

Coastal Access Equity and the Implementation of the California Coastal Act

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The California Coastal Act, passed in 1976, protects public coastal access for all Californians. In the forty years since the Act's passage, the state's population has nearly doubled with much of that growth occurring in the coastal zone, where the beaches and public trust shoreline are an important natural, open space resource. As such, they are beneficial to individual and community well-being. Inequities in access to nature (and other beneficial resources) are increasingly common. In this study, we evaluate and map the proximity of different demographic groups to public shoreline access points on California's coast. In so doing, we identify disparities in the availability of coastal access opportunities to different groups and show that, in general, wealthy, white, senior residents of California live closer to coastal access than other groups, while populous minority groups are significantly underrepresented in terms of their proximity to coastal access points. We discuss these findings in light of environmental change (e.g., sea level rise) and responses to such changes (e.g., shoreline armoring), combined with social factors (e.g., continued population growth) and policy responses to such changes (e.g., climate adaptation planning). Our analyses set the stage for further place-based study of disparities in public coastal access, including their impacts on specific populations, as well as mechanisms intrinsic to the Coastal Act for increasing coastal access equity in California through the Act's next forty years.

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I. INTRODUCTION

One of the primary goals of California's 1976 Coastal Act was to maximize public access to and along the coast for Californians.¹ But like other ostensibly public goods, public access has traditionally been inequitably distributed between different groups—whether *de jure* or *de facto*.² Access to resources, from clean air to food to open space, is a significant environmental justice issue and is inseparable from social and economic issues underlying sustainable environmental and resource management.³ Inequities between different groups of people have been documented in both their exposure to problematic environmental stressors, such as climate change,⁴ and also their access to critical resources, including food and medical care.⁵ With increasing frequency, however, inequities

1. CAL. PUB. RES. CODE § 30001.5 (West 2016) (stating that one of the goals of the Coastal Act is to “[m]aximize public access to and along the coast . . .”).

2. See generally Annika Dahlberg, Rick Rohde, & Klas Sandell, *National Parks and Environmental Justice: Comparing Access Rights and Ideological Legacies in Three Countries*, 8 CONSERVATION AND SOCIETY 209 (2010); Robert García & Erica Flores Baltodano, *Free the Beach! Public Access, Equal Justice, and the California Coast*, 2 STAN. J.C.R. & C.L. 143 (2005); Hugh Millward, *Public Recreational Access in the Countryside: Concepts and Measures of Physical Rigour*, 7 JOURNAL OF RURAL STUDIES 241 (1991).

3. United Nations Environment Programme, *Advancing Justice, Governance and Law for Environmental Sustainability*, (June 22, 2012), http://www.unep.org/delc/Portals/119/publications/Advancing_Justice_Governance_Law.pdf.

4. David S.G. Thomas & Chasca Twyman, *Equity and Justice in Climate Change Adaptation Amongst Natural-Resource-Dependent Societies*, 15 GLOBAL ENVIRONMENTAL CHANGE 115 (2005).

5. Maria Goddard & Peter Smith, *Equity of Access to Health Care Services: Theory and*

are being documented in access to nature and open space.⁶ Lack of access to “recreational” resources is of growing concern as the physiological and psychological benefits of exposure to nature are better understood.⁷ Thus, inequitable access to these resources may have very real implications for health, happiness, and productivity.

The coastal zone is a common pool natural resource. Space in coastal areas will become increasingly limited due to rising seas, likely adding to the complexity and intensity of conflict and exacerbating potential for inequities in coastal access, unless preempted by thoughtful coastal planning. A changing climate and its associated impacts (e.g., rising seas, increased storm events) will serve as a risk multiplier, leaving the coasts both ecologically and socially vulnerable. In California, communities are responding to the threats of rising sea levels, growing coastal populations, and increasingly damaging storms by building armoring structures that may threaten or undermine coastal access by reducing the size of beaches, coastal access points, or both.⁸

Local governments have a role to play in ensuring that their local coastal programs conform to the strictures of the Coastal Act—California’s coastal zone management (CZM) law.⁹ Accordingly, these governments can take proactive steps to ensure that their coastlines continue to provide public access to all, especially in the

Evidence from the UK, 53 SOCIAL SCIENCE & MEDICINE 1149 (2001); H. Charles J. Godfray et al., *Food Security: The Challenge of Feeding 9 Billion People*, 327 SCIENCE 812, 815 (2010).

6. Christopher G. Boone, Geoffrey L. Buckley, J. Morgan Grove & Chona Sister, *Parks and People: An Environmental Justice Inquiry in Baltimore, Maryland*, 99 ANNALS OF THE ASSOCIATION OF AMERICAN GEOGRAPHERS 767, 769 (2009); Bethany B. Cutts, Kate J. Darby, Christopher G. Boone & Alexandra Brewis, *City Structure, Obesity, and Environmental Justice: An Integrated Analysis of Physical and Social Barriers to Walkable Streets and Park Access*, 69 SOCIAL SCIENCE AND MEDICINE 1314, 1315 (2009); Chona Sister, Jennifer Wolch & John Wilson, *Got Green? Addressing Environmental Justice in Park Provision*, 75 GEOJOURNAL 229, 243 (2009); Jennifer R. Wolcha, Jason Byrne & Joshua P. Newell, *Urban Green Space, Public Health, and Environmental Justice: The Challenge of Making Cities “Just Green Enough”*, 125 LANDSCAPE AND URBAN PLANNING 234, 235 (2014).

7. See generally Gregory N. Bratman, J. Paul Hamilton, & Gretchen C. Daily, *The Impacts of Nature Experience on Human Cognitive Function and Mental Health*, 1249 ANNALS OF THE NEW YORK ACADEMY OF SCIENCES 118 (2012) (categorizing how humans interact with nature to lay a foundation for further exploration of the psychological benefits nature provides); Roly Russell et al., *Humans and Nature: How Knowing and Experiencing Nature Affect Well-Being*, 38 ANNUAL REVIEW OF ENVIRONMENT AND RESOURCES 473 (2013) (creating a framework that links aspects of well-being to nature experience).

8. MOLLY LOUGHNEY MELIUS & MARGARET R. CALDWELL, ENV’T AND NAT. RES. LAW & POLICY PROGRAM, *California Coastal Armoring Report: Managing Coastal Armoring and Climate Change Adaptation in the 21st Century* (2015).

9. CAL. PUB. RES. CODE § 30005 (West 2016).

face of rising seas. Particularly, local governments can engage in climate change adaptation planning to minimize inequitable economic and social losses in coastal access associated with climate change and to inform a more equitable implementation of the public access policies of the California Coastal Act. This paper examines the spatial distribution of public access to the coastline in California relative to the distribution of the state's diverse residents and asks whether access to this important resource is equitably shared among all residents of California. We discuss results of these analyses in the context of decisionmaking regarding the management of California's coastline and of access to it.

II. BACKGROUND: COASTAL VALUE, PUBLIC COASTAL ACCESS, AND THE PUBLIC TRUST DOCTRINE

Coastal regions are epicenters of population and economic activity. In the United States, coastal counties constitute just 18% of the United States' land area, but 37% of its population and 42% of its economic output.¹⁰ In California, shoreline counties are even more significant. In 2007, they comprised just 21% of the state's land area, but 69% of its population, 66% of its jobs, and 69% of its GDP.¹¹ With continued population growth, development pressures on the coast will continue to increase, driven in part by the productivity of the coastal economy, but also increasingly by the "quality of life" it offers.¹² Beach recreation, which according to a 2005 estimate contributes \$2.25–\$7.5 billion annually to the state's economy, is an important component of this coastal quality of life.¹³ The public's ability to recreate on the state's beaches is predicated on its ability to access them.¹⁴

The importance of equitable access to coastal resources and in particular to the shoreline has long been recognized and is enshrined within the common law public trust doctrine (PTD).¹⁵ In

10. JUDITH T. KILDOW ET AL., CENTER FOR THE BLUE ECONOMY, *State of the U.S. Ocean and Coastal Economies 2009*, https://www.miiis.edu/media/view/8901/original/NOEP_Book_FINAL.pdf.

11. *Id.*

12. Jordan Rappaport & Jeffrey D. Sachs, *The United States as a Coastal Nation*, 8 J. OF ECON. GROWTH 5 (2003).

13. Linwood Pendleton & Judith Kildow, *The Non-Market Value of Beach Recreation in California*, 74 SHORE & BEACH, 34 (2006).

14. See, e.g., Jesse Reiblich, *Greening the Tube: Paddling Toward Comprehensive Surf Break Protection*, ENVTL. L. & POL'Y J. 45, 52 (2013).

15. The PTD was first codified by the Roman emperor Justinian in the 6th century CE,

the United States, public coastal access is a priority of the national Coastal Zone Management Act of 1972, which calls on the states to separately prepare CZM programs to implement the priorities of the act, including the provision of “public access to the coasts for recreation purposes.”¹⁶ In a large scale review of CZM programs conducted in the late nineties, California placed high value on implementing public access measures and was relying on more tools than other states.¹⁷

In California, the PTD and public access to the coast are reflected in Article X, Section 4 of the state’s constitution, which declares that no entity “shall be permitted to exclude the right of way to [coastal and other] such water . . . [so that] access to the navigable waters of this State shall be always attainable for the people thereof.”¹⁸ Subsequently, this protection is codified in the California Coastal Act of 1976 (the State’s Coastal Zone Management implementing legislation), which states that “maximum access . . . shall be provided for *all the people*”¹⁹ In light of rapid coastal development, increasing property values, the growing income gap between rich and poor, and prominent instances of private property owners asserting their exclusive right to shoreline access,²⁰ there is some question as to whether access to the California shoreline is equitably available for all Californians.²¹

This study addresses the fundamental question: to whom is shoreline access most readily available in California? This question is explored through spatial analysis of population, income, age, and race of Californians in relationship to their physical proximity to shoreline access points (derived from a database assembled and curated by the California Coastal Commission).²² We test the

who held that “[b]y the law of nature these things are common to mankind: the air, running water, the sea, and consequently the shores of the sea . . . No one, therefore, is forbidden to approach the seashore, provided that he respects habitations, monuments, and buildings which are not, like the sea, subject only to the law of nations.” Institutes of Justinian § II(I)(1).

16. 16 U.S.C. § 1452 (2) (E) (2016).

17. Pamela Pogue & Virginia Lee, *Providing Public Access to the Shore: The Role of Coastal Zone Management Programs*, 27 COASTAL MANAGEMENT 219 (1999).

18. CAL. CONST. Art. X, § 4.

19. CAL. PUB. RES. CODE § 30210 (West 2016) (emphasis added).

20. See, e.g., *Friends of Martin’s Beach v. Martin’s Beach 1 LLC*, 246 Cal. App. 4th 1312 (1st D. 2016).

21. García & Baltodano, *supra* note 2, at 143.

22. A shoreline access point is a location by which the public can gain access to the public trust tidelands from the nearest public right-of-way (e.g., a street, park, or public

hypothesis that, despite legal mandates in the California Coastal Act, shoreline access is not equitably accessible to all Californians.²³ As an indicator of equity, we analyze the proportionality of population distribution in California.²⁴ The results of this study have important public policy implications and lay the groundwork for future examination of the potential impacts of environmental change and coastal management policy on the differential accessibility of the coast to diverse populations.

path).

23. The PTD does not explicitly call for equality in access; but we argue such equality is implicit to the PTD as follows: if the sovereign holds a resource in trust for the benefit of all people (and there is additional constitutional and statutory language providing for access to this resource, e.g., CAL. PUB. RES. CODE § 30210 (West 2016), but there are structural factors that prevent specific sub-groups of people from using or benefiting from the resource, is that not inherently a failure of implementation of the PTD? If air for breathing is a public trust resource, but some people are not able to breathe it because of societal pressures outside their own control and their health suffers, is that not evidence of a failure of the sovereign to implement the PTD and a failure to manage the resource for the benefits of its people? In this instance, it seems that some measure of equality (in opportunity, access, etc.) is intrinsic to the PTD.

A counter example can be found in fisheries: if *everyone* had equal access to all the fish they could catch, then we suffer from a “tragedy of the commons”. Garrett Hardin, *The Tragedy of the Commons*, 162 SCIENCE 1243 (1968). Therefore, the sovereign has some duty to manage the resource in order to maximize the societal benefit of the resource: healthy, well-managed fisheries are better for society than overharvested, collapsed fisheries.

The question then is whether the coastline—and access to it—is a public trust resource that is more like air for breathing or more like fish for catching. There is a reasonable argument that coastal access, use, or benefits *must be managed* to prevent a “tragedy of the commons” situation: trampling of sensitive habitats, litter, mismatched use of the surfzone (e.g., surfers or boaters among swimmers) are real problems in many coastal environments. Access to the coastline, however, is on balance less like a fisheries resource and much more like the air that everyone has an equal right to breathe. It is large and expansive and much less affected by any one person’s individual use; management actions that deal with over-use (or types of use) are not discriminatory of any type or group of person. Furthermore, like air, public use is *freely* accessible; no permits, specialized equipment, or training are necessary for successful use.

That coastal resources are public trust resources belonging to all the people intrinsically implies that all people should have equal access. Access can be defined as “the ability to derive benefits from things”; if certain groups of people have widely varying abilities to derive benefits from public resources, this seems the very definition of inequity. Jesse C. Ribot & Nancy Lee Peluso, *A Theory of Access*, 68 RURAL SOCIOLOGY 153 (2003). If one group is systematically prevented from achieving equal opportunities for use of the resource (as a result of large scale, structural, societal issues), it implies a failure of the sovereign to fairly undertake its responsibility as the trustee for a public resource.

24. And for the heuristic purposes of this study, we define an “equitable distribution” as one in which aspects of a population (e.g., age, income, or race) are distributed evenly throughout the state.

III. METHODS

We applied spatial analysis to evaluate equity in the distribution of coastal access versus the distribution of racial, ethnic, economic, socially vulnerable, and other populations in California. Specifically, we used Geographic Information Systems (GIS) to integrate the spatial patterns of coastal access and demography of coastal communities to evaluate which populations have the most and least proximate access—in terms of physical distance—to the current shoreline in California. The demographic data we included in our analysis were race, age, population, and income. These data are derived from the United States Census Bureau’s 2010 census block database shapefile.²⁵ The data for location of coastal access points are derived from a database of coastal access points curated by the California Coastal Commission. For our analyses, we only use coastal access points that enable direct access to the beach or shoreline; thus viewpoints or upland parks still located within the coastal zone are not included in our analyses.

Working within the ArcGIS software suite, the “buffer analysis tool” was used to create buffers extending 1km, 10km, and 100km around each coastal access point. Subsequently, the “select by location tool” was used to identify census GEOIDs that intersected with each buffer²⁶ Finally, the statistics tool was used to calculate averages and totals of various fields in the attribute table. All analysis was run in ArcMap 10.3 and the census data is available as a vector. Consequently, the buffer analysis is an overestimate, as it includes data extending outside of the buffer zones (i.e., for those census blocks that fall partly within a buffer distance from an access point, our analysis includes the block’s population within the buffer radius as well as the block’s population that lives outside the buffer radius). We additionally conducted similar spatial analyses for the County of Los Angeles with buffer distances of 1km and 10km. Note that in all

25. Available at <https://www.census.gov/geo/maps-data/data/tiger.html>.

26. *Understanding Geographic Identifiers (GEOIDs)*, U.S. CENSUS BUREAU (Sept. 8, 2016), <https://www.census.gov/geo/reference/geointentifiers.html>. “The Census Bureau and other state and federal agencies are responsible for assigning geographic identifiers, or GEOIDs, to geographic entities to facilitate the organization, presentation, and exchange of geographic and statistical data. GEOIDs are numeric codes that uniquely identify all administrative/legal and statistical geographic areas for which the Census Bureau tabulates data. GEOIDs are very important for understanding and interpreting geographic and demographic data and their relationship to one another. Data users rely on GEOIDs to join the appropriate demographic data from censuses and surveys to various levels of geography for data analysis, interpretation and mapping.”

analyses, the buffer radii represent the “as the crow flies” distance of whether or not any portion of a census block falls within the radius distance; it does not include travel time that might be associated with the transportation grid (roads, public transit, *etc.*).²⁷

To determine the amount of geographic inequity among these groups, we calculated proportional values for each group within each buffer zone. Thus, if a given group makes up X% of the state’s total population, then predicted proportion in each buffer zone is $X\% \times \text{Total Population of the Zone}$. The difference between the predicted and observed populations is calculated as $100\% \times (\text{Observed} - \text{Predicted}) / \text{Predicted}$. In this case, the buffer zones are not cumulative; that is, we look at the population living between 0km and 1km, 1km and 10km, 10km and 100km, and greater than 100km from coastal access points.

IV. RESULTS

As the input data are based on results of the 2010 Decennial Census, they thus represent a recent snapshot of the contemporary geographical distribution of California residents and their relative proximity to public coastal access.

Figure 1, *infra*, depicts census tracts (GEOIDs) that intersect the 1km, 10km, and 100km buffers zones from public coastal access points (and the inset shows these same analyses for Los Angeles County).²⁸ In our analysis of these areas, we base our comparison of each demographic group’s population distribution with the same group’s *hypothetical* population if it were distributed perfectly evenly throughout California (its “proportionate distribution”). Some key differences include: within 1km of coastal access, there are roughly 25% more white people and 30% more senior citizens, while at the same time there are 52% fewer Hispanic or Latino people, 60% fewer Black or African American people, 57% fewer American Indians, and 18% fewer households below the poverty line *as compared to their population predicted by a proportionate distribution*.

In the following tables, the buffer distance column values are

27. See Section V.D., *infra*, for discussion of limitations to this method.

28. As described, our method of identifying census tracts (GEOIDs) within a given distance of a public access point results in inclusion (within the 1km buffer) of much land area that is greater than 1km from a coastal access point, but which falls within a census tract part of which does lie within 1km. As a result of this process, census tracts falling between 1 and 10 km do not appear as often in the map except in those high population density regions where census tracts are more numerous—and therefore smaller.

cumulative (unless otherwise noted); that is, the population living within the 10km buffer also includes the population living within 1km and the 100km buffer also includes those within 10 or 1km. In terms of population and income (Table 1), 1.3 million of California's 38 million (or 3.5%) residents live in a census tract that lies within 1km of a public coastal access point that provides beach or shoreline access; more than 30.3 million (79.7%) live within 100km. In terms of annual household income, the statewide average is \$68,304 and this value increases steadily with proximity to coastal access, with households living 1km or less from coastal access making on average roughly 20% more than the state average.

In Table 2, we display the breakdown of different demographic groups, including racial/ethnic identities, poverty status, and age. White residents make up the majority of Californians (62.1%) and more than 1 million (4.3% of whites and 2.7% of Californians) live within 1km of coastal access. Hispanic or Latino residents make up 38.2% of Californians, but only 1.7% of them (0.6% of Californians) live within 1km of coastal access. Only 1.5% of Black or African American residents (0.1% of Californians) live within 1km of coastal access. The proportional values depicted in

Table 3 highlight which population groups live either closer or further from coastal access than would be predicted based on their proportion of the total California population.²⁹

Table 4 presents the same results calculated for the entire state (as in Table 3) for the County of Los Angeles. In general, these proportions and predicted proportions track the state-wide estimates, though some disparities are accentuated. As compared to their population if proportionately distributed throughout LA County, Hispanic and Latino residents, for example, are even more underrepresented within 1km of public access points than elsewhere in state; by contrast senior citizens are significantly overrepresented.

V. DISCUSSION

In this study, we analyze the distribution of California residents in terms of their proximity to public shoreline access points. The

29. In other words, the proportions displayed in the Tables 3 and 4 describe the difference between the *actual* distribution of residents and the hypothetical distribution of residents if all California residents of all groups were distributed evenly throughout the whole state.

United States has been described as a “coastal nation”³⁰ and California is, according to our results, most certainly a “coastal state,” with nearly 80% of its 38 million residents living in a census tract that falls in whole or part within 100km of a shoreline access point (Table 1). However, in California, some groups of residents are “more coastal” than other groups. Compared to a hypothetically homogenous distribution, the population within 1km of a coastal access point is approximately 25% more white, 52% less Hispanic or Latino, 60% less black, 58% less American Indian, and has 18% fewer households living below the poverty line (Table 3).

This disproportionality is not the result of any one coastal management or policy decision, but rather is the result of complex social and economic forces acting on California’s population over many decades. Leaving aside the question of whether any individual or group does or does not *want* to access the coastline, our results document a geographic disparity in their proximity to the coastline. The resulting distributional inequities represent legitimate differences in the ability of some groups of California residents to easily access the coastline: some groups, on average, simply have to travel further than other groups. In the face of increasing population, urbanization, and development, this disparity accentuates the difficulty that some groups of people already face in getting access to open space—particularly natural open space.³¹ There is increasing recognition that access to and use of such spaces have very real implications for not only for people’s physical health, but also their mental and emotional health.³²⁻³³

A. Addressing Public Access Disparities

These inequities also represent significant challenges for coastal managers charged with implementing the laws governing public

30. See Rappaport & Sachs, *supra* note 12.

31. See, e.g., Boone et al., *supra* note 6.

32. See, e.g., Bratman et al., *supra* note 7.

33. CAL. COASTAL COMM’N, THE CALIFORNIA COASTAL COMMISSION SEA LEVEL RISE POLICY GUIDANCE: INTERPRETIVE GUIDELINES FOR ADDRESSING SEA LEVEL RISE IN LOCAL COASTAL PROGRAMS AND COASTAL DEVELOPMENT PERMITS, 59 (2015), https://documents.coastal.ca.gov/assets/slr/guidance/August2015/0_Full_Adopted_Sea_Level_Rise_Policy_Guidance.pdf, (“Public access to the coast is important to the health and well-being of the public, and promoting public access for all citizens provides low-cost, outdoor recreation that can improve the overall quality of life of the public, including low-income and underserved communities.”).

coastal access.³⁴ The public's right of access to the California shoreline is enshrined in the state constitution and managed under the pioneering language of the California Coastal Act, whose central provisions have been in place since 1972, preceding even the implementation of the federal Coastal Zone Management Act. Our results demonstrate that, despite these legal protections that have been in place for over 40 years, the California coastline itself is not equally accessible to all California residents. There are substantial disparities in the proximity of different groups of Californians to the coast; these disparities exist among all groups examined herein, including racial, ethnic, economic and age (see Table 1 and Table 2). These disparities persist at the state level and are accentuated at the County level in Los Angeles (see Table 4). In general, by virtue of their place of residence, white, wealthy, senior Californians live disproportionately closer to public coastal access points than other groups. Conversely, minority groups and economically disadvantaged families are concentrated further from coastal access. These results have implications for equity and social justice in terms of access to public open space, natural resources, and natural places. Further, these results are suggestive of the challenges to implementation of the aspirational California Coastal Act and how these aspirations have clashed with the realities of social and economic forces impacting coastal access over the intervening 40 years.

Currently, 1 out of every 8 U.S. residents live in California and 1 out of every 15 U.S. residents live in one of California's 15 Pacific Coast counties.³⁵ California's population is rapidly growing and is projected to top 50 million people by mid-century (Figure 2). The California coast will also continue to change in the coming decades. The disparities in coastal access presented here could potentially be exacerbated as California's population continues to grow and change: such changes underscore the need for public engagement with the California Coastal Commission (CCC) and the California State Coastal Conservancy (SCC), two of the state agencies that

34. *Id.* ("Thus, the potential loss of beach and shoreline recreation areas represents a significant potential impact to a resource that both is especially important to those with fewer economic resources and one that we endeavor to provide for everyone without discrimination, no matter their income levels, ethnicities or cultures; no matter if they are from coastal or inland areas or from outside the state.").

35. 2010 Census data via www.census.gov. The total population of California's 15 Pacific coast counties is 20,658,728: roughly 6.7% (or 1/15) of the total U.S. population of 308,745,538.

share jurisdiction for the implementation of the Coastal Act. The CCC is charged with carrying out the Coastal Act by certifying that Local Coastal Programs (LCPs) conform with the strictures of the Act. The CCC also oversees the Coastal Development Permitting (CDP) program, and retains original jurisdiction over tidelands and public trust lands. The CCC, through LCPs, will be a key player in addressing access disparities in the face of a changing population and a changing environment.

B. *The Challenge of Sea Level Rise*

Such disparities could be further stressed by shoreline management practices that prioritize protection of existing structures (infrastructure and private property) over preservation of natural beaches.³⁶ For instance, building protective structures like seawalls can negatively impact the surrounding beaches, and the wet part of the beach, which belongs to everyone vis-à-vis the PTD.³⁷ Rising sea levels—as much as 1.6 meters by the end of the century—further complicate this picture.³⁸ In the face of climate change and its effects, particularly on the coastline, the CCC recently adopted and released its Sea Level Rise Policy Guidance (“Guidance”).³⁹ The Guidance is intended to act as a framework for local governments updating their LCPs and CDP review processes such that they address impacts from rising sea levels. The Guidance recognizes the environmental, economic, and social impacts of sea level rise on California’s coast and specifically acknowledges that public access points lost to rising seas will disproportionately affect lower income communities.⁴⁰ Specifically, these communities rely on beaches for low-cost, outdoor recreation, and some rely on it as an economic resource.⁴¹ Furthermore, because disadvantaged communities typically have fewer economic and recreational resources and

36. See Melius & Caldwell, *supra* note 8.

37. *Id.*

38. John A. Church et al., *Sea Level Change*, in CLIMATE CHANGE 2013: THE PHYSICAL SCIENCE BASIS. CONTRIBUTION OF WORKING GROUP I TO THE FIFTH ASSESSMENT REPORT OF THE INTERGOVERNMENTAL PANEL ON CLIMATE CHANGE 1137–1216 (T.F. Stocker et al. eds., 2013), http://www.ipcc.ch/pdf/assessment-report/ar5/wg1/WG1AR5_Chapter13_FINAL.pdf; National Research Council et al., *Sea-Level Rise for the Coasts of California, Oregon, and Washington: Past, Present, and Future*, THE NATIONAL ACADEMIES PRESS (2012), <https://www.nap.edu/catalog/13389/sea-level-rise-for-the-coasts-of-california-oregon-and-washington>.

39. See CAL. COASTAL COMM’N, SEA LEVEL RISE POLICY GUIDANCE, *supra* note 33.

40. *Id.*

41. *Id.* at 59.

opportunities, foreclosing any of the ones they do have will disproportionately affect them. The Guidance also noted that diminishing public beach resources are potentially an environmental justice concern. Accordingly, the CCC has called for consideration of potential environmental justice impacts to public beach access, recognizing that those least able to adapt will be most affected; our results provide an important step towards enabling this consideration.⁴² Because the beach shoreline and public access lands are legally required to be open to all, the Guidance specifically warned against hazard mitigation that protects coastal development that only benefits a few.

The CCC recommends that coastal communities address sea level rise through updates to these communities' LCPs. LCPs are planning documents that coastal local governments use to guide development in their jurisdictions. Each LCP must comply with the Coastal Act, but they can be more restrictive than the Act itself. Furthermore, while the CCC can steer or nudge what local governments include in their LCPs, they cannot mandate additional restrictions beyond those required under the Coastal Act. Accordingly, LCP updates are one vehicle that local governments can use to adopt robust policies to protect public access for all Californians. By prioritizing public access in their LCP updates, local governments can help buffer public access points from sea level rise. LCP updates can be amended to ensure various aspects of access are safeguarded and expanded as possible, including parking, transportation, and increased overnight accommodations. Where these aims might not be feasible, mitigation is another possibility. LCP updates should be pursued in concert with other proactive planning measures to ensure these public goods are safeguarded for all to enjoy, in perpetuity.

The spatial analysis conducted here highlights how disadvantaged and socially vulnerable populations may face a disproportionately greater impact to coastal access in California. By evaluating and mapping the adverse impacts of climate change and coastal access to disadvantaged and socially vulnerable populations, the discourse of equity and diversity can enter into the scientific communication of results, inform management and planning processes, and ultimately shape important planning and policy decisions.

42. In fact, legislation has brought environmental justice to bear on the Coastal Act. (See A.B. 2616; Assem. Bill 2616, 2016 Reg. Sess. (Cal. 2016)).

C. *Recommendations*

As our results demonstrate, economically disadvantaged and minority residents in general live further from coastal access points than wealthy and white residents. Thus, in order to visit and benefit from the state's public trust tidelands, these groups must travel further to reach the coastline; increased travel distance increases travel cost, compounding the burden and inequities inherent in the distribution of access points. It is unlikely, however, that this issue will be addressed by redistributing the state's population or radically adjusting the housing market in the coastal zone. Instead, the increased travel burden imposed on minorities and lower income households who wish to visit the coast highlights the importance of other planning strategies that increase the accessibility of coastal access to those people and groups. Three examples of such strategies include: (1) affordable, convenient public transportation that serves inland population centers and connects to coastal access points, (2) ample, affordable parking and associated visitation amenities (e.g., bathrooms) at or very near coastal access points, and (3) affordable overnight accommodation options. In particular, well-connected public transit and sufficient, low-cost parking are essential and under-emphasized components of how access to the public trust tidelands (and associated resources) is managed. In short, effectively providing access to the coast (under the Coastal Act sections 30210-14) means an expansive interpretation of what "access" involves.

In particular, the CCC has identified the availability of overnight accommodations as an issue that local governments can address in LCP updates. Specifically, the CCC pointed out that overnight accommodations are being upgraded, which has resulted in a loss of lower price-range overnight accommodations in the coastal zone. The CCC recommends mitigating this loss through construction of additional lower-cost facilities. Public parking near coastal access points has also been an active issue. Historically, some communities have taken steps to reduce public parking as a way to "protect" their local coastal resources from visitors;⁴³ such practices certainly do not ameliorate the discrepancies we document here. Such restrictive policies can be addressed head on through the LCP update process. Environmental justice is a growing concern, especially in light of

43. Robert Thompson, *Local Government and the Closing of the Coast: Parking Bans and the Beach As A Traditional Public Forum*, 25 FORDHAM ENVTL. L. REV. 458 (2014).

climate change. Local-level spatial planning serves a key role in promoting robust climate adaptation measures.⁴⁴ Climate change and adaptation planning are globally relevant and the scalability of solutions are an important consideration.

D. *Limitations & Next Steps*

While these analyses investigate the distribution of diverse demographic populations throughout the state and their proximity to coastal access, they do not investigate the interest in or intention to visit or utilize the coast among these different groups. Thus the converse of our conclusion that access to the coast is reduced for lower income populations is that access to inland areas is similarly reduced for wealthier populations. In this paper, we simply aim to highlight these differences in light of constitutional and statutory provisions that seek to ensure access to coastal resources. In subsequent analyses we can draw on mixed methodologies to identify and measure the interests and motivations of different groups of people living throughout California in order to generate conclusions that more robustly project the impacts of access inequity.

The demographic data we included in our analysis were based on the 2010 values for race, age, population, and income. It will be important to track demographic changes over time in order to inform coastal management with the most recent census data sets. In addition, the buffer analysis conducted in this work represents a general overestimate because it includes data extending outside of the buffer zones. For example, for the census blocks that fall partly within a buffer distance from an access point the analysis included the block's population within the buffer radius as well as the block's population that lives outside the buffer radius. This approach is further hindered by our use of straight buffer distances (i.e., "as the crow flies") instead of the actual travel distance via the transportation system (highways, surface roads, paths, etc.). While more accurate, the latter method is analytically more challenging; the simpler strategy we relied on thus underestimates the actual distances. The analysis also only used coastal access points that were noted to provide direct access to the beach or shoreline. As a result, viewpoints or upland parks still located within the coastal zone are

44. Elizabeth Wilson, *Adapting to Climate Change at the Local Level: The Spatial Planning Response*, 11 (6) INT'L J. LOCAL ENV'T 609 (2006).

not included in our analyses and this should be taken into consideration during the interpretation of results.

Lastly, in future analyses we can take into consideration the impacts of sea level rise on coastal access and address the important and related questions about how such impacts will affect equity in access to the coast. Furthermore, this type of analysis will be beneficial for managers in identifying “access hotspots” that provide access to more diverse populations; such access points could be prioritized for management in light of pending environmental changes.

VI. CONCLUSION

With the passage of the California Coastal Act in 1976, Californians gained assurance that public access to their coastline was guaranteed for all. However, continued social and demographic changes in the state since 1976 have led to a population distributed such that access to the coast is not equally available to all. Our study explores the differences in “access to access” among different demographic groups and finds that in general, the relative proportion of wealthy, white seniors in close proximity to the coast is higher than expected compared to racial and ethnic minorities and families living below the poverty line. These discrepancies highlight the need for coastal access managers and city planners to consider other approaches for equalizing access to access, including affordable public parking, transportation, and overnight accommodation. Implementing such measures could lower the costs associated with traveling further to reach the coast and thereby better serve demographic groups (and all residents) who live further away. California’s beaches and public trust shoreline are significant natural, open space resources that are beneficial to individual and community well-being. In light of social and environmental change, maintaining and improving access to these coastal resources will be increasingly important and challenging. Our analyses set the stage for further study of place-based disparities in accessibility to public coastal access, including their impacts on specific populations, as well as consideration of mechanisms intrinsic to the Coastal Act for increasing coastal access equity in California in the course of the Act’s next forty years.

APPENDIX

TABLES

Table 1. Population and Income Distribution Versus Proximity to Coast

	Buffer Distance						State Total or State Average
	1km		10km		100km		
		%		%		%	
Population	1,319,348	3.5%	7,716,375	20.3%	30,344,126	79.71%	38,066,920
Average of Median Household Incomes*	\$81,929	19.9%†	\$76,921	12.6%†	\$72,471	6.1%†	\$68,304
* 2014 inflation-adjusted dollars, rounded down to nearest whole dollar value. † These values calculated as the percentage over the state average.							

Table 2. Demographic Distributions Versus Proximity to Coast

Census Demographic Group	Buffer Distance									Group Total	% State*
	1km			10km			100km				
		% Group	% State*		% Group	% State*		% Group	% State*		
White	1,023,699	4.3%	2.7%	4,970,820	21.0%	13.1%	18,215,147	77.0%	47.9%	23,650,913	62.1%
Hispanic or Latino	240,642	1.7%	0.6%	1,035,014	7.1%	2.7%	11,598,600	79.8%	30.5%	14,534,449	38.2%
Asian	125,164	2.4%	0.3%	1,223,443	23.8%	3.2%	4,571,130	89.1%	12.0%	5,130,536	13.5%
Black/African American	33,147	1.5%	0.1%	429,676	19.0%	1.1%	1,873,061	82.8%	4.9%	2,262,323	5.9%
American Indian	9,483	3.3%	0.0%	48,571	16.9%	0.1%	198,700	69.1%	0.5%	287,360	0.8%
Hawaiian or Pacific Islander	3,110	2.1%	0.0%	34,656	23.5%	0.1%	115,503	78.4%	0.3%	147,286	0.4%
Other Race	67,734	1.4%	0.2%	640,795	13.1%	1.7%	4,032,079	82.5%	10.6%	4,890,329	12.8%
Households below Poverty Level†	75,132	2.8%	0.2%	486,012	18.4%	1.3%	1,970,184	74.6%	5.3%	2,642,882	7.1%
≥65 years old	208,983	4.5%	0.5%	1,027,050	22.2%	2.7%	3,632,832	78.7%	9.5%	4,617,907	12.1%

* Proportions of State Total Population, 38,066,920.

† Proportions of State Total Households, 37,323,127.

N.B. Census respondents can identify with more than one demographic group. Thus group totals will sum to more than the State total population.

Table 3. Population Differences as Compared to Predicted Proportions

Census Demographic Group	Buffer Distance (values non-cumulative)				% State Total Population
	≤ 1km	> 1km ≤ 10km	> 10km ≤ 100km	> 100km	
White	24.9%	-0.7%	-5.8%	13.3%	62.1%
Hispanic or Latino	-52.2%	-67.5%	25.1%	-8.6%	38.2%
Asian	-29.6%	27.4%	13.9%	-58.3%	13.5%
Black/African American	-60.0%	-30.3%	19.0%	-20.3%	12.8%
American Indian	-57.7%	4.3%	9.8%	-22.4%	5.9%
Hawaiian or Pacific Islander	-4.8%	-19.1%	-6.6%	35.8%	0.8%
Other Race	-39.1%	27.5%	-4.1%	-4.0%	0.4%
Households below Poverty Level†	-18.0%	-7.5%	-5.5%	25.5%	7.1%
≥65 years old	30.6%	5.4%	2.5%	-17.2%	12.1%

Table 4. Population Differences as Compared to Predicted Proportions for LA County.

Census Demographic Group	Buffer Distance (values non-cumulative)			% County Total Population
	≤ 1km	> 1km ≤ 10km	> 10km	
White	46.9%	4.4%	-2.7%	53.6%
Hispanic or Latino	-67.8%	-27.9%	9.0%	47.9%
Asian	-12%	15%	-3.2%	45.2%
Black/African American	-50%	-37%	10.4%	39.9%
American Indian	-47.4%	-5.4%	3.0%	18.5%
Hawaiian or Pacific Islander	18.6%	-26.6%	5.6%	2.0%
Other Race	-24.1%	15.6%	-2.8%	1.1%
≥65 years old	62.6%	-4.4%	-1.2%	11.6%

FIGURES



Figure 1. Depicts census tracts that intersect 1km, 10km, and 100km buffer zones from coastal access points. Inset depicts an expanded view of the census tracts within Los Angeles County that intersect 1km and 10km buffer zones.

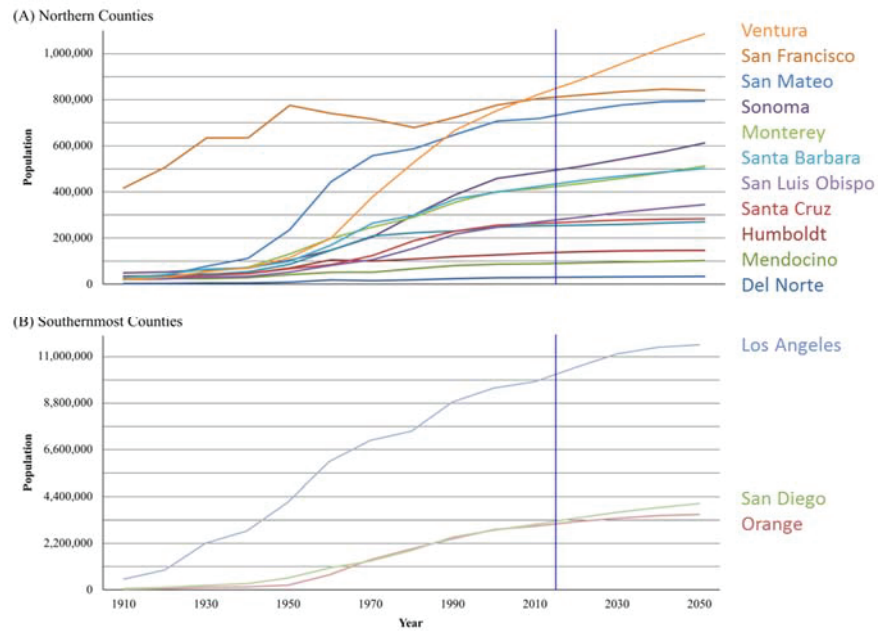


Figure 2. Coastal population growth by county since 1910 and projected growth through 2050. (a) 12 northernmost counties, (b) 3 southernmost counties. Note ten-fold difference in scale. Blue vertical line indicates present day. Historic population growth data from U.S. Census Bureau (www.census.gov); population projections via the California Department of Finance (<http://www.dof.ca.gov/research/demographic/reports/projections/interim/view.php>, downloaded January 17, 2013; Figure adapted from Reineman, D. R. (2015). *The Human Dimensions of Wave Resource Management in California*. Stanford University. (Reineman, 2015)