



Ocean Protection Council AB 2516 Implementation Project
Deliverable 2A: Literature Review on Sea Level Rise Stakeholder Needs
Bruce Riordan & Sandra Lupien, Climate Readiness Institute
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Introduction

AB 2516 (Gordon) calls for the California Natural Resources Agency and the Ocean Protection Council to develop a *Planning for Sea Level Rise Database* “describing steps being taken throughout the state to prepare for, and adapt to, sea level rise.” The database will include studies, modeling, mapping, vulnerability assessments, and other materials.

“It is the intent of the Legislature that the *Planning for Sea Level Rise Database* provide the public with an educational tool that will enable parties to view up-to-date information from a single, centrally located source about actions taken by cities, counties, regions, and public and private entities to address sea level rise.”

The Ocean Protection Council hired UC Berkeley’s Climate Readiness Institute to support the implementation of AB 2516. To begin this process, CRI conducted a literature review of surveys, assessments and other reports that have focused on the barriers facing California coastal planners as they attempt to address the impacts of sea level rise and extreme storm events. The literature review provided valuable background material to the CRI staff and identified the key issues that should be discussed in the subsequent stakeholder interviews (Task 2B).

California’s regional coastal managers face a formidable task in developing policies and plans that can protect people, residences, businesses, and habitats from the devastating impacts of sea-level rise and extreme storms. We look forward to helping these regional leaders to move forward and accelerate their progress toward a resilient California shoreline.

Materials Reviewed

- Adapting to Rising Tides Portfolio (SF Bay Area)
- Bay Area Sea-Level Rise Regional Survey Draft Findings (2016)
- California Climate Adaptation Needs Assessment Survey (preliminary results 2017)
- California Climate Adaptation Planning Guide (2012)
- California Coastal Management With a Changing Climate (2008)
- California State Lands Commission Sea-Level Rise Survey (2009)

- Can California Coastal Managers Plan for Sea-Level Rise In A Cost-Effective Way? (2013)
- City of Santa Cruz Climate Adaptation Plan (2011)
- Climate Ready Sonoma County: Climate Hazards and Vulnerabilities (2011)
- A Greater L.A.: The Framework for Regional Climate Action and Sustainability (2016)
- Governing California Through Climate Change (2014)
- Identifying and Overcoming Barriers to Climate Change Adaptation in San Francisco Bay: Results from Case Studies (2012)
- Is California Preparing for Sea-Level Rise? The Answer is Disquieting (2007)
- More Than Information: What California’s Coastal Managers Need to Plan for Climate Change (2007)
- California Coastal Commission Sea-Level Rise Policy Guidance (2015)
- Rising to the Challenge: Results of the 2011 California Coastal Adaptation Needs Assessment
- Safeguarding California: Implementation Action Plans (2016)
- Safeguarding California: Reducing Climate Risk (2014)
- Sea-Level Rise Adaptation Strategy for San Diego Bay (2012)
- Vulnerability to Climate Change: Coastal Managers’ Attitudes, Knowledge, Perceptions, and Actions (2007)

Notes about Context and Timing of This Review

1. We recognize that recent actions on sea-level rise by state, regional, and local entities are making progress on some of the barriers identified by stakeholders over the last few years. It is expected that two new assessments scheduled for publication in the next few months—the updated California Climate Adaptation Needs Assessment Survey and the Coastal Commission’s county-level “snapshots” of sea-level rise activity—will shed substantial light on this progress and where we need to focus greater time and resources.
2. We assume that the eventual full implementation of Executive Order B-30-15, SB 246, SB 379, and AB 1482 (already partially underway) along with similar directives and grant programs from the Coastal Conservancy, Ocean Protection Council, the Coastal Commission, Strategic Growth Council and others will help address many of the barriers described below.

Overview of Findings

Regional coastal managers and others responsible for sea-level rise preparedness are faced with an array of barriers as they develop and implement effective policies and plans. We synthesized the top barriers described in the literature into **five themes**:

1. Funding is insufficient for both planning and implementation.
2. Local and regional entities lack staff time and expertise to plan for sea-level rise.
3. Planners are hampered by insufficient local data (or a perception of inadequate data) and a lack of expertise to effectively integrate scientific research into adaptation planning.
4. While the State’s world-class climate *mitigation* efforts have featured quantifiable goals, major regulations and substantial funding programs, the State’s policy actions for climate

adaptation have only recently become more clear and direct and still do not address the primary need for adequate funding for regional and local planning.

5. A lack of formal structures for shared decision-making and planning undermines collaboration across city and county borders, and by overlapping authorities.

The literature review identified a second set of barriers that also impede effective action on sea-level rise.

1. Lack of clarity around the application of California's Public Trust Doctrine.
2. Lack of public demand for action on sea-level rise and climate change.
3. Continuous pressure on local governments to move ahead with development on coast and bayside areas.
4. A lack of *regional* leaders and champions to address threats that transcend local entities.

Each of these themes is discussed in greater detail in the sections that follow.

Key Findings

1. Funding is insufficient for both planning and implementation.

Lack of **funding** for planning was the #4 barrier cited by Bay Area planners, while lack of funding for implementation was #1, summarized as:

“Lack of funding to undertake an adaptation planning process (not in work plan, not in budget, no outside funding).” (Moser and Ekstrom 2012, pg. 102)

“Lack of funds for detailed assessments, including environmental impact assessments (EIAs).” (Moser and Ekstrom 2012, pg. 102)

“Lack of funding to implement options (competition for funds with other jurisdictions, other priorities, overall budget cuts, economic crisis, lack of revenues; different revenue sources and funding structures).” (Moser and Ekstrom 2012, pg. 103)

In the 2011 California Coastal Adaptation Needs Assessment, **funding** to prepare a plan was the #4 barrier, and funding to implement a plan was #2. (Finzi Hart, et al 2012, p. 15)

Funding appears as a barrier in the more recent 2014 *Governing California Through Climate Change* report:

“Local governments are challenged with limited financial resources to support their climate adaptation efforts. Culley Thomas, a senior sustainability planner at AECOM, told the Commission that local jurisdictions want to proactively plan for climate change, but lack funding.” (Little Hoover, p. 63)

The 2008 *California Coastal Management With a Changing Climate* report predicts that **funding** will be an ongoing challenge to climate adaptation:

“Across coastal management entities, there is currently considerable variation in the ability to finance adaptation measures... the state’s two key coastal management bodies – the California Coastal Commission and BCDC – will surely face resource limitations for conducting analysis, outreach, and technical support, given current state budget difficulties. Budget limitations have already posed constraints to the Coastal Commission’s activities to address climate change.” (Hanak and Moreno, p. 22)

The *Adapting to Rising Tides Portfolio* (SF Bay Area) describes **funding** as a barrier across issues and sectors, as in the case of the Oakland International Airport:

“Financing strategies available to the airport are currently inadequate to fund the necessary planning and implementation of adaptation actions, or to quickly make repairs when damage does occur.” ([ART Portfolio](#))

The City of Santa Cruz identified **funding** as “a determining factor in prioritization and appears to be the greatest barrier to implementing identified actions.” (City of Santa Cruz, p. 33)

The County of Sonoma noted that protecting infrastructure against sea-level rise and other climate impacts puts additional pressure on already **insufficient resources**:

“Overall funding levels and replacement of aging infrastructure is less than is needed to keep up with maintenance. Climate impacts can increase the costs of keeping these critical elements functioning at necessary levels.” (Cornwall, et al, p. 57)

Recent **grant programs** are helping to address this barrier; examples include the Coastal Commission Local Coastal Program Grants, the Ocean Protection Council Local Coastal Program Sea-Level Rise Grants, and Coastal Conservancy Climate Ready Grant Program. (California Coastal Commission, p. 29). *A Greater L.A.: The Framework for Regional Climate Action and Sustainability* cites several of these programs as being central to helping expand and coordinate sea-level rise preparedness efforts throughout the Los Angeles region. (LARC, p. 81)

The Ocean Protection Council is developing “a **catalogue of funding opportunities** related to sea-level rise and other coastal hazards.” (CNRA 2016, p. 136)

2. Local and regional entities lack staff time and expertise to plan for sea-level rise.

In the 2011 Coastal Needs Survey, “insufficient **staff resources** to analyze relevant information” was the #1 barrier, cited by nearly 70% of respondents, while “**current pressing issues** are all-consuming” was the #3 barrier overall. (Finzi Hart, et al 2012)

Coastal managers surveyed in 2007 by Moser cited a lack of **time** in their jobs as a critical barrier to addressing sea-level rise:

“The pressing coastal management challenges that currently occupy these managers include inland and nearshore water quality issues, inland flooding, species and habitat protection, coastal erosion, coastal flooding, public access, and salt-water intrusion. Because all of these will become more problematic with global warming, in some respects

climate change will just be bringing more of the same. But because managers feel overburdened as it is, they can't even make the time to find out that climate change and sea-level rise won't bring something fundamentally new, different, or 'extra,' but instead worsen the problems they face daily now." (Moser, 2007, p. 28)

"Lack of resources, staff, and time form major hurdles for them to even get informed about how global warming may affect the problems they deal with on a daily basis, including risks to public safety, private property and public development, as well as the precious environmental resources that coastal California depend on economically and culturally. (Moser 2007, pg. 29)

Sixty percent of respondents to Finzi Hart's 2011 survey reported not having "any **formal climate adaptation training**." They identified a pressing need "to build the capacity of coastal managers so they can advance the state of their communities' preparedness, with the longer term outcome of applying research to decision-making and making." Notably, the survey found regional planners "want greater emphasis on hands-on training rather than just the delivery of information or data packages, guidebooks, and handbooks." (Finzi Hart, et al, p. 23) A City of Vallejo respondent to the State Lands Commission's 2009 survey suggested a number of types of technical support the state might offer to regional coastal managers to help address lack of **expertise**:

"Formalize planning guidelines, measure changes that may be occurring and accurately predict time table, have planning tools made available to assist agencies in land use assessment, fully understand inter-agency strategies that have impact on other agencies, timely communication to tenants with long term leases to understand and mitigate the impacts of sea-level rise, integrate city adopted planning guidelines with other agencies to assure consistency of approaches, methodology and understanding of long term social and financial impacts." (State Lands Commission, p. 45)

In their survey of Bay Area planners, Moser and Ekstrom found, "Survey respondents bemoaned the lack of technical assistance, however, which may point to a lack of expertise or knowledge of relevant scientific assessments." (Moser and Ekstrom, p. 97)

The *Safeguarding California: Implementation Action Plans'* Ocean and Coastal Resources section identified addressing these barriers as a top priority for the State:

"Expanding support for regional and local sea-level rise adaptation, including vulnerability assessments, selection and implementation of adaptation measures, and monitoring." (CNRA 2016, p. 142)

In *Safeguarding California: Reducing Climate Risks*, the State identified as a key area for investment, "**tools and guidance** to support efforts to plan for climate risks at the state, local, and regional level." (CNRA 2014, p. 13)

The State is making progress to address this barrier. For example, The *Safeguarding California Implementation Action Plans*, the *California Adaptation Planning Guides* published in 2012 by California Natural Resources Agency, California Emergency Management Agency, and Federal

Emergency Management Agency, along with the *California Coastal Commission Sea-Level Rise Policy Guidance* all represent efforts to mitigate lack of regional technical expertise.

Another important effort is the California Coastal Commission's Local Coastal Program (LCP) process. The Coastal Commission has for several years been working with communities to help them incorporate sea-level rise into their LCPs, and the Commission and the California Ocean Protection Council have provided grants to some communities to fund this process. (CNRA 2014, p. 177).

Planning for sea level rise is a new and emerging field and there are not, at this point in time, enough good models or examples to draw upon. (Coastal Commission interview)

3. Planners are hampered by insufficient local data (or a perception of inadequate data) and a lack of expertise to effectively integrate scientific research into adaptation planning.

The lack of scientifically strong **localized data** is a major barrier to coastal planners. Variations on this theme—no single standardized source, the need for higher resolution/site-specific data, where to find the right data, etc.—are expressed at both the regional and the local scale.

“Data records for the ocean are often less complete than those on land, and for many variables, researchers still have difficulty discerning long-term climate-related trends from natural variability. As relevant data accumulate on local ocean conditions and wildlife impacts, managers will better be able to anticipate, identify, and mitigate threats to coastal resources as they arise.” (LARC, p. 83)

“No single authoritative source of standardized information about climate risks in California currently exists within state government. Cities, counties, regional governing agencies and even the state lack reliable, consistent information to guide decision-making, particularly regarding long-range infrastructure investments and land-use choices. Local government leaders understand they are vulnerable to climate impacts, but lack more specific risk assessment capacity that would help guide planning and decision-making.” (Little Hoover Commission, p.iii)

“There is currently no comprehensive data on the type, condition, and elevation of shoreline protection infrastructure on San Diego Bay. This information is critical to performing site specific vulnerability assessments and engineering of capital projects.” (Sea-level Rise Adaptation Strategy for San Diego 2012, pg. 24)

“Locally relevant science becomes in many ways more important when communities try to implement specific adaptation strategies. Generally relevant science may be sufficient to motivate people to begin an adaptation process, but more specific scientific information is needed further down the road.” (Moser and Ekstrom 2012, p. 92)

“Managers are very clear in saying, ‘I don’t want generalized forecasts of warming for the globe. I want to know: Can I still meet my management objectives? How far back do I have to tell people they have to build? How does sea-level rise translate into a retreat rate?’”

(Moser 2007, p. 27)

Regions lack resources and **expertise** to access and integrate scientific research into adaptation plans. A common theme across the sea-level rise adaptation literature is what Moser and Tribbia refer to as the “**Science-Practice Disconnect.**” (p. 8)

“Several interviewees reported that in cross-departmental meetings they could not agree on “the numbers” (i.e., which climate change and SLR scenarios to use) in light of scientific uncertainties, and considered that lack of agreement one of the reasons for why they had not yet agreed upon a more integrated citywide adaptation planning effort.” (Moser and Ekstrom, p. 93)

“What quantitative guidelines should be used on sea-level rise, erosion rates, and changes in flood risk, over what time period? With this information and authority in hand, local governments can go back to their master plans for flood channels, require higher elevation of building pads, change the base flood elevation in flood maps, and modify their capital improvement programs.” (Hanak and Moreno, p. 20)

This barrier does not stem from a dearth of general scientific research on the impacts of climate change, but from a gap between scientists and practitioners centered around five themes:

- *Scientific research is not published via channels that practitioners use or can access.* For example, the surveys by Finzi Hart, et al (2011, p. 20) and Moser and Tribbia (2007a, p. 19) found that regional coastal planners use online resources to inform their work, whereas much scientific research is published in academic journals, which are either unknown to coastal managers, or are password or paywall-protected.
- *Practitioners often don't seek the expertise of academics.* Regional coastal managers typically seek expert advice from colleagues; few report having relationships with academic experts who conduct research on climate adaptation. (Finzi Hart, et al, p. 21)
- *Practitioners lack the time to comb through dense scientific research.* Even given access, regional planners report having both many conflicting priorities and understaffed departments, leaving them little time to conduct in-depth technical research. (Moser and Ekstrom, p. 100)
- *Scientists don't speak practitioner language.* Scientists often “do not engage in research with the underlying purpose to communicate findings to anyone outside their area of expertise.” (Moser and Tribbia 2007a, p. 9) As a result, scientific research is typically reported in highly specialized or technical terms that can make it difficult for practitioners to both evaluate its quality and usefulness, and apply it to regional sea-level rise planning.
- *Practitioners use different analytical tools than those used in long-range research and planning.* Finzi Hart, et al found that a large majority of coastal planners said their organizations most commonly relied on geographic information systems, paper maps, and visualization and database compilation and management tools. In contrast, the respondents of Finzi Hart, et al either did not use or sought outside experts to support “the use of more complex and analytic tools such as decision analysis tools and scenario

planning – commonly used for long-term, multi-objective adaptation planning and decisions.” (Finzi Hart, et al, p. 21)

A number of state and local projects are working on individual and collaborative efforts related to modeling intended to help address the need for relevant local and regional **data**. (CNRA 2016, p. 139). For example, the state has invested considerable resources in Cal-Adapt, the online tool to provide data to local planners. The Coastal Conservancy, Ocean Protection Council and the Energy Commission are funding an expansion of the CoSMOS modeling project to provide detailed local data to planners. The state is currently conducting the Fourth Assessment, a set of more than 30 research studies on adaptation issues that will add new data and information to the knowledge base generated by the first three assessments. In addition, the state has created the first California Climate Research Plan to guide future research efforts.

4. While the State’s world-class climate *mitigation* efforts have featured quantifiable goals, major regulations and substantial funding programs, the State’s policy actions for climate *adaptation* have only recently become more clear and direct and still do not address the primary need for adequate funding for regional and local planning.

Significant, recent state actions—including SB 379, the Coastal Commission SLR Policy Guidance, and the Department of Water Resources’ guidance for flood planning—are providing clearer guidance and direction for local sea level rise planning. However, stakeholders still don’t see nearly the same level of organization and urgency that the State is showing with emissions reduction.

“While notable for the scale of their research and identification of strategies, the state’s adaptation initiatives hardly compare with CARB’s efforts to reduce carbon emissions. This can be viewed as a profound policy disconnect.” (Little Hoover Commission 2014, p.40)

“Daniel Mazmanian, University of Southern California public policy professor and chair of a 2010 Pacific Council on International Policy report on climate adaptation strategies for California, told the Commission, ‘What is disheartening, in view of California’s reputation as an environmental policy leader, is the reluctance of the state’s policy makers to address as boldly the ramifications of a changing climate that will be visited on the people of California. In specific, the Legislature has not established policies and goals. Nor has the Governor promulgated executive orders for adaptation comparable to the demanding, quantitative and highly publicized targets set for greenhouse gas emissions reduction.’” (Little Hoover Commission, pg. 4)

“Within a state government system responsible for protecting a large population, economy and environment, there is no one agency, department, council or commission to conduct or fund climate risk assessment, map climate hazard zones, provide standard definitions of expected impacts for planning purposes or coordinate the adaptation funding that will become increasingly necessary.” (Little Hoover Commission p. 39)

The lack of the legal mandate for climate adaptation planning is noted by a number of stakeholders and is affecting the level or effort in most regions. (NOTE: This will begin to

change as general plans conform with SB 379 in the next few years.)

“More than half of the respondents also viewed the lack of a legal mandate to take global warming into account as a major hurdle. Legal mandates are likely to provide the strongest motivation to plan ahead and prepare for climate change. They must be accompanied, however, with adequate funding mechanisms and additional staff resources to implement such mandates (for example, to assess community vulnerabilities to various coastal impacts and identify response strategies). (Moser and Tribbia, 2007b, p. 4)

“It is our sense that local managers may also need a regulatory boost toward planning for increased resiliency. Particularly in communities where there is not already a strong environmental sensibility, it can be difficult for local officials to argue for changing the status quo. Several persons we interviewed suggested that guidelines or regulations from the state would facilitate local actions.” (Hanak and Moreno, p. 20)

“Even though a change could be made locally by relevant actors, both institutional and attitudinal issues can be very difficult to change among local actors alone. It is here where some degree of intervention from non-local actors can be helpful to help shift the local politics or personal and interpersonal dynamics.” (Moser and Ekstrom, p. 114)

Over the last two years, Sacramento has begun to address this barrier with a set of directives, including:

- Senate Bill 379 – Requires general plans to address climate adaptation and resilience.
- Executive Order B-30-15 - Directs all state agencies to take climate adaptation (including sea-level rise) into account in all planning processes.
- Senate Bill 246 – Establishes the Integrated Climate Adaptation and Resiliency Program (ICARP) in the Office of Planning and Research to coordinate state, regional and local efforts.
- Assembly Bill 1482 - Requires the Natural Resources Agency to update the state’s climate adaptation strategy every three years.

In addition, state agencies have published a number of reports to inform regional adaptation efforts, such as the 2015 *Sea-level Rise Policy Guidance* by the Coastal Commission, and the 2012 *California Adaptation Planning Guide* compiled by the Emergency Management Agency and Natural Resources Agency; CNRA published the 2014 *Safeguarding California: Reducing Climate Risk* and the 2015 *Safeguarding California Implementation Action Plans*.

5. A lack of formal structures for shared decision-making and planning undermines collaboration across city and county borders, and by overlapping authorities.

Conflicting authorities and permitting processes are cited by a number of stakeholders as a barrier to planning and implementing projects.

“Many state and federal agencies play a role in regulating development around San Diego Bay. Clear and concise guidance or common regulations from these agencies would reduce uncertainty about appropriate planning and development practices, thereby reducing

economic and political barriers to adaptation planning. Relevant agencies include the Regional Water Quality Control Board, the Coastal Commission, the Governor’s Office of Planning and Research, and the Army Corps of Engineers.” (ICLEI, p. 24)

“Multiple agencies and databases track contaminated sites differently, making it difficult to understand their location and condition. To address this, agencies that regulate or manage contaminated lands should establish agreements to use consistent data collection and management methods, and to develop and keep current a centralized information system with critical emergency and adaptation planning information.” ([ART Portfolio](#))

Since the California coast and shoreline spans numerous counties and cities, new forms of collaboration will be required to ensure that adaptation efforts in one jurisdiction or region don’t have unintended consequences in another and to maximize the efficient use of scarce planning resources.

“One obstacle is getting other property owners that are adjacent/upstream from the Oakland International Airport to address sea-level rise issues that could impact the airport. For example, if San Leandro does not improve their perimeter dike, OAK could be flooded in the south-eastern portion of the airport.” (CA Lands Commission, p. 37)

“The airport does not control or manage much of the surrounding shoreline, or the roads and transit that serve the airport, meaning that responsibility for ensuring the airport remains operational and accessible rests with other entities.” ([ART Portfolio](#))

“The lack or fragmentation of governance structure (lack of regional policy or guidance, lack of decision-making structure) cuts across jurisdictions, resistance to regional approach, lack of coordination across agencies, divisions, jurisdictions; different missions).” (Moser and Ekstrom, p. 103)

“During early stages of adaptation work, coastal managers report being very aware of the legal changes or permitting obstacles they might encounter if the preferred option were to be implemented. To not have to deal with these obstacles alone, much of the emphasis was on building coalitions and broadening the governance structure to support the envisioned adaptation in the future.” (Moser and Ekstrom, p. 91)

“Planning, financing, and coordinating the ongoing maintenance or capital improvements of structural shorelines is complex as they are often owned by one entity and maintained by another, and are regulated by a number of different agencies. One of the most significant challenges with structural shorelines and the assets that they protect is that the owners of those assets do not own and are not responsible for the protection.” ([ART Portfolio](#))

A number of efforts are underway to improve collaboration. The ICARP, to be established under SB 246, will facilitate state, regional and local integration of efforts. The Alliance of Regional Collaboratives for Climate Adaptation (ARCCA) was formed by regional stakeholders and OPR to share information and best practices among adaptation-focused organizations and to influence state policy on adaptation and resilience. In the Bay Area, the Adapting to Rising Tides program has brought together diverse stakeholders to work together on county-level sea-level rise

vulnerability assessments. In the Humboldt Bay area, a number of organizations are working together to investigate “the opportunities and mechanisms by which state coastal agencies can cooperate on sea-level rise adaptation activities locally, regionally, and statewide.” (CNRA 2016, p. 136)

Additional Findings

Based on the document review, the following barriers also restrict sea-level rise planning, but arise less frequently in the literature:

1. Lack of clarity around the application of California’s Public Trust Doctrine.

California’s Common Law Public Trust Doctrine confers public ownership to all coastal lands that fall on the seaward side of the mean high tide line. However, as sea-level rises, tide lines will move inland, affecting beachfront properties that were formerly on the landward side of the tideline. The Little Hoover Commission suggests that, “Private property owners are not expected to surrender lightly. Yet the State of California is bound by law to exercise its rights.” (Little Hoover Commission p. 70) Absent state efforts to clarify the application of the Public Trust Doctrine, regional coastal planners are likely to get caught in the middle of legal battles; advance knowledge of this conflict could discourage sea-level rise adaptation planning, while lawsuits could thwart implementation of sound plans.

2. Lack of public demand for action on sea-level rise and climate change.

While a majority of California residents see climate change as a significant problem, there is a noticeable lack of public pressure for local governments to take action to prepare for sea-level rise. Planning can be hampered by this lack of urgency about a topic that is often viewed as a problem for distant decades and future generations.

3. Pressure to develop coast and bayside areas.

In many areas, there is substantial and continuous pressure on local governments from developers and others who want to move ahead with residential and commercial development in coast and bayside zones. This may influence planning processes to identify vulnerable areas and eventually restrict or prohibit development. The positive selling points of development—jobs, more housing, increased local tax revenues, etc.—can be contrasted with the negative perception of sea-level rise protection—unpopular solutions, distant time frames, etc.

4. A lack of *regional* leaders and champions to address threats that transcend local entities.

Elected leaders, as well as those holding executive or management-level position in regional governments, who are not on board with adaptation planning are cited as a key barrier in a number of surveys and reports. The lack of champions for sea-level rise and adaptation planning is slowing progress. In contrast, where adaptation efforts do advance, elected leaders and other champions often play a key role.

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