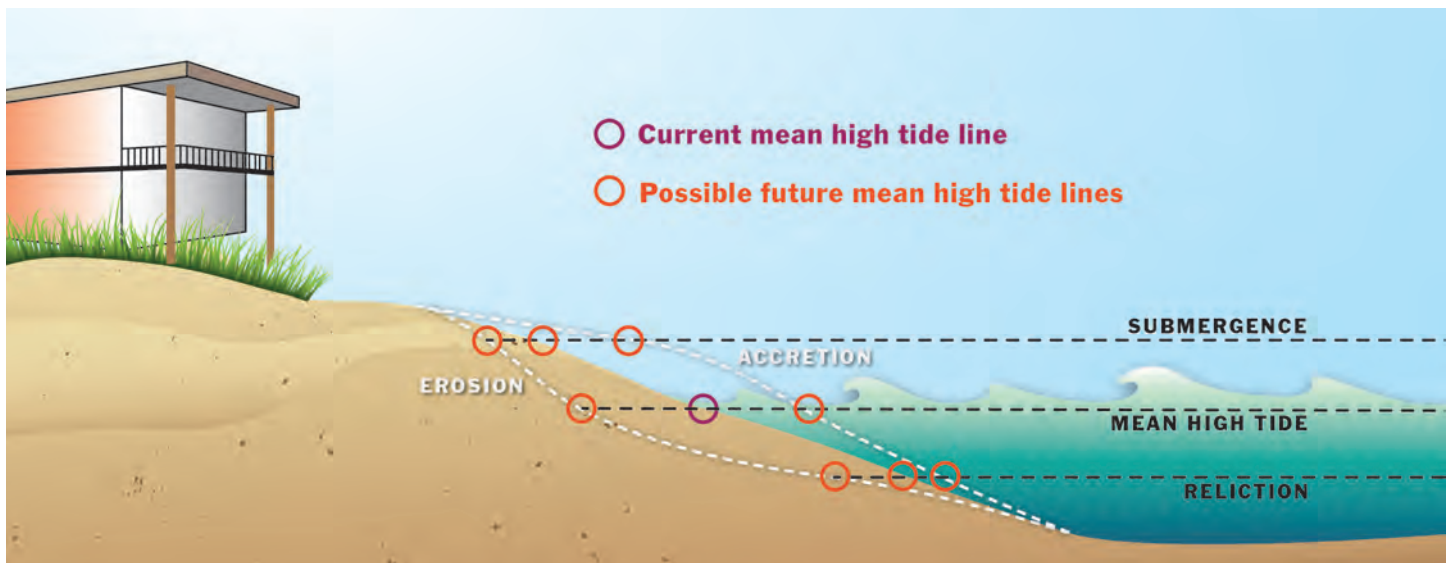


Figure 1. Diagram of four dynamic processes and how they may change the location of the mean high tide line.

lands.¹⁰ This inevitable collision of sea level rise and coastal infrastructure—or “coastal squeeze”—threatens to degrade, destroy, and even privatize the state’s shorelines.¹¹

Implications

State and local governments in California are tasked with allocating funds and making decisions about where and how coastal uses should be permitted. This challenging task is complicated by the effects of rising sea levels, as the potential for long-term unidirectional change to the coastline and site-specific uncertainty make the future state of the coast a required consideration in present-day planning and decision making. As decisions about California’s coastline are made, the public trust doctrine’s values must inform the decisionmaking of legislative, administrative, and judicial government bodies at the state and local level. The dynamic division between California’s public trust lands and private properties is important for local planning specifically, as some lands currently regulated by local government planning bodies may become state-owned public trust lands due to the landward progression of the mean high tide line. Although a fact- and location-specific analysis is necessary to determine the particular public trust obligations that apply in a given

circumstance, the doctrine’s guiding principles apply to all lawmaking and management activities that may affect public resources and uses.

These difficult questions necessitate careful planning and enhanced coordination between decisionmakers at all levels of government. Specifically, due to the complexity in identifying coastal property boundaries and defining public trust obligations, coordination and collaboration between local governments, the California Coastal Commission, and the State Lands Commission is essential. The effect of rising sea levels on the ambulatory shoreline boundary may result in the State Lands Commission recognizing future control over some lands currently under the regulatory purview of local governments. Local governments should act now to protect the public’s future interests in these public lands. The public trust doctrine arguably requires current coastal planners with jurisdiction over lands above the mean high tide line to ensure that future public interests are not negatively affected, or given away, through land use and development permitting decisions.¹² This reality highlights the need for collaboration and dialogue between

¹⁰ CENTER FOR OCEAN SOLUTIONS, *supra* note 1, at 17.

¹¹ *Id.*

¹² *National Audubon Soc’y v. Superior Court*, 33 Cal. 3d 419, 429–30, 446 (Cal. 1983).

the State Lands Commission, Coastal Commission, local governments, and affected coastal property owners.¹³

A heightened focus on community level engagement and planning should assist this endeavor. Affected communities are uniquely situated to understand the local sense of place, economic importance, and cultural benefits that are in play as difficult tradeoffs are made. Protecting the public's interest in shared resources of the coastal zone from current and foreseeable future harm is a central tenet

of the public trust doctrine, and the sooner sea level rise adaptation planning proceeds with all involved, the better.

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¹³ This logic extends to upland uses and cumulative effects as well; aggregate coastal development is likely to have greater effects on public trust resources than individual projects, and should be scrutinized in conjunction with foreseeable uses, harms, and changes to public trust resources. CENTER FOR OCEAN SOLUTIONS, *supra* note 1, at 29.

Coastal Adaptation and Takings Law

Introduction

Local governments can proactively plan for sea level rise by amending their local coastal programs and other local planning documents and ordinances to better address the expected effects of rising seas and eroding coastlines. However, there is no one-size-fits-all approach for all coastal communities. Furthermore, private property disputes in the coastal zone will likely increase as coastal squeeze threatens both private property and public resources, including beaches and other public trust lands. As local communities navigate these challenges, understanding the Fifth Amendment's Takings Clause and its implications for local governments will aid their efforts. Understanding this complex area of the law can help decisionmakers steer clear of avoidable takings claims and better deal with inevitable ones. Ideally, local governments will be able to choose policies that financially burden their constituents the least while still achieving their long-term planning and coastal adaptation objectives.¹ With this aim in mind, this document provides a brief overview of federal and California-specific takings law.

General Takings Law

The Takings Clause of the Fifth Amendment to the U.S. Constitution prohibits the federal government from taking private property for “public use, without just compensation.”² The Fourteenth Amendment extends this prohibition to state and local governments through the Due Process Clause.³ A government taking can occur in two ways: when the government acquires title to private property for a public use through eminent domain, or when the government has regulated a private property to such a degree that it has lost all of its economic value. Deciding when a government entity has “taken” private property,

and therefore must provide just compensation to a private property owner, is at the core of takings law jurisprudence.

The first category of takings is eminent domain—when the government literally takes private property for some public purpose.⁴ Case law limits the exercise of eminent domain to circumstances where property is taken for “public use.”⁵ In *Kelo v. City of New London* the Court found that even a community’s economic development can be a public use.⁶ Many state legislatures responded to this decision by enacting statutes defining when and how the government can condemn properties for public use.⁷

A second category of takings is when a government regulation limits or affects the use of private property past a legally-defined threshold. Importantly, the Takings Clause does not diminish the government’s ability to regulate property. Instead, it requires the government to compensate private property owners when a regulation goes “too far.”⁸ Determining whether a regulation goes “too far” so as to effectuate a taking is a legal question that encompasses at least four categories.⁹ Each of these categories “aims to identify regulatory actions that are functionally equivalent to the classic taking . . . in which government directly appropriates private property.”¹⁰

1 Michael Allan Wolf, *Strategies for Making Sea-Level Rise Adaptation Tools ‘Takings-Proof’*, 28 J. LAND USE & ENVTL. L. 157, 164 (2013), available at <http://scholarship.law.ufl.edu/facultypub/404>.

2 U.S. CONST. amend. V.

3 U.S. CONST. amend. XIV, § 1.

4 Wolf, *supra* note 1, at 159.

5 *Kelo v. City of New London*, 545 U.S. 469 (2005).

6 *Id.* at 485.

7 Wolf *supra* note 1, at 164; CAL. CONST. art. 1, §19; CAL. PUB. RES. CODE § 30010.

8 *Pennsylvania Coal Co. v. Mahon*, 260 U.S. 393, 415 (1922); *Block v. Hirsh*, 256 U.S. 135, 156 (1921).

9 CECILY TALBERT BARCLAY & MATHEW S. GRAY, CALIFORNIA LAND USE & PLANNING LAW 299 (35th ed. 2016).

10 *Lingle v. Chevron U.S.A.*, 544 U.S. 528, 548 (2005).

Legal precedent has established at least one exception to regulatory takings. Where a regulation forbids a use of a property that would have already been prohibited by “background principles of the state’s law of property and nuisance” the government is not required to compensate a private property owner based on the effects of that regulation on the property.¹¹ Practically, this means that government regulations do not effect a taking when they prohibit an action that the property owner never had the right to do, such as creating or sustaining a nuisance or occupying another’s land.¹² This allows governments to limit development that would infringe on publicly-owned tidelands for some portion of the year. This also allows governments to limit the use of shoreline armoring if that armoring is found to create a nuisance.¹³ Governments may successfully defend many other regulatory, planning, or decisionmaking actions from a takings challenge by arguing that the government action is consistent with background principles of California property law.¹⁴

Categories of Regulatory Takings

One type of regulatory takings occurs when a regulation effects a permanent physical invasion of one’s property, no matter how slight the intrusion.¹⁵ In *Loretto*, the Supreme Court ruled that a regulation requiring landlords to allow cable companies to enter and install cable lines on their private property was a physical taking.¹⁶ The court concluded that “a permanent physical occupation authorized by government is a taking, without regard to the public interests that it may serve.”¹⁷

A government regulation that denies a property owner of “all economically beneficial use”—also known as a *Lucas* taking—of their property is another kind of regulatory taking.¹⁸ Proving this kind of taking is rare, as subsequent court cases have highlighted the need for all economic value to be eliminated for this categorical

taking to apply.¹⁹ For instance, local land use development moratoriums²⁰ and regulations drastically limiting developmental opportunities²¹ have not been found to be takings under this rule. Instead, courts have generally found in these cases that where some economically permissible use is still allowed on the property despite the government regulation, then all economic value has not been eliminated.²² Accordingly, the threshold question for whether a regulation causes a *Lucas* taking is the extent of economic impact to the property.

A third kind of regulatory takings occurs when a government regulation goes “too far” in placing a public burden on particular private property owners.²³ Courts use the ad hoc, factually-intensive *Penn Central* factors test to determine when a regulation goes “too far.”²⁴ The three *Penn Central* factors are: (1) the economic impact of the regulation on the affected landowner; (2) the extent to which that landowner has reasonably distinct investment-backed expectations for their property; and (3) the nature of the governmental action (whether the property regulation has occurred in order to confer a public benefit or to prevent a public harm).²⁵ This test has largely resulted in courts holding that a government regulation which partially impacts the economic value of a property is not a takings for two reasons.²⁶ First, governments have broad leeway under the first and third factors to balance the benefits of the common good against the burdens of economic changes.²⁷ Second, courts have held that property owners “with knowledge of pre-existing government regulations or even of reasonably foreseeable extensions of existing law” should temper the reasonability of their investment-backed expectations.²⁸ The idea that government regulations are capable of changing and, therefore, property owners should soften their economic expectations in light of variable regulatory landscapes, pervades *Penn Central* case law.²⁹

11 *Lucas v. South Carolina Coastal Council*, 505 U.S. 1003, 1028 (1992).

12 Michael C. Blumm & Lucas Ritchie, *Lucas’s Unlikely Legacy: The Rise of Background Principles as Categorical Takings Defenses*, 29 HARVARD ENVTL. L. REV. 321, 326 (2005); see also *Scott v. City of Del Mar*, 58 Cal. App. 4th 1296 (1997) (a city-ordered removal of seawalls did not qualify as a compensable taking because the seawalls, which encroached onto a public right-of-way, were considered a public nuisance).

13 See, e.g., *Scott v. City of Del Mar*, 58 Cal. App. 4th 1296 (1997).

14 See, e.g., *id.*; see also Robin Kundis Craig, *Public Trust and Public Necessity Defenses to Takings Liability for Sea Level Rise Responses on the Gulf Coast*, 26 J. LAND USE & ENVTL. L. 395, 404 (2011); Sean B. Hecht, *Taking Background Principles Seriously in the Context of Sea Level Rise*, 39 VERMONT L. REV. 781, 784-788 (2015).

15 BARCLAY & GRAY, *supra* note 9, at 299.

16 *Loretto v. Teleprompter Manhattan CATV Corporation*, 458 U.S. 419, 421 (1982).

17 *Id.* at 426.

18 *Lucas*, 505 U.S. at 1015.

19 BARCLAY & GRAY, *supra* note 9, at 300.

20 See *Tahoe-Sierra Preservation Council, Inc. v. Tahoe Reg’l Planning Agency*, 535 U.S. 302, 342 (2002).

21 *William C. Haas & Co. v. City and County of San Francisco*, 605 F.2d 1117, 1119 (9th Cir. 1979).

22 For a discussion of *Lucas* takings and its limitations see *Outdoor Systems, Inc. v. City of Mesa*, 997 F.2d 604, 616 (9th Cir. 1993); BARCLAY & GRAY, *supra* note 9, at 300-1.

23 BARCLAY & GRAY, *supra* note 9, at 302.

24 *Penn Central Transportation Company v. City of New York*, 438 U.S. 104 (1978).

25 *Id.* at 124.

26 Wolf, *supra* note 1, at 168.

27 *Id.* citing *Penn Central*, 438 U.S. at 124.

28 *Id.* citing *Commonwealth Edison Co. v. United States*, 271 F.3d 1327, 1357 (Fed. Cir. 2001).

29 See generally BARCLAY & GRAY, *supra* note 9, at 303-305.

The final category of regulatory takings addresses exactions—i.e. government-imposed conditions on a development permit intended to mitigate the environmental or public impacts of the development.³⁰ Courts apply the *Nollan*³¹ and *Dolan*³² tests to dispose of these takings claims. *Nollan* requires a legitimate “nexus”—a direct, logical relationship—between the exaction and the purpose of the restriction.³³ *Dolan* additionally requires that the benefit of the exaction be “roughly proportional” to the projected harm of the permitted activity.³⁴ These tests have since been applied to monetary exactions intended to fund similarly-related yet off-site mitigation projects through the 2013 *Koontz* decision.³⁵

Regulatory Takings Jurisprudence in California

California’s Constitution includes its own takings provision.³⁶ Thus, all takings analyses for actions undertaken by the State of California must be consistent with both federal and state takings requirements.³⁷ For its part, the State of California has taken the frameworks derived from Supreme Court cases (above) and, in some instances, expanded upon them to include other factors or procedures.³⁸

For regulations that effect a physical taking, California courts utilize the *Loretto* framework as described above. California also has several eminent domain laws codified as statutes.³⁹ For instance, one of these laws delineates the process by which California state actors may be given entry to a property and provide just compensation to the property owner.⁴⁰ Overall, the statutes require that a public entity either obtain a court order prior to entering a property

for a land condemnation action or obtain permission from said property owner prior to the anticipated activity.⁴¹ As *Loretto* prescribes, the prevailing question for a physical takings analysis under this law depends on the permanency of the intrusion, and state actions are therefore scrutinized under both the constitutional and statutory tests.⁴²

Like federal *Lucas* claims, California cases where regulations have been found to deny all economic use of a property are rare.⁴³ This is largely because California courts follow the “valuation rule,” which evaluates whether there is any economic value left in the property that remains, instead of evaluating the decrease in the value of the property after the regulation.⁴⁴ Using this formula, California cases have held that downzoning, modified motel ordinances which effect 30%–65% of motel’s business, and the planting of public trees which obstructed the views of billboard advertisements did not constitute a per se *Lucas* taking.⁴⁵ This jurisprudence conforms with the principle that “denial of the highest and best use [of property] does not constitute a taking of the property.”⁴⁶

Regarding *Penn Central* takings analyses, California has adopted the *Penn Central* test in these scenarios and extended its considerations by including ten more factors that courts can consider.⁴⁷ Broadly, these additional factors take into account the traditional uses of the property affected, the state’s interest in the regulation, whether the regulation mitigates the financial burdens placed on the property owner, and any fundamental changes to property ownership effectuated by the regulation.⁴⁸ With these additional factors in place, California courts are wary to “articulate a standard test for determining when circumstances comprise an acceptable diminution in value as compared to a regulation that ‘goes too far.’”⁴⁹

30 *Id.* at 307.

31 *Nollan v. California Coastal Commission*, 483 U.S. 825 (1987).

32 *Dolan v. City of Tigard*, 512 U.S. 374 (1994).

33 *Nollan*, 483 U.S. at 837.

34 *Dolan*, 512 U.S. at 375.

35 *Koontz v. St. Johns River Water Mgmt. Dist.*, 133 S. Ct. 2586, 2599 (2013).

36 CAL. CONST. art. 1, § 19 (“Private property may be taken or damaged for public use only when just compensation, ascertained by a jury unless waived, has first been paid to, or into court for, the owner. The Legislature may provide for possession by the condemnor following commencement of eminent domain proceedings upon deposit in court and prompt release to the owner of money determined by the court to be the probable amount of just compensation.”) California’s Takings Article goes beyond the U.S. Constitution by additionally providing citizens with the right to have just compensation determined by a jury, as opposed to a presiding judge, unless waived.

37 See generally *Prop. Reserve, Inc. v. Super. Ct.*, 375 P.3d 887 (Cal. 2016).

38 Broadly-sweeping laws, such as the California Coastal Act, also generally include a provision which ensures that any action authorized by such a statute does not “decrease the rights of any owner of property under the Constitution of the State of California or the United States.” CAL. PUB. RES. CODE § 30010.

39 CAL. PUB. RES. CODE §§ 1230.010 *et seq.*

40 CAL. PUB. RES. CODE §§ 1245.010-060.

41 CAL. CODE CIV. PROC. §§ 1245.020-030.

42 *Prop. Reserve, Inc. v. Super. Ct.*, 375 P.3d 887, 915 (Cal. 2016).

43 BARCLAY & GRAY, *supra* note 9, at 301.

44 *Id.*

45 *Id. citing* *Terminals Equip. Co. v. City and County of San Francisco*, 221 Cal. App. 3d 234 (1990); *Buena Park Motel Ass’n. v. City of Buena Park*, 109 Cal. App. 4th 302, 311 (2003); *Regency Outdoor Advertising, Inc. v. City of Los Angeles*, 39 Cal. 4th 507, 513 (2006).

46 BARCLAY & GRAY, *supra* note 9, at 302 *citing* *Long Beach Equities, Inc. v. Superior Court of Ventura County*, 231 Cal. App. 3d 1016, 1036 (1991); *MacLeod v. County of Santa Clara*, 749 F.2d 541, 548 (9th Cir. 1984).

47 *Kavanau v. Santa Monica Rent Control Bd.*, 16 Cal. 4th 761, 776 (1997) (“This list is not a comprehensive enumeration of all the factors that might be relevant to a takings claim, and we do not propose a single analytical method for these claims. Rather, we simply note factors the high court has found relevant in particular cases. Thus, instead of applying these factors mechanically, checking them off as it proceeds, a court should apply them as appropriate to the facts of the case it is considering.”).

48 BARCLAY & GRAY, *supra* note 9, at 303-4.

49 *Id. citing* *Penn. Coal Co. v. Mahon*, 260 U.S. 393, 415 (1922).

Unfortunately, for local governments and regulated property owners alike, this framework has caused a vastly uncertain legal landscape in this complex area of law.

California law establishes certain procedures for land and monetary exactions, beyond the constitutional limits under *Nollan* and *Dolan*. For instance, the California Mitigation Fee Act of 1987 requires government actions that establish, increase, or impose a fee as a condition of a development permit to identify the purpose of the fee, declare how it is related to the impacts on the project, and determine how the fee uses will contribute to the needs of public facilities in the area.⁵⁰ This law, along with the California Supreme Court's *Ehrlich* decision, require

cities to document the need and decisionmaking criteria for proposed exactions, and provide private landowners a process to challenge those decisions.⁵¹ California cases challenging exactions look both to the constitutionality of the exaction under the *Nollan* and *Dolan* decisions, as well as the government's compliance the Mitigation Fee Act.⁵²

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- 51 *Ehrlich v. City of Culver City*, 12 Cal. 4th 854 (1996) (“[T]he best reading of this statute is that the Act imposes additional requirements on a local government in assessing an ad hoc fee, and is not intended to supplant *Nollan* and *Dolan* review for ad hoc fees.”); *BARCLAY & GRAY*, *supra* note 9, at 346.
- 52 *BARCLAY & GRAY*, *supra* note 9, at 346; *San Remo Hotel L.P. v. City & Cty. of San Francisco*, 41 P.3d 87, 100 (Cal. 2002); *Barratt American Inc. v. City of Rancho Cucamonga*, 37 Cal. 4th 685 (2005); *Homebuilders Ass’n of Tulare/Kings Counties, Inc. v. City of Lemoore*, 185 Cal. App. 4th 554 (2010).

50 CAL. GOV’T CODE §§ 66000–66025; CAL. GOV’T CODE § 66001.



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