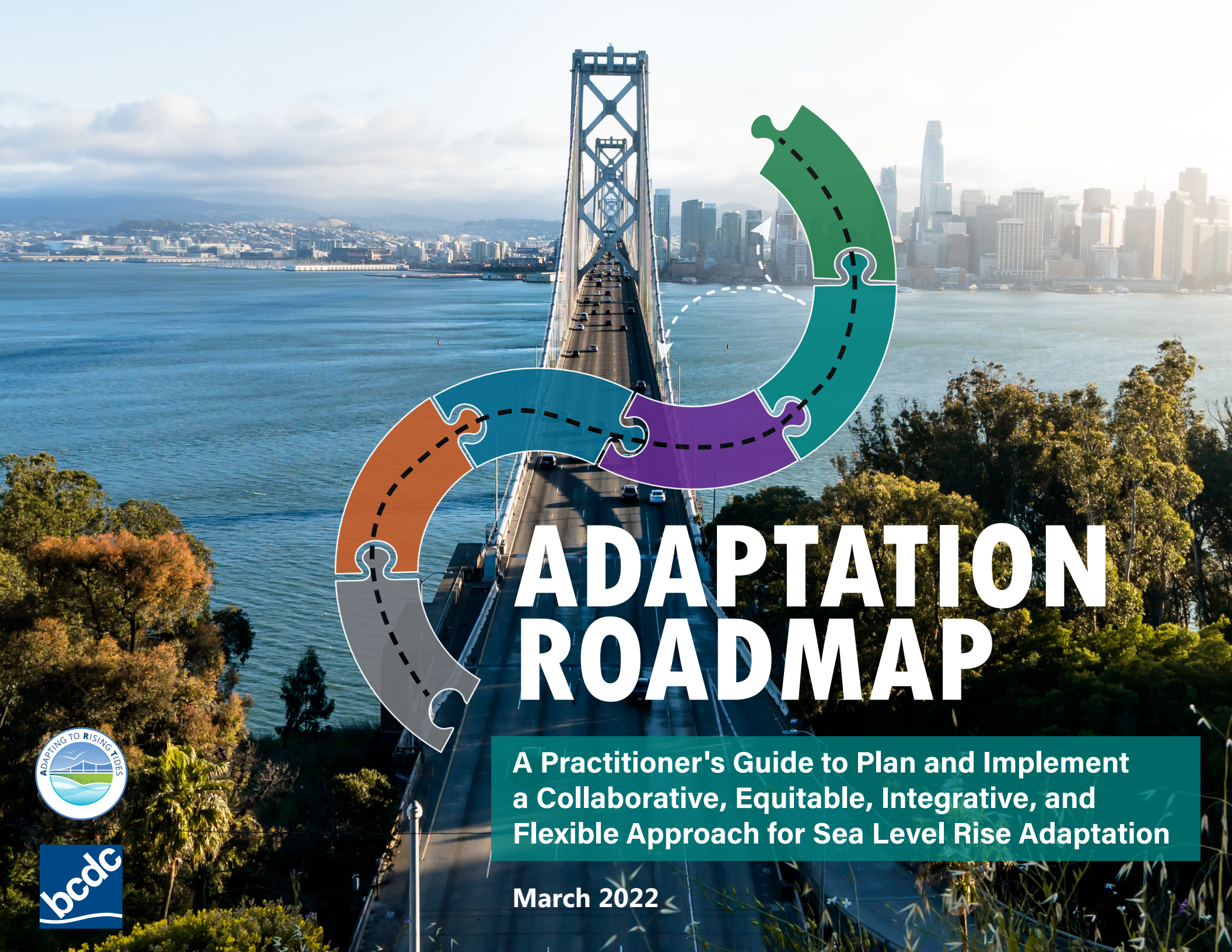

ADAPTATION ROADMAP

A Practitioner's Guide to Plan and Implement a Collaborative, Equitable, Integrative, and Flexible Approach for Sea Level Rise Adaptation

March 2022

The Adaptation Roadmap unravels the complex strings of sea level rise adaptation to demystify its challenges and guide your journey to solutions.

Moving beyond vulnerability to create shared adaptation solutions opens the doors to a complicated decision-making landscape, challenging deep-rooted conversations, and the need to make choices in the face of uncertain futures. The Adaptation Roadmap serves as your guide to navigate this new terrain as governments, communities, and partners rise together to take on the challenges of today and into the future.

This resource has been designed to meet Web Content Accessibility Guidelines (WCAG) Level AA Requirements to the extent feasible. We acknowledge parts of this document may still require additional assistance. Please contact us at BCDC at:

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ADAPTATION ROADMAP

A Practitioner's Guide to Plan and Implement a Collaborative, Equitable, Integrative, and Flexible Approach for Sea Level Rise Adaptation

March 2022

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This report was created by the Bay Conservation and Development Commission (BCDC). BCDC recognizes our office resides on the traditional territory of the Ramaytush Ohlone people. This document seeks to elevate the importance of building relationships, trust, and partnerships with tribal governments and indigenous people of the Bay Area.

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Contents

Chapter 4

Shape a Shared Vision of the Future

▸ Download Workbook 4

Chapter 5

Bring Together Shared Solutions

▸ Download Workbook 5

Chapter 6

Pathways Approach to Implementation

▸ Download Workbook 6

Additional Downloadable Complimentary Resources:

- ART Adaptation Catalog: Database of Sea Level Rise Actions
- Suisun City Focus Area: Example Application of the Adaptation Roadmap
- Richmond City Focus Area: Example Application of the Adaptation Roadmap

PREFACE

Towards Shared Adaptation Outcomes

Many people now recognize the significance of climate change to our lives and need to prepare our communities for these challenges. Among these threats is rising sea level, the result of increasing global temperatures from human activities causing expanding and melting glaciers.

Sea level rise poses a specific kind of climate change challenge. The oceans are rising right now and *faster than ever before* in the last 2,000 years[1]. The reality is that even if we reduce human-caused emissions, the oceans will continue to rise for hundreds, if not thousands, of years. We must start preparing now.

The Adaptation Roadmap is a solutions-oriented resource for moving beyond sea level rise vulnerability to develop equitable, collaborative, integrative, and flexible adaptation outcomes.

With the passing of California Senate Bill 379 in 2015, cities and counties are required to identify all climate change hazards and adaptation strategies into the Safety Element of their General Plan by January 1, 2022[2]. Other climate hazards include heat, wildfire, drought, and flooding. Existing resources to support adaptation planning include the Adaptation Planning Guidance 2.0, Adaptation Atlas, Adapting to Rising Tides Planning Approach, and others.

The Adaptation Roadmap complements these existing resources while adding greater level of detail that *begins specifically* at sea level rise adaptation planning, elevates best practices of equity, guides decision-making, and advances adaptation pathways for planning over time.

1 NASA. (2021, July). *Sea Level.* Global Climate Change Vital Signs of the Planet. https://climate.nasa.gov/vital-signs/sea-level/

2 Land Use: general plan: safety element. Assemb. S. 379 (2015-2016), Chapter 608, Section 65302 (Cal. Stat. 2015).

81 % of cities and counties surveyed in the nine-county Bay Area said they have information about their jurisdiction's vulnerability to sea level rise[3]

45 % do not have or are not yet working on adaptation plans[3]

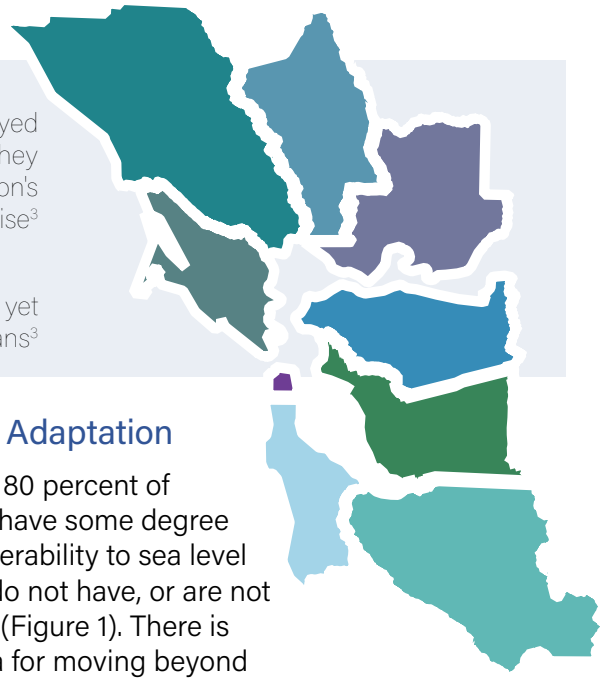


Figure 1 · Nine-County Bay Area. Examples from around the Bay Area will be highlighted in this document, but concepts and guidance on sea level rise adaptation extends beyond the Bay Area and can apply nationally and internationally.

Timing is Right for Advancing Adaptation

In the San Francisco Bay Area, over 80 percent of shoreline cities acknowledged they have some degree of information about their city's vulnerability to sea level rise, although the majority of cities do not have, or are not yet working on, an adaptation plan[3] (Figure 1). There is growing momentum in the Bay Area for moving beyond vulnerability assessments and initiating sea level rise adaptation efforts that result in *outcomes* to reduce flood risks and prepare communities to make future decisions.

Sea level rise is the focus of the Adaptation Roadmap given the critical need to plan and prepare early for the short and long term impacts that are coming. At the same time, this resource can be used to support planning for multiple climate hazards, which when done together can help communities consider multiple problems and solutions at once. In order to provide the greatest level of detail, this resource will provide specific examples and considerations for sea level rise only, although many sections have overlaps with other types of hazards.

The Adaptation Roadmap presents an organizational approach to navigating the key components of adaptation. It is designed to be used flexibly to improve cities, counties and their communities' ability to work together to make decisions now and for future generations.

3 BCDC, BayCAN, MTC-ABAG, BARC, SFEI, SFEP. (2021). *Sea Level Rise Adaptation Progress, Gaps and Needs Survey.*

Who is the Adaptation Roadmap For?

The Adaptation Roadmap can be used by different audiences depending on what kind of information they are interested in. The Adaptation Roadmap encourages adaptation planning to be collaborative and inclusive and involve a range of individuals, entities, and organizations to participate and engage in critical conversations.

The concepts and resources within are suitable for traditional planning leads, such as local government, but also for non-traditional leads in sea level rise adaptation such as community-based organizations or non-governmental organizations. The two key audiences this resource is designed for are practitioners and participating community and stakeholder groups (Box 1).

Diverse practitioners engage in conversations about sea level rise vulnerability in San Rafael during the ART Bay Area project. Photo by BCDC.

1. **Practitioners**: Local governments, including cities and counties, and other entities such as special districts, community-based organizations, or non-governmental organizations seeking to move beyond vulnerability assessments to lead and engage in adaptation planning processes can follow this guidance to support more equitable, integrated, and strategic adaptation planning. Practitioners may include:
   - Government Staff
   - Community-Based Organizations
   - Non-Governmental Organizations
   - Tribal Governments
   - Special Districts
   - Consultants
2. **Participating Communities and Stakeholder Groups**: The Adaptation Roadmap can also serve as an easy-to-navigate resource for the multitude of community and stakeholder groups that will be involved in an adaptation effort to understand what the adaptation process is, and how and where they can participate to create a vision, explore solutions, and make decisions together. Participants may include:
   - Community Members
   - Elected Officials
   - Private Sectors
   - Interested Stakeholders

Box 1 · Audiences of the Adaptation Roadmap.

What Does the Adaptation Roadmap Do?

The Adaptation Roadmap includes an Introduction, six chapters, and six workbooks to support key concepts and guide conversations for advancing sea level rise adaptation.

Introduce Sea Level Rise Adaptation Landscape

The **Introduction** lays out common challenges to sea level rise to prime practitioners for what to expect. It also frames adaptation as an opportunity to improve how government and society can work together to respond to sea level rise and other climate hazards over time. Adapting to sea level rise can look like many different efforts – from plan updates, to community capacity building, to implementing projects in the ground. The Introduction and all six chapters of the Adaptation Roadmap emphasize embracing your local context to improve local, and regional, outcomes of adaptation.

Helps Users Navigate Adaptation Concepts

There is a wealth of information on adaptation, from best practices on community-driven approaches, to plan alignment, technical and engineering guidance, and more. The Adaptation Roadmap brings together curated ideas and concepts into an organizational framework using themes across **Chapters 1 – 6** that are easy to navigate and access by those starting at different places (Figure 2).

The Adaptation Roadmap can be used as a linear, though iterative, process for navigating adaptation concepts to reach a desired outcome, or users can pick and choose which pieces of the Adaptation Roadmap are most useful to their unique situation. Ultimately, guidance in each Chapter builds upon one another to help practitioners, communities, and stakeholders come together to create a shared vision to explore *why* they are selecting certain adaptation strategies.

Supports Decision-Making for Actionable Outcomes

Each of the chapters in the Adaptation Roadmap provide guidance and resources to reach specific outcomes of adaptation. These include how to assess your starting point and desired outcomes (Chapter 1), how to structure the process (Chapter 2), how to gather information on local context and conditions (Chapter 3), how to vision future adaptation (Chapter 4), how to build strategies to meet your vision that are bundled and phased over time (Chapter 5), and how to lay out your approach using adaptation pathways (Chapter 6).

In order to help users of this resource achieve these outcomes, each chapter has a corresponding **Workbook 1 – 6** that are separate PDFs that can be downloaded and contain fillable space to record, share, and build upon key information as it is gathered throughout the adaptation effort.

Embeds Four Foundational Pillars for Adaptation

COLLABORATIVE: Solving the challenges of sea level rise will require unprecedented levels of cooperation and collaboration across governments, sectors, and communities.

EQUITABLE: Historically under-served communities and populations must be centered in the planning process to ensure that decisions today address existing inequities and *improve* equitable outcomes into the future.

INTEGRATIVE: Building upon existing plans, relationships and processes, while aligning efforts and information, will be essential to moving adaptation forward effectively over time.

FLEXIBLE: Embracing uncertainty in how people work together, adjusting the process as it goes, and using adaptation pathways to take discrete actionable steps today to build long-term resilience over time.

Overview of the Adaptation Roadmap

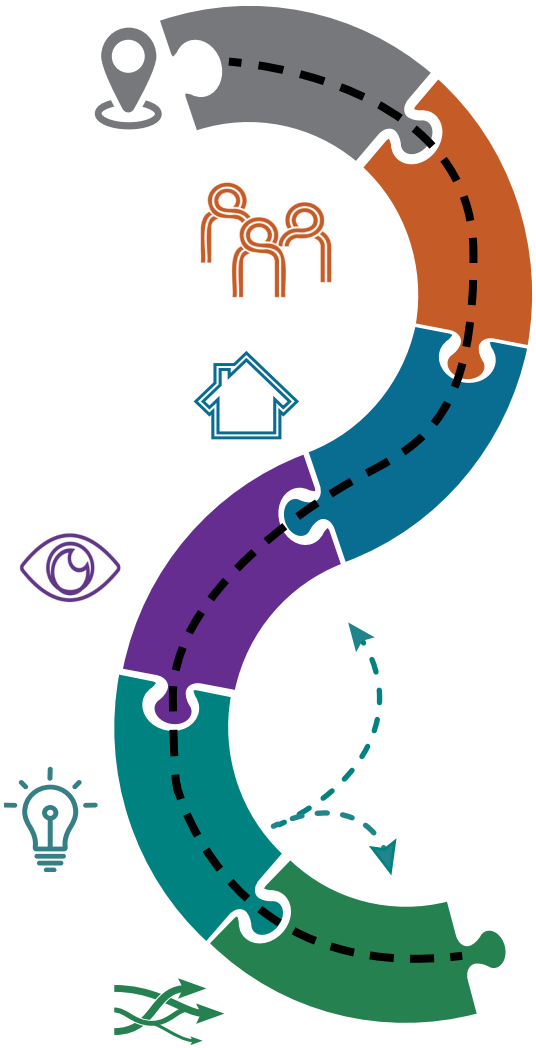


Figure 2 · Overview of Content and Themes Within Each Chapter of the Adaptation Roadmap.

Chapter 1. **Build Your Adaptation Roadmap**
Assess your starting point and desired outcomes.

Chapter 2. **Center People in Decision-Making**
Structure your adaptation process by building your core team, identifying communities and stakeholders, using participation and decision-making tools, and applying effective communication approaches.

Chapter 3. **Set Local Context and Sense of Place**
Gather information on local context and conditions including local and regional plans, embedding community values, identifying nature-based opportunities, and framing adaptation pathways.

Chapter 4. **Shape Shared Vision of the Future**
Explore visions for future adaptation by defining the issues, creating vision and guiding principles, doing scenario planning to explore different adaptation futures, and discussing outcomes and expectations.

Chapter 5. **Bring Together Shared Solutions**
Build adaptation strategies that meet community and stakeholders visions by exploring adaptation actions and the ART Adaptation Catalog, bundling actions into strategies, phasing them over time, discussing tradeoffs and making decisions.

Chapter 6. **Pathways Approach to Implementation**
Lay out the plan by linking people and processes to outcomes, creating an implementation and monitoring plans and preparing for change over time.

Introduction

View from Marin County looking across the San Francisco Bay.
Photo Photo by SF Baykeeper, Cole Robb Most, and LightHawk.

INTRODUCTION

i. Laying the Landscape of Adaptation

To adapt is to change and there are many choices we can take to change the *physical landscape* of the shoreline and be *prepared to make future* decisions about rising sea level. See Table 1 for common definitions in adaptation planning.

Why is Adaptation so Challenging?

For those who have completed a sea level rise vulnerability assessment, adaptation planning can seem overwhelming. It can be daunting to think about how to solve the many interconnected, complex, often large-scale challenges associated with the scale and magnitude of the problem.

Sea level rise adaptation is expected to cost an enormous amount of money[1] and require us to work together across sectors and jurisdictions in ways we have not done in the past. In our interconnected Bay system, a failure to coordinate adaptation actions could lead to new problems for neighboring jurisdictions, such as increased flooding, widening inequity, displacement of people and jobs, and loss of connected ecosystems[2]. At the same time, the choices we make raise key questions about governance, responsibility, ownership, equity and decision-making[3].

Sea level rise also presents new challenges for the future uncertainty of climate change impacts and societal responses. It is an inter-generational issue where actions today have consequences for what future decisions are possible. All together, these reasons and many more are why sea level rise adaptation is so hard to tackle (Box 2).

1 Sander, N. 2021. Bridging the Gap: Funding Sea Level Rise Adaptation in the Bay Area. Bay Conservation and Development Commission.
2 Hummel, M.A., Griffin, R., Arkema, K. and Guerry A.D. 2021. Economic evaluation of sea-level rise adaptation strongly influenced by hydrodynamic feedbacks. Proceedings of the National Academy of Sciences.
3 Lubbel, M. 2019. The Governance Gap: Climate Adaptation and Sea-Level Rise in the San Francisco Bay Area. UC Davis.

Terms	*Common Definitions*
Climate Change Impacts	Climate change is the increase in global atmospheric and ocean temperatures, leading to a range of consequences that will impact human and environmental systems including increased wildfires, smoke, heat waves, drought, and flooding from changes in rainfall patterns, shallow groundwater rise, and sea level rise (Adaptation Roadmap, 2022).
Sea Level Rise	Sea level rise is the worldwide average increase in ocean water levels due to human-caused climate change, where warmer atmospheric and ocean temperatures causes ocean waters to expand and glaciers and ice sheets to melt (NASA, 2021).
Climate Change Adaptation*	Climate change adaptation involves adjusting to actual or expected future climate (NASA, 2021), which includes taking actions to change the physical landscape of the environment or prepare communities to respond to future impacts of climate change. Sea Level rise adaptation actions refer to specific interventions or ways to manage the shoreline, flooding, and sea level rise. (Adaptation Atlas, 2019). It is focused on addressing both short-term and long-term climate change impacts to human life, property, economic continuity, ecological integrity, and community function (Adapt New South Whales and IPCC, 2014).
Climate Change Mitigation	Climate change mitigation involves reducing the amount of greenhouse gases going into the atmosphere in order to limit the severity of future climate change and its impacts (NASA, 2021). This term should not be confused with another commonly used definition of mitigation in wetlands and habitat restoration, which refers to the restoration, creation, or enhancement of wetlands to compensate for permitted wetland losses" (Lewis, 1989).
Resilience*	Resilience is the capacity of any entity — an individual, a community, an organization, or a natural system — to prepare for disruptions, to recover from shocks and stresses, and to adapt and grow from a disruptive experience (Adaptation Planning Guide 2.0).
Equity*	Equity in the Adaptation Roadmap means centering people in inclusive decision-making, which means fairness and access for all to participate in the processes, removing barriers to participation between certain groups, ensuring voices and perspectives are heard and integrated in meaningful ways, and a commitment to transparency, sustained engagement, and measurement of actions that improve outcomes for all (Adaptation Roadmap, 2022).
Environmental Justice	Environmental Justice is the fair treatment and meaningful involvement of people of all races, cultures, incomes and national origins with respect to the development, adoption, implementation and enforcement of environmental laws, regulations and policies (OPR).
Community-Driven Planning*	Community-driven planning is a process where community members most impacted by climate change share decision making power with government leads to help produce strategies focused on their priorities and concerns (Movement Strategy Center, 2019).
Adaptation Pathways	Adaptation Pathways is an approach to planning flexibly over time where decision making is made up of a sequence of manageable steps or decision-points re-visited over time. (Coast Adapt)

Table 1. Common Definitions in Sea Level Rise Adaptation Planning. *For some terms, it may be especially important to co-define these with communities and stakeholders.

Challenges of Sea Level Rise Adaptation

Cost Prohibitive to "Go it Alone"

The costs of adapting to sea level rise by building projects along shorelines are projected to be orders of magnitude larger than we currently have available. Tackling this challenge on an individual basis is likely unrealistic given the scale and complexity of the problem.

Complexity of People and Sectors

Flooding has the potential to impact – and involve – a wide range of individuals, all with different perspectives, values, and priorities. Bringing together so many diverse people to find a shared vision for the future in a meaningful way can be challenging, especially as it relates to historical inequities, underrepresented voices and environmental justice.

Decision Making and Equity

Behind all adaptation challenges – cost, complexity, and responsibility – is the question of who makes decisions, who is impacted, and who benefits? Social dynamics, historical land ownership, environmental injustice, and power dynamics have led to an unequal distribution of sea level rise impacts on communities of color as well as unequal access to resources to solve the problem. Unless adaptation processes actively create an equitable decision-making process, inequitable outcomes will continue to occur.

Private Land Ownership Interests

Shorelines and other areas at risk of sea level rise around the Bay Area are often owned or managed by a patchwork of different entities, including public and private owners. It can be challenging to discuss why private land owners should work collaboratively with others for shared benefits that go beyond their own interests and property, or where public investments benefit private properties. This issue is particularly present on creek shorelines, where numerous private land owners would need to agree on shared solutions.

Complex Regulatory Landscape

In the Bay Area there are many different agencies that have their own rules and regulations for shoreline development. This can make it challenging to plan and implement innovative adaptation solutions. It also raises questions about how can we plan boldly for the future or to what degree should adaptation planning be constrained to current regulatory feasibility.

Uncertainty and the "Number"

Both climate impacts and how people will respond over time is uncertain. The range of sea level rise projections also adds a major challenge of what "number" or water level should we all prepare for, which can be challenging when different places experience different levels of risk.

Time Needed to Prepare for Future Impacts

Sea level rise presents a unique generational planning challenge – the need to spend money today to prepare for impacts that will affect both ourselves and future generations. Our decisions today have the ability to limit future options or provide opportunities for future generations to make decisions about the challenges ahead.

Making Space for Nature to Adapt

Coastal habitats such as wetlands are the first to be impacted by sea level rise and require space and access to sediment supply to naturally adapt to rising seas. Many wetlands around the Bay are constrained by existing development behind them.

Urgency or "More Immediate" Priorities

Because sea level rise is slow-moving in nature, most consequences won't be felt until the future. This can make it easy to avoid taking action today, especially when more immediate concerns are present. However, since many actions have a long lead time, lack of action today impacts future options and opportunities and may dramatically increase future costs.

Lack of Compelling Story for Resilience

All of this complexity makes it difficult to wrap our heads around the many challenges *and* solutions. We are missing a compelling shared narrative that connects sea level rise impacts to people's values and how our actions add up together towards resilience.

How Can Sea Level Rise Be an Opportunity?

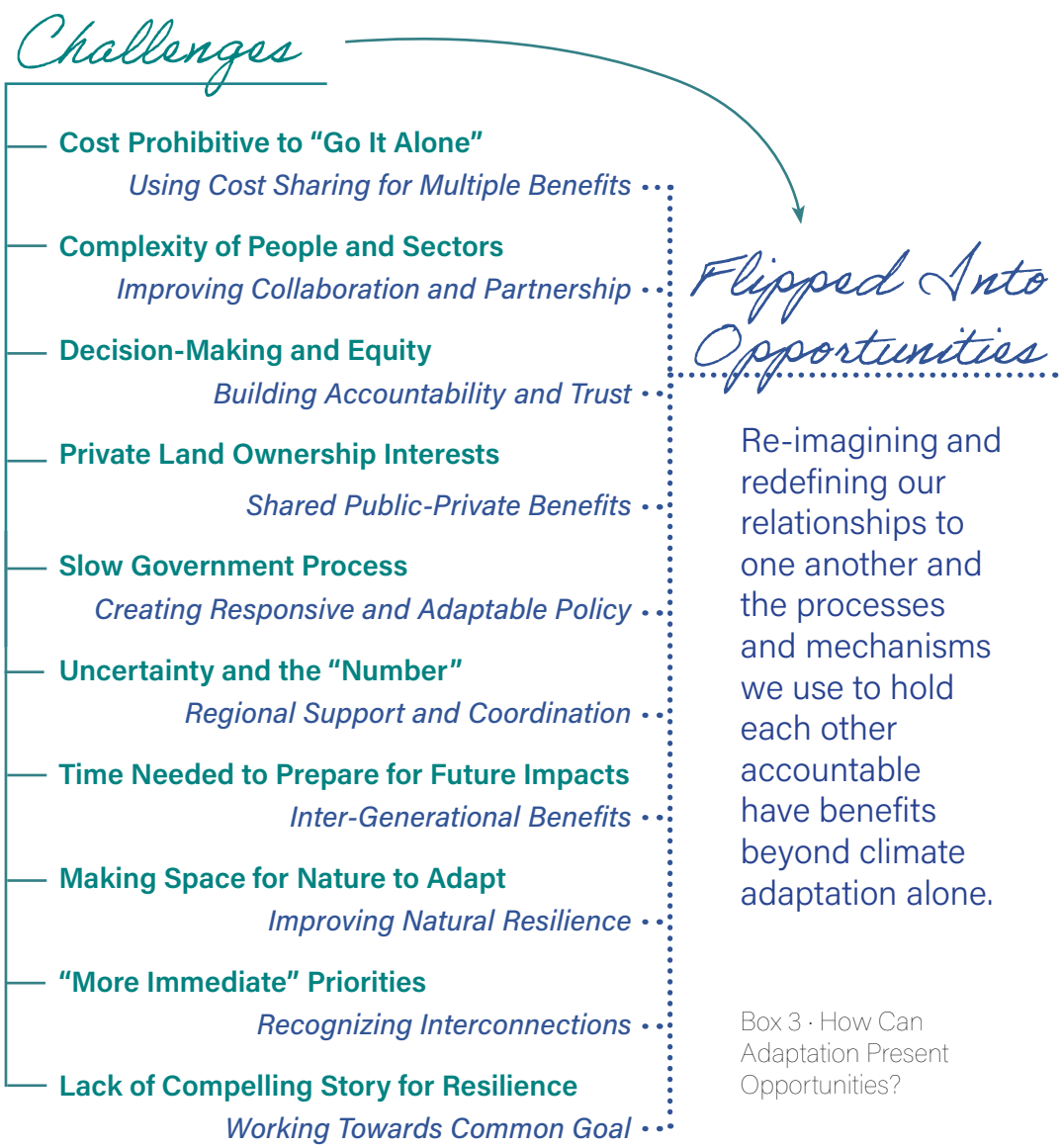
For those who see themselves as a "glass is half full" kind of person, sea level rise and its challenges, in turn, can present unique *opportunities* for transformative change.

Each of the challenges identified in **Box 2 ▪ Why Is Adaptation so Challenging?** can be viewed through an opportunistic lens, if we so choose. Many of the issues relate to how we work together, who makes decisions, who holds responsibility, and how our actions respond to change. We have the choice in how we perceive, communicate, to address these challenges (Box 3).

> The reality that sea level rise can impact so many different people and sectors is the same reason why it can be such an transformative opportunity for change.

For example, solutions that are cost prohibitive for a single entity alone may provide new opportunities for cost sharing and multi-benefit solutions. The complexity involved in advancing adaptation can help build new ways to work together effectively across sectors. The choices we make for sea level rise adaptation may have long-lasting implications for improving current and future collaboration that supports adaptation over time. Creating mechanisms and processes to hold organizations, entities and individuals accountable for their actions have benefits that extend beyond this particular climate change hazard of sea level rise alone.

We can create new ways to collaborate that improves efficiencies across our society, uplifting quality of life concerns alongside addressing climate risks. How we set ourselves up for success to make decisions for today and in the future gives us an opportunity to strengthen how we work together to take on these challenges ahead.



Box 3 · How Can Adaptation Present Opportunities?

What Can Adaptation Look Like?

The range of Challenges of Sea Level Rise Adaptation means there is also a wide range of solutions. **Adaptation does not refer to one specific type of outcome and will not look the exact same in every place.** Not all places or communities begin with the same conditions, challenges, or opportunities, and thus every place will take their own path towards adaptation.

There is a range of different actions or outcomes that are part of the essential building blocks of adaptation. These outcomes could mean anything from starting or integrating planning processes, to engaging with communities and stakeholders to build their capacity to participate in this work and even designing and implementing projects in the ground. All of these are important steps that get us toward adaptation.

How Do Adaptation Outcomes Add Up?

It is important to remember that adaptation doesn't have a true "ending" because climate change impacts will continue over time. Instead of finding a single "outcome", the Adaptation Roadmap is focused on helping you figure out how to set yourself up for success so that your communities can adapt to changes over time.

The Adaptation Roadmap graphic (Figure 3) illustrates how different adaptation outcomes can be thought about as discrete, but interconnected, efforts that can build upon one another on your adaptation journey. One of the most challenging parts of sea level rise adaptation is bringing together communities and stakeholders to have conversations and make informed decisions. Ensuring that your communities, governments, and other stakeholders have the capacity, knowledge, and opportunity to participate is foundational to ensure adaptation decisions are supported by those who live and work there.

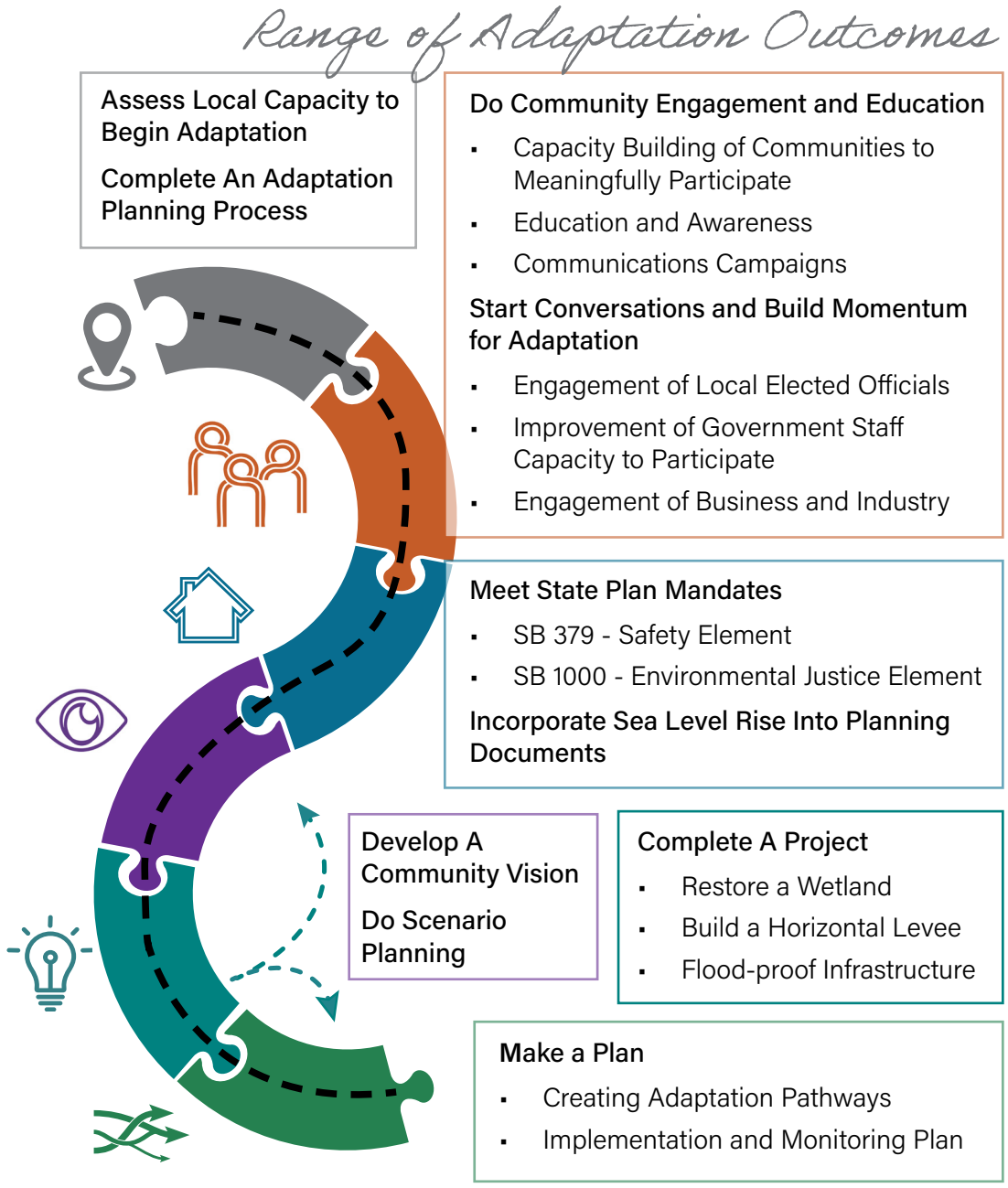


Figure 3 · Examples of Adaptation Outcomes. This list is not exhaustive.

Setting Expectations

The purpose of the Introduction is to help ensure that those coming into the process have a shared understanding of what to expect. Miscommunication or misunderstandings about why adaptation is so challenging, what adaptation means for a community, and how the pieces come together to build resilience can slow down or impede important progress. To prepare for these pitfalls, we share some expectations when starting adaptation efforts (Box 4).

Build A Shared Vocabulary

Every individual has their own experiences and worldviews that shape their understanding of certain terms or phrases (more in 2.4 Effective Communications). At the beginning of each chapter in the Adaptation Roadmap, we list common definitions encountered in that chapter. We encourage practitioners and community members to review and discuss definitions and adjust them to make sense for your community and stakeholders. This might even mean changing the language used to better reflect a community's desired outcomes. It it important at the beginning and throughout any adaptation process to continuously check in with communities and stakeholders to make sure you are on the same page and have working definitions of adaptation concepts. Keep an updated list of definitions to refer back to throughout your effort.

Expectations for Adaptation

Expect Things to Get Messy

The Adaptation Roadmap is designed to help clarify and organize the components of adaptation, yet it is still complex (Box 2). Those working in this field are still figuring out the most effective ways to engage with different people and find the best solutions for their communities. Working with many people can be challenging, and it's likely there will be mistakes, but be ready to navigate new territories and topics, build new relationships, and stick with challenging conversations.

Be Flexible, Can't Plan It 100%

The inherent uncertainty of sea level rise adaptation means that we can only prepare so much. Additionally, embedding equitable outcomes means ensuring that people engage in conversations to drive, and even change, the process itself. Be ready to adapt to your communities and stakeholders values, visions, and voices.

This Will Not Be Linear

We've said it already, but it's worth repeating: you will likely have to go back and revisit past chapters as part of the process to move forward. For example, identifying actions to meet a community's vision might shed new light on what's possible, and therefore a review of the vision might be necessary to move forward. Be ready allow new information to alter your course.

Be As Transparent As Possible

There can be underlying, historic mistrust between government and communities. Being transparent requires more work and effort, but can help heal historic barriers and reduce suspicions about "hidden agendas". As part of this, Build A Shared Vocabulary so that people are on the same page when having discussions.

May Have to Do Things Differently

Sea level rise is unlike any challenge we have faced before. Because of this, the approach to addressing the issue will likely need to be different. This might mean re-evaluating the ways you've engaged communities and stakeholders in the past and acknowledging that we have to do things differently in the face of this unprecedented challenge. Sea level rise exacerbates existing issues of housing, jobs, and equity, and requires us to think about how to solve multiple problems at once. Be ready to try new approaches as needed and embrace change as a necessary and valuable part in the process.

Encourage Creativity

It may be easy to feel like there are only a few limited options when looking at what other places have done for sea level rise. Try to encourage your communities to think beyond traditional solutions and tap into creative visioning. Be ready to embrace new ideas and opportunities.

Box 4 · Setting Expectations for Adaptation.

ii. Embedding Foundational Pillars in the Adaptation Roadmap

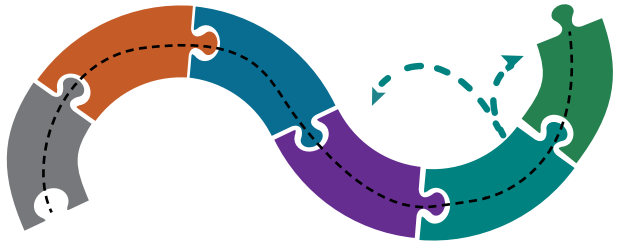
The Adaptation Roadmap is intended to support a thoughtful approach to engagement and problem solving for an uncertain future. Though the focus in the Adaptation Roadmap is on sea level rise adaptation planning, this process inherently helps to build resilience across a variety of hazards and community concerns. To ensure that the Adaptation Roadmap is inclusive of solutions that meet current and future needs within communities, it is built upon four foundational pillars (Box 5).

These key underlying concepts are embedded across the Adaptation Roadmap and guide users towards creating and conducting adaptation efforts that are collaborative, equitable, integrative and advances a flexible adaptation pathways approach to sea level rise planning.

Adaptation Roadmap Development

The contents of this document have been guided by an Advisory Committee representing a range of perspectives and expertise on sea level rise adaptation planning and implementation. These include local city and county government, community and equity advocacy organizations, private consultants, research institutions, and regional, state, and federal government.

The Adaptation Roadmap was also created with support and input of numerous local government staff within the Bay Area Climate Adaptation Network (BayCAN) Sea Level Rise Assessment to Adaptation working group. Ultimately, over two dozen individuals provided essential brainstorming, input, and advice in the development of the Adaptation Roadmap.



Collaborative Multi-Sector Adaptation

Solving the challenges of sea level rise will require unprecedented levels of cooperation and collaboration across governments, sectors, and communities

Equitable Community-Driven Planning

Historically under-served communities and populations must be centered in the planning process to ensure that decisions today address existing inequities and improve equitable outcomes into the future.

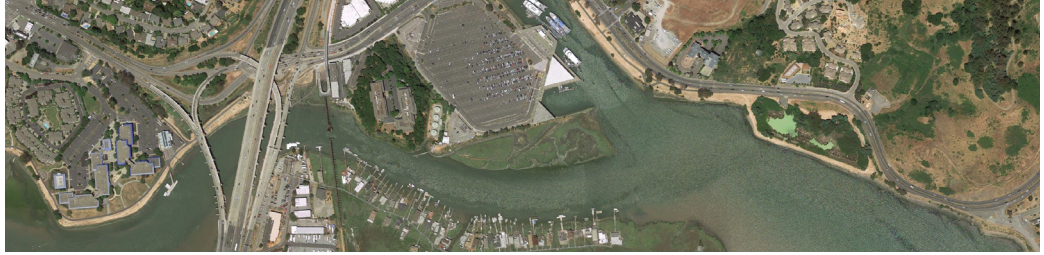
Integrative Plans, People, and Processes

Building upon existing plans, relationships and processes, while aligning efforts and information, will be essential to moving adaptation forward effectively over time.

Flexible Approach for Decisions Over Time

Embracing uncertainty in how people work together, adjusting the process as it goes, and using adaptation pathways to take discrete actionable steps today to build long-term resilience over time.

Box 5 · Foundational Pillars of Adaptation.



Marshes, homes, highways, trails, utilities and more line the shorelines of Larkspur. Photo courtesy of Google Earth.

Collaborative Multi-Sector Adaptation

Sea level rise adaptation is not only a technical challenge, but also a societal dilemma. One of the greatest challenges for adaptation is creating the conditions where multiple different people, with different backgrounds, perspectives, experiences, and desires, can *come together to discuss, envision, and find common ground on a set of shared solutions that can be supported and implemented.*.

Flooding Doesn't Care About Boundaries

Flooding from sea level rise will cross boundaries and borders, affecting both public and private sectors because water follows physical and biological conditions–not institutional ones. Rising sea level pays no attention to which jurisdictions are being flooded, who owns or manages the assets flooded, who is impacted, what departments need to be involved, or what authorities are responsible for solutions. The broad reaching impacts of climate change requires interdisciplinary, creative and collaborative approaches to solutions.

Creating an overarching vision guided by the values and principles of a broad range of stakeholders ensures that solutions–no matter what scale–work together to achieve a shared goal. To do this means bringing together stakeholders and sectors that may not normally work together. This collection of people can bridge gaps in knowledge, experience and expertise to collectively develop and implement the policies and projects that address the interconnected impacts of sea level rise.

The inclusion of diverse stakeholders is one reason that adaptation planning is challenging and complex, yet it is also an essential and critical component for creating outcomes that are supported by communities and implemented across sectors.

Creating the Foundations for Collaboration

There is no doubt that sea levels are rising. The uncertainty remains in how fast impacts will occur, what our societies might look like in the future, and what decisions we might make in the near future that could affect the worst-case projections over time. This uncertainty associated with the impacts and timing of climate change means that solutions should focus on building a strong collaborative foundation so that people can continue working together better to address both current and *future* risks.

We cannot solve climate change in one plan, process or project. Addressing the impacts of climate change will be ongoing and iterative. **We need to lay the foundation for long-term success by ensuring our structures for decision-making with multiple stakeholders are capable of addressing sea level rise challenges over time.**

Many adaptation planning processes have made the mistake of not engaging enough with residents, businesses, utility owners, or other necessary stakeholders, only to find that the outcomes of their process are no longer feasible given a lack of support to move forward. As we try to address large-scale sea level rise adaptation challenges, such as those we face along the Bay Area shorelines, it is clear that no single entity can solve them alone. Rising sea levels present an unprecedented threat, requiring an unprecedented level of cooperation and collaboration among different stakeholders to explore and develop shared solutions with multiple benefits.

The Adaptation Roadmap emphasizes diverse collaboration from beginning to end and in distributing responsibility across sectors for holistic and effective sea level rise solutions.

Equitable Community-Driven Planning

The United States has a long history of oppression when it comes to race and social equity, and the San Francisco Bay Area is no exception. Large differences in quality of life outcomes, such as health and life expectancy, access to education and opportunity, quality of housing, and vulnerability and risk to climate change hazards and environmental pollution exist based on race[1].

These disparities are the result of both intentional government practices, such as the history of explicitly racist housing policies like redlining, as well as unintentional outcomes of government decisions that have perpetuated these inequalities. This has led to disproportionate burdens of pollution and other environmental harms on historically marginalized, low-income and disenfranchised populations of people. The term "environmental justice" describes "the fair treatment of people of all races, cultures, and incomes with respect to the development, adoption, implementation, and enforcement of environmental laws, regulations, and policies"[2].

Inequitable Practices Are Still The Norm

Today, planning processes often still unintentionally exclude certain groups of people from the decision-making process. Such exclusion misses a key point: it is the diversity of perspectives, experiences and innovation that is our greatest asset when it comes to creating a more resilient future. Yet, for far too long, certain populations of people remain largely left out of conversations and decisions that impact their lives.

Specifically, these include low-income communities, Black communities, communities of color, tribal communities, and the disability community. This historic absence of diverse perspectives, lived experiences, and opportunity for creative ideas has resulted in decisions that have often adversely affected these populations of people, increasing their vulnerability and risks to climate change impacts. Tackling the complex challenges of climate change requires re-imagining not only what decisions we make for the future, but also how we make decisions and who gets a voice in the process. This is why it is not enough to be conscientious or aware about issues of equity, race, and environmental justice, but instead intentional and explicit about how equitable practices are embedded across the entirety of the planning process.

Traditional practices of community engagement can often perpetuate less-than-meaningful participation for a wide variety of reasons, ranging from a lack of adequate budgeting for meaningful engagement, inconvenient timing of public meetings, unequal access to childcare and/or transportation to attend meetings, and lack of public awareness on meeting topics. While equity has become a more prominent topic in recent years, we have a long way to go. We need a change in the way we do engagement to ensure this happens in a meaningful and empowering way. This is called community-driven planning, which is described next.

> "When racial inequities are not openly acknowledged in climate action planning, it is likely they will be created, worsened, and/or perpetuated."
>
> - USDN Guide to Community Driven Climate Preparedness Planning

Community leaders presents at a public forum in Spanish on sea level rise impacts in East Palo Alto. Photo by BCDC.

1 California is At a Turning Point. *Race Counts*. www.racecounts.org.
2 Environmental Justice. Senate Bill 115 (1999-2000), Chapter 690, Section 65040.12 (Cal. Stat. 1999).

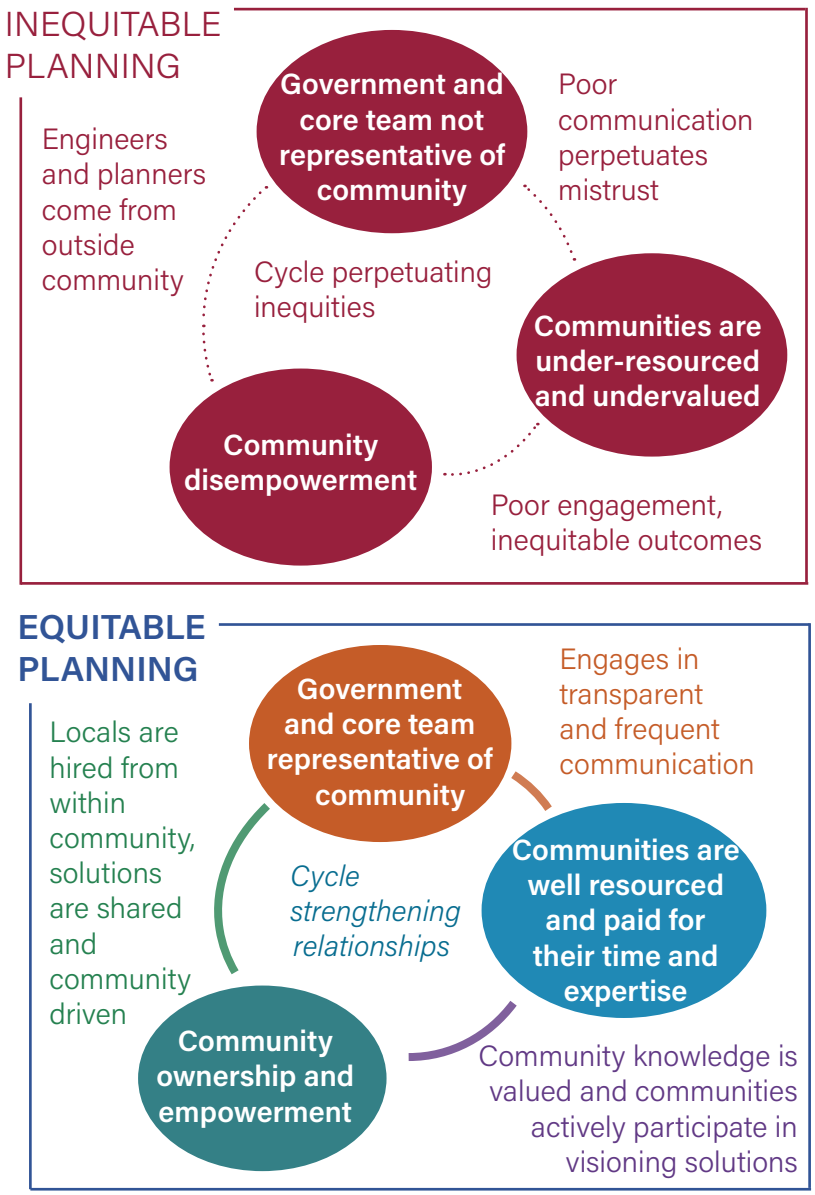


Figure 4 · Cycles of Inequitable and More Equitable Planning | Graphics redrawn from the work of Phoenix Armenta, West Oakland Environmental Indicators Project (WOEIP), and Nahal Ghoghaie, BCDC.

Shifting the Dynamics of Power in The Planning Process

Community-driven planning for climate resilience is defined as the process where "residents of vulnerable and impacted communities define for themselves the complex climate challenges they face, and the climate solutions most relevant to their unique assets and threats"[3]. To do this requires rethinking past processes and embracing new approaches to participation and empowerment. This includes culture-shifting within our institutions to prioritizing a shared understanding of what equity means and what it looks like in practice[4]. It includes advancing practices of trust-building and power-building with historically underrepresented communities. And it means evaluating our own institutional structures when it comes to diversity and equity in hiring, contracting, budgeting, and valuing community participation in the planning process[5].

These transformative practices will not happen overnight, but instead require a commitment to continued learning and growing in our understanding and application of equitable practices alongside communities and stakeholders. It can be difficult to understand what a more equitable process looks like without explicit examples of how traditional planning practices can perpetuate the exclusion of disadvantaged communities' voices. Figure 4 and Table 2 provide visual representations of what this looks like in practice, starting with an example of our current inequitable approach, followed by examples of what an equitable approach looks like[6]. Now is an opportunity to reflect on our past and alter the course ahead to be intentional and explicit about how we truly advance equity moving forward.

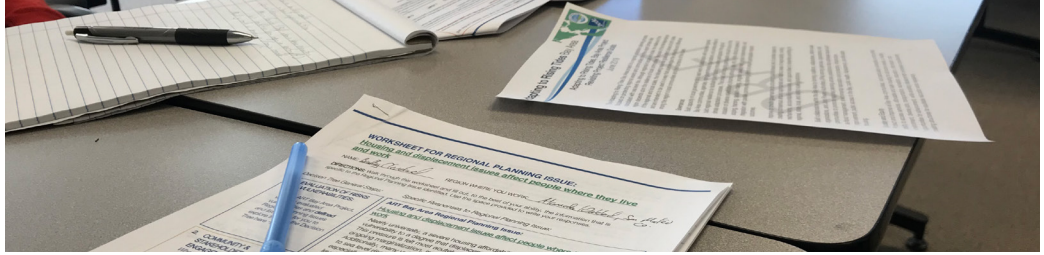
> The Adaptation Roadmap seeks to advance equitable approaches of adaptation planning at every step, ensuring equitable practices are intentionally and explicitly elevated and acted upon to improve process and outcomes.

3 Pandora Thomas. Community Driven Climate Resiliency Planning. Accessed October 2021 at http://www.pandorathomas.com/community-led-climate-resiliency-planning
4 Equity Foundations Training. Urban Sustainability Directors Network. Accessed October 2021 at https://www.usdn.org/equity-foundations-training.html
5 Equity, Diversity and Inclusion in Recruitment, Hiring and Retention. Urban Sustainability Directors Network. October 2018.
6 Visuals re-drawn based on the work of Phoenix Armenta, West Oakland Environmental Indicators Project and Nahal Ghoghaie, BCDC.

Equitable vs. Inequitable Planning

	Equitable and Holistic Approach	Inequitable Approach
Chapter **1** Build Your Adaptation Roadmap	▪ Flexible Project Parameters: Designed for flexibility and expected to reasonably change as participants help shape the process that includes technical, social and environmental aspects of adaptation. ▪ Explicit Funding for Community Participation: Funding identified has allocation for community participation as a key aspect to adaptation.	▪ Rigid Project Parameters: Predetermined by a small team prioritizing the technical needs of adaptation and without contribution of communities, community-based organization (CBO) partners, or other stakeholders. ▪ Limited/No Funding for Community Participation: Funding identified is limited and does not include explicit allocation for community participation.
Chapter **2** Center People in Decision-Making	▪ Cross-Sector Core Team: Made up of individuals across government, communities, and locally relevant stakeholders to co-lead an effort. ▪ Early Collaboration: Early engagement with communities and CBOs that are paid for their time and help shape process and outcomes. ▪ Local Consultants: Hired locally, where possible, and consultants from outside the community are actively listening to community concerns. ▪ Transparent Decision-Making: Process for decision-making is discussed with participants and decision points are identified. ▪ Co-Developed Participation Strategy: Participants are asked how they want to be engaged, effort and funds are brought to existing forums. ▪ Effective Communication: Easy and frequent among Core Team and Participants and two-way trust is built and maintained.	▪ Single-Sector Core Team: Made of up government and consultants that are not representative of communities and do not invite partners to co- lead. ▪ Lack of Collaboration: No early engagement with communities or CBOs to shape process or outcomes, and if involved they are not paid for their time. ▪ External Consultants: Hired from outside the community and limited transfer of research and data shared back to government and community. ▪ Unclear Decision-Making: Lack of understanding about how decisions are made or how community input will be used. ▪ Minimum Engagement: Community engagement is seen as a "box to check" and there is limited to no effort or funds to meet communities where they are. ▪ Ineffective Communication: Lack of transparency leads to miscommunication and distrust between government and communities.
Chapter **3** Set Local Context and Sense of Place	▪ Community Vales Are Centered: Planning occurs around community values and concerns, with climate hazards being discussed as they relate and connect to people's lived experiences. ▪ Two-Way Knowledge Transfer: Joint "fact-finding" of what communities and stakeholders understand about a specific location, and participants can reflect and determine how the process is working for them.	▪ Technical Data and Climate Hazards Are Centered: Planning emphasizes climate hazards over people and technical information is perceived to be more important that social or political conditions. ▪ One-Way Data Gathering Only: Data is gathered from communities and stakeholders through a survey or other one-way interaction of input, which is then considered as adequate community input in a planning process.
Chapter **4** Shape a Shared Vision of the Future	▪ Facilitated Discussions on Future Visioning: Participants co-define the problems and shape the vision and guiding principles, leading to increased buy-in and understanding of risks and opportunities.	▪ Limited Participant Input on Vision: Problems, vision or other key goals are set by the team core and consultants without robust community and stakeholder participation or dialogue about future options.
Chapter **5** Bring Together Shared Solutions	▪ Solutions Driven By Shared Vision: Adaptation solutions are designed by consultants and engineered based on technical feasibility, cost and input from stakeholder visioning and include solutions that represent community values for short-term solutions and long-term options.	▪ Solutions Driven by Technical Considerations Alone: Adaptation solutions are designed by consultants and engineers based on technical feasibility and cost alone without explicit consideration for community concerns, values and visioning, or cultural, institutional, or financial limitations.
Chapter **6** Pathways Approach to Implementation	▪ Distributed Responsibility for Implementation: Government, communities, and stakeholders take on different responsibilities for implementing adaptation based on their authorities and expertise. ▪ Agreements for Coordinated Actions: Memorandum Of Understandings (MOUs), Community Benefits Agreements or other documents are created to ensure adaptation outcomes align with community values.	▪ Government Expected to Do All Implementation: Government is seen as solely responsible for implementation of all actions, which is likely not comprehensive due to lack of land ownership or authority across entire shorelines. Actions may not be supported by the community because they have not felt included in the process. Negative impacts to communities may result due to uncoordinated processes and lack of involvement in creating collaborative solutions.

Table 2 · Characteristics of Equitable Vs. Inequitable Adaptation Planning. Concepts in this table have been adapted from the work of Phoenix Armenta, West Oakland Environmental Indicators Project (WOEIP), Nahal Ghoghaie, BCDC, and interpreted into how they are embedded in the Adaptation Roadmap.



Integrative Plans, People, and Processes

It may often feel as though the complexity of adaptation (see Challenges of Sea Level Rise Adaptation) means that solving the challenges requires many new efforts, projects, and processes. While in certain cases that may very well be true, throughout the various chapters and sections of the Adaptation Roadmap, we suggest getting into the mindset of always starting first with where you are and what opportunities you currently have. If there are opportunities to build on the work you're already doing, the relationships you have, or the processes you've created, find opportunities to integrate. If that is not the best option, then consider how any new things added work alongside or within your efforts.

Learning from Existing Practices and Processes

For example, adaptation planning is often touted as a "new" planning process – yet fundamentally, adaptation planning builds upon other types of planning, with added complexities and opportunities. Some of the differences with traditional planning may include having a narrower (or topic-specific focus) and perceived "final planning state". Adaptation planning, on the other hand, is more likely to be a continuously evolving process because there is no single "end state" that can be predicted. Instead, we must respond continuously to changing conditions.

However, there is value in bringing in traditional planning practices and other disciplines. There is a lot we can learn from other fields of study when it comes to creating inclusive, equitable processes for decision-making in the face of uncertainty. These include the fields of hazard and resiliency planning (earthquakes, wildfires, fluvial flooding), sustainable development planning, natural resources and water management, insurance and risk analysis, equity planning and more. To some extent, elements of these processes are embedded in this guidance document.

Building Upon Existing Relationships Where Possible But Make Time To Build New Relationships

The concept of integrating existing efforts goes beyond planning and also extends into how we work with other people, both those we already know and when seeking to form new relationships. The sections on Collaborative Multi-Sector Adaptation, Equitable Community-Driven Planning, and creating participation strategies in Chapter 2: Center People in Decision-Making provide greater detail on putting this concept into practice. Similar to other streamlining and integration efforts, start conversations and build upon relationships you already have. However, if there are new relationships you are trying to build, spend more time on those relationships and work to build long-lasting partnerships. Relationships are a powerful way to create innovative solutions and shared ownership for implementation.

Distributing Information Across Plans, People, and Processes for Effective Implementation

One of the challenges – and needs – of sea level rise adaptation is distributing relevant and consistent information about both the risks and adaptation solutions across the varying array of planning documents, governments, sectors, and processes necessary to address the scale of the problem. Throughout the Adaptation Roadmap, we suggest identifying appropriate ways to disseminate and share information about adaptation. In Chapter 6: Pathways Approach to Implementation, we specifically discuss how adaptation solutions may need to exist both centrally, and across plans, people and processes.

> The Adaptation Roadmap builds upon and brings together critical resources that enhance robust planning and outcomes for sea level rise adaptation.

Take the time to integrate documents, as well as other's expertise and experience whereever possible is critical to sustain adaptation over time.

Flexible Approach for Decisions Over Time

In addition to the challenge of involving multiple people with different perspectives and interests is the reality that the future is inherently uncertain, and the severity of long-term climate change impacts depends largely on future social decisions we have yet to make.

While sea level rise is already observed and accelerating[1], the range of long-term impacts within this century and beyond depend on current and future policy or regulatory decisions and society's capacity to reduce the drivers of climate change. Given the unclear extent of sea level rise for any particular time frame or planning horizon, some people are choosing to focus only on shorter-term, temporary solutions, or have not yet started adaptation efforts at all. Yet, we do have tools at our disposal to plan flexibly in discrete steps over time.

Taking An Adaptation Pathways Approach

A promising approach to the challenge of making decisions under deep uncertainty are *adaptation pathways*. This refers to an approach in planning where strategies, made up of individual actions, are broken up into a sequence of manageable steps with specific "decision points" that support the ability to take shorter-term actions with longer-term alternative futures in mind[2].

It can be contrasted with a traditional planning approach, which follows a "predict-and-plan" method that plans for a single "most probable" future[3]. Alternatively, an adaptation pathways approach embeds a more flexible process towards decision-making under future uncertainty by staggering actions and decisions to maintain flexibility.

Adaptation pathways provide a useful framework for considering broad, long-term potential impacts with a suite of options, while enabling focus on near-term manageable actions that may be "low/no regrets" or "low-hanging fruit" strategies that can be implemented today, without limiting potential longer-term strategies. While adaptation pathways were pioneered in the water management sector in the Netherlands[4], the approach has been expanded across a variety of sectors, including climate change adaptation.

Adapting to Adaptation As You Go

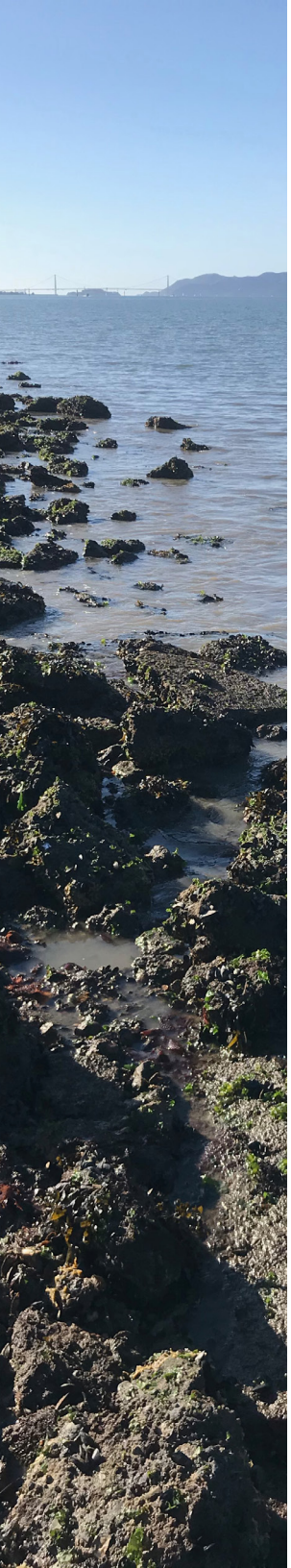
In addition to using an adaptation pathways approach for planning, the Adaptation Roadmap encourages practitioners and participants to keep an open mind throughout the adaptation effort and be willing to change course, adjust the timing, schedule, or process as needed to reflect your conditions and situation. This concept was identified in Setting Expectations, but it cannot be emphasized enough that creating a new, equitable, collaborative and integrative approach to addressing sea level rise challenges over time will not be easy and will require innovative and flexible thinking across various parts of your adaptation effort.

Instead of worrying about changes that might result from including a broad range of communities and stakeholders, for example, consider how to embrace new ideas as they come. Be flexible in your approach to adaptation, and in your reactions to information and ideas as they arise.

> The Adaptation Roadmap elevates key components of the adaptation pathways approach and encourages flexible and creative thinking to support new ideas and innovative solutions.

Just as natural habitats change over time to reflect their conditions, we must also be flexible in our approach to planning and solutions. Photo of Suisun Marsh by BCDC.

1 NASA. (2021, July). *Sea Level*. Global Climate Change Vital Signs of the Planet. https://climate.nasa.gov/vital-signs/sea-level/
2 What Is a Pathways Approach to Adaptation? | CoastAdapt."
3 CalOES, "California Adaptation Planning Guide." Appendix B: Adaptation Pathways: An Overview
4 Haasnoot et al., "Dynamic Adaptive Policy Pathways."



iii. Using the Adaptation Roadmap

Each chapter of the Adaptation Roadmap is designed to provide curated resources to help you achieve your adaptation outcomes. Within each chapter, there are different resources that are organized thematically and also build upon one another. Each subsection of a chapter can be used in part or in whole.

Should the Adaptation Roadmap Be Your Starting Point?

Before you advance further into this work, it is important to know if this is the right resource for you The Adaptation Roadmap fills a gap in adaptation planning – namely, how to get to *why* a community chooses certain adaptation actions over others. This means that the Adaptation Roadmap is suitable to those who have already conducted some level of sea level rise vulnerability assessment work. Ask yourself:

- Do you have a **vulnerability assessment** completed at a city or county scale?
- Do you want to include or **focus on sea level rise adaptation** within your effort?
- Do you want to (and are ready to) move beyond a vulnerability assessment and **get to decision-making and adaptation solutions?**

If you said yes to all of these, this resource is probably right for you!

If you said no, consider other resources that provide the appropriate level of detail and guidance on conducting a sea level rise vulnerability assessment, such as the Adapting to Rising Tides (ART) Planning Approach, or multi-climate hazard process, such as the California State Adaptation Planning Guide 2.0.

Organization of Concepts and Outcomes

Depending on where your community is starting from, you might find that it makes sense to start from the Adaptation Roadmap "beginning" to "end". Alternatively, you might find that certain chapters are more useful to you than others. The Adaptation Roadmap can be used in two ways:

1. **A process you can work through (somewhat) linearly.** This linear approach is well suited for those looking to initiate an adaptation planning process that is likely to result in an "adaptation plan". It is important to emphasize that adaptation is dynamic and repetitive by nature. While there is a linear flow to these chapters, it is likely that you'll have to return to previous chapters as new information unfolds. A key benefit to using the Adaptation Roadmap in this way (sequentially) is that the information and corresponding workbooks (2 – 6) are designed specifically to help you record key pieces of information as you go and build upon that information in following sections.
2. **A repository of information and concepts grouped by key adaptation components thematically.** This thematic approach is well suited for those looking to augment their existing adaptation efforts or access information about adaptation topics more easily and flexibly.

The good news is that **Chapter 1 (and Workbook 1)** is designed to help you figure our your starting point and the best way to use the resources within the Adaptation Roadmap to get to the outcomes you want to achieve. The remaining **Chapters 2 – 6 (and Workbooks 2 – 6)** provide different types of information about key concepts to consider as you create your sea level rise adaptation effort.

See Figure 5 for details on what you will find within each Chapter and section of the Adaptation Roadmap.

Navigating the Adaptation Roadmap

The Adaptation Roadmap *brings together key concepts and resources* that can be used by different people at different parts of their sea level rise adaptation effort.

The intention of the Adaptation Roadmap is to help diverse stakeholders reivew, understand, and work together towards a shared approach to sea level rise adaptation.

In the following two pages, explore the content and concepts within the Adaptation Roadmap (Figure 5-1 and 5-2).

Each chapter has a workbook that can be downloaded and used alongside the chapter to document and record key outcomes that will be used to inform subsequent parts of adaptation.

Chapter 1: Build Your Adaptation Roadmap

1.1 Assess Your What and Why
1.1.1 Adaptation Outcomes
1.1.2 Initial Lead
1.1.3 Motivations and Opportunities
1.1.4 Key Barriers

1.2 Assess Your Issues and Scale
1.2.1 Foundational Studies
1.2.2 Connected Issues
1.2.3 Sea Level Rise and Flooding Science
1.2.4 Scale

1.3 Assess Your Capacity and Resources
1.3.1 Government Capacity
1.3.2 Community Capacity
1.3.3 Stakeholder Support
1.3.4 Resources and Funding

1.4 Use Workbook 1 Outcomes

- ✓ Your Strengths and Opportunities
- ✓ Your Challenges to Address
- ✓ Your Adaptation Roadmap

Chapter 2: Center People in Decision-Making

2.1 Managing the Adaptation Process
2.1.1 Build Your Core Team
2.1.2 Early Engagement With Key Partners
2.1.3 Consultants in Adaptation
2.1.4 Roles and Responsibilities

2.2 Exploring and Identifying Who Has Input in the Adaptation Process
2.2.1 Stakeholder Groups and Goals
2.2.2 Audiences Involved and Why
2.2.3 Identify and Map Populations
2.2.4 Assess Relationships for Participation

2.3 Determine Structures for Participation and Decision-Making
2.3.1 Participatory Engagement
2.3.2 Types of Participation Structures
2.3.3 Decision-Making Process
2.3.4 Types of Networks and Agreements

2.4 Effective Communications Techniques
2.4.1 Communications Approach
2.4.2 Connect to Values
2.4.3 Make it Relatable
2.4.4 Frame the Message and Delivery

2.5 Use Workbook 2 Outcomes

- ✓ Management Team
- ✓ Co-Created Participation Plan(s)

Chapter 3: Set Local Context and Sense of Place

3.1 Align Local and Regional Plans or Processes
3.1.1 Vulnerability Assessment
3.1.2 Local Plan Alignment
3.1.3 Neighboring or Regional Alignment

3.2 Integrate Community Values
3.2.1 Build Upon Community Initiatives
3.2.2 Connect to Local Knowledge
3.2.3 Stories of Place

3.3 Incorporate Environmental and Physical Characteristics
3.3.1 Value of Nature
3.3.2 Projects and Infrastructure
3.3.3 Shoreline Planning Units

3.4 Frame Discussion for Uncertain Futures Using Adaptation Pathways
3.4.1 Conceptual Framing
3.4.2 Thresholds
3.4.3 Triggers and Monitoring
3.4.4 Planning Horizons

3.5 Use Workbook 3 Outcomes

- ✓ List of Plans to Align
- ✓ Local Stories of Place
- ✓ Nature-Based and Physical Considerations
- ✓ Shoreline Planning Units
- ✓ Planning Horizons

Figure 5-1 · Details of the Adaptation Roadmap. Chapters 1 through 3 serve to set the foundations for sea level rise adaptation by gathering existing resources, centering people and equitable decision making across the process, and building upon local opportunities and considerations.

Chapter 4: Shape a Shared Vision of the Future

4.1 Define the Problem
4.1.1 Risk Tolerance and Perception
4.1.2 Current Decision Context
4.1.3 Shared Problems to Respond To

4.2 Determine What Success Means
4.2.1 Vision
4.2.2 Guiding Principles
4.2.3 Evaluation Criteria

4.3 Explore What the Future Can Look Like Through Scenario Planning
4.3.1 Scenarios as a Pathways Tool
4.3.2 Strategic Approaches
4.3.3 Scenario Planning Parameters
4.3.4 Conducting and Summarizing

4.4 Discuss Outcomes and Expectations
4.4.1 Raising Difficult Topics
4.4.2 Future Decision Context
4.4.3 Advancing Scenarios

4.5 Use Workbook 4 Outcomes

- ✓ Vision and Guiding Principles
- ✓ Scenarios to Advance

Chapter 5: Bring Together Shared Solutions

5.1 Explore Actions to Meet Envisioned Futures
5.1.1 Actions and Strategies
5.1.2 Adaptation Action Types
5.1.3 ART Adaptation Catalog

5.2 Creating Bundled Strategies That Work Together
5.2.1 Starting With the End in Mind
5.2.2 Linking Plans and Programs
5.2.3 Connecting to People
5.2.4 Paying for Adaptation

5.3 Phasing and Sequencing Strategies Over Time
5.3.1 Action Lifespan and Time Horizons
5.3.2 Sequencing and Lead Times
5.3.3 Applying Triggers and Decision Points

5.4 Evaluating Tradeoffs and Making Decisions
5.3.4 Visualizing Adaptation Pathways
5.4.1 Share Results and Apply Criteria
5.4.2 Additional Evaluation Approaches
5.4.3 Make Decisions on Adaptation

5.5 Use Workbook 5 Outcomes

- ✓ Sets of Adaptation Strategies for Short, Medium, and Long-Term

Chapter 6: Pathways Approach to Implementation

6.1 Link Strategies to Outcomes
6.1.1 Creating (Or Connecting To) Plans
6.1.2 Connecting Processes and Projects
6.1.3 Connecting People

6.2 Advance Near-Term Strategies
6.2.1 Order of Implementation
6.2.2 Implementation Work Plan
6.2.3 Sustaining Momentum

6.3 Prepare for Changes Over Time
6.3.1 Monitoring and Tracking
6.3.2 Reacting to Changes
6.3.3 Love Letter to the Future

6.4 Use Workbook 6 Outcomes

- ✓ Adaptation Plan (or Document)
- ✓ Implementation and Monitoring Approach

Figure 5-2 · Details of the Adaptation Roadmap (Continued). Chapters 4 through 6 use the information gathered in the first three chapters to look forward together by creating shared principles, matching adaptation solutions to community's vision for the future, and distributing responsibility for adaptation outcomes across communities and stakeholders involved.

Using the Adaptation Roadmap Flexibly

While the Adaptation Roadmap can be used in order from Chapter 1 through Chapter 6, the resources within can also be used dynamically in the order that meets your needs. Even if moving through in order, adaptation is messy and complicated, and there will likely be re-visiting of previous chapters as new information unfolds, and using resources in more than one chapter at once.

Earlier, we identified a Range of Adaptation Outcomes, which can include conducting a planning process, but can also include other outcomes such as conducting community engagement and education, meeting state plan mandates, completing a project, or multiple of these.

Figure 6 provides an example of how differently Chapters of the Adaptation Roadmap might be used to support different kinds of adaptation outcomes that best meet your needs.

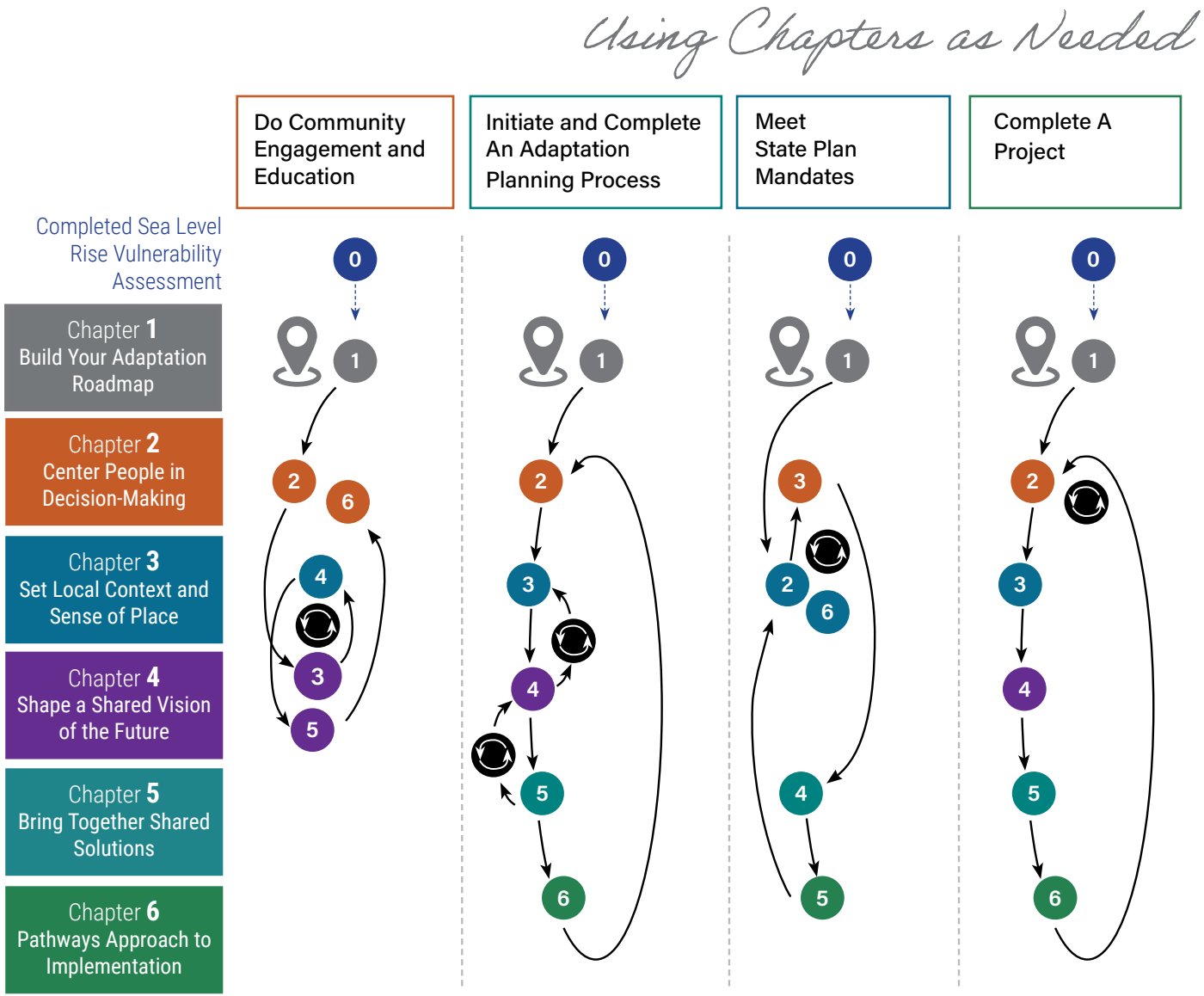


Figure 6 · Flexible Uses of Adaptation Roadmap. Four examples above illustrate how chapters of the Adaptation Roadmap can be used in slightly different orders depending on your outcomes. In all cases, there should already be a vulnerability assessment completed that includes sea level rise impacts. The numbers in the graphic above refer to examples of the different orders someone might take across chapters to achieve different outcomes, with the black circular arrows representing the repetition and re-visiting of chapters. Regardless of your outcome, it is recommended to start with Chapter 1 and then move through additional chapters in an iterative way. Often, moving forward may require you to take a step back.

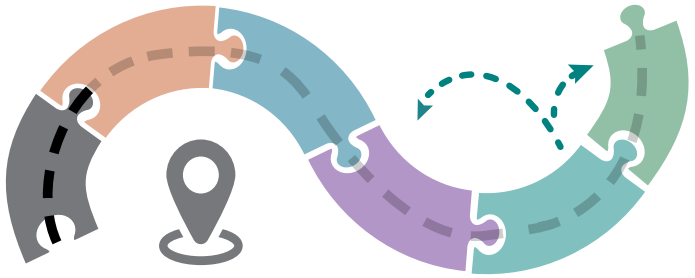
CHAPTER 1

Build Your Adaptation Roadmap

Chapter 1 is a self-assessment to help you figure out your starting point and how to use these resources to build your roadmap.

Chapter 1

Build Your Adaptation Roadmap



What Will You Find in This Chapter?

This chapter is designed be used with Workbook 1, in which you will review the information, write your responses, and use that information to determine what sections of the Adaptation Roadmap to read and review. Given the size of this document, it is not expected that someone will use all of the resources in this Roadmap at once.

Chapter 1 is about figuring out where you are starting from, where you want to go, and how the Adaptation Roadmap can help you get there.

Details in this chapter include understanding who you are and what opportunities or barriers you might have, assessing the issues and scale to consider adaptation efforts, and assessing your resources and funding to understand where you are starting from and how you can shape this effort to get you where you need to go.

Who is This Chapter For?

Anyone considering initiating or leading an adaptation process – whether you are from a local government, NGO, private sector, special district, utility, or more. If you are curious and wondering if you're in a position to kick off an adaptation process, this is the place to start! The outcome of this step will be to Build Your Adaptation Roadmap so that you can access the resources you need. **Whether you know what you want to get out of adaptation or not, Chapter 1 is the place to start.**

What Outcomes Will This Get You?

Download Workbook 1 and use it as a place to track your responses from this Chapter as well as provide additional information on how to Build Your Roadmap. Outcomes includes the following:

- **Strengths and Opportunities:** List to share with others;
- **Challenges to Address:** List to share with others; and
- **Your Roadmap:** Sections to use in the Adaptation Roadmap.

1.1 Assess Your What and Why

1.1.1 Adaptation Outcomes
1.1.2 Initial Lead
1.1.3 Motivations and Opportunities
1.1.4 Key Barriers

1.2 Assess Your Issues and Scale

1.2.1 Foundational Studies
1.2.2 Connected Issues
1.2.3 Sea Level Rise and Flooding Science
1.2.4 Scale

1.3 Assess Your Capacity and Resources

1.3.1 Government Capacity
1.3.2 Community Capacity
1.3.3 Stakeholder Support
1.3.4 Resources and Funding

1.4 Use Workbook 1

Download Workbook 1

1.4 Use Workbook 1 Outcomes

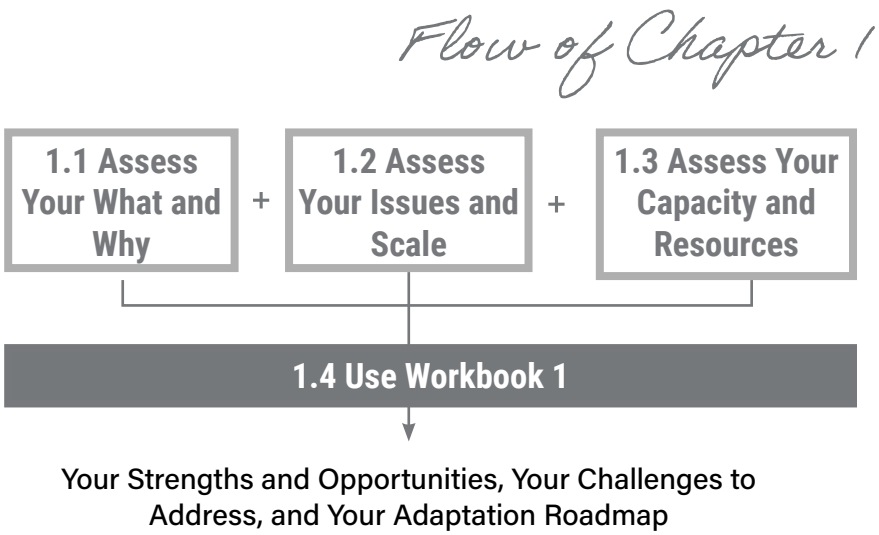


Figure 7 · Three Key Outcomes of Chapter 1. Chapter 1 provides an opportunity to gather existing resources and baseline information to help you understand how to advance your adaptation effort.

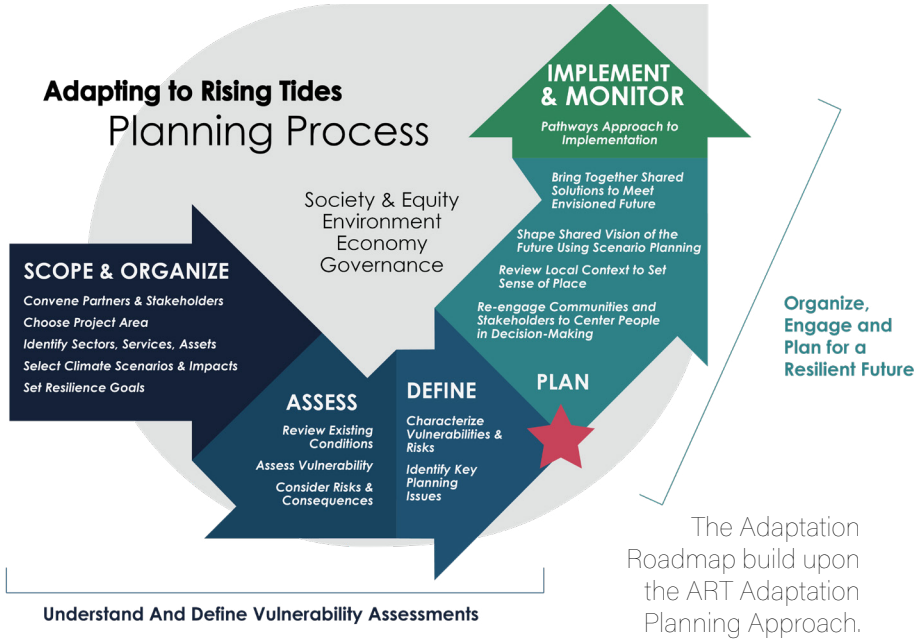
Checklist for Chapter 1

Is this chapter for you? Explore the following questions to navigate to where you need to go. See Chapter 1 outcomes in Figure 7.

- ✓ Do you know what you're trying to achieve? > 1.1.1 Adaptation Outcomes, 1.1.2 Initial Lead
- ✓ Do you know what's driving the interest adaptation? > 1.1.3 Motivations and Opportunities
- ✓ Do you know what's your largest barriers to adaptation? > 1.1.4 Key Barriers
- ✓ What other efforts and issues will adaptation build upon? > 1.2.1 Foundational Studies, 1.2.2 Connected Issues, 1.2.4 Scale
- ✓ Are you using the most updated science on flooding? > 1.2.3 Sea Level Rise and Flooding Science
- ✓ Do you have the capacity to do adaptation planning efforts? > 1.3.1 Government Capacity, 1.3.2 Community Capacity, 1.3.3 Stakeholder Support
- ✓ Do you have resources and funding to initiate this effort? > 1.3.4 Resources and Funding
- ✓ Do you know how to use the Adaptation Roadmap resources? > 1.4 Use Workbook 1 Outcomes

1.1 Assess Your What and Why

This section will dive deeper into what adaptation outcomes to consider in adaptation, who can initiate or lead the process, how to identify key motivations and opportunities as well as important barriers. You can navigate to the details in each section below:



Use This Section to Get Your Effort Started

Sea level rise adaptation should build upon existing work and assessments and bring together previous stakeholders and partners that have already been engaged in this topic.

If there is no existing vulnerability assessment on sea level rise in your area, this resource is not for you! See the California State Adaptation Planning Guide or Adapting to Rising Tides (ART) Planning Approach if you are just beginning a sea level rise or multi-hazard climate vulnerability and adaptation effort.

For those familiar with the ART Planning Approach, the Adaptation Roadmap specifically picks up following the "Define" stage of planning, *after* the completion of a sea level rise vulnerability assessment. This resource acknowledges that conducting vulnerability assessments is an intensive process and in many cases, there is a time lag in between the vulnerability assessment being completed and a new effort to advance sea level rise adaptation, or in other words, *to make decisions* about what to do about the vulnerabilities identified. At the same time, not every vulnerability assessment is done in the same way or includes the same information.

Every community is starting from a different place with different initial local considerations and opportunities. This section is designed to help you pick up the pieces of existing climate work to help you organize an approach to move forward. Throughout Chapter 1 and the entire Adaptation Roadmap, you will build upon your existing sea level rise vulnerability assessment and other resources as a starting point, while working through concepts in the Adaptation Roadmap to advance collaborative, equitable, integrative, and flexible sea level rise adaptation.

1.1.1 Adaptation Outcomes

What Do You Want to Do?

There is *a reason* you are starting this adaptation work at this moment in time. Understanding ***what you think you want to do*** is essential for figuring out how to use the Adaptation Roadmap. For a list of ideas and examples, see What Can Adaptation Look Like? Consider what outcome(s) you'd like to achieve:

- Planning
- Education/Awareness
- Capacity Building
- Project
- Learn about Adaptation
- Unsure

For example, do you already know that you're interested in planning outcomes? This might include updating your General Plan to meet California State mandates SB 379 (Safety Element) or SB 1000 (Environmental Justice Element)? Maybe instead you want to focus on capacity building or community awareness and education outcomes, such as learning how your city, county, or community can take small, but important steps toward adaptation and resilience? Maybe you have a specific project in mind and want to integrate and build adaptation and resilience into an existing project?

It could be one, or more, of those things. Or maybe you don't have a specific outcome in mind at all and are using this resource to help determine what outcomes make sense for your community. Keep in mind these outcomes are starting points. They will shift and evolve as you begin engaging with communities and stakeholders in your work, which is explored further in Chapter 2: Center People in Decision-Making.

Use Worksheet 1A to list your adaptation outcome(s).

1.1.2 Initial Lead

Who Can Initiate or Lead the Process?

If you are interested in adaptation and passionate about preparing your community for sea level rise, you can play a critical role in the process, no matter who you are. Sometimes one of the most important things that can happen is *getting the ball moving* by raising the issue and creating opportunities for others come on board. Consider who you are or who you represent and think about what opportunities or unique perspective it brings you:

- City or County Government Staff
- Elected Officials
- Non-Governmental Organizations (NGO) or Community-Based Organizations (CBO)
- Wastewater Treatment Districts or Other Special Districts

It is often assumed that a government entity (like a city or county) is responsible for *initiating* sea level rise adaptation. While government entities are critical to be involved with other partners (more on this in 2.1.1 Build Your Core Team), they do not always have to initiate or solely lead a process. Adaptation can be initiated by non-traditional leads, such as non-governmental organizations (NGOs), community-based organizations (CBOs), special districts, and more.

Since adaptation efforts should build upon previous vulnerability assessments there should already be individuals in your city, county or community with expertise on this topic. You'll have a chance to list those individuals in 1.3 Assess Your Capacity and Resources and consider the importance of forming early relationships in 2.1.2 Early Engagement With Key Partners.

Use Worksheet 1A to list who you are.

Non-Government Organizations Initiating Adaptation

Sustainable Solano is a non-profit initiating sea level rise adaptation efforts in Suisun City through their Resilient Neighborhoods Program, while the Watershed Project supported government agencies as a driving force in conducting community-led visioning for sea level rise in North Richmond.

1.1.3 Motivations and Opportunities

What's Driving the Reason(s) for Adaptation?

Different communities face different challenges and take advantage of different opportunities when it comes to adaptation planning. What's driving your community or colleagues to raise this issue? **Think of this as the *beginning* of a story – one that should change and grow as you engage with more people.** Be specific and also consider what is most compelling, such as:

- Existing county or city-scale vulnerability assessment
- Local community interest or concern (e.g. meeting, article)
- Local efforts or activities (e.g. community, development)
- Local elected official or champion
- State mandate (it's a reason!)
- Insurance or regulatory change
- Flooding event or stressor (e.g. lived experience)
- Funding opportunity

Motivations can be directly connected to the outcomes you want to achieve – for example, if your outcome is an updated plan, the motivation may be a state mandate. It might strange to think of a state mandate, alarming news article or major development project as an "opportunity." Yet, if it helps bring people into the conversation, it can be part of your story. Use this as a space dig a little deeper. What's special and unique about where you live? What matters to the communities you serve? What's driving you and what opportunities do you have right now?

It's valuable to start building a narrative and story to support communications throughout the process. Knowing how your story "starts" by listing what brought you to this point will be helpful later when it comes to having conversations with communities and stakeholders and even applying for funding List the key reasons or motivations that brought you to this point.

Use Worksheet 1A to list motivations and opportunities.

1.1.4 Key Barriers

What Should Be Addressed In This Effort?

There are many challenges in adaptation (we listed a bunch in Why is Adaptation so Challenging?) – but instead of listing every possible barrier or issue you can think of, consider what challenges or issues are specific to your community and *why.*

These could be anything from a lack of government leadership to prioritize adaptation, staff resources to do the work, public understanding about the impacts of sea level rise, patchwork of private and public ownership along a shoreline, etc. As you are considering your local challenges or barriers, ask yourself how they might actually be part of your adaptation effort.

For example, resources and staffing may be significant barriers to doing this work – maybe you have too few staff who are already doing too much work. This might be a good reason to advocate for new permanent positions, integrate sea level rise into existing duties and programs, and distribute responsibility for sea level rise beyond one agency, department or organization. Consider how you might be able to flip barriers into opportunities (you can find ideas for this in the How Can Sea Level Rise Be an Opportunity?)

Ask yourself how do you feel about this work, and then list the barriers that feel like they might stand in the way of progress so that they can be considered upfront and addressed as part of building your adaptation roadmap.

Barriers to Adaptation in the Bay Area

A 2021 survey of Sea Level Rise Adaptation Progress, Gaps and Needs by BCDC's Adapting to Rising Tides program found that **92%** of respondents cited insufficient staff and funds to plan and prepare for sea level rise, another **55%** had unmet staffing needs, and almost **two-thirds** indicated a lack of state legislation to provide direction as another key barrier to adaptation.

Use Worksheet 1A to list these key issues you are concerned about.

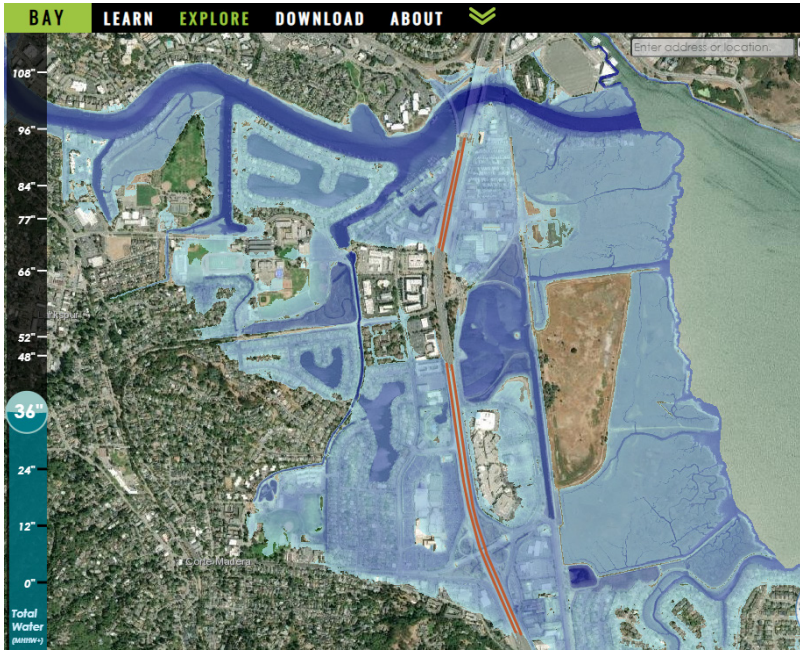
1.2 Assess Your Issues and Scale

This section will dive deeper into what foundational studies you might want to build upon, what other issues may be connected to sea level rise, how updated science can be understood and used, and what scale(s) to consider. You can navigate to the details in each section below:

Use this Section to Collect Key Details

Part of figuring out how to move sea level rise adaptation efforts forward is bringing together existing foundational studies, such as the sea level rise vulnerability assessment, or other climate hazard work, which can help you understand what other connected issues may be relevant to bring into a sea level adaptation effort.

At the same time, it is essential to consider the most updated state of the science on flooding – from sea level rise to fluvial, or riverine, flooding, shallow groundwater rise, and more – to understand if the studies you are building upon reflect current information or if additional updated analysis needs to occur. Sea level rise projections from climate change is a dynamic field of study. The question is not *if* sea levels will rise, but *how quickly*.



An example of flooding impacting the transportation sector. Screenshot from the Adapting to Rising Tides Bay Shoreline Flood Explorer.

While the Adaptation Roadmap presents an adaptation pathways approach to planning that embeds uncertainty and planning flexibly for sea level rise, understanding the most recent science on sea level rise is essential to ensure you are making the most informed decisions possible.

All of this information helps you understand at what scale, or scales, of planning and adaptation to consider. While this may change or be adjusted as you move further into the adaptation planning process, it will be helpful to start with a scale in mind that reflects these foundational studies, connected issues, and sea level rise projections.

1.2.1 Foundational Studies

What Are You Building Upon?

It is important to gather and organize foundational studies, reports, and/or plans in one place so that they can be used and leveraged. This is *not* to say every single study or related resource should be identified now (there is an opportunity for this in 3.1 Align Local and Regional Plans or Processes), but instead consider *key* documents that can be the backbone needed to kick things off the ground. Key foundational documents include:

- City or County Vulnerability Assessment
- General Plan or Safety, Housing, etc. Element(s) Update
- Local Hazard Mitigation Plan Update
- Community Plan(s)
- Other Relevant Key Studies/Reports/Efforts

Which resources are considered "foundational" to your adaptation effort might look different depending on what efforts have already happened in your community. Take the time to consider and list what you see as critical plans, studies or documents that this effort should build upon. For each document, list the name, authors, date completed (or if it's in progress), and other important identifying information, such as what sea level rise projection data was used, other flooding sources such as fluvial, riverine, or groundwater flooding, and other baseline information.

It can be challenging to connect information and data across different reports, particularly as data changes over time (such as in 1.2.3 Sea Level Rise and Flooding Science). However, putting in this effort upfront can be useful to ensure productive conversations moving forward. Having a list of these key studies and information will be helpful for ensuring you are bringing the right partners into the process, and having productive conversations, and is often needed for grants and funding.

> Use Worksheet 1B to list these foundational studies or plans and relevant details.

1.2.2 Connected Issues

What Other Issues Need to Be Included?

One of the key pillars of the Adaptation Roadmap is ensuring Integrative Plans, People, and Processes in adaptation. This means intentionally considering how you can unite, combine or fold in other related issues into the conversation on sea level rise issues and solutions. The benefits of this include streamlining and consistency across plans and potentially the identification of solutions that with multiple different benefits (multi-benefits).

Sea level rise impacts can cross sectors, scales and issues. Based on the information you've already gathered, consider if any other issue should be integrated into this work. This does not have to be exhaustive. Instead, think about these issues as they relate to your local context. These issues could include:

- Housing
- Transportation
- Public Health
- Safety/Emergency
- Environmental Health
- Economic Health
- Hazardous Materials
- Food Security
- Education
- Other Climate Hazards
- Public Access and Open Space

Additionally, separate out issues that area "must-haves" to be integrated, versus issues that would be "nice-to-have" integrated, but might be beyond the scope at this time.

> Use Worksheet 1B to list issues that should be integrated into this work and issues that would be great to include if possible.

1.2.3 Sea Level Rise and Flooding Science

How Do We Ensure We're Using Updated Data?

Sea level rise is one of many types of flooding impacts occurring due to climate change, with other flooding sources including fluvial/riverine and shallow groundwater rise (definitions on page 27). As the underlying science, data and modeling of these impacts changes, it is essential to review the flooding sources used in the 1.2.1 Foundational Studies to determine if notable changes have been made in predicted scenarios since the creation of those plans and reports. Consider what flooding sources and data were used, and note what data was *not* included in foundational studies, such as:

- Sea level rise projections (e.g. CoSmoS, ART, etc.)
- Storm surge
- Fluvial/riverine flooding
- Shallow groundwater rise
- Shoreline erosion
- Subsidence

Initiating an adaptation process should always incorporate the best available science, regardless of the science used and available at the time when creating the building blocks, such as a vulnerability assessment or general plan update.

Do foundational studies reflect the most updated science?

Scientists continue to refine models of sea level rise projections based on potential ice loss and warming scenarios to determine *how much* and *how quickly* sea levels are likely to rise over the next century or so. **It is possible and likely that the scientific guidance relied upon for your sea level rise vulnerability assessment or other foundational study may no longer reflect the most current and accepted available resource.**

> Note: Given the uncertainty in the rate and severity of future climate impacts, the Adaptation Roadmap embeds using a **Flexible Approach for Decisions Over Time** through adaptation pathways, which are explored and applied throughout this resource.

New guidance on sea level rise projections or flood data may not automatically compel an update to a vulnerability assessment or other foundational study, but should be considered and utilized in any new analysis of future options.

If it is determined that key studies have *not* used the most updated sea level rise science or additional flooding sources that should be incorporated, this is the time in the process to elevate this issue and incorporate how to do additional analysis of new flooding information as part of advancing your adaptation effort.

This new flooding information may impact what 1.2.2 Connected Issues need to part of the adaptation effort in order to ensure adaptation solutions do not exacerbate existing issues but instead seek to find shared benefits.

Do foundational studies use the same underlying data across studies and neighboring jurisdictions?

Another important consideration when evaluating updated science in your foundational studies is comparing what data exists across your studies and if those are consistent, as well as if the science is comparable or consistent across jurisdictions. While there is more discussion of working with neighboring jurisdictions in 2.1 Managing the Process and 3.1 Align Local and Regional Plans or Processes, starting to note your data sources now will be useful in future conversations.

Use Worksheet 1C to indicate flooding science and sources used in Foundational Studies.

Updated Sea Level Rise Projections

At the time of this publication in March 2022, updated science includes the National Climate Assessment, California Climate Change Assessment and the State of California's Sea Level Rise Guidance. See the **Resources for Chapter 1** for additional resources.

Sea Level Rise Flood Viewers

Two key sea level rise viewers include the Adapting to Rising Tides (ART) Bay Shoreline Flood Explorer and the USGS Our Coast, Our Future viewer. Sea the Future is a tool to help compare these different viewers in California.

1.2.4 **Scale**

What's the Largest Scale to Consider?

There are varying scales at which adaptation can occur and it is likely that any given adaptation effort will consider various different scales in their process (Figure 8). Review the scale and scope of the sea level rise vulnerability assessment identified in 1.2.1 Foundational Studies as a place to start. You can have more than one scale (you might even consider all of them). These include:

- County-wide
- City-wide
- Neighborhood
- Specific Shoreline/Shoreline Reach
- Individual Asset
- Multi-jurisdictional
- Operational Landscape Units (OLUs)

How can there be many different scales to consider?

For example, there might be one scale to consider the extent and severity of sea level rise flooding *impacts*, which might be different than the scale at which you identify individual adaptation *solutions*. It also will depend on the type of adaptation solutions you will explore in Chapter 4: Shape a Shared Vision of the Future and Chapter 5: Bring Together Shared Solutions. Some adaptation actions and strategies may need to occur city or county wide, like zoning map changes, building codes, or other policies, while others might occur at a particular shoreline, such a flood protection projects, while some actions may occur within an individual neighborhood, such as community programs.

Additional details on different scales are provided in later sections. In 3.3.1 Value of Nature the use of Operational Landscape Units are described in further details, while 3.3.3 Shoreline Planning Units provides more information on defining the smaller shoreline scales or reaches in sea level rise adaptation.

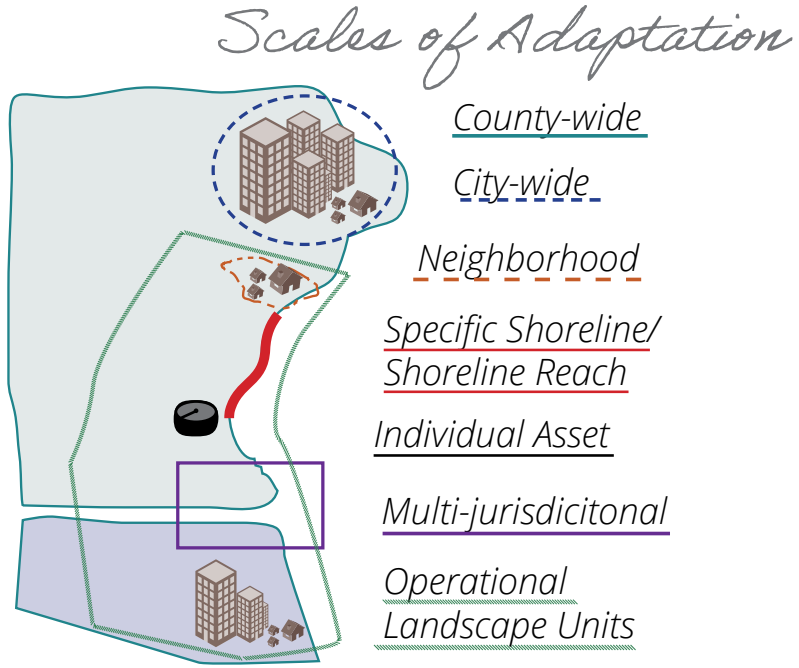


Figure 8 · Scales of Sea Level Rise Adaptation. Adaptation can occur at many different scales, at this point it may be helpful to identify the largest scale to consider to inform your planning.

Conversations about adaptation solutions will occur with communities and stakeholders throughout this process, so the intention now is to consider the *largest scale* at which you think this effort should include. Many planning efforts will likely be at least at the city or county-wide scale, as that is where jurisdictional control happens. However, this is an important section to consider if there is also a larger scale to incorporate, such as cross-jurisdictional.

Scale influences the breadth and depth of the process. This includes which communities and stakeholders are involved, what resources, budget, and timelines may be needed, and the use and applicability of adaptation pathways (see Flexible Approach for Decisions Over Time).

Use Worksheet 1C to list potential scales.

1.3 Assess Your Capacity and Resources

This section will dive deeper into exploring what people you may already have the support and capacity from, as well as where you have missing expertise and capacity across government, communities, and private sectors. Additionally, this section will help you describe what resources you have and what may be needed. You can navigate to the details in each section below:

Use this Section to Determine If You Are Ready

Knowing your starting point means more than just understanding the desired outcomes, motivations, barriers, interconnected issues, foundational studies, and scales. All of this work depends on understanding what capacity of people – governments, communities, and private sectors – are available to move this work forward. At the same time, it is essential to understand what financial or other resources are necessary to even begin a sea level rise adaptation planning effort.

Like all sections of Chapter 1, the following pages are meant to provide an assessment of where you are. It may be particularly helpful and important here to review the Introduction sections for Collaborative Multi-Sector Adaptation and Equitable Community-Driven Planning.

A community based organization called Nuestra Casa, in East Palo Alto, has been developing community programs to train residents on climate and environmental justice. Photo by Nuestra Casa.

How we explicitly include individuals from populations who have been historically excluded from planning efforts should be considered in this section, and there will be additional opportunities to consider equitable participation again in Chapter 2: Center People in Decision-Making, specifically in 2.1 Manage the Process and 2.2 Input in the Process.

1.3.1 Government Capacity

Are Staff Available and Trained for Adaptation?

While a single person can help kick off an adaptation effort as highlighted in 1.1.2 Initial Lead, it takes a team of people to drive meaningful work forward, which is described further in the following section 2.1.1 Build Your Core Team.

This section is asking you to consider who you may already have available in government to help you advance an adaptation effort. Government, and especially local government, is essential to holistic sea level rise adaptation given their role in providing public services, regulating zoning and land uses, building and maintaining public infrastructure, and more. In this section, we ask you to consider:

1. Identifying individuals who have been involved in previous sea level rise efforts, such as 1.2.1 Foundational Studies, 1.2.2 Connected Issues, or related efforts; and
2. Readiness across key areas of capacity available in local government.

> Note: This is a starting point and does not constitute your "core team", although it will be helpful when you get to shaping it in Chapter 2: Center People in Decision-Making. This might also be a good place to review the ART Planning Approach Scope and Organize step.

Do you know individuals who should be involved?

This is an important moment to consider specific individuals that may be able to help support this work. Consider who you *likely* have support from, whether it be political, topic expertise, capacity, networking, etc. Having the capacity to support this work could mean someone has available or dedicated work time to engage in this topic, expertise in a specific topic, and interest to participate. Also note individuals who should be involved but currently *do not* have the capacity to do so.

A good place to start is seeing if people who were part of the foundational studies or plans listed are still available to help you continue the next step of sea level rise planning for adaptation.

Is there institutional and organizational capacity?

In addition to considering the capacity of individuals within government to participate, this may also be a good opportunity to evaluate the broader institutional and organizational capacity available (Box 6).

The Adaptation Capability Advancement Toolkit (Adapt-CA) is a website that provides a matrix and checklists to help local government understand their capacity for adaptation across four key area:

- **Leadership and Organizational Culture:** Engaging agency executives and elected officials, establishing adaptation as a strategic priority, and transforming agency culture through internal coordination and staff empowerment.
- **Staffing and Technical Capacity:** Allocating staff to dedicated adaptation roles, developing adaptation competency throughout the agency, and enhancing technical capabilities, tools, and resources.
- **Stakeholder Engagement and Partnerships:** Standardizing authentic community engagement in agency decision-making processes, regional coordination, and external collaboration and partnerships.
- **Operations and Institutional Processes:** Engaging agency executives and elected officials, establishing adaptation as a strategic priority, and transforming agency culture through internal coordination and staff empowerment.

Box 6 · Assessing Government Capacity

Use Worksheet 1D to list government capacity.

1.3.2 **Community Capacity**

Can Communities Participate Meaningfully?

Working *in partnership with* communities and community- based organizations is a foundational pillar of Equitable Community-Driven Planning. A huge part of assessing how to initiate sea level rise adaptation is understanding if your local communities have the ability and knowledge to participate *meaningfully* in an adaptation effort. Some questions to consider may include:

- Are there trusted Community-Based Organizations (CBOs) working within your community that work on climate change, sea level rise and flooding, environmental justice, or other related issues?
- Are there specific individuals or leaders in these CBOs or other areas of the community galvanizing this issue?
- Are people and/or local media talking about or raising this issue and want to engage in adaptation?

Community capacity to engage and participate in adaptation is essential. If you realize that there is not enough organizational capacity or readiness from community members to participate in a complex adaptation planning effort, then consider how to support building that capacity *first* before initiating adaptation.

Working to build local trust with communities and tribal governments and beginning constructive dialogue on local issues and climate change impacts will take time and dedication and should happen before any planning efforts. You can use parts of this Adaptation Roadmap to help you initiate community capacity building and education.

Use Worksheet 1D to list community capacity.

1.3.3 **Stakeholder Support**

Do You Have Support from Local Interests?

In addition to government and community capacity, it will be important to evaluate the social, economic and environmental context in which adaptation efforts may occur. These considerations may overlap with the 1.1.3 Motivations and Opportunities or 1.1.4 Key Barriers, but provide an opportunity to think about *people*, such as:

- Is there political will or local champions?
- Who are the largest local land owners in your area?
- Are there active local business associations that are likely to support an adaptation effort?
- Are there local environmental organizations that are likely to support an adaptation effort?
- Are there neighboring efforts for adaptation occurring locally or regionally?

There will be more opportunity to consider which specific stakeholders need to be involved in 2.1 Manage the Process and 2.2 Input in the Process. The purpose of this section is to consider the broader context and support you may have to initiate an adaptation effort.

Use Worksheet 1D to list stakeholder support.

One Shoreline Sea Level Rise and Flood Resiliency District

San Mateo County created a special district to meet the sea level rise and flooding challenges across the county, called the One Shoreline Sea Level Rise and Flood Resiliency District.

Building on a history of cooperation in the county on issues of sea level rise and flooding, including political support and Sea Change San Mateo County's Sea Level Rise Vulnerability Assessment, prompted the development of a multi-jurisdictional entity that could coordinate and implement flood protection projects.

1.3.4 **Resources and Funding**

What is Already Available Vs. Needed?

Adaptation can be funded from new, existing, or combinations of funding sources, and not all funding needs to be identified from the beginning. Funding is often considered one of the top barriers to adaptation planning efforts. In this section, we ask you to identify what resources you *have*, and where funding or resources may be needed. For example, if you are able to use your job to work on this effort, you have resources available. List the time you have for this work, as well as staff time from others that may be available.

Resources and Funding You Have

The purpose of this section is to spend time acknowledging that you may have existing funding sources that can be used to initiate or kick off this work. That funding might not be able to power the entire process, but elevating what you do have can help you more clearly identify what additional funding and resources you need. Some sources to consider what funding or financial resources you have include:

- Existing staff positions able to work on this
- General funding (e.g. property taxes)
- Local Bond
- Fees
- Annual budget
- Grant funding

In addition to thinking about what "dollars" you may have, don't forget to include skills and other assets that people who can support you can bring. For example, someone that can support you and has communications or design skills are valuable resources you may have.

Resources and Funding You Need

It can be easy to say you need more money or resources for adaptation, but more difficult to identify how much money, for how long and for what purposes are needed. This is the kind of information often needed for grant applications or allocating existing funding streams to a new adaptation planning effort.

It might be helpful to think about funding for adaptation in key three parts:

Part I. Kicking Off or Initiating Adaptation Efforts (e.g. Staff funding to organize how to Build Your Roadmap);

Part II. Conducting a Planning Effort/Process (e.g. Staff funding for a Core Team, stipends and funding for equitable participation, potentially consultant funding for technical analysis or other support, etc.); and

Part III. Adaptation Implementation (e.g. Project planning, design, construction, and continued community and stakeholder participation).

While all three of these parts are necessary, at this stage it's important to focus on Parts I and II (as Part III hasn't been developed yet!). In addition to existing financial resources you have, consider additional funding you need.

Use Worksheet 1E to list funding sources you are either plan to seek, are actively seeking, or that you know you will need to move forward.

California Grants Portal

There are a range of grant funding opportunities available depending on the type or work you are doing. The California Grants Portal provides an interactive way to explore funding options by topic.

Ready-to-Fund Resilience Toolkit

The American Society of Adaptation Professionals (ASAP) and Climate Resilience Consulting (CRC) developed the Ready-to-Fund Resilience Toolkit for local government leads and partners that identifies ten characteristics of ready-to-fund projects, as well as resources on funding and partnerships.

Download Workbook 1

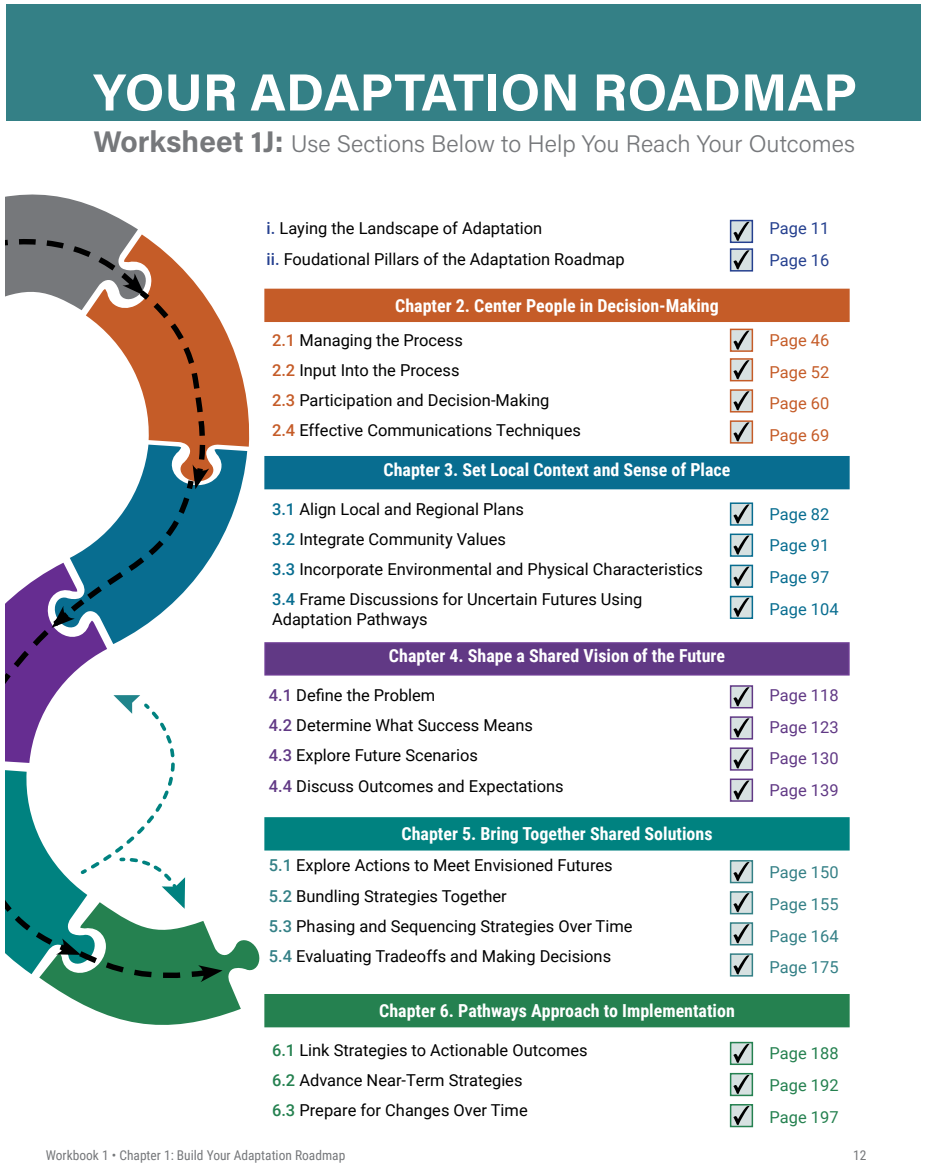
1.4 Use Workbook 1 Outcomes

Build YOUR Adaptation Roadmap

Workbook 1 is unique among the Adaptation Roadmap workbooks in that it is meant to help you organize the information being collected in a new way that may be useful for sharing and advocating for sea level rise adaptation with others.

If you've been using Workbook 1 to record your efforts, the key elements you will find are:

- Strengths and Opportunities for adaptation that can be shared with colleagues to advocate for your effort (WORKSHEET 1F)
- Challenges to Address that may become part of your adaptation process to find solutions to these gaps (WORKSHEET 1G)
- Build Your Adaptation Roadmap Checklist (WORKSHEETS 1H-1J)



YOUR ADAPTATION ROADMAP

Worksheet 1J: Use Sections Below to Help You Reach Your Outcomes

Workbook 1 • Chapter 1: Build Your Adaptation Roadmap 12

Example of Worksheet 1N, which provides a checklist of sections of the Adaptation Roadmap to review given responses in the Workbook 1 Decision Tree.

Resources for Chapter 1: Build Your Adaptation Roadmap

RESOURCES AND FURTHER READING

1.1 Assess Your What and Why

- Step 1. Scope and Organize. Adapting to Rising Tides (ART) Program Planning Process Design Your Project. San Francisco Bay Conservation and Development Commission (BCDC).
- Step 1.1 Confirm Motivations and Scope. Adaptation Planning Guidance 2.0. California Governor's Office of Emergency Services.

1.2 Asses Your Scale and Issues

- Adapting to Rising Tides (ART) Program Planning Process Design Your Project. San Francisco Bay Conservation and Development Commission (BCDC).
  - Findings by Issue
  - Findings by Sector
  - Scope and Scale in Adaptation Planning: Findings from ART
- Adapting to Rising Tides Bay Shoreline Flood Explorer and East Contra Costa Shoreline Flood Explorer. San Francisco Bay Conservation and Development Commission (BCDC).
- Accessing Sea Level Rise Science Reports
  - IPCC Sixth Climate Assessment, 2021
  - IPCC Special Report on the Climate and Cryosphere, 2019
  - United States Fourth National Climate Assessment, 2018
  - California Fourth Climate Change Assessment, 2018
  - Rising Seas in California, 2017
  - State of California's Sea Level Rise Guidance, 2018
  - Your local jurisdiction (ex. San Francisco Sea Level Rise Guidance)
  - BCDC's Climate Change Policy Guidance
  - California Coastal Commission's Sea Level Rise Policy Guidance
- California's Fourth Climate Change Assessment. State of California.
- State of California Sea-Level Rise Guidance 2018 Update. Ocean Protection Council and California Natural Resources Agency.
- Intergovernmental Panel on Climate Change (IPCC) Sixth Assessment Report. United Nations Working Group 1.

1.3 Assess Your Capacity and Resources

- Step 1. Engagement for Resilience. Regional Resilience Toolkit: 5 Steps to Build Large-Scale Resilience to Natural Disasters. Brechwald. et al. United States
- Staffing and Technical Capacity and Staffing and Technical Capacity Checklist. Adaptation Capability Advancement Toolkit (Adapt-CA). Alliance of Regional Collaboratives for Climate Adaptation (ARCCA)

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CHAPTER 2

Center People in Decision-Making

Chapter 2 supports determining decision-making processes and community and stakeholder group structures for collaborative and equitable participation and outcomes.

Introduction | Navigating the Adaptation Roadmap

Chapter **1** Build Your Adaptation Roadmap

Chapter **2** Center People in Decision-Making

Chapter **3** Set Local Context and Sense of Place

Chapter **4** Shape a Shared Vision of the Future

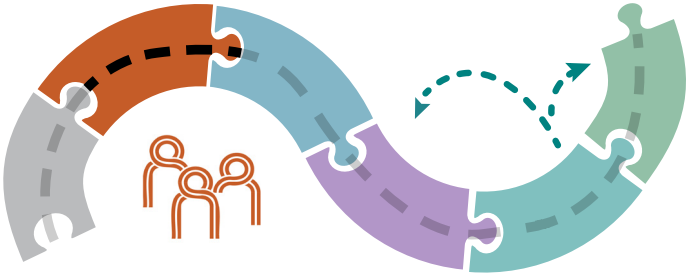
Chapter **5** Bring Together Shared Solutions

Chapter **6** Pathways Approach to Implementation

Community members enjoy the waterfront at Heron's Head park in San Francisco. Photo by the Port of San Francisco licensed under CC BY 2.0.

Chapter 2

Center People in Decision-Making



What Will You Find in This Chapter?

Chapter 2 is focused on understanding **who** to bring into an adaptation process and **why**, and guidance for **how** to structure engagement with different groups to build long-term capacity to participate in adaptation over time.

Chapter 2 sets the framework for articulating explicitly how the process will center people across communities, sectors, and governments to work together collaboratively and equitably.

Details in this chapter include how to build a core team, establish early partnerships with key stakeholders, explore who needs to be involved in the process, types of participation and decision-making structures, tips on communication techniques, and creating a strategy for participation for the entirety of your adaptation effort.

Who is This Chapter For?

Those initiating adaptation (from 1.1.2 Initial Lead) can use Chapter 2 to establish a Core Team and Key Partnerships that include equitable and collaborative representation. The Core Team and Partners can then work through this chapter together to build and co-create strategies for community and stakeholder participation used throughout the entire effort.

What Outcomes Will This Get You?

Download Workbook 2 to support reaching Chapter 2 outcomes. These outcomes include:

- **Management Team:** List of core team members and advisory committees representing communities and stakeholders and their roles in the process; and
- **Co-Created Participation Plan(s):** Strategies co-created with representative partners that includes decision making and communication techniques.

The entire Adaptation Roadmap builds upon the decisions made in Chapter 2, where communities and stakeholders will drive conversations on local conditions, vulnerabilities, and stories of place (Chapter 3), define shared problems and build a shared vision for the future (Chapter 4), co-create solutions, discuss and evaluate them based on shared criteria (Chapter 5), and share responsibilities to advance adaptation outcomes over time (Chapter 6).

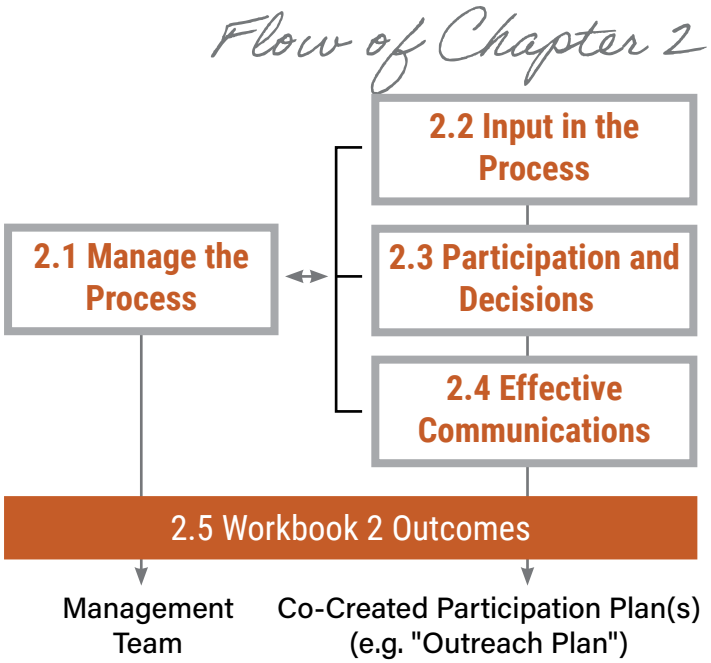


Figure 9 · Two Key Outcomes of Chapter 2. Section 2.1 supports creating a management team while the next three sections support co-developing participation strategies with communities and stakeholders. The outcomes of this chapter should guide how you engage with participants throughout the process.

Checklist for Chapter 2

Is this chapter for you? Explore the following questions to navigate to where you need to go. See Chapter 2 outcomes in Figure 9.

✓ Do you have a core team?	> 2.1.1 Build Your Core Team, 2.1.3 Consultants in Adaptation, 2.1.4 Roles and Responsibilities
✓ Do you have an advisory committee?	> 2.1.2 Early Engagement With Key Partners, 2.1.4 Roles and Responsibilities
✓ Do you know who else should be involved?	> 2.2.1 Stakeholder Groups and Goals, 2.2.2 Audiences Involved and Why, 2.2.3 Identify and Map Populations, 2.2.4 Assess Relationships for Participation
✓ Do you know what participation will look like?	> 2.3.1 Participatory Engagement, 2.3.2 Types of Participation Structures
✓ Do you know how decisions will be made?	> 2.3.3 Decision-Making Process, 2.3.4 Types of Networks and Agreements
✓ Do you know how to communicate effectively?	> 2.4.1 Communications Approach, 2.4.2 Connect to Values
✓ Do you have a strategic messaging approach?	> 2.4.3 Make it Relatable, 2.4.4 Frame the Message and Delivery
✓ Do you have an outreach and participation strategy?	> 2.5 Use Workbook 2 Outcomes

2.1 Managing the Adaptation Process

This section will dive deeper into guidance on building your core team, establishing key partnerships and potential advisory committees, exploring the role of consultants in adaptation, and describing the roles and responsibilities of the core team and key partners. You can navigate to the details in each section below:

Use this Section to Create a Management Team

Every project and process needs good management, and when it comes to sea level rise adaptation the management should be comprised of a team of people who represent different skills, expertise, and perspectives across governments, communities, and locally relevant stakeholders that are reflective of the communities impacted and issues at hand.

Climate change, and especially sea level rise, exacerbates existing social and economic issues while also creating new ones. In terms of identifying solutions to these issues, there are challenges and implications related to not only *what* decisions get made, but also *how* decisions get made and by *whom*. In this section, we specifically discuss organizing the *management* of an adaptation effort and the importance of ensuring equitable representation of those driving the process.

The Project Management Team (PMT) meets to discuss project updates on sea level rise flooding for the Dumbarton Bridge project. Photo by Jaclyn Perrin-Martinez, BCDC.

This section informs the creation of the **Management Team**, which includes both a Core Team of people with responsibilities for day-to-day management of the adaptation effort (including consultants), and Key Partners such as Advisory Committees that serve specific roles in managing and directing the process.

In later sections of Chapter 2 we explore additional components of centering people in collaborative decision-making. In 2.2 Input in the Process, we dive into different types of communities and stakeholders to involve in your adaptation effort, while 2.3 Participation and Decision-Making provides resources on types participation and decision-making approaches that support creating participation strategies for your adaptation effort.

The importance of structuring the management of an adaptation effort is essential because this group of people will have the greatest influence in the process and are responsible for ensuring how equity is centered and elevated.

2.1.1 Build Your Core Team

Who Organizes and Leads the Process?

The **Core Team**, which can go by many different names, such as a Project Management Team (PMT) or Steering Committee, serves as the primary drivers and organizers of a process. While many different people can spur interest in adaptation (as discussed in 1.1.2 Initial Lead), now is the time to intentionally bring together people representing valuable perspectives, skills or expertise to lead and manage the rest of the process.

The composition and size of the Core Team will depend on the 1.2.4 Scale and 1.1.1 Adaptation Outcomes you hope to achieve. The Core Team should include a range of relevant expertise across government and community representatives, local partners, and consultants as needed. The number of people on a Core Team should always be a manageable size. Though manageable is subjective, this might include ensuring the number of people selected are capable of meeting regularly, working together cooperatively, sharing information, and making decisions.

Key lenses to consider on a Core Team: a. Local Government, b. Community and Tribal Representation, c. Locally-Based or Relevant Expertise, and d. Consultants (Figure 10 and Box 7). Review information gathered in 1.3 Assess Your Capacity and Resources to explore who you may already have and what skills and perspectives are still needed. This should be a clear and transparent process for determining who is on the Core Team, which also includes defined 2.1.4 Roles and Responsibilities.

For each person identified consider: Does this individual provide valuable or unique perspectives for this process? Does this person represent the area considered for planning? Is this the right person to lead? Is there a Black, Indigenous and Person of Color (BIPOC) to uplift to do this work instead? This does not mean tokenizing individuals, but instead questioning who has the expertise to do this work and also reflects local communities.

Use Worksheet 2A to list potential members of a Core Team.

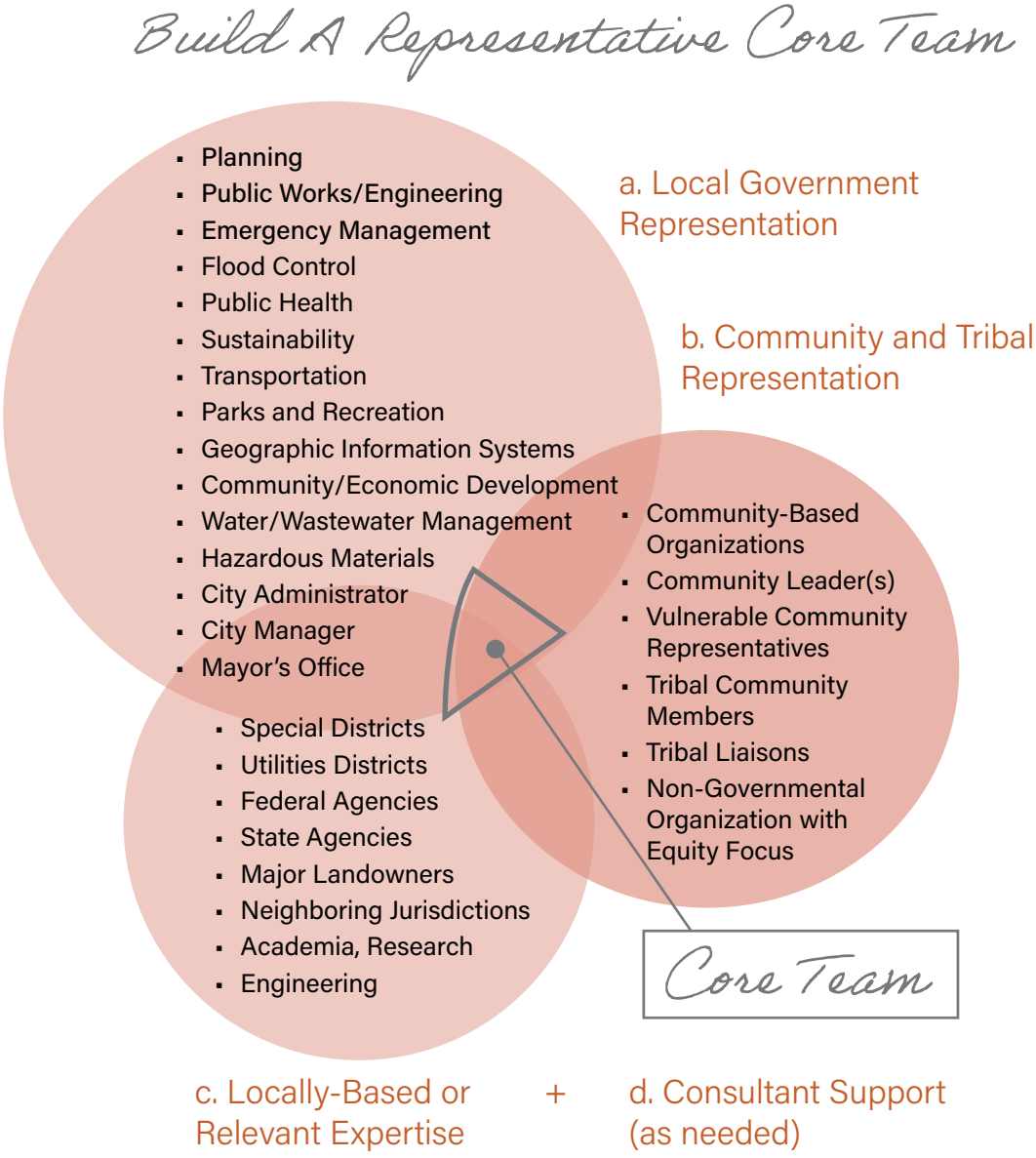


Figure 10 · Key Lenses and Perspectives Represented on the Core Team. The content within this diagram reflects ideas and options for types of expertise and perspectives within each category.

a. Local Government Representation

Governments have an essential role to play in adaptation planning. Every jurisdiction is unique in their organizational structures and how they allocate responsibilities across government. When considering who should be involved, be sure to include at least a planning perspective to bring in planning expertise (e.g. General Plans, Land Use), and engineering perspective to bring in an implementation expertise (e.g. Public works, operations and maintenance).

Additional perspectives and areas of expertise can also add value depending on local characteristics and conditions. Review the 1.2.1 Foundational Studies gathered earlier in the process to explore how sea level rise is expected to impact your local jurisdiction and consider individuals who can support conversations for solutions on those topics. For example, if flooding impacts a hazardous waste facility, consider inviting someone from a department that plans for those facilities. Consider the size, resources and capacity of the local government. This can help determine who can be on the team to support "in-house" tasks versus where consultant support may be needed.

It is also important to keep in mind that not everyone who might need to be involved from local government needs to be on the Core Team. You will also have opportunities to invite individuals to participate in adaptation efforts in 2.1.2 Early Engagement With Key Partners, such as through an Advisory Committee, and you can also consider local government staff as a key stakeholder group in 2.2 Input in the Process. There is no one right way to structure your Core Team, but it is essential to ensure the team is representative of the issues and people in your community.

Prop 1 DAC Program

The Disadvantaged Communities (DAC) Involvement Program is funded by the California Department of Water Resources (DWR) to involve communities and tribal government in the Integrated Regional Water Management Program (IRWMP). In the Bay Area, community-based organizations and tribal governments served on the core team with state and local governments, NGOs, and utilities industries to develop the process and deliver outcomes.

b. Community and Tribal Representation

Embedding equity means including community and tribal representation and/or other equity perspectives into the Core Team from the very beginning, and compensating people for their time. We all need to be held accountable for ensuring an adaptation process does not perpetuate inequities, but actively improves equitable outcomes. It is important to identify roles on the Core Team for individuals outside local government to represent perspectives of communities and tribal governments, and also ensure there is 1.3.2 Community Capacity to participate.

The importance of centering equity in adaptation is described further in Equitable Community-Driven Planning. Including community and tribal representation in the Core Team is only the start of building equity into the process. To do this requires an initial assessment of demographics and characteristics of impacted communities, which may be in the Vulnerability Assessment. It is important to recognize that tribal governments have different issues, histories, and governance processes that need to be addressed differently than other local communities. Establishing and building trust is essential in adaptation. If you are finding it difficult to identify representation from communities and tribal nations, see 2.1.2 Early Engagement With Key Partners.

c. Locally-Based or Relevant Expertise

Every place has its own unique characteristics and local partners can add immense value to an adaptation process. Consider organizations or individuals that have a important local roles, authorities, or ownership that may can provide useful support and value to the Core Team. If you are finding that some key locally-based interest partners should be involved but not necessary on the Core Team, see 2.1.2 Early Engagement With Key Partners or consider how they can have 2.2 Input in the Process.

d. Consultant Support

The use of 2.1.3 Consultants in Adaptation should supplement and fill in missing gaps of skills or expertise to the Core Team, as needed.

Box 7 · Details for Building a Representative Core Team.

2.1.2 Early Engagement With Key Partners

Do You Have Key Partners Influencing the Process?

As you 2.1.1 Build Your Core Team, you may come across individuals, organizations or entities that would add value to the adaptation process and should have elevated influence, but do not need to be on the Core Team. Instead, other types of partnerships with defined relationships to the Core Team can serve as valuable structures for engaging with key partners early and throughout the process with specific 2.1.4 Roles and Responsibilities (Figure 11).

This is where the creation of an **Advisory Committee,** or other type of group such as a Community or Citizens Committee, Resilience Advisory Committee, Equity Steering Committee, etc. can support the Core Team in managing the adaptation effort. These groups often serve to give advice on processes or projects and can include different types of partners and expertise, such as supporting outreach, technical support, keeping elected officials involved, etc, but meet less often than the core team and are less involved in day-to-day operations.

Building an equitable adaptation effort means ensuring you have individuals that represent vulnerable communities, tribal governments, and other equity-focused perspectives relevant to your community on either or connected to the Core Team. Reaching out *early* in the process can provide a flexible way for key partners to *work with* the Core Team to identify communities and stakeholders to participate in 2.2 Input in the Process and co-create participation strategies. As you move further into your adaptation effort, the roles of these partnerships may shift depending on the outcomes you want to achieve.

This is a good time to refer back to information identified in 1.2 Assess Your Issues and Scale and 1.3 Assess Your Capacity and Resources and re-engage with key partners if they already exist. If they do not exist, there is more work you will need to do.

If you do not have existing relationships with key partners, you will need to pause and take the time to explore and build them before moving forward.

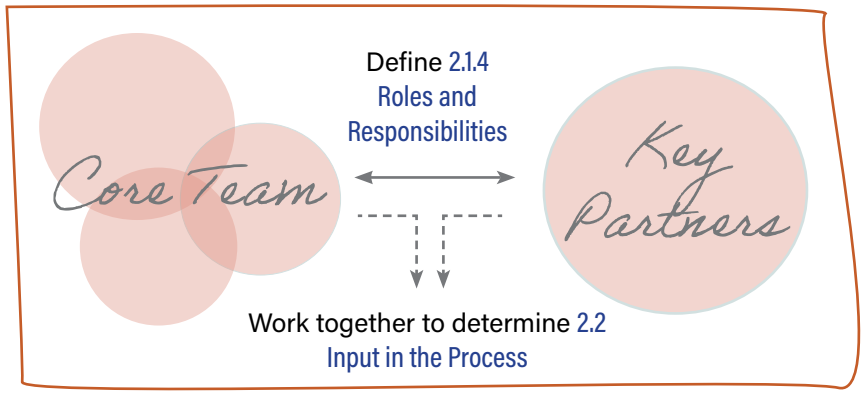


Figure 11 · Early Partnerships with the Core Team in Adaptation.

Your initial or first conversation with a new group, such as community-based organization, should *not be* about your adaptation effort alone. Instead take the time to:

- Research community-based organizations in your area to learn about their mission, areas of expertise, and interest. BCDC's CBO Matchmaking Tool is a great place to start!
- Seek areas of mutual benefits by asking about what the organization is trying to do in their community and how an adaptation effort can support their work.
- Follow up on commitments and recognize the importance of building and maintaining trust across relationships.

BCDC's CBO Directory

A database that helps to connect community-based organizations in the San Francisco Bay area to government or other partners to build meaningful relationships and engage in local projects and decision-making. This resource can be found on BCDC's Community Vulnerability Mapping page.

When creating an Advisory Committee (or other partnership), consider the purpose of the group, whose perspectives and expertise are represented, how members are paid for their time (through their own organizations or new stipends), and their roles and relationships to the Core Team. There is also an opportunity to 2.2.4 Assess Relationships for Participation, which may include asking Key Partners *how* they want to be involved.

Use Worksheet 2B to list key partnerships or Advisory Group(s).

2.1.3 Consultants in Adaptation

What Roles Can or Should Consultants Play?

The use of consultants in adaptation can vary in terms of the expertise they provide and extent of their involvement. In terms of equity, there is a perspective that consultants coming in to lead a process without existing relationships with communities and stakeholders can result in outcomes that do not feel driven or owned by local jurisdictions, communities or stakeholders. Improving equity in hiring consultants include hiring locally and supporting minority-owned consultant firms.

Stinson Beach Consultant RFP

Marin County used the Adaptation Roadmap to help develop a Request for Proposal (RFP) for consultants to support key aspects of adaptation planning in Stinson Beach. This RFP includes community and stakeholder participation, envisioning futures scenarios and adaptation pathways.

We emphasize the importance of building local capacity across governments, communities and stakeholders so that they can carry on adaptation planning even after a consultant finishes their role in a particular project. Therefore, we recommend the role of consultants as *supporting* governments, communities, and stakeholders by filling in missing areas of expertise, while at the same time, transferring knowledge back to local communities and stakeholders (Box 8). There are many different types, sizes, and specialties of consultants, such as:

- Small business consultants who specialize working locally with government;
- Academic or scientific institutions, which can include students and researchers;
- Large consulting firms with diverse ranges of expertise and work nationally or internationally; and
- Local consultants who are also community representatives, such as facilitators, outreach and engagement specialists, etc.

Recognizing the diverse range and roles of consultants in adaptation can help you consider what skills and values a consultant can bring in and support for your adaptation effort.

Use Worksheet 2A to add consultants to your Core Team as needed.

When to Use Consultants

Project Management

Does someone on the Core Team have capacity and resources to manage this work? A project manager from local government or the community can help ensure the process is integrating with local existing plans and processes. However, consultants as project managers can be particularly useful for smaller cities with less staff. They can also help set up processes, coordination, and trainings needed for government and partners to continue.

Equitable Outreach/Engagement

Does someone on the Core Team have capacity and resources to plan and conduct participatory outreach and engagement? Does the Core Team member represent the community or equity perspective and have relationships that can be leveraged for this process? Outreach and engagement is a central part of adaptation, and ensuring there is an adequate lead to do this work well is essential. Consultants with this expertise, especially local consultants from the community, can add immense value.

Neutral Facilitation

Having facilitator (especially a neutral, third-party) can add immense value to community and stakeholder participation by creating space for honest and open dialogue throughout the process. Conversations about adaptation can elicit strong emotions and complex histories that a facilitator can help navigate among government, communities and stakeholder groups. This is a role highly recommended for a consultant if resources allow. Facilitation is often needed in group settings.

Technical/Engineering

Does someone on the Core Team have the capacity and resources to conduct technical or other feasibility analysis for sea level rise adaptation? Do you have a geospatial analyst and/or engineering expertise and capacity on your Core Team? Often, consultants provide technical and engineering analysis and support in sea level rise adaptation efforts.

Box 8 · Common Areas of Consultant Expertise.

2.1.4 Roles and Responsibilities

How Does Everyone Contribute?

With individuals in mind from 2.1.1 Build Your Core Team, 2.1.2 Early Engagement With Key Partners, and 2.1.3 Consultants in Adaptation, take the time to define the roles and responsibilities of each group and how they will interact with one another throughout the process.

Core Team

Group Responsibilities: Revisit information in 1.1 Assess Your What and Why to confirm the purpose for adaptation, as well as 1.2 Assess Your Issues and Scale and 1.3 Assess Your Capacity and Resources. As a team, discuss how often you will meet and define your team's responsibilities, which may include, but is not limited to:

- Acquiring funding for the planning process which includes outreach and participation and consultant support;
- Doing background research, analysis, and preparing/ presenting information to communities and stakeholders;
- Organizing community and stakeholder meeting space, taking notes from community and stakeholder dialogue and ensuring feedback is used and recorded transparently;
- Developing and following a 2.3.3 Decision-Making Process; and
- Creating documentation of process and outcomes.

Individual Team Member Roles: Members of the Core Team should reflect diverse expertise and the roles and leadership of members may shift throughout the process (Figure 12).

For example, the beginning stages of an adaptation effort may involve greater leadership for planning and community engagement background and expertise. As the process shifts from planning and visioning to more technical and engineering aspects, individuals from the Core Team with public works, engineering, or other skills may now take a more prominent leadership role. It should be noted, however, that all members of the Core Team should be involved throughout the entirety of the process so that there is continuity and consistency across the planning and implementation conversations

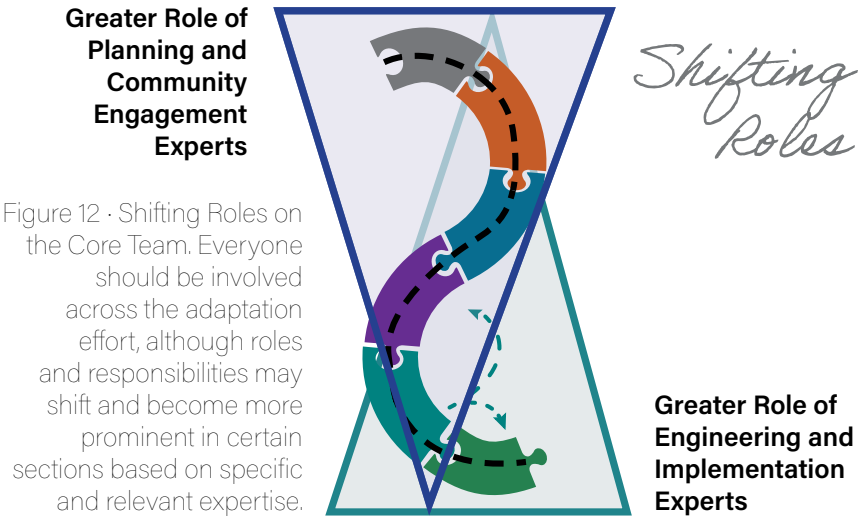


Figure 12 · Shifting Roles on the Core Team. Everyone should be involved across the adaptation effort, although roles and responsibilities may shift and become more prominent in certain sections based on specific and relevant expertise.

Key Partners or Advisory Committee(s)

Group Responsibilities and Relationship to Core Team: With the Core Team, determine why this group was created, whose perspectives are represented, what is expected of this group, and how the group will coordinate and share information with the Core Team. Some of these relationships to define include:

- Will there be individual meetings held by this group in addition to meetings with the Core Team?
- How are people being paid for their time? Is there funding available for those representing their communities?
- How often and where in the process will this group be asked to weigh in and provide advice or recommendations? What is the 2.3.3 Decision-Making Process and influence in the process?

This is an important step to begin understanding the relationship between the "Management" groups: Core Team and Advisory Committee(s), although this may evolve as you further engage with communities and stakeholder in your adaptation effort.

Use Worksheet 2C to describe roles and responsibilities.

2.2 Exploring and Identifying Who Has Input in the Adaptation Process

This section will dive deeper into exploring who are different stakeholder groups, what audiences are within those groups to involve, how to develop relationships to co-create participation strategies, and identifying and mapping populations. You can navigate to the details in each section below:

A family looks stands on a pier looking out across the San Francisco Bay at sunset in Pinole. Photo by BCDC.

Use this Section to Identify People to Involve

The wide-ranging impacts of sea level rise means many different people are likely to be involved in an adaptation process. *Who* should be involved may depend upon the 1.2.4 Scale at which you are considering planning, future sea level rise projections from 1.2.3 Sea Level Rise and Flooding Science, and vulnerability assessment results in 1.2.1 Foundational Studies.

It is essential to consider the full range of individuals who may be involved in the process early to effectively organize communication and engagement strategies. Those involved can include not only individuals directly impacted by sea level rise, but also those who may be indirectly impacted.

This section (and Chapter 2 in general) is somewhat unique from the other chapters in the Adaptation Roadmap because the capacity building initiated in this chapter can be both a process of adaptation planning, and a potential outcome of adaptation.

Involving people to participate in a current adaptation effort while also building their capacity to participate in the future will be essential to address sea level rise challenges *over time*.

- **Capacity Building in the Process**: Before beginning adaptation, there must be adequate and existing 1.3.2 Community Capacity to be involved. Participating in conversations about flooding vulnerabilities and solutions will continue building capacity *through* this process.
- **Capacity Building as an Outcome**: While going through this adaptation process, it may become clear there is a need for *more* capacity building and education in communities, private sectors, or government to effectively make decisions on adaptation over time. The structures to participate and facilitate meaningful conversations on adaptation now may also support long-term capacity building outcomes.

2.2.1 Stakeholder Groups and Goals

Who Are Potential Stakeholder Involved?

Having a diverse range of stakeholders participate in adaptation efforts has multiple far reaching benefits. Ensuring broad voices and perspectives are incorporated into the adaptation process, and centering underrepresented populations, brings in relevant expertise and knowledge about local issues and opportunities, creates support from implementing partners, and helps build consensus for shared solutions. At the same time, a wider range of perspectives, experiences, and thinking can provide more creative, integrative, and holistic solutions to sea level rise challenges that are supported and embraced by local communities and stakeholders.

Consider the Key Goals of Participation

Refer to the 1.1.1 Adaptation Outcomes you hope to achieve and articulate the **purpose and goals** of engaging with stakeholders and communities through this effort. As you move through additional sections, such as 2.3 Participation and Decision-Making, it may become necessary to refine the purpose and goals to reflect new considerations. Determining *who* should be involved and *how* will require critical thinking and affects the way you co-create your participation strategies to achieve participation goals.

Explore Stakeholder Groups and Audiences

In this section, we focus on exploring different types of community and stakeholder groups *broadly* who will participate and provide *input* into the sea level rise adaptation process and outcomes. This is separate, but connected to, those identified in 2.1 Manage the Process, who can also provide input but are primarily responsible for organizing the process.

We group the range of potential communities and stakeholders that would participate in the process into four key categories of communities, sectors, government and champions with specific audiences within (Table 3). The next section 2.2.2 Audiences Involved and Why goes deeper into specific audiences within these groups.

Community and Stakeholder Categories

Communities	Sectors	Government	Champions
Vulnerable Communities*	Business and Industry Leaders, Large Employers or Business Associations	Internal Government Departments	Local Elected Officials
Tribal Communities and Tribal Governments**	Non-Governmental Organizations (NGOs) Community-Focused, Cultural, Faith Based, Environmental Groups	Neighboring Jurisdictions	Community Leaders
General Public Renters, Land Owners	Special Districts Utilities, Open Space, Schools	Regional, State, Federal, and Tribal** Government	Private Sector Leaders
Youth	Academia Universities, Research Institutions	Regulatory Agencies***	Other Champions

Table 3 · Communities and Stakeholder Categories and Audiences Within. This table is meant to illustrate the range of different stakeholders that might be involved. *Vulnerable Communities can be defined in various ways, such as BCDC's Vulnerable Communities, State of California's Disadvantaged Communities, or your own. **Federally recognized tribes have their own government rules and systems. ***This may include BCDC.

These four categories provide an *initial* starting point to explore the types of stakeholders to include in your process. The table is not intended to be prescriptive. How you structure or categorize individuals or groups in your process can vary. These categories are not mutually exclusive, but serve as a useful starting point for considering the range of individuals, organizations or entities to include in the process. As you move through this process, be ready to adjust these groups and categories to best reflect your local communities and stakeholders.

Use Worksheet 2D to articulate goals and purpose and consider stakeholder groups and audiences.

2.2.2 Audiences Involved and Why

Why Should Adaptation Be Inclusive?

It is undoubtably more time, work, and money to go through an adaptation planning effort with *more* people. In 2.2.1 Stakeholder Groups and Goals, we broadly categorize groups in society. In this section, we ask you to dive deeper into *specific audiences* within those categories to understand *why* they should be involved.

A good starting point for identifying audiences might be returning to the vulnerability assessment from 1.2.1 Foundational Studies and see if specific populations, or other entities or organizations were identified. Review if any groups participated in earlier efforts and consider including them moving forward. While working through this section, it may be helpful also 2.2.3 Identify and Map Populations and 2.2.4 Assess Relationships for Participation. A few ways to consider audiences to be involved include:

- **Impacted:** Who is directly or indirectly impacted by a climate hazard or response?
- **Skills:** Who has the skills, or knowledge, or authority needed to make or understand decisions?
- **Actors:** Who is or may be responsible for implementation?
- **Financial:** Who has or can contribute financial resources for implementation?
- **Education:** Who has the ability to disseminate knowledge or education?
- **Leaders:** Who may be a valuable leader?
- **Current Efforts**: Who is already working on existing efforts?

As you move through the rest of Chapter 2 and begin your process, be sure to allow this list evolve and keep in mind that adaptation is all about building relationships (Box 10).

Use Worksheet 2E to dive deeper into ***why*** specific audiences should be involved.

Communities

Vulnerable Communities, Tribal Communities, and General Public

Residents living in areas at risk of flooding impacts are the heart of adaptation planning.

For community members, there is a personal and emotional investment to adaptation planning decisions. The conversations and decisions of adaptation have the potential to uproot someone's entire world if it includes changes to where someone lives, works, takes their kids to school, or otherwise interacts with others in their community.

For residents, adaptation planning conversations are likely to take on different meaning and greater emotional toll than for stakeholders who have financial or other special interests in an area. Being cognizant and sensitive to the underlying and personal emotions of residents in the process is essential, especially as you move from broader visioning conversations towards more concrete actions and decisions that may impact where people live. These challenging and close-to-home conversations can make it difficult to create consensus and agreement for shared vision and solutions. However, it may be helpful to identify shared values and build conversations from there. Within the Communities category, specific audiences can include:

- Vulnerable Communities (see Box 9)
- Tribal Communities and Governments
- General Public, Renters, and Landowners
- Youth

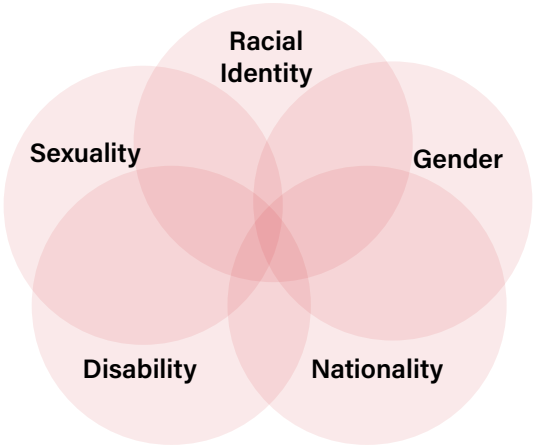
Who Are Vulnerable Communities?

A "community" can be defined in many ways. BCDC's uses the term "vulnerable communities" to refer to socio-economic indicators and contamination burdens that contribute to a community's vulnerability[1]. This data is gathered at the U.S. census blocks scale and identifies populations with *multiple* characteristics that might make it more difficult for individuals to prepare for, respond to, or recover from a flood or hazard event. These characteristics include: Very Low Income, Not U.S. Citizens, Without a Vehicle, People with Disability, Single Parent Households, Communities of Color, Limited English Proficiency, Without a High School Degree, Young Children Under 5, Severely Housing Cost Burdened, Older Adults, and Renters.

At the same time, there are often multiple dimensions of "vulnerability," and many vulnerabilities are the result of social, economic, or environmental inequities that have led people into these circumstances. Review Equitable Community-Driven Planning for additional details on the importance of embedding equity across adaptation.

Dimensions of Vulnerability

- **Logical/Systemic Vulernability**: The result of institutional or other conditions outside an individual person that affects their vulerability. For example, government policies such as redlining resulted in communities of color being segregated, dis-invested in, and located near toxic sites. Another example could be the lack of an elevator in a building that restricts the access of someone in a wheelchair. The external condition affecting an individual creates and perpetuates the vulnerability.
- **Physiological Vulnerability**: The result of underlying psychological, physical or other disabilities that may impact an individuals vulnerability. For example, young children are more susceptible to mold, which can result from flooding, than adults. Another example could be the elderly and people with certain disabilities who may have difficulty with, or be unable to, wade or swim through floodwaters.
- **Intersectional Vulnerability**: The result of multiple, complex dimensions of vulnerabilities that interact and accumulate in a person's experience[2]. It is the concept that all oppression is linked and categories such as class, race, gender are not discrete, but interconnected. For example, a young women who is also a person of color may experience discrimination in multiple forms, such as due to her age, gender, *and* ethnicity. The image below illustrates this concept of intersectionality[2].



Intersectional Vulnerability

Intersectionality was coined by Kimberlé Crenshaw in 1989 to describe how race, class, gender and other characteristics intersect with one another[3].

1 Commnity Vulnerability Mapping. BCDC. Accessed October 2021 at https://www.bcdc.ca.gov/data/community.html

2 Intersectionality 101: What is It and Why is it Important? Womenkind Worldwide. Access October 2021 at https://www.womankind.org.uk/intersectionality-101-what-is-it-and-why-is-it-important/

3. Coaston. J. The Intersectionality Wars. Vox Magazine. Accessed October 2021 at https://www.vox.com/the-highlight/2019/5/20/18542843/intersectionality-conservatism-law-race-gender-discrimination

Box 9 · Multiple Dimensions of Vulnerability.

Sectors

Business, Non-Governmental Organizations (NGOs), Special Districts/Utilities, Academia

Local interest groups can provide important perspective, expertise, and financial support.

Big solutions to big problems will require collective actions and coordination amongst a wide range of stakeholders, which may have ownership, management, financing, and/or other interests in potential solutions. Public and private sectors can play important roles in adaptation as participants in the process by lending their perspectives, expertise, as well as through helping connect adaptation efforts to others through their own networks.

Businesses, industries, and non-governmental organizations serve unique roles in their communities. These stakeholders are critical for cultivating buy-in, overcoming barriers to implementation, coming up with creative financing partnerships, and generating actions they may have control over. Additionally, tapping into these existing networks can support improved coordination with others and help facilitate more inclusive, integrative solutions that can have multiple benefits beyond any one entity, sector or jurisdiction. Within the Sector category, we consider audiences such as:

- Business and Industry
- Non-Governmental Organizations
- Utilities and Special Districts
- Academia, Universities, and Research

Government

Internal, Multi-Jurisdictional, and Regulatory Agencies

There are certain roles in adaptation planning that must be done by governments at different scales.

Governments are systems of people tasked with creating and enforcing rules, and providing services for the safety and benefit of the public. As such, governments have essential roles to play in adaptation efforts.

Holistic solutions to sea level rise must include the legally enforceable authorities granted to government entities. Different levels of government have different roles in society and in adaptation. Local government works most directly with residents on matters of public health, safety, land use, and utilities, and are essential in local solutions. Horizontal government refers to neighboring local jurisdictions (city or county), which should be coordinated in their actions. Vertical government refers to levels of government at bigger, or smaller, scales. For example, regional, state, and federal government are vertical scales above local government, and have different roles such as allocation of funding, laws and mandates, and land use authorities. Federally recognized tribes have tribal sovereignty and separate governance systems and laws. Within the Government category, we consider audiences such as:

- Internal Government
- Neighboring Jurisdictions (Multi-Jurisdictional)
- Regional, State and Federal Government
- Regulatory Agencies
- Tribal Governments

Champions + Political Support

Community Leaders, Local Elected Officials, and Industry Champions

Leadership across sectors, scales, and expertise brings in people and holds a process together.

Public, private, and community leaders catalyze adaptation. Collaborative and robust adaptation involves diverse stakeholders, and engaging with these groups can greatly benefit when specific people from their fields take on elevated leadership roles in the process.

Effective leadership can play an outsized role in adaptation planning, as leaders can drive, inspire, and champion lasting outcomes. Leaders may arise across different sectors and scales - local elected officials who have a passion and interest in climate issues, business CEOs or professionals who are esteemed in their industry or sector, and citizens or community members who are recognized as natural champions or leaders within their community. While these are only a few examples, good leaders can come from anywhere, even in unexpected places. As you move through the adaptation planning process, keep an open mind about who might be able to step into leadership positions and make sure to provide flexible opportunities throughout the process for champions to lead. Within the Champions category we consider audiences such as:

- Local Elected Officials
- Community Leaders
- Private Sector Leaders

Do Your Homework – Show Effort and Intention when Building Relationships

Whether you are dealing with community members, representatives of businesses or NGOs, or local government staff - you are working with people. Even if you are engaging with businesses or government agencies, there are **people** behind every sector, organization, and entity.

People are ultimately what drives the success of a process, as well as what can cause the biggest challenges. This section is designed to help you better understand who your audiences are, and what kind of values and motivations may help you better connect their interests to the adaptation efforts. However, it is also important to keep in mind that different stakeholder groups (and people) will have different histories and relationships with one another. Spending time as a Core Team and with your Key Partners to try to understand these dynamics before reaching out, especially when it comes to new stakeholders with historically fraught relationships to government, can go a long way in demonstrating your willingness to put in the effort and intention behind building trusting partnerships.

Patience, and a commitment to shared understanding and listening may be needed in instances of existing or historical tensions among stakeholder groups. This is where a neutral facilitator can be immensely valuable.

It will be important to keep all of this in mind and be flexible in your approach as you develop relationships with individual people who make up your stakeholders and begin to engage in more collaborative conversations about solutions.

Box 10 · Relationships Are Everything.

2.2.3 Identify and Map Populations

Where Are Audiences and Their Characteristics?

Understanding *who* needs to be involved in an adaptation effort can be a complex process requiring iterative research and conversations with 2.1.2 Early Engagement With Key Partners. Knowing you want to engage with a particular audience, for example, doesn't tell you exactly *where* they are or what characteristics or conditions may affect their interest or ability to participate.

> Note: In 3.2 Integrate Community Values, there are opportunities to have dialogue with communities and stakeholders about their values.

In this section, we are focused on knowing who and where populations are to structure participation and effectively engage in deeper conversations.

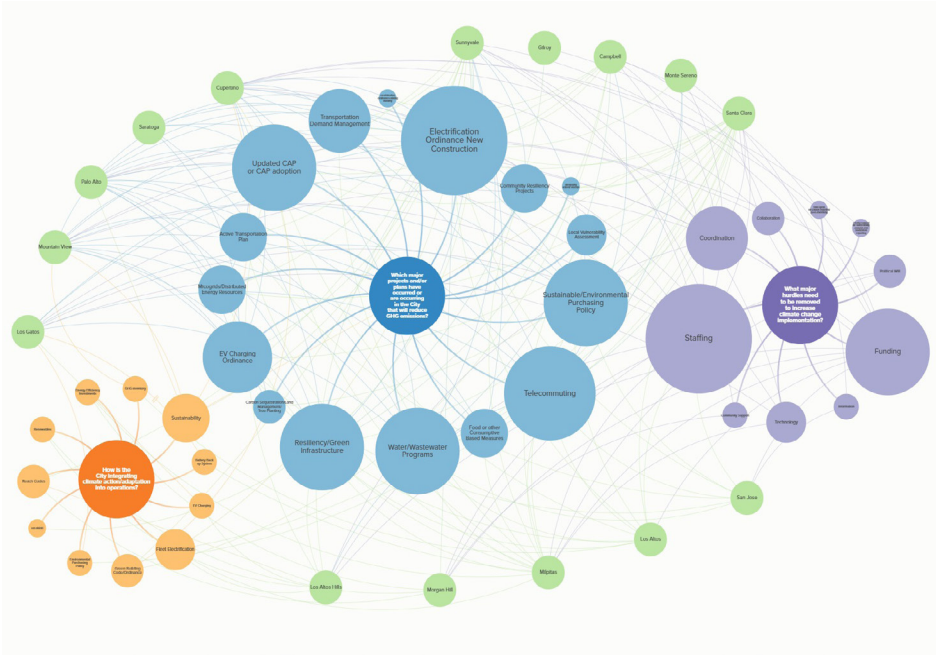
Mapping Populations Geographically

Knowing where people exist geographically (or spatially) through a map can help you understand how to build effective participation strategies that meet people where they are. Mapping populations may involve using existing regional or local datasets, well as desktop internet searches, or conversations with key partners. Some resources for mapping can include:

- BCDC's Community Vulnerability Mapping Tool
- Indigenous Populations Land Mapping
- County or City Parcel Data

Identifying Characteristics Including Spoken Languages

The mapping data used may contain additional information to better understand your audiences. For example, BCDC's Community Vulnerability Mapping Tool provides insight on up to twelve characteristics that contribute to social vulnerability and can help inform what challenges populations may face. **Data should never be used alone,** but it can help you gain a better initial understanding of audiences. Identify the primary languages spoken by audiences to ensure you are creating materials in the appropriate languages for communities and stakeholders to participate.



County Climate Collaborative Network Analysis

The Santa Clara County Climate Collaborative developed a network analysis map of their stakeholders county-wide. The intention was to understand what groups were working on climate efforts and how they were connected to one another.

Network Analysis or Other Mapping Exercises

In addition to understanding who your communities and stakeholders are, it may also be helpful to explore what their relationships are to *one another*. This is where network analysis or other type of visual about connections may be useful. There is a field of science on social network analysis (SNA) and resources for conducting this type of work[1]. However, there can also be more informal ways to describe these relationships.

Use Worksheet 2E to list resources and add audience specific details in Worksheets 2I-2O.

1 Planning a Social Network Analysis. Digitial Promise. Accessed October 2021 at https://digitalpromise.org/wp-content/uploads/2018/09/SNA-Toolkit.pdf

2.2.4 Assess Relationships for Participation

Do You Have Appropriate Insight and Support to Develop a Strategy with Stakeholder Groups?

Prior to developing an outreach plan, approach or strategies for participation for stakeholder groups or audience, evaluate if you have the relationships to potentially co-develop these strategies in a way that works with communities and stakeholders. To help you determine if you have the right partnerships, consider:

- Does someone from 2.1.1 Build Your Core Team represent the interests of stakeholder groups or audiences?
- Does anyone from your 2.1.2 Early Engagement With Key Partners represent the interests of stakeholder group or audiences?
- Do you have existing relationships with any of the Champions identified in 2.2.2 Audiences Involved and Why and would they be willing to support this part of the process?

If there is not someone in any of these groups, consider who else can help you either create, or at least vet your strategy. If you do not have any existing relationships, spend time developing new relationships. Identify one (or more) individual(s) that should be consulted across the development of this strategy. Review tips for co-creating participation strategies (Box 11) and work through the next two sections of Chapter 2 with your partner(s). The following two sections on 2.3 Participation and Decision-Making and 2.4 Effective Communications provide greater detail that will help you develop these strategies.

When and how much time a partner spends helping you develop these strategies should depend on conversations with them. It may make sense for the partner to work with you from the onset, or for the Core Team to draft a strategy first and vet it with your partner. Either way, the Core Team should spend some time doing their homework first and then bring it to the right partners to ensure the strategy makes sense for the audience.

Use Worksheet 2E to list relationships and add audience specific details in Worksheets 2I-2O.

Co-Creating the Approach

Build On Existing Relationships Where Possible

If someone on the Core Team or Key Partners have relationships that can connect you to other groups, now is the time to reach out. People are more likely to engage in efforts when they hear about it from someone they know and trust.

Create New Relationships Where They Don't Exist

While there is an emphasis on building upon past success and strengthening relationships, it is also essential to create time and space to establish and build new relationships. Investing in new partnerships can open new opportunities.

Ask Audiences How They Want to Participate

To meet people where they are means asking them. Sometimes, they might now know, but do not pass up an opportunity to work with your trusted partner and consider one-on-one or small group conversations about what is the best way to involve them.

Allow it to be Flexible and Evolve

This is an initial outreach and participation strategy. As you engage with communities and stakeholders further, you may find that certain audiences or groups prefer to be engaged with in slightly different ways. Be aware and allow the process to shift to reflect new information.

Pay People for Their Time

If you are asking a community or tribal representative to help, ensure you have the ability to pay them for their time, input, and expertise. Including partners on an Advisory Committee or other group from 2.1.2 Early Engagement With Key Partners can be a great way to pay people for their time and ensure they stay engaged in the adaptaton effort from beginning to end.

Box 11 · Co-Creating Strategies for Participation..

2.3 Determine Structures for Participation and Decision-Making

This section will dive deeper into levels of participatory engagement, what participation structures look like, how to consider and establish a decision-making process, and what kinds of partnership agreements may be needed. You can navigate to the details in each section below:

Community members in East Palo Alto participate in a Community Forum, held separately in both English and Spanish, to discuss sea level rise and flooding issues. Photo by Jaclyn Perrin-Martinez, BCDC.

Use this Section to Develop Participation Strategies

Transforming the decision-making process to be truly equitable means being intentional about who is involved, how input and information are used, and what influence participants have in the final outcomes and decisions. To do this well requires being explicit about the roles and responsibilities of those involved. It also means being transparent about the **process** used to come to those final decisions.

As noted in the Equitable Community-Driven Planning, participation and the decision-making process is a critical point in your effort to be intentional and explicit about how underrepresented populations have a voice and power in shaping both the *process itself* and *outcomes*. Having an equitable adaptation process means shifting the balance of power from a single individual, entity or organization, such as government, towards a more collaborative structure based on principles of shared decision-making.

While there may be increased emphasis on the importance of this section for vulnerable populations, having a transparent decision-making process and structures to participate meaningfully are important for all stakeholder groups.

Following the identification of stakeholder groups and audiences in 2.2 Input in the Process, this section will provide additional details to support the creation of participation and outreach.

2.3.1 Participatory Engagement

What Does Participatory Engagement Look Like?

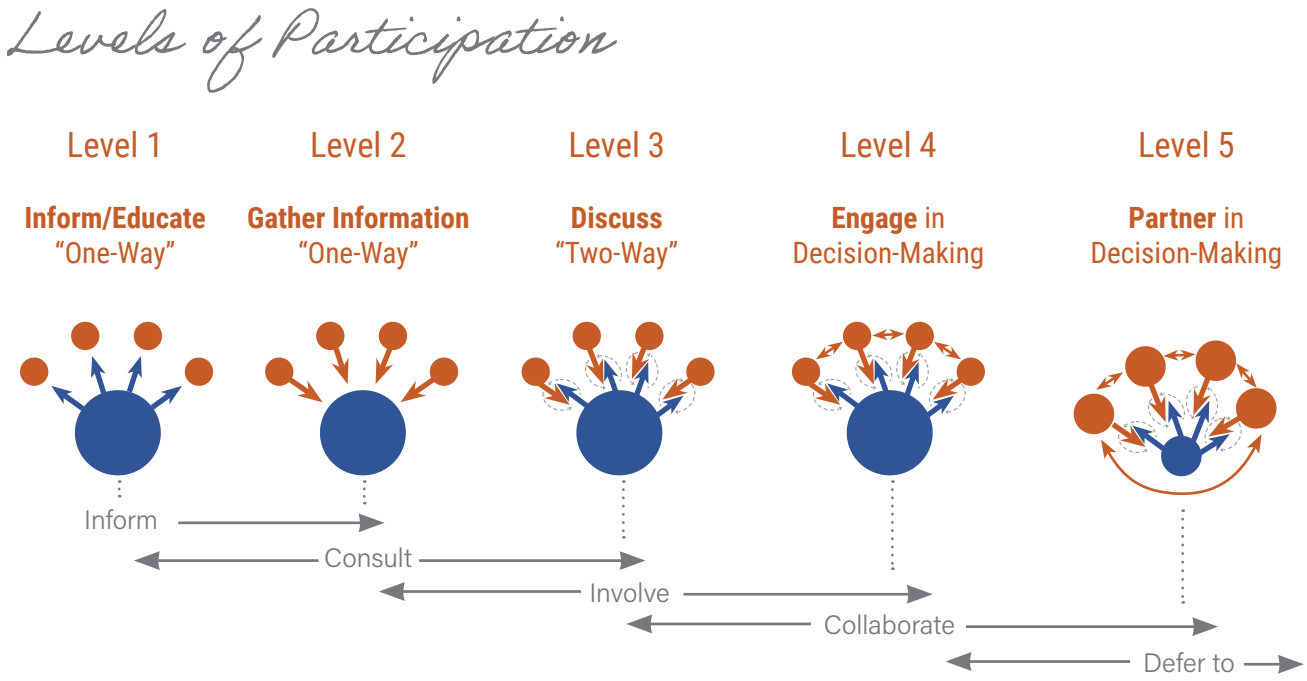
Stakeholder engagement exists along a spectrum, with *participatory* engagement referring to processes where stakeholders are given a higher level of input and influence in shaping the process and outcomes[1]. The Health Canada Policy Toolkit for Public Involvement in Decision Making provides a helpful way to visualize levels of participation. Figure 13 illustrates five different levels of participation, with 1 being the lowest and 5 being the highest. This figure should be reviewed alongside the Spectrum of Engagement[2] chart to further explore and understand what it means to specifically give communities greater ownership and power in participation.

1 Canada and Health Canada, Health Canada Policy Toolkit for Public Involvement in Decision Making.
2 Spectrum of Family and Community Engagement for Education Equity. Movement Strategy Center. Oakland, CA

The Adaptation Roadmap seeks to advance concepts of transformative and collaborative decision-making, where communities and stakeholders are seen as partners with "two-way" dialogue and provided high levels of involvement and influence over decision-making. This is in contrast to practices of "one-way" communication with communities and stakeholders with a low level of involvement and/or influence in the process.

It is helpful to note that different levels of engagement may be appropriate for different purposes. Instead of thinking everyone always needs the highest level of participation all the time, the next section 2.3.2 Types of Participation Structures will help you consider at what points in the process are higher vs lower levels of participation most appropriate.

How people participate in the process determines what information will be gathered, shared and used to inform, influence or direct decisions. This section provides space to consider ***what degree of stakeholder inputs, experiences, and values are integrated into the process, and when.***



Use Worksheet 2F to describe levels of participation at different parts of your adaptation effort.

Figure 13 · Five Levels of Participatory Engagement. Graphic redrawn from Canada and Health Canada, Health Canada Policy Toolkit for Public Involvement in Decision Making and incorporating Spectrum of Family and Community Engagement for Education Equity, Movement Strategy Center.

2.3.2 Types of Participation Structures

What Does Participation Look Like?

Participation *structures* in the Adaptation Roadmap refer to the physical (or virtual) meeting spaces, forums, or other avenues to communicate, share information, and engage in dialogue with the groups created in 2.2 Input in the Process. Building upon the levels of engagement explored in the previous section 2.3.1 Participatory Engagement, this section provides examples and ideas for different participation structures (e.g. events, formats, or processes) that can be used to interact with stakeholders throughout your adaptation effort.

There are numerous ways to interact with communities and stakeholders that extend across different levels of participation (Figure 14). Engaging with stakeholders can include multiple different structures at different stages of the process, and it is important to remember that different structures may be more useful than others at achieving specific types of outcomes, such as communicating to individuals broadly, engaging in dialogue, coming to consensus on decisions, etc. (Box 12).[1] Within a single *type* of event (for example a community forum) the level of participation and outcome(s) may differ based on how it is organized and conducted. Different types of participation structures can also vary in the number of people they are likely to reach, as well as the level of detail or "robustness" that may be possible. Figure 14 provides a conceptual way to think about participation structures along these two axes.

The Core Team should review their 1.3.1 Government Capacity to engage in this work and set appropriate expectations for how participants can engage. Work with key partners to identifying participation structures (Box 13).

Use Worksheets 2I-2O to list structures for each audience with support from trusted partners.

1 Stakeholder Participation in Climate Change Adaptation Planning. USAID. January 2013. Retrieved from https://www.climatelinks.org/sites/default/files/asset/document/Stakeholder%2520Participation_CLEARED.pdf

Participation Structures

Figure 14 · Types of Participation Structures Across Participation Levels. Information gathered and synthesized from key sources including: Stakeholder Participation in Climate Change Adaptation, Health Canada Policy Toolkit for Public Involvement in Decision Making, and Spectrum of Family and Community Engagement for Education Equity.

Note: Community Benefits and Partner agreements are discussed further in 2.3.4 Types of Networks and Agreements.

Using Participation Structures

Before engaging with communities and stakeholders, it is important to ask basic questions about what you are trying to achieve and the purpose different points of engagement[2].

Informing/Educating (Level 1)

There are times when it is necessary to share information to a broad range of people, such as when beginning a process, inviting people to participate, and/or sharing the results of a process or outcome following a collaborative decision.

Gather Information (Level 2)

There may be times when the purpose is to gather insight, expertise and perspectives, which may occur in earlier conversations around local conditions. Additionally, depending on your stakeholders, it may be necessary to stay in the inform/educate and gather information levels if stakeholders need more time understanding the issues *before* providing input.

Discuss (Level 3)

Engaging in two-way dialogue provides the opportunity to both listen and exchange information, which should occur throughout the process and especially when conversations begin to shape and inform *outcomes*.

Engage (Level 4)

Creating the conditions for communities and stakeholders to interact *with one another* can help further explore opportunities and tradeoffs for adaptation outcomes. This is where shared conversations about problem definition, future visioning, and scenario planning are important.

Partner (Level 5)

As you move towards sea level rise adaptation solutions, it will be important to empower communities and stakeholders to take on responsibility to implement and advance shared outcomes.

2 Canada and Health Canada, Health Canada Policy Toolkit for Public Involvement in Decision Making.

Box 12 · Using Different Levels of Participation Structures.

Range of Participation Structures

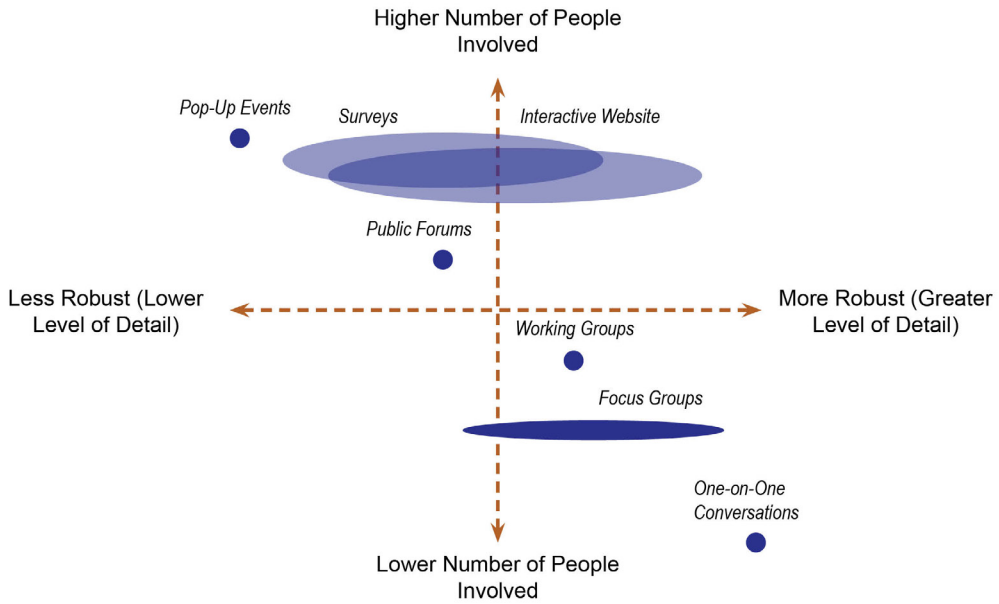


Figure 14 · Conceptual Example of the Range of Participation Structures. Actual outcomes depend on the organization and execution of specific meetings. However, the forum or structure selected can inform what is possible to achieve.

"Participation is best carried out deliberately, with clear expectations on the part of decision-makers about the scope and scale of participation, and clear expectations on the part of stakeholders as to how their participation will impact decisions."

- Stakeholder Participation in Climate Change Adaptation Planning, USAID Report (2013)

Considering Participation Structures

Choose an Appropriate Number of Meetings

The number of meetings will depend on the 1.1.1 Adaptation Outcomes you hope to achieve, goals of participation, number of stakeholder groups or audiences involved, and resources and capacity available. Given this, consider how many meeting are needed for participants to contribute meaningfully. This means participants have opportunities to understand topics, space for conversations and questions, and time in between meetings to digest, reflect, and re-engage in topics. Consider how these meetings might be structured to ensure you can engage with participants meaningfully in your effort. The more complex a process or closer it gets to decision-making outcomes, the more meetings for participation you should probably have.

Consider Combinations of Small and Large Meetings

Meaningful participation requires dedicated time and appropriate meeting spaces to engage in deeper dialogue with communities and stakeholders. Consider smaller group settings such as breakout groups and/or audience-specific meetings that provide a safe, neutral venue (with support from a facilitator) to discuss complex topics. While smaller group conversations can help audiences go deeper into topics, reaching shared understanding and even consensus on issues, the vision and guiding principles, and making decisions will require bringing groups together to cross-pollinate ideas in a collaborative environment.

Use Supplemental Activities to Keep Things Fun

Additional ways to engage with participants outside of a structured or traditional setting can be highly beneficial in increasing awareness and encourage broader participation. These can provide opportunities to add games, pop-up events, or interactive elements. They should be supplemental to other avenues for deeper participation.

Provide an Accessible Online Presence for Participants

Having a website or other online presence can be highly beneficial by providing an easy way for participants to learn more about your process, access meeting materials and notes, understand who is involved, and even interact with content. Online visual and collaboration software can be particularly useful in virtual setting. See 2.4 Effective Communications Techniques and Resources for Chapter 2 for communications resources.

Equitable Logistics Considerations, including Language

Creating a welcoming space for participants to engage in an adaptation effort includes considering where the meeting spaces are located, time of day, language of meeting notices and materials, and amenities available, such as water or other beverages, light snacks or even dinner. Consider providing stipends or gift cards for participating in meetings, as well as financial support for transportation access to meetings. Another key consideration is children. Due to liability concerns, you may not be able to provide "child care", but instead activities for children. Depending on the ages of children, youth-focused meetings can occur alongside adult ones.

Planning for Meetings Takes 90% of The Time!

It probably feels like lot of work setting up this process – and it is! Planning for effective meetings *should* be the biggest amount of time you spend. In addition to external meeting logistics, it can be helpful to have a facilitation agenda to run the meetings and process to follow-up on feedback received and adjust your process as needed.

Allow Structures to Evolve, As Needed

While planning for your process is key, you will learn through experience the things that work and the things that don't. Do not be afraid to adjust parts of your strategy in response to feedback. At the same time, slow down the effort if people need more time to participate meaningfully.

Box 13 · Choosing Stakeholder Structures for Participation.

Liberating Structures: Unconventional Approaches to Organizing Interactions and How Groups Work Together

Liberating Structures introduce "tiny shifts in the way we meet, plan, decide and relate to one another[1]." The Liberating Structures online resource provides over thirty "micro-structures" for designing meeting spaces using unconventional techniques to improve participation and outcomes in group dialogue and decision-making. This approach argues that there are five underlying elements to defining the structures in which we participate: 1) Structuring the invitation; 2) How the space is arranged and what materials are needed; 3) How participation is distributed; 4) How groups are configured; and 5) Sequence of steps and time allocation. Different approaches and tools from this website may be useful in different setting and conversations with your participants across an adaptation effort.

1 Introduction to Liberating Structures. Liberating Structures. Accessed online March 2022 at https://www.liberatingstructures.com/

Meetings can take many different forms and shapes. Photo courtesy of Jason Goodman.

2.3.3 Decision-Making Process

What Does Equitable Decision-Making Look Like?

What decisions get made, and by whom, is among the most important consideration for adaptation when seeking to elevate equity and collaboration. Can adaptation be "successful" if outcomes are not supported by communities and stakeholders? That depends on your definition of success. In the Adaptation Roadmap, our efforts to advance equitable and collaborative participation and outcomes means we will emphasize opportunities for *shared decision-making*. To do this, we explore the importance of identifying points for decisions, as well as defining the process for how those decisions will be made.

Where Are The Points for Decision-Making?

The first thing to consider is what processes for decision-making currently exist and where the final "authority" lies, based on where you are starting from and how this adaptation effort has been initiated. For example, is this effort funded by a local government with a need for final adoption or resolution by elected officials? Is this effort funded by a grant whose final authority comes from a non-profit, government agency or other?

Starting with the end "authority" can be helpful as it may provide a clear end point for decisions. However, depending on the 1.1.1 Adaptation Outcomes you want to achieve, there will likely be *multiple* parts of your adaptation effort where decisions, even seemingly small decisions, get made. "Small" decisions are not always trivial and it is important to acknowledge that decision-making is *not* always clear or straightforward, even to those who are part of the process.

Striving for more equitable adaptation outcomes means taking the time to consider decision-making more intentionally by identifying parts of the process where specific points for decisions can be more transparent and inclusive. A helpful place to start may be creating or reviewing tasks or outlines of your adaptation effort and identifying the points where decisions need to be made. See Figure 15 for examples of potential points for decisions in a process.

Who develops this decision-making process is key and we recommend engaging with your 2.1.2 Early Engagement With Key Partners and/or individuals identified in 2.2.4 Assess Relationships for Participation to identify points for decisions and the process. There are various questions to help you get started. Ask yourself, is it clear where decisions need to be made and who is making these decisions? Are there legal implications for how decisions must be made, for example, can only elected officials can make final decisions? Where are there opportunities for communities and stakeholders to have influence over decisions throughout the process?

While it may not be feasibly to identify every single point for decisions, the purpose of this section is to consider decision-making more holistically and explore ways to improve transparency, equity, and collaboration in your process. This information will then be combined with the spectrum of decision-making on the following page to create your approach.

Use Worksheet 2G to describe the decision-making process and points for decisions.

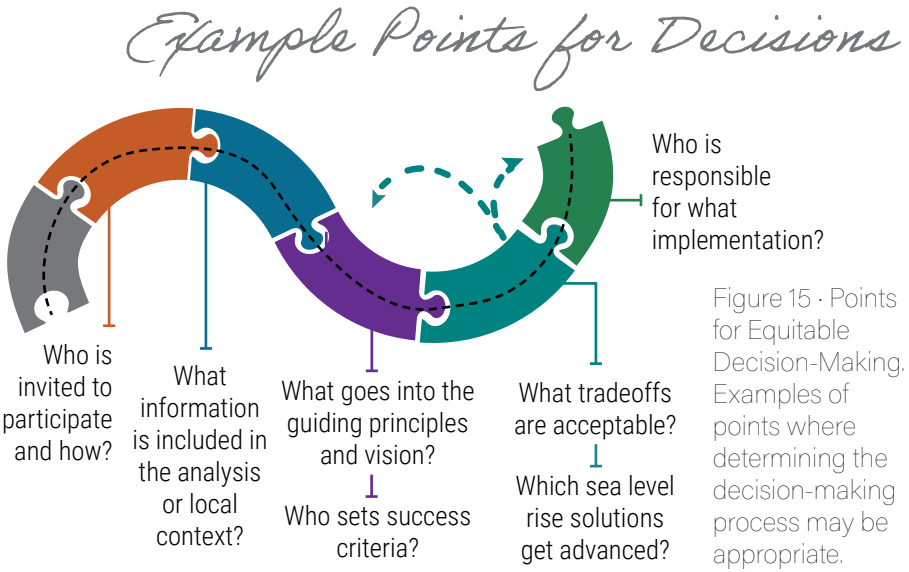


Figure 15 · Points for Equitable Decision-Making. Examples of points where determining the decision-making process may be appropriate.

Who Has Influence in Decision-Making?

The Adaptation Roadmap encourages using models of shared or group ownership of decision-making, where possible. Figure 16 illustrates an example of a decision-making continuum, which lays out six options that represent a range of participation levels and shared commitment when it comes to making decisions.

At the lowest end of shared commitment and participation are three styles of "individual" ownership, where power lies with a select few. These include: *Tell,* where decisions are told to participants but made without their input; *Sell,* where participants are given a reason for the decision to get support, but it is still made without their input; and *Input*, where an individual makes a decision after hearing input from others, yet the decision still lies in the power of a few.

On the other end of the spectrum is a higher level of shared commitment and participation with three styles that represent "group" ownership. These include *Vote*, where a group votes and a designated percentage of the vote wins; *Consensus*, where there is agreement from all participants on how to proceed, even though some might be less enthusiastic than others; and *Alignment*, where everyone agrees and feels positive about the decision.

Within group ownership of decisions, there are various considerations. In group voting, decisions are made through a specific percentage of the vote, such as majority, two-thirds, etc. In a voting structure, individuals in the minority group may feel very strongly against a decision, but are out-voted and may no longer support an initiative. While this is a shared decision-making style, some participants may be highly unhappy.

Bay Adapt Used A Consensus Approach

Bay Adapt: A Regional Strategy for a Rising Bay is regional effort to find shared solutions on regional adaptation. For key decisions, participants selected a range of 1 through 5, where 1 is *not* approving the choice and 5 is loving it. In order for a decision to move forward, all participants had to select 3 or above, therefore seeking consensus on how to proceed.

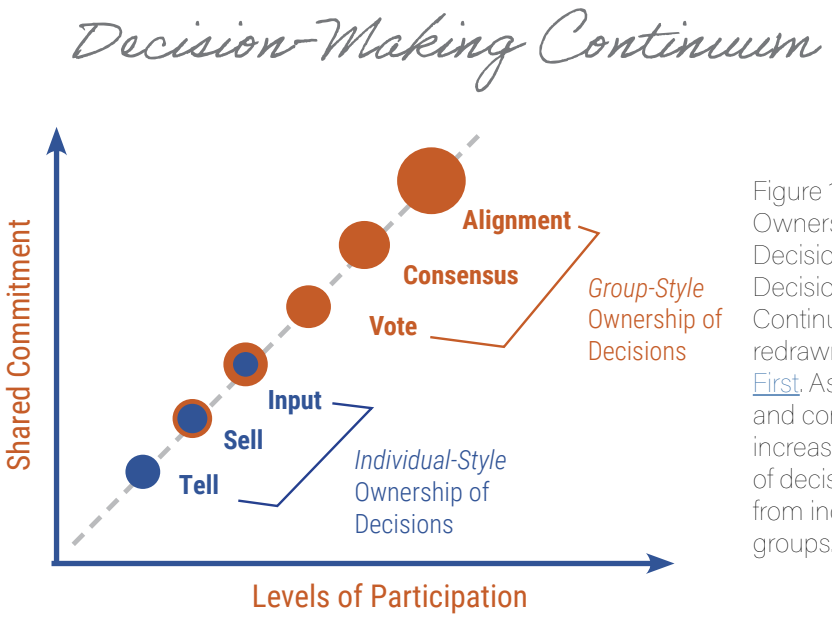


Figure 16 · Ownership of Decisions on a Decision-Making Continuum. Graphic redrawn from Being First. As participation and commitment increases, ownership of decisions moves from individuals to groups.

In consensus, the focus is on avoiding negative outcomes for participants, where no single individual or parties feel strongly and negatively about a particular outcome. Consensus decision-making is a social process that supports collaborative problem solving and conflict-resolution. Consensus building does not mean unanimity, where everyone agrees *fully*, but it does mean everyone can accept the final outcomes or decisions. In alignment, the group all feels strongly and positively about an outcome. This can be difficult to achieve based on the number and diversity of participants and topics at hand.

Reaching consensus in a process can be highly challenging and may not always be necessary. As the Core Team and Key Partners structure the adaptation effort, it will be essential to think critically about what is possible to achieve and be clear to your participants. Different decision-making styles can be used for different points of decisions.

Use Worksheet 2G to describe decision-making type for each point for decision.

2.3.4 Types of Networks and Agreements

What Is the Range of Formality Required?

As you are exploring participation and decision-making, consider how different groups might be involved and what partnerships and/or agreements may be necessary to support cooperation. Different networks or agreements may be useful for different groups depending on their level of involvement, influence in the process, and roles and responsibilities for implementation (Figure 17). Many of these can be adjusted to fit your needs, and these can be useful during, or as an outcome of, your effort.

Informal Networks

Many groups created for adaptation begin as informal networks, where groups of people, such as working groups, agree to meet regularly to achieve a shared goal. They tend to be created for short-term projects, active for a period of time, and dissolve. In some cases, informal networks can evolve into formal structures.

Chartered Networks

Groups with signed documentation outlining priorities, rules, or processes that everyone agrees upon. This can include a Project Charter, Community Benefits, or Partnership Agreements. These can be formal, but non-legally binding agreements.

Legal Entity

Groups with a legally-binding agreement have defined goals and objectives and high level of cooperation. This can include Memorandum of Understandings (MOUs) or Joint Powers Authority (JPA). These groups can fund initiatives, hire staff, and take on greater levels of responsibility for implementation.

Regulatory Body

The highest level of formality are groups that have been granted the authority to act as government through legislative action, executive orders, or other authorized processes. This can include a Special District with mandated functions in adaptation.

Use Worksheets 2I-2O to list partnerships or agreements for specific audiences.

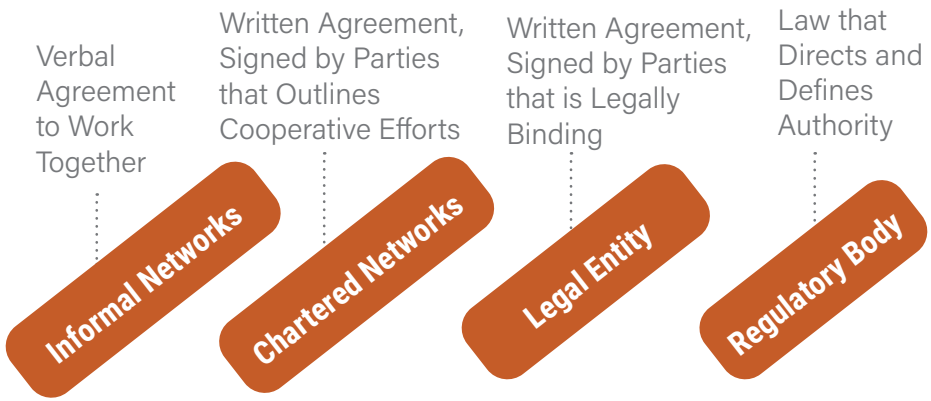


Figure 17 · Formality Across Partnerships. Redrawn from Regional Governance to Climate Action and M. McCormick, Farallon Strategies, LLC.

Project Charter: Written agreement to work together for a specific project or purpose. Project charters can be flexible ways to encourage collaboration as they do not have to be legally binding contracts but do signify cooperation. Examples include the North Richmond Shoreline Living Levee Project.

Community Benefits or Partnership Agreement: Written agreements with community-based partners can help ensure process and outcomes benefit local communities. Examples include the West Oakland Environmental Indicators Project, and Carleton Center for Community and Civic Engagement.

Memorandum of Understanding (MOU): Written agreement with expressesed intention to work together. MOUs represent more formal acknowledgment of agreement, and can be legally binding if that language is specifically included.

Joint Powers Authority (JPA): Legal entities that allow agencies to jointly exercise common powers. Examples include the San Francisquito Creek JPA and Hayward Area Shoreline Planning Agency (HASPA).

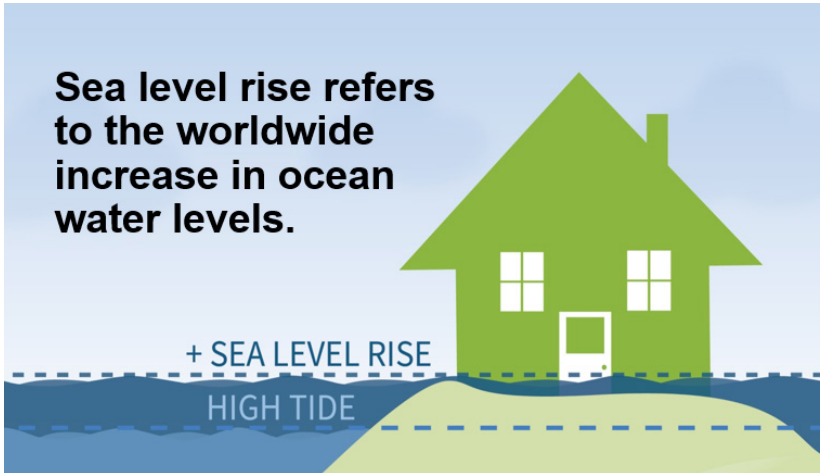
Special District: Independent, special purpose government units that can carry out one or more functions (e.g. utilities, park districts, and includes JPAs). An example is the One Shoreline San Mateo County Flood and Sea Level Rise Resiliency District.

West Oakland Community Agreement

The Bay Area Air Quality Management District partnered with the West Oakland Environmental Indicators Project and created a Steering Committee Charter and Participation Agreement to outline their partnership.

2.4 Effective Communications Techniques

This section will dive deeper into expectations and outline for developing a communications approach, with details to help you shape this approach such as how to create communications materials that connect to values, are accessible and inviting, and frame the message and method of delivery appropriately. You can navigate to the details in each section below:



Use simple graphics and images to share information. Graphic is part of the Learn section in the Adapting to Rising Tides Shoreline Flood Explorer created by Jaclyn Perrin-Martinez, BCDC.

Use this Section to Build A Communication Approach

Creating an equitable and collaborative adaptation process means ensuring communities and stakeholders understand what is being asked of them and can participate in ways that make sense for them so they can make informed contributions. It may feel like a lot of work to consider each of your community and stakeholder audiences from 2.2 Input in the Process and develop a communications plan or strategy to guide how to set expectations for the process and have conversations about adaptation. Yet, ultimately sea level rise adaptation outcomes are for *people* – impacting where we live, work, or play.

Having detailed conversations about sea level rise adaptation, or any other climate hazard, is complicated by a few obstacles. First, communities and stakeholders must understand why adaptation is necessary at all, which includes communicating the hazard of sea level rise itself, how this hazard may interact with or impact their lives, and ensure this resonates with people's personal perceptions and worldviews. Second, communities and stakeholders must also be brought along in a process where both the risks and solutions cut across governance, social and community values, economic interests, environmental processes, and technical engineering practices. Communities and stakeholders must understand borh the risks and hazards of the climate impact, as well as the realities, constraints, and opportunities for solutions.

In short, a communication approach needs to consider effective ways to engage with multiple diverse participants on multiple complex topics to many people who may come from very different starting points on the issues involved.

2.4.1 Communications Approach

What Are Expectations and Outcomes?

A communications plan, which can also be called an approach or strategy, outlines who your audiences are (which was done in 2.2 Input in the Process) and *how* you intend to deliver strategic messages to them throughout the process (Box 14).

Communities and stakeholders must understand the issues at hand and feel equipped with the information necessary to make choices. This begins with an acknowledgment about the *value* of effective communications and what it actually means. Communications is *not* about the act of sending an email, giving a presentation, or even having a one-on-one conversation with a stakeholder. Those are structures to engage with people.

In the Adaptation Roadmap, we emphasize that effective communications is about the *outcome.* What is the individual you're communicating to going to take away from your interaction? How well did your framing of the problem or solution move them towards a greater understanding of how to engage in the topic? Do your communities and stakeholders feel empowered with the knowledge necessary to contribute to decision-making? Do they understand how their voices and input will shape outcomes?

While this may seem like a lot of work, you don't necessarily need to hire a communications expert or firm (although you certainty could). Instead, we suggest spending time now and in tandem with the other sections of Chapter 2 to work through your approach for communications. Communications plans can take many different forms. Consider the following types of information in Box 14 to help shape your approach. Committing to being transparent and responsive and adjusting your approach, analysis, or processes to reflect what you are hearing from your communities and stakeholders will also go a long way in effective communications.

Use Worksheet 2H to outline a communication approach for your adaptation effort.

Communications Plan Parts

Background and Context Setting

Setting the context is always a good idea when creating a new document, especially since it might be shared to other partners who would benefit from a reminder on the study area, core team members and key partners involved.

Goals and Expectations

Review and refine the initial goals for participation and outreach and ensure that you are setting the appropriate expectations for how community members will participate and in what ways they will have influence. Do not over promise how people's input will be used. Consider the choices made in 2.3 Participation and Decision-Making and ensure your messaging reflects these expectations.

Primary Impact Story: Key Message

Details on how to develop and create your key messages are described further throughout this section in 2.4.2 Connect to Values, 2.4.3 Make it Relatable, and 2.4.4 Frame the Message and Delivery. While you may adjust how you deliver or frame your message to specific audiences, there should still be a cohesive and consistent messaging approach applied throughout your effort.

Vehicles for Communication

List what ways will your message be shared and delivered to your audiences. Refer back to the 2.3 Participation and Decision-Making section and consider how those participation structures can be used. In addition to meeting spaces and events, other channels of communication include traditional and ethinic media, website and social media, and door-to-door conversations.

Other Information As Needed

Your communications approach should work for you. Add other details, such as previous outreach to date, key dates or key contact to support your approach.

Box 14 · Crafting A Communications Approach.

2.4.2 **Connect to Values**

Why Should You Consider Worldviews, Identities and Values of Your Stakeholders?

Data and facts *alone* are not the most compelling to people. This is becoming increasingly clear through scientific literature from the social sciences about how people perceive and understand climate change and its risks[1].

Instead, it is people's values, social and cultural norms that are most influential in how people understand and respond to climate change[1,2,3]. While the science itself is important, knowing more about how people best receive information can help ensure the adaptation planning process communicates information in a way that resonates with people to increase understanding, participation and support for solutions. To do this requires an understanding about what shapes people's perceptions, and also how to ensure that the framing of the adaptation message is appropriate and relevant.

The Psychology and Social Dimensions Shaping Climate Perception and Understanding

We all have our own mental models of the world: our thought processes for understanding how things work[4]. These thought processes are shaped by our personal values, experiences, knowledge, beliefs, worldview, identities, and more. We all often seek information and better receive information when it already fits within the mental models we've created, which is known as *confirmation bias*[4,5].

1 Marshall et al., "Our Environmental Value Orientations Influence How We Respond to Climate Change."
2 Neef et al., "Climate Adaptation Strategies in Fiji."
3 Wolf, Allice, and Bell, "Values, Climate Change, and Implications for Adaptation."
4 Center for Research on Environmental Decisions, "The Psychology of Climate Change Communication: A Guide for Scientists, Journalists, Educators, Political Aides, and the Interested Public."
5 Center for Research on Environmental. Decisions and ecoAmerica. (2014). Connecting on Climate: A Guide to Effective Climate Change Communication. New York and Washington, D.C.

While our mental models can change over time, understanding what perspectives your communities and stakeholders have can be helpful in identifying effective strategies to communicate and engage with them.

> Most of the time, people seek out information that supports their existing beliefs and values and reject information that contradicts the beliefs and values that are most important to them.
>
> -EcoAmerica Connecting on Climate, Guide to Climate Communication

Understanding Values, Worldview and Identity in Shaping Communications

While we cannot address all of the social dimensions of climate change understanding in an adaptation effort, we can identify certain characteristics that may help us shape climate communications to be most effective.

In Box 15, some examples of Worldview, Identities, and Values are highlighted[5]. For all community and stakeholder groups, consider if you can identify key considerations that should be noted and incorporated into your Outreach Plan/Strategy.

> Use Worksheets 2I-2O to list values and motivations for each audience with support from trusted partners.

Worldview

Sets of deeply held beliefs and attitudes about how the world works and how people choose to relate to each other[1].

Four key worldviews that may be helpful to understand for crafting effective messaging:

- **Hierarchical** = *Decisions should be made by authoritative groups*
- **Egalitarian** = *Decisions should be made through a process where all are equal*
- **Individualism** = *Personal responsibility to protect individual livelihoods and freedoms*
- **Communitarianism** = *Shared responsibility to support one another and address risks to protect our common livelihoods and communities*

Identities

Concept and expression of one's self and social groups in which an individual belongs (note: everyone holds multiple identities)[1].

A few examples of how identities can translate into effective communications messaging:

- **Resident** = *Support your **local** community*
- **Age or Generation** (Youth, Parent, Grandparent, Millennial, Baby-Boomer, etc.) = *e.g. Youth: You have an opportunity to shape your future*
- **Religion** = *Your faith preaches to support your neighbors in the face of dangers*
- **Culture** = *Your culture emphasizes supporting your neighbors and community in the face of challenges*
- **Political Party** = *Climate change adaptation is supported by the party you support*

Values

Principles people hold that help them make judgments about if climate change is a problem and how they should respond[1].

A few examples of how values can translate into effective communications messaging:

- **Self-Sufficiency** = *Climate resilience will help **you** be prepared for disaster*
- **Family / Community** = *Coming together to protect our families and neighbors will make our community stronger*
- **Patriotism** = *Being a leader in climate adaptation strengthens our global standing and protects our country from future risks*
- **Environmental** = *The imminent risks to the environment warrant that we act early to ensure ecosystems and habitats can adapt to rising sea levels*

Box 15 · Understanding Worldviews, Identities, and Values Help Shape Communications. Concepts re-drawn from 1. Center for Research on Environmental. Decisions and ecoAmerica. (2014). Connecting on Climate: A Guide to Effective Climate Change Communication. New York and Washington, D.C.

2.4.3 **Make it Relatable**

How Do You Translate Abstract Science to Be Accessible and Relatable?

Most of the information on sea level rise science remains in the realm of technical jargon, abstract concepts, and information on global processes that don't feel connected to everyday life. While a global phenomenon, sea level rise has local impacts. Identifying what those local impacts are, and connecting them to people's values, worldviews, and identities will be necessary to bring stakeholders along in the adaptation process. Below are some recommendations to address common problems associated with climate science communication (Table 4).

Use this information with section 2.4.4 Frame the Message and Delivery.

Try to...	What Do We Mean...	Examples
Listen and Build Upon People's Concerns	Make space in your effort to have two-way dialogue with communities and stakeholders and pay attention to the language they use and perspectives they hold. What concerns are being raised? Provide information that builds upon where they are starting from.	If traffic comes up as a reoccurring issue in a community and sea level rise flooding is expected to worsen the existing situation, it may be helpful to include impacts to traffic in a communications efforts, as it is already a topic that people are familiar with and concerned about.
Reduce Jargon	Pay attention to when jargon occurs, and where possible, describe the term in common language instead. If a technical term is important to use, define it before using (see Build A Shared Vocabulary), and spell out acronyms.	• "Anthropogenic" = human-caused • "Inundation" = flooding • "FEMA" = Federal Emergency Management Agency
Use Culturally Appropriate Language	Create space for conversations to occur in a community's native language(s) with and by partners who represent their communities. Encourage peer-to-peer dialogue, which allows people to share their experiences, connect with and learn from one another.	Through a community partnership, a project management team learned that there is no word in the Spanish language for "sustainability." So, communities explored the topic with a community facilitator and created a shared definition of sustainability in Spanish that made sense for them.
Simplify Your Message and Start with the "Lead"	Put your most important points first. In journalism, this is know as starting with the "lead". Don't bury the important information within details that don't contribute to the key message. Try to find the core message of what you want to communicate, and remove information that could cloud or confuse the core message.	Instead of "Sea level rise is projected to impact a range of different ecosystems at different points in time and without action we may lose the natural protection benefits of habitats," consider "Coastal habitats can help protect us from flooding. They are also at risk of disappearing as sea levels rise if we do not take action today."
Use Visuals and Local Images	Allow pictures, graphics, or other visuals to tell your story. Pair local visuals with local examples to help connect people to issues. Sketches, cartoons, and illustrations can also be great ways to simplify complex information.	Instead of using bullet points about global impacts, show an image from a local flooding event and describe or show consequences. Consider activities that encourage youth, local artists, or residents to help visualize what impacts mean to their community.
Bring Issues to the Local Scale	Climate change is a global issue and scientists often talk about impacts globally. Yet, climate impacts are experienced locally. Whenever possible, translate global values into local experiences.	Instead of "The oceans are rising by 1/8 inch each year globally on average," consider identifying local relative change using the nearest tide gauges, including images of local flooding, and local conditions such as subsidence.
Link Physical Impacts to Social Ones	Climate hazards are often described based on their physical impacts, such as water levels, temperature change, etc, When possible, share how these translate into everyday impacts that people can relate to such as consequences to homes, jobs, schools, hospitals, etc.	• More flooding events may lead to higher insurance premiums • Even though you're home may not be directly affected, flooding at the wastewater treatment plant will affect your water services • Flooding at the bridge will increase your commute to work

Table 4 · Make Science Relatable and Accessible to People. This table includes lessons learned by working with communities during the ART Bay Area project.

2.4.4 Frame the Message and Delivery

Why Is It So Important to Frame the Message, Messenger and Delivery Around Audience?

We hear it all the time: audience matters. This becomes all the more obvious when we acknowledge that people come into conversations with different sets of values and perceptions, and those determine how responsive they might be to new information provided. Thinking deeply and critically about the audiences that make up your communities and stakeholders is key. Within the broad groups identified in 2.2.1 Stakeholder Groups and Goals, there may still be different audiences that can be further grouped and understood based on common sets of values, worldviews and identities. It is essential to be audience-appropriate with the message, messengers and delivery[1].

Framing the Message

The **message** is what you say, the ***framing of the message*** is "the setting of an issue within an appropriate context to achieve a desired interpretation or perspective."[2] The framing should be informed and shaped by the worldviews, identities, and values of your audience (Box 15).

Framing has value because it can help organize central ideas, support the relevance of the message to the audience, and can help condense a message into useful mental "short-cuts" people already have.[3] To give two examples, consider: 1) The Human Health Frame, which can draw upon values of family, community, and local health impacts; and 2) The National Security Frame, which can draw upon values of patriotism, self-sufficiency, and global standing[2]. More information on this topic can be found in The Psychology of Climate Change Communications Guide.

1 Urban Sustainability Directors Network, "Equity Foundations Training."
2 Center for Research on Environmental Decisions, "The Psychology of Climate Change Communication: A Guide for Scientists, Journalists, Educators, Political Aides, and the Interested Public."
3 Center for Research on Environmental Decisions.

When crafting messaging, consistency and repetition are key. Although the framing of a message may shift with different audiences, the underlying message should remain consistent. For example, communication with residents of a community may include framing around family resilience and engaging local youth, with an underlying message that community perspectives are valued in shaping outcomes. Alternatively, communication with business owners may include framing around economic security and shared cost opportunities, with the same underlying message that business perspectives are valued in shaping the process outcomes. The purpose is to reach people where they are, while also bringing people together toward a shared understanding of where the process is going.

Framing the message is about understanding where people are starting from in order to help them relate to issues and topics in ways that resonance with them.

The Messenger and Method of Delivery

The person who delivers the message, known as the messenger, also matters. People are much more likely to believe those they trust, and more likely to act based on that recommendation. Communications experts call this the "Trusted Messenger Principle." In addition to the messenger, the method of delivery is also important. These two components should work together, and be as audience-specific as possible.

In terms of identifying a trusted messenger, researchers have identified that trusted messengers can come from many different places. They can come from local community members, as well as family and friends. They can also come from certain kinds of professionals, such as scientists, physicians and health care workers, faith leaders, meteorologists, staff at zoos, aquariums, museums and nature centers, as well as university leaders and farmers.

You don't need to know who all of the trusted messengers are at the beginning of the process, but you should start thinking about who might be a good fit for these roles once you begin

outreach and engagement. This is one of the reasons that we've emphasized the identification of "Champions" in this section of the process, as these can often be people who are good messengers to their audiences, whether that be a community, business, environmental, or other leader. Also, allow who might be the best champion to evolve and be shaped on stakeholder feedback.

> "As you meet with community members to build your network, ask representatives from different groups who they consider to be the best person to disseminate messages to their community. Avoid making assumptions about who the trusted person might be based upon your own interactions."
>
> - Oak Ridge Institute for Science and Education

Other potential messengers can include local media, such as reporters, print and media news organizations that serve specific communities. While these would be considered more traditional sources of messengers, there is value in the broad reach they can provide. The delivery of the message should make sense through the role of the messenger. Use existing streams or channels whenever possible.

It is also helpful to pay attention to the format or forum. For example, messengers can communicate to audiences through existing local or community events, at farmers markets, schools, libraries, and other local events. There can also be more formal focus group meetings where audiences are brought together into small groups, as well as even larger, broader public meetings. Other methods of delivery include online interactions. It is important to be flexible and creative, and allow the people and process to shape what works best for your community.

Storytelling

It is not enough to create and deliver effective messages, we must also *intentionally create new narratives* about where we are going. Humans understand the world through stories. Science communications research is increasingly showing the value of engaging with people through narrative storytelling techniques[4]. There are many ways to tell a story - it can be written, spoken, through art, and even data[5]. As you begin interacting with your communities and stakeholders, start to understand what stories exist and how you might create shared narratives of adaptation. Consider this Climate Storytelling Guide, or other resources for more information.

These stories will become particularly useful as you engage in conversations with communities in 3.2.3 Stories of Place and Chapter 4: Shape a Shared Vision of the Future. Storytelling efforts may also become part of your adaptation outcomes to continue connecting people to participate in adaptation efforts over time.

> Use Worksheets 2I-2O to frame the message and trusted messenger for each audience.

Christina Lives By A Beautiful Creek Digital Storybook

In 2018, a collaborative design challenge called Resilient By Design identified areas around the Bay Area to develop innovative sea level rise solutions. Resilient South City was one of the projects and one creative outcome was the a digital book called Christina Lives by a Beautiful Creek by ColmaCreekConnector (and available in four languages!) that tells a story about a communities relationship to the creek through the eyes of a young girl and her grandmother.

4 Narrative Persuasion and Storytelling as Climate Communications Strategies. 2017. Climate Science. Oxford University.
5 Connecting Data to Storytelling. Yale Program on Climate Change Communications

Download Workbook 2

2.5 Use Workbook 2 Outcomes

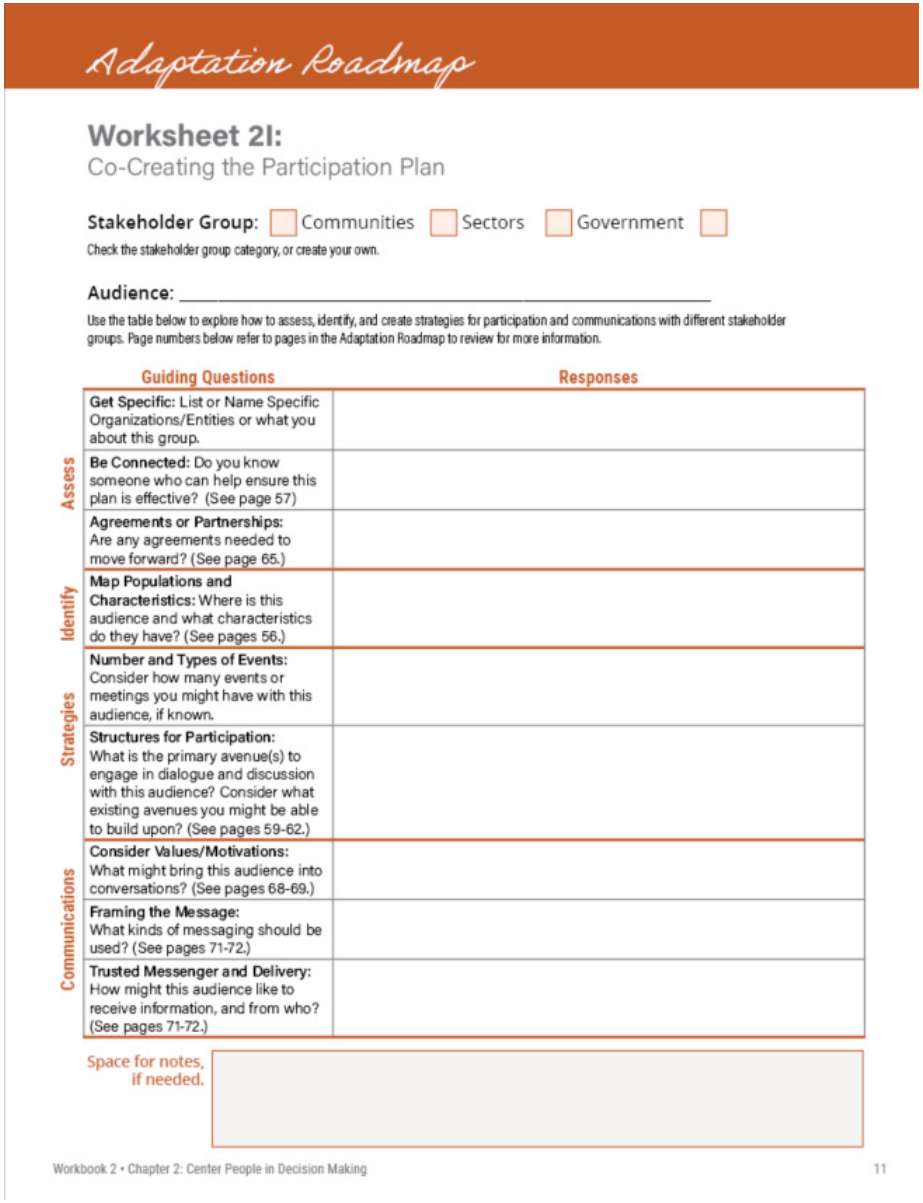
HOW TO STRUCTURE YOUR PROCESS

Use the information and relationships identified from Workbook 2 to co-create an outreach approach with community and stakeholders partners that describes *how* participants will engage throughout the entire adaptation process.

Key outcomes of Chapter 2 include:

- Management Team including a core team to manage the adaptation effort, key partnerships or advisory groups, and roles and responsibilities (WORKSHEETS 2A-2C)
- Audience Specific Participation Plans(s) created with the support from key partners, including levels of participation, decision-making process, communications approach, and audience specific participation plans (WORKSHEETS 2F-20)

These worksheets can serve as important ways to organize your process and describe how each group will participate meaningfully. As you continue your effort, be aware that these may need to be refined, updated, and that you may need to add additional stakeholders as you advance conversations on adaptation.



Adaptation Roadmap

Worksheet 2I:
Co-Creating the Participation Plan

Stakeholder Group: ☐ Communities ☐ Sectors ☐ Government ☐
Check the stakeholder group category, or create your own.

Audience: _____

Use the table below to explore how to assess, identify, and create strategies for participation and communications with different stakeholder groups. Page numbers below refer to pages in the Adaptation Roadmap to review for more information.

	Guiding Questions	Responses
Assess	**Get Specific:** List or Name Specific Organizations/Entities or what you about this group.	
	Be Connected: Do you know someone who can help ensure this plan is effective? (See page 57)	
	Agreements or Partnerships: Are any agreements needed to move forward? (See page 65.)	
Identify	**Map Populations and Characteristics:** Where is this audience and what characteristics do they have? (See pages 56.)	
Strategies	**Number and Types of Events:** Consider how many events or meetings you might have with this audience, if known.	
	Structures for Participation: What is the primary avenue(s) to engage in dialogue and discussion with this audience? Consider what existing avenues you might be able to build upon? (See pages 59-62.)	
Communications	**Consider Values/Motivations:** What might bring this audience into conversations? (See pages 68-69.)	
	Framing the Message: What kinds of messaging should be used? (See pages 71-72.)	
	Trusted Messenger and Delivery: How might this audience like to receive information, and from who? (See pages 71-72.)	

Space for notes, if needed.

Workbook 2 • Chapter 2: Center People in Decision Making 11

Resources for Chapter 2: Center People in Collaborative Decision-Making

RESOURCES AND FURTHER READING

2.1 Managing the Process

- Step 1. Scope and Organize. Adapting to Rising Tides (ART) Program Planning Process Design Your Project. San Francisco Bay Conservation and Development Commission (BCDC).
- Step 1.2 Assemble Project Team (pages 49-52). Adaptation Planning Guidance 2.0. California Governor's Office of Emergency Services.
- Step 1. Engagement for Resilience (Page 18). Regional Resilience Toolkit: 5 Steps to Build Large-Scale Resilience to Natural Disasters. Brechwald. et al. United States

2.2 Input into the Process

- Building Authentic Collaborations with Tribal Communities. Climate Science Alliance.
- Good Planning Guide: Stakeholder Engagement. Adapting to Rising Tides (ART) Program Planning Process Design Your Project. San Francisco Bay Conservation and Development Commission (BCDC).
- Stakeholder Engagement and Partnerships and Stakeholder Engagement and Partnerships Checklist. Adaptation Capability Advancement Toolkit (Adapt-CA). Alliance of Regional Collaboratives for Climate Adaptation (ARCCA).
- Step 1. Engagement for Resilience (Pages 19-30). Regional Resilience Toolkit: 5 Steps to Build Large-Scale Resilience to Natural Disasters. Brechwald. et al. United States.

2.3 Participation and Decision-Making

- Community-Driven Climate Resilience Planning: A Framework Version 2.0. National Association of Climate Resilience Planners.
- Community Resilience Toolkit: A Workshop Guide for Community Resilience Planning. Bay Localize. Schwind, K. 2009.
- Equitable Adaptation Legal and Policy Toolkit. Georgetown Climate Center.
- Equitable Adaptation Resource Guide. Salz, Y., Ghoghaie-Ipakchi, N., Armenta, P. Bay Area Climate Adaptation Network (BayCAN). Produced by the BayCAN Equity Work Group.
- Farther Together: Seven Best Practices for Engaging Communities to Create A Healthy Resilient Region for All. Bay Area Health Inequities Initatives.
- Five Levels of Participatory Engagement. Canada and Health. Canada, Health Canada Policy. Toolkit for Public Involvement in Decision Making.
- Good Planning Guide: Transparent Decision-Making. Adapting to Rising Tides (ART) Program Planning Process Design Your Project. San Francisco Bay Conservation and Development Commission (BCDC).
- Guide to Equitable Community-Driven Climate Preparedness. Urban Sustainability Directors Network, 2017.
- Liberating Structures Menu. Liberating Structures: Including and Unleashing Everyone.
- Making Equity Real in Climate Adaptation and Community Resilience Policies and Programs: A Guidebook. Greenlining Institute. August 2019.
- Resilience Guidebook Equity Checklist. State of California Governor's Office of Planning and Research (OPR). Technical Advisory Group (TAG).

Resources for Chapter 2: Center People in Collaborative Decision-Making (Continued)

- Spectrum of Family and Community Engagement for Educational Equity. Facilitating Power and Movement Strategy Center.
- SB1000 Toolkit: Planning for Healthy Communities. CEJA and Placeworks.
- Tip 8. Create A Partnership Agreement. West Oakland Environmental Indicators Project. Promising Practices to Improve Community Performance and Sustainability. Environmental Protection Agency.

2.4 Effective Communication Techniques

- Connecting on Climate: A Guide to Effective Climate Change Communication. Center for Research on Environmental Decisions.
- How-To Guide: Communicating About Climate Impacts. Adapting to Rising Tides (ART) Program Planning Process Design Your Project. San Francisco Bay Conservation and Development Commission (BCDC).
- How to Talk About Climate Change: Prepared for the National Network for Ocean and Climate Change Interpretation with Support from the National Science Foundation. 2015. Frameworks.
- Let's Talk Climate: Messages to Motivate Americans. EcoAmerica, Lake Research Partners, ASO Communications, Natural Resources Defense Council.
- The Psychology of Climate Change Communication: A Guide for Scientists, Journalists, Educators, Political Aides, and the Interested Public. Center for Research on Environmental Decisions.
- Corner, A., Lewandowsky, S., Phillips, M. and Roberts, O. (2015) The Uncertainty Handbook. Bristol: University of Bristol.

SELECTED EXAMPLES

- Acterra Community-based Vulnerability Planning Pilot Project Report. Thomas, P., Bayuk K., Samai E., Harrell, B., Saena, F.V., and Clifford, T. Urban Permaculture Institute, Acterra, and Ecology and Environment, Inc. Prepared for the San Mateo Office of Sustainability and California Department of Transportation.
- A Seat at the Table: Integrating the Needs and Challenges of Underrepresented and Socially Vulnerable Populations into Coastal Hazards Planning in New Jersey. The New Jersey Coastal Zone Management Program; New Jersey Department of Environmental Protection. May 202.
- Equitable Community Engagement Blueprint. Engage Durham Neighborhood Improvement Services, City of Durham, North Carolina.

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- Sona Mohnot, Climate Equity Associate Director, Greenlining Institute
- Hoi Fe Mok, Sustainability Manager, City of San Leandro
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CHAPTER 3

Set Local Context and Sense of Place

Chapter 3 supports gathering and reviewing conditions of planning, society, economy, environment, and climate impacts to set the context for the problem and solutions.

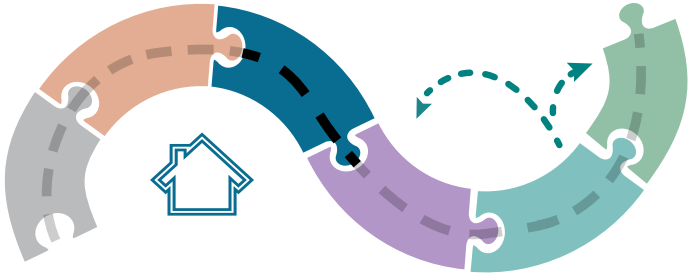
Introduction | Navigating the Adaptation Roadmap

Chapter **1** Build Your Adaptation Roadmap | Chapter **2** Center People in Decision-Making | Chapter **3** Set Local Context and Sense of Place | Chapter **4** Shape a Shared Vision of the Future | Chapter **5** Bring Together Shared Solutions | Chapter **6** Pathways Approach to Implementation

Flooding of wetlands and trail during King Tides in January 2020 on a windy but clear day in Bothin Marsh in the North day. Photo by Steve Disenhof, courtesy of California King Tides Project.

Chapter 3

Set Local Context and Sense of Place



What Will You Find in This Chapter?

This chapter is focused on exploring the local conditions, challenges, and opportunities with the core team, communities, and stakeholders identified in Chapter 2: Center People in Decision-Making.

Chapter 3 guides communities, stakeholders, and government participants through key conversations and considerations to share, learn and integrate existing and new information to shape a shared understanding of local context.

Details in this chapter include: how to evaluate your sea level rise vulnerability assessment; aligning and integrating data into local, neighboring or regional planning processes; engaging in meaningful conversations with communities about where they live and what they value; incorporating physical and environmental considerations and opportunities; and setting up conversations about adaptation pathways and preparing for the future.

Who is This Chapter For?

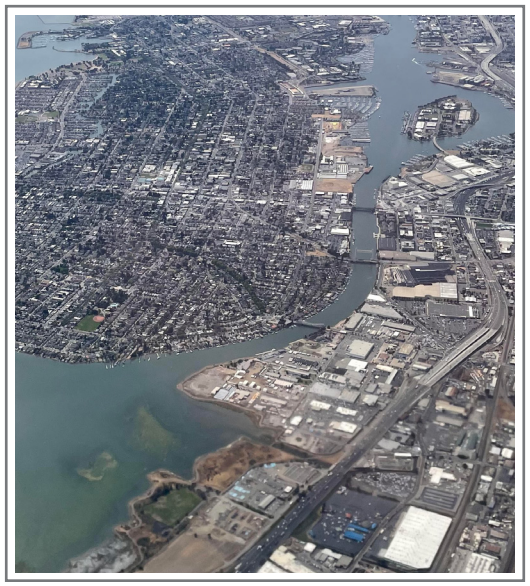
The Core Team should lead on organizing the information being gathered, while Key Partners and/or Champions should support and/or lead community and stakeholder conversations. Government will be needed for 3.1 Align Local and Regional Plans or Processes, while 3.3 Incorporate Environmental and Physical Characteristics, and 3.4 Frame Discussion for Uncertain Futures Using Adaptation Pathways may require more technical support.

What Outcomes Will This Get You?

Download Workbook 3 to support reaching Chapter 3 outcomes. These outcomes include:

- **Lists of Plans or Processes** for local and neighboring integration and alignment;
- **Stories of Place** about people, values, histories, and connections to the landscape;
- **Nature-Based and Physical Conditions, and Shoreline Planning Units** that elevate the local environmental conditions and refines shoreline planning scales; and
- **Planning Horizons** that account for social, physical and environmental conditions, flooding thresholds, and potential future triggers.

Chapter 3 outcomes are the essential building blocks that set the local context for shared visioning and adaptation strategies identified in the following Chapters 4 and 5.



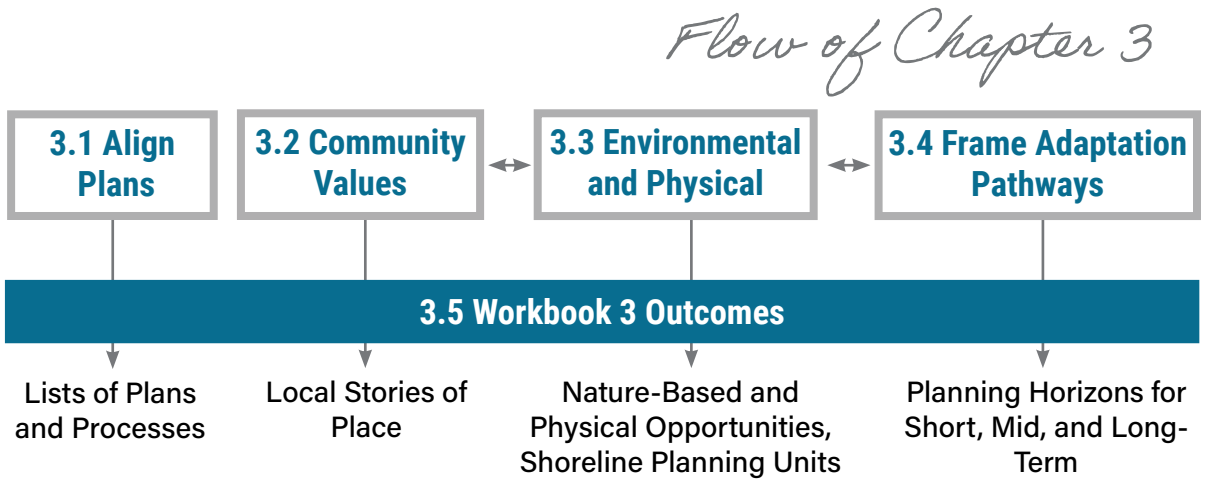


Figure 18 · Four Key Outcomes of Chapter 3. Chapter 3 provides an opportunity to gather information on local conditions, and all four section outcomes should build upon and inform one another.

Checklist for Chapter 3

Is this chapter for you? Explore the following questions to navigate to where you need to go. See Chapter 3 outcomes in Figure 18.

- ✓ Is your vulnerability assessment robust? > 3.1.1 Vulnerability Assessment
- ✓ Do you want to align local or neighboring plans or efforts? > 3.1.2 Local Plan Alignment, 3.1.3 Neighboring or Regional Alignment
- ✓ Have you had conversations about community values? > 3.2.1 Build Upon Community Initiatives, 3.2.2 Connect to Local Knowledge, 3.2.3 Stories of Place
- ✓ Have you identified nature-based opportunities for adaptation? > 3.3.1 Value of Nature
- ✓ Have you identified other physical context and considerations? > 3.3.2 Projects and Infrastructure
- ✓ Have you created shoreline planning units? > 3.3.3 Shoreline Planning Units
- ✓ Have you discussed the topic of adaptation pathways? > 3.4.1 Conceptual Framing
- ✓ Have you identified flooding thresholds or discussed triggers? > 3.4.2 Thresholds, 3.4.3 Triggers and Monitoring
- ✓ Have you created short, mid, and long-term planning horizons? > 3.4.4 Planning Horizons
- ✓ Have you organized your local context information in one place? > 3.5 Use Workbook 3 Outcomes

3.1 Align Local and Regional Plans or Processes

This section will dive deeper into reviewing the results of the sea level rise vulnerability assessment, plan alignment opportunities (including California state mandates SB 379, SB 1000, and the General Plan Housing Element), and suggestions for integrating neighboring or regional impacts. You can navigate to the details in each section below:

The Bay Trail along the south Richmond shoreline looks out across the wetlands and San Francisco Bay. Photo by Jaclyn Perrin-Martinez, BCDC.

Use this Section to Seek Integration Opportunities

Every jurisdiction comes into adaptation planning with a different set of local planning contexts and priorities. A key feature of the Adaptation Roadmap is that it follows the completion of a sea level rise vulnerability assessment, which should have been identified in 1.2.1 Foundational Studies, with an initial consideration for the 1.2.4 Scale at which to consider adaptation. Use this information gathered from Chapter 1 as you move forward in this section.

Sea level rise adaptation is inherently a local issue – local governments in California have authority over land use decisions that affect how people live, work, and recreate in their communities. At the same time, local planning cannot happen separately from neighboring jurisdictions or regional coordination as we know from the Collaborative Multi-Sector Adaptation that flooding crosses jurisdictional boundaries and actions taken in one part of the Bay can have impacts to another side. This sections highlights how the 2.1.1 Build Your Core Team can work with local government staff, elected officials, and even cross-jurisdictional governments, special districts, or other entities to identify relevant planning documents and processes that advance coordinated and collaborative adaptation outcomes.

In this section we define plan alignment as: "Using the same or complementary underlying data and methods across multiple different planning documents in such a way that different plans with different purposes are ultimately based on the same foundation of knowledge relating to both vulnerability and solutions."

The goal of this step is twofold: (1) ensure the vulnerability assessment that informs adaptation is robust, and (2) set yourself up for plan alignment opportunities.

This means a single robust adaptation planning process can inform plan updates (or plan development) with the same underlying information while advancing adaptation outcomes that are most suited to the purpose and goals of different planning documents.

3.1.1 Vulnerability Assessment

Are You Ready to Use Your Vulnerability Assessment?

A prerequisite to using the Adaptation Roadmap is having a sea level rise vulnerability assessment already completed. This is because this resource is designed to support *using the results of the vulnerability assessment* by building upon these results and adding key conversations and considerations explored throughout the following chapters to ultimately make decisions that reflect collaborative, equitable, integrative, and flexible adaptation solutions.

Is it robust and provide details at the approach scale?

There is not a single "right" way to conduct a vulnerability assessment, although there is guidance available including California State's Adaptation Planning Guidance 2.0 and BCDC's ART Planning Approach. Even with good guidance, every jurisdiction, organization, or community likely addressed different climate impacts or vulnerabilities based on their local issues.

Before moving forward in a new adaptation effort it is imperative to take a critical look at the existing vulnerability assessment to see if it is robust and up-to-date. Review the vulnerability assessment identified in 1.2.1 Foundational Studies, whether it still reflects the most updated 1.2.3 Sea Level Rise and Flooding Science, identifies vulnerabilities at the appropriate 1.2.4 Scale, and includes appropriate analysis of key vulnerabilities and sectors (Figure 19).

A robust vulnerability assessment should include detailed information that identifies climate risks to people and the natural and built environment. Review Box 16 for considerations on what may be in a vulnerability assessment to evaluate if yours is robust or needs to be updated. The vulnerability assessment should set the foundation for discussing scale and engaging in conversations about how to solve the vulnerabilities identified.

> Vulnerability assessments provide essential information, but they *alone* do not tell you *how* to adapt. Those decisions come from people – and should reflect the kind of world people want to live in.

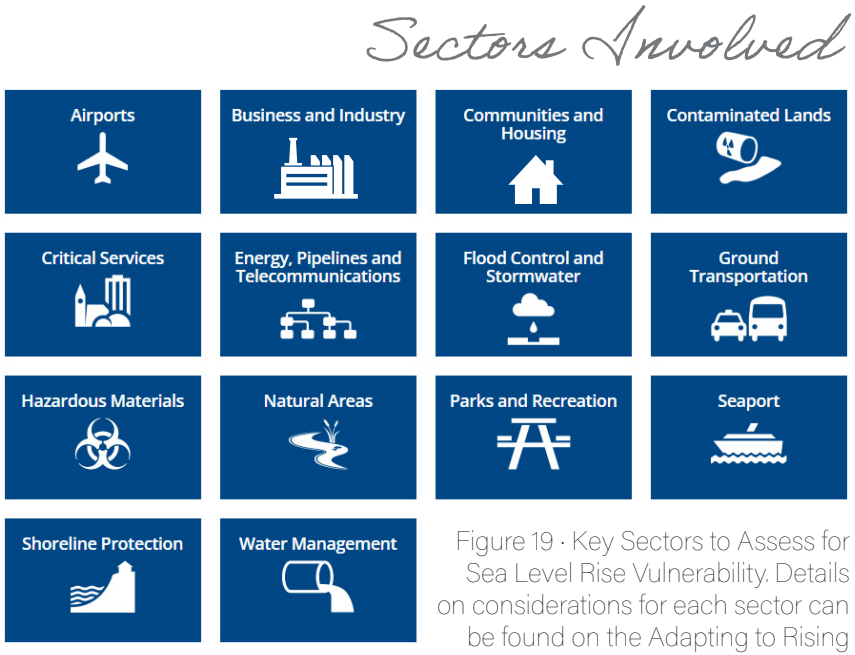


Figure 19 · Key Sectors to Assess for Sea Level Rise Vulnerability. Details on considerations for each sector can be found on the Adapting to Rising Tides website here.

Note: For meeting California Plan Mandate of SB 379, a vulnerability assessment for *all climate hazards* is the first requirement. However, California's Adaptation Planning Guidance 2.0 encourages those beginning a climate vulnerability and adaptation effort to start with their Phase 1: Define, Explore and Initiate step, which includes visioning and creating a community engagement strategy.

The Adaptation Roadmap acknowledges that vulnerability assessments, particularly those done many years ago. may have included different levels of community and stakeholder participation, visioning. etc. If previous vulnerability assessments included this level of detail, use and build upon that effort. If they did not, or if they were done at a higher scale, such as county-scale, use the Adaptation Roadmap resources to help develop more local visioning and guiding principles.

Vulnerability Assessment Considerations

Using Vulnerability Assessment Results

Vulnerability assessment results should be a foundation for the local context as you engage with conversations with communities and stakeholders across Chapter 3.

Places to use and highlight key components of the vulnerability assessment should occur across all four sections of Chapter 3:

- 3.1 Align Local and Regional Plans or Processes
- 3.2 Integrate Community Values
- 3.3 Incorporate Environmental and Physical Characteristics
- 3.4 Frame Discussion for Uncertain Futures using Adaptation Pathways

Use Workbook 3A to note vulnerability results you have and how they will be used.

Climate Impacts and Scenarios
Vulnerability assessments can focus on a single hazard (such as sea level rise) or include multiple hazards. For sea level rise, consider projections and mapping data from 1.2.3 Sea Level Rise and Flooding Science.

ART Bay Shoreline Flood Explorer
ART Climate Impacts

Communities and Housing
This may include analysis of demographics impacted, characteristics of populations, residential buildings, future growth areas, and more.

BCDC's Community Vulnerability Mapping
ART Bay Area Vulnerable Communities
ART Bay Area Future Growth Areas
ART Communities and Housing

Contamination
This may include brownfield sites, Superfund sites, and previously remediated sites that may be impacted by rising groundwater levels, as well as facilities that generate or store hazardous materials, such as landfills, laboratories, gas stations and more.

ART Contaminated Lands
ART Hazardous Materials

Community and Critical Services
This may include community services such as healthcare facilities, grocery stores, schools, and other services. Emergency response facilities such as fire and police stations. Utilities such as power plants and substations, underground transmission and distribution lines, and telecommunications. Public services such as water and wastewater, stormwater infrastructure and flood management.

ART Critical Services
ART Energy, Pipelines and Telecommunications
ART Water Management
ART Flood Control and Stormwater

Industry and Business
This may include number of commercial and industrial buildings and properties impacted. This can also include agricultural lands.

ART Business and Industry

Natural Areas
This may include acreage of natural lands, coastal and subtidal habitats, ecosystem systems, and wetlands migrations space.

ART Natural Lands

Open Spaces, Parks, and Recreation
This may include parks and open spaces in urban, regional, and national areas, including sports fields, golf course and more.

ART Parks and Recreation

Transportation
This may include bridges, railroads, highways and local roads, ferry facilitaties, bus and bicycle routes.

ART Ground Transportation
ART Airports
ART Seaport
ART Bay Area Transportation Networks

Box 16 · Components of a Vulnerability Assessment for Sea Level Rise and Resources.

3.1.2 Local Plan Alignment

Do You Want to Align Multiple Plans?

There are many different reasons to consider plan alignment in a sea level rise (or multi-hazard) adaptation effort. These may include meeting California state mandates on climate change, connecting updates to other related issues, such as housing, land use, circulation, conservation, open space, health, and other 1.2.2 Connected Issues, and/or using consistent information across multiple plans to improve outcomes for implementation.

In a perfect world information from comprehensive plans would permeate effortlessly into more focused plans that serve implementation (Figure 20). In reality, the large array of plans makes this challenging: the processes for updating different plans are often managed by different departments, require different intervals or cycles for updates, and contain different types of information at varying scales and levels of detail. However, working through these challenges and finding opportunities to update multiple plans, link information, and coordinate across departments of governments can have benefits that extend beyond adaptation alone (Box 17).

What are key planning documents to consider aligning?

In this section we emphasize alignment of planning processes that are increasingly being done together. These include:

- General Plan updates on the Safety, Environmental Justice (EJ) and Housing Elements,
- Local Hazard Mitigation Plan (LHMP) updates,
- Stand-Alone Climate Plan (Action, Adaptation, etc.)
- Capital Improvement Plan (CIP)

Through these key updates, it may be possible to satisfy requirements for SB 379 (Climate Adaptation), SB 1000 (Environmental Justice Element), and the Housing Element updates simultaneously. If you are only interested in the Housing Element Update, see MTC/ABAG's Regional Housing Technical Assistance Program website with additional resources. This section is informed by the Coastal Plan Alignment Compass Tool.

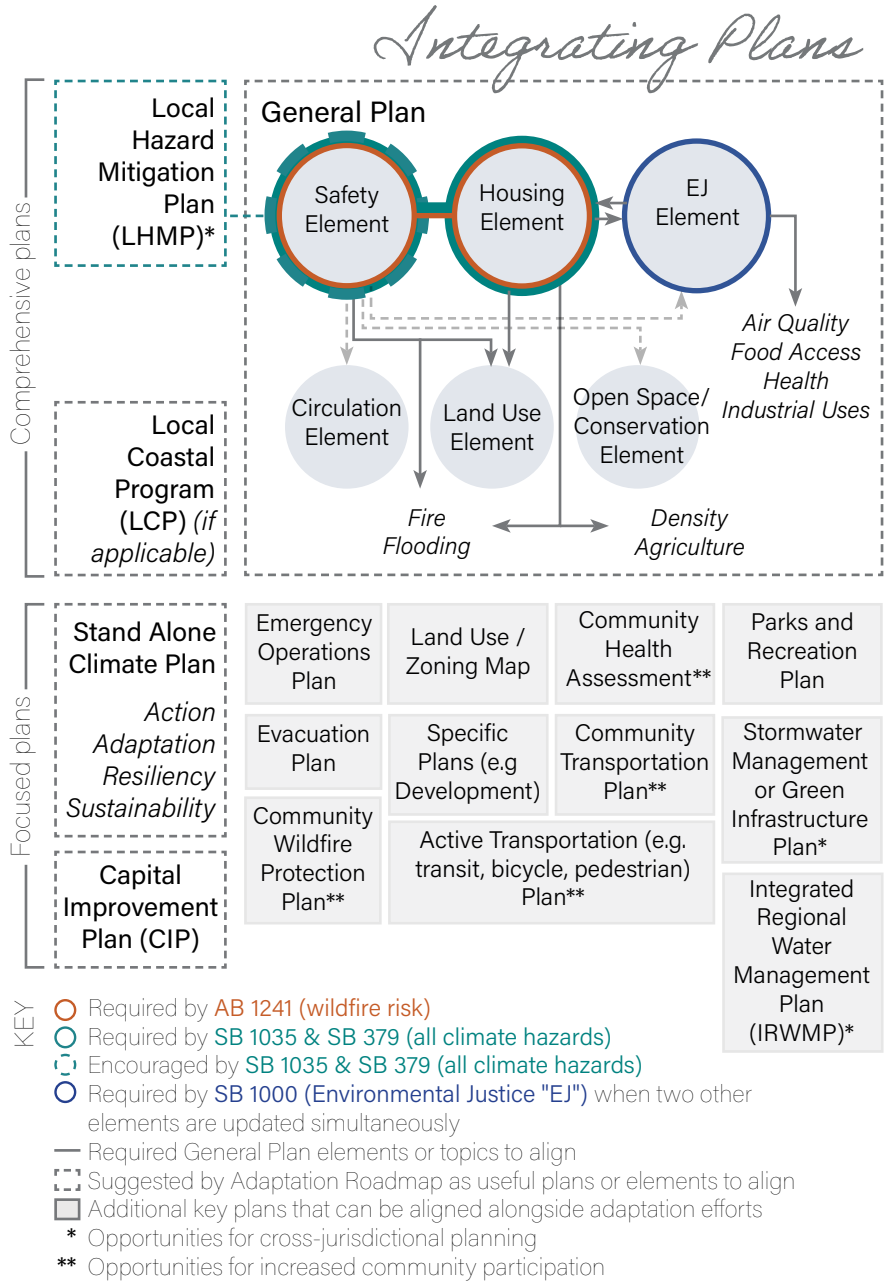


Figure 20 · Multi-Plan Integration and Alignment. This graphic identifies General plan elements, that may be useful to consider in plan alignment for sea level rise, where lines represent functional relationships among topics. See the Key for additional details.

Different Plans and Purposes

	Plan Purpose	Mandates or Incentives	Use in Adaptation	Update Timelines
General Plan	Serves as a future blueprint by prescribing policy goals and objectives that shape and guide land use decisions and development.	Only certain elements are required, including Land Use, Circulation, Housing, Conservation, Open Space, Noise, Safety, Environmental Justice and Air Quality. See OPR General Plan Guidelines.	Adaptation actions, including policies, in the General Plan that may affect the environment require CEQA, a public disclosure process, providing legal underpinning for actions.	Only certain elements are required and specific timelines depend on the element. General Plans generally cover 20-30 time horizons.
Safety Element	To reduce short and long-term risks to people, property, and the economy from fires, floods, droughts, earthquakes, climate change and other hazards.	Mandated by Senate Bill No. 379 that all climate hazards are assessed and adaptation strategies are identified and/or linked to this element.	Link adaptation actions that support safety and emergency response, and legal underpinning for implementation.	Required to be completed by January 1, 2022. See OPR's Safety Element Guidelines.
Housing Element	To implement California law to prioritize fair and affordable housing access for all.	Mandated by California Government Code 65580 to support adequate housing supply and affordability.	Link adaptation actions that affecting housing supply and quality and legal underpinning for implementation.	Required every 8 years. See OPR's Housing Element Guidelines.
Environmental Justice (EJ) Element	To identify disadvantaged communities and prioritize improvements to health and other related issues.	Mandated by Senate Bill No. 1000 to add or incorporate environmental justice population issues and strategies to improve outcomes.	Link adaptation actions that improve equitable outcomes for EJ communities and legal underpinning for implementation.	Required when two elements are updated simultaneously. See OPR's Environmental Justice Element Guidelines..
Local Hazard Mitigation Plan (LHMP)	Identifies natural disaster risks and vulnerabilities and develops strategies for reducing loss of life and property.	Incentivized by the Federal Emergency Management Agency (FEMA) by providing access to funding with approved plans.	Actions and strategies listed in an approved LHMP can be eligible for a range of FEMA funding, including both pre- and post-disaster funds.	Must be updated every 5 years to maintain eligibility for funding. See FEMA Guidelines.
Stand Alone Plan	Can be created for a specific purpose, provide topic-specific information for implementation.	Not mandated, but can improve and streamline CEQA requirements, for example.	Can provide holistic picture of how adaptation actions implemented across different plans function cohesively.	None required.
Capital Improvement Plan (CIP)	A CIP is a shorter-term plan created and approved by local jurisdictions that identifies capital projects and purchases, often supporting Strategic Plans.	Mandated by California Government Code 65403 to prepare a CIP that supports construction or maintains of public facilities and infrastructure.	Link adaptation actions to local funding sources that can be implemented by local government through their public works or other budgeting processes.	A five-year plan that must be reviewed and can be revised annually.

How can different plans serve adaptation?

Different plans can provide different benefits and values for adaptation (Table 5).

Some plans have legal requirements to be updated on specific cycles with different types of information or levels of detail (such as General Plan Elements), other plans can provide important sources of funding (such as LHMPs and CIPs), or serve other purposes such as organizing information that is otherwise distributed across plans (such as Stand Alone Climate Plans).

The State of California's Office of Planning and Research (OPR) provides resources on General Plan Guidelines and Technical Advisories. Keep in mind this table is not exhaustive and there may be other plans or processes that may be useful to align in your adaptation effort.

Table 5 · Overview of Key Plans that Can Be Aligned. This table includes information about suggested key plans in adaptation, their purpose, if they are mandated or incentivized benefits in adaptation, and required timelines.

Alignment Guiding Questions

For each plan considered in 1.2.1 Foundational Studies or identified in this section, review the following:

Plans Relevant or Connected to Adaptation

- What are the plans you are interested in updating?
- What is the specific purpose or goal of each plan?
- What is the scale of the plan and topic area, if applicable?
- What level of specificity is required by different plans?
- Which department(s) are likely to lead an update?
- What is the process to initiate and make updates?

Ordering or Hierarchy in Joint Planning

- Are state mandates or specific mandate timelines required by certain plans? When are they?
- Do some plans inform others? Should updates be done sequentially, concurrently, or cascading?
- What might be an effective ordering and timing for the development of, or updates to, relevant plans?

Defining Plan Alignment and Incorporating Adaptation

- What underlying data or information from the adaptation planning process can be integrated across multiple plans?
- Where will adaptation action and strategies live?

Organization and Coordination of Plan Alignment/Updates

- Are there existing regularly scheduled meetings in place for coordination? Can existing meetings be used?
- Is there a forum in place for coordinating with external governments? (e.g. with other cities, special districts or neighboring jurisdictions)
- Are there existing stakeholder outreach efforts that can be included in additional plan developments or updates?

Box 17 · Plan Alignment Guiding Questions.

Where should adaptation actions live?

California's Office of Planning and Research (OPR) provides guidance, but does not mandate, where adaptation actions should go. OPR suggests using the planning document or mechanism that best overlaps with the adaptation outcomes and/or is next slated to be updated. In practice, adaptation actions have often gone in stand alone plans and/or integrated across existing plans.

How to consider CEQA in adaptation?

At the time of this publication, there is no official state guidance on how the California Environmental Quality Act (CEQA) should be addressed in climate adaptation. A good place to start is thinking about *where* you are planning to have adaptation actions and strategies live.

- *a. Linked to General Plan Updates:* General Plans updates often require a CEQA process. If your effort includes one, or more, General Plan element updates, CEQA is likely to be involved. *If you are linking adaptation outcomes to General Plan updates, consider initiating CEQA early as part of the plan update process.*
- *b. Within a Stand Alone Plan or LHMP:* Adaptation actions or strategies listed in a stand alone plan or document may or may not need to do a CEQA process. Because a list of actions and strategies may not be considered "discretionary projects," it's unlikely CEQA would be required. However, this may depend on the level of detail/design. At the same time, doing a CEQA process alongside plan development can speed up implementation, if that is your goal. Keep in mind CEQA is an expensive process. *If you are doing a stand-alone adaptation plan, consider initiating CEQA only if the financial resources to do so make sense, otherwise consider waiting until it's required for a specific project.*

Ultimately, this is an evolving topic. As more jurisdictions do this work, guidance and even mandates may change in the future.

What information gets aligned and where?

Understanding what underlying information you have and what kind of information should be aligned across different documents will be helpful in organizing a multiple plan update process. In the Adaptation Roadmap, we recommend beginning with information and content in your existing vulnerability assessment. Wherever possible, build upon what you have already done and add to it as move into decision making and outcomes for adaptation. The types of information that might be useful to consider for alignment include:

People and Processes

- Stakeholders/Departments Involved
- Community Participation
- Shared Vision and Guiding Principles

Data and Information

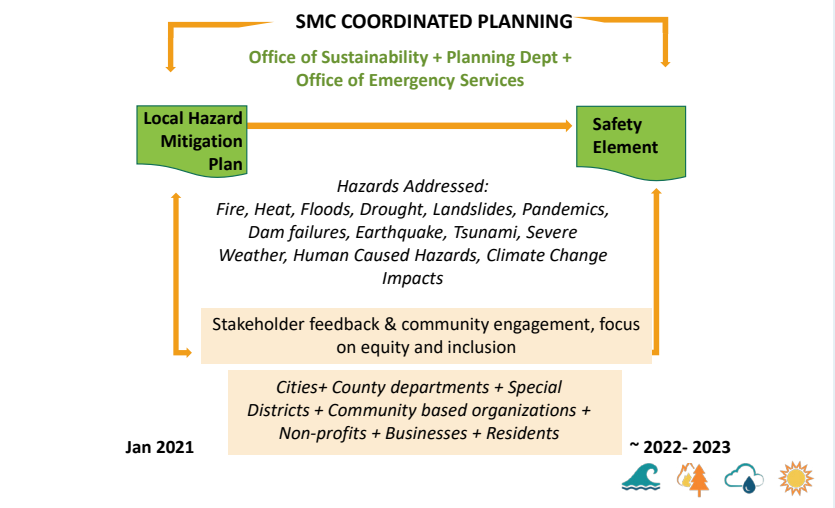
- Maps of Hazards/Flooding Areas at Risk
- Sea Level Rise Projections and Modeling
- Asset/Sector Vulnerabilities and Consequences
- Issue Identification and Prioritization

As you move beyond the vulnerability assessment, it may also be useful to align the outcomes of adaptation. The Adaptation Roadmap highlights five major categories of adaptation actions, desribed in further detail in Chapter 5: Bring Together Shared Solutions.

Adaptation Actions and Outcomes

- Plans and Policies
- Programs and Operations
- Capacity Building
- Funding and Financing
- Build A Project

Use Worksheets 3B-3D to list your responses.



County of San Mateo Joint Planning Approach

In November 2021, the County of San Mateo adopted the Multi-Jurisdictional Hazard Mitigation Plan (MJHMP) to guide the County and 35 planning partners in reducing the impact of natural hazards, including earthquake, fire, flooding, extreme heat, and landslides, and climate change. The five-year MJHMP is a collaborative effort across 36 local governments and special districts. Each entity developed an Annex Plan with mitigation actions detailing how their organization intends to reduce the impacts of natural hazards and climate change. During the development of the MJHMP, the County invited community members to participate in the effort by reviewing and commenting on the draft and/or attending public workshops in the Spring and Summer of 2021. In addition, the Office of Sustainability and the County Manager's Office Communications team and Social Media Coordinator partnered with eight community-based organizations to conduct targeted outreach in hard-to-reach communities, reaching over 30,000 people through events and social media. The MJHMP greatly benefited from input from community members, and the County looks forward to continuing to work with community-based organizations and community members to implement the plan.

The MJLHMP is now being used as a base for updating the County's Safety Element. The County is currently scoping additional analysis and work needed to comply with SB379. This may include an updated climate change vulnerability assessment, updating the MJLHMP goals and objectives to include goals focused on climate adaptation and resilience, and development of adaptation strategies, land use policies and implementation actions to address climate impacts. The County is exploring a coordinated Safety Element update approach with some cities in partnership with 21 Elements.

3.1.3 Neighboring or Regional Alignment

How Can You Align Efforts More Broadly?

This section is about exploring how your local jurisdiction or planning area *fits into* a regional or broader context, including regional plans, policies, projects, and data. While decision-making for adaptation must occur at the local scale, the impacts of flooding and consequences of adaptation decisions can affect areas outside of your own local jurisdiction or community. This os described in detail in Collaborative Multi-Sector Adaptation. The impacts of shared flooding between neighboring jurisdictions should have been identified during your initial assessments in Chapters 1 and 2.

Refer back to 1.2.1 Foundational Studies, 1.2.4 Scale, 1.2.3 Sea Level Rise and Flooding Science, and 2.2.1 Stakeholder Groups and Goals.

What are benefits of regional coordination?

The Bay Area region is interconnected in many ways – from our defining feature of San Francisco Bay itself, which is a large estuary with hydrological connections, to being a metropolitan area made up of numerous counties and cities where jobs, housing, and recreation opportunities interact across jurisdictions. Regional can refer to the larger "nine-county Bay Area," or subregional areas such as the Operational Landscape Unit (OLU) scale. Improving coordination with neighboring jurisdictions and regional entities can offer benefits, such as:

1. Funding opportunities
2. Accessing regional or subregional data
3. Sharing local knowledge and resources

Review the following questions in Box 18 to explore regional alignment.

Use Worksheet 3E to list regional opportunities and neighboring impacts.

Bay Adapt: Regional Strategy for a Rising Bay

Bay Adapt is an initiative to establish regional agreement on the actions necessary to protect people and the natural and built environment from rising sea levels. Bay Adapt is convened by the San Francisco Bay Conservation and Development Commission (BCDC) in partnership with a broad range of Bay Area leaders.

Hundreds of people from across the Bay came together in 2020 and 2021 to develop the Bay Adapt Joint Platform. Outreach and Participation occurred through dozens of expert working groups, public forums, community and stakeholder focus groups, presentations, an environmental justice caucus, and led by a Leadership Advisory Group.

The resulting nine actions and 21 tasks lay an approach for adapting faster, better, and more equitably to a rising Bay. The Joint Platform highlights the role and responsibility of local jurisdictions to make choices on adaptation decisions, while also acknowledging that each jurisdiction "going it alone" can result in outcomes that lead to increased harm, such as flooding neighbors, vulnerable communities, and loosing critical wetlands habitat, among others.

Bay Adapt is currently moving forward on implementing a number of these actions and tasks, including the development of a Regional Adaptation Plan. Stay up to date on these efforts at www.BayAdapt.org.

Regional Coordination Guiding Questions

Neighboring or Regional Projects

Are there existing adaptation projects nearby that may be relevant for coordination? The Shoreline Adaptation Project Mapping is a tool for the San Francisco Bay Area to spatially track adaptation projects with relevant details, such as project leads, specific adaptation measures used in the project, funding sources and/or need, and other design conditions. Review this regional shoreline tracking project to identify existing or in-development shoreline adaptation projects.

Regional or County Climate Collaboratives

Is there an existing regional or sub-regional "collaborative" or other forum for discussing climate related issues broadly? Is there a county-wide program or collaborative to coordinate climate adaptation? If so, has this group been included in the 2.2 Input in the Process? If not, how might you align your efforts with the broader group?

Existing Multi-Jurisdictional Shoreline Working Groups

Are there other large-scale (shoreline landscape, city-wide, etc.) adaptation planning efforts being undertaken by cities or counties within your Operational Landscape Unit (OLU)?

Assets of Regional Significance

Does your jurisdiction or planning area contain assets of regional significance? This may include flooding impacts to major transportation networks, utilities or major infrastructure, highly vulnerable communities, rare habitats or endangered species, or other regionally significant entities? For example, BCDC's ART Bay Area includes Local Assessments with shared neighboring flooding impacts and "hot spots" of regional consequence. This might also be a place to incorporate additional stakeholders. For example, if a Caltrans transportation route is impacted, this could be an opportunity to invite them into your effort.

Regional Plans and Programs

Are relevant regional plans, programs, or other services being utilized? There are many regional plans and programs that can support adaptation. Some of these include Plan Bay Area 2050, Bay Adapt: Strategy for A Rising Bay, The Estuary Blueprint, Baylands Habitat Goals and others.

Regional Resources

ART Bay Shoreline Flood Explorer
Shoreline Adaptation Project Mapping
SFEI/SPUR Adaptation Atlas
Point Blue Conservation Science Future Tidal Marshes

Regional Climate Collaboratives

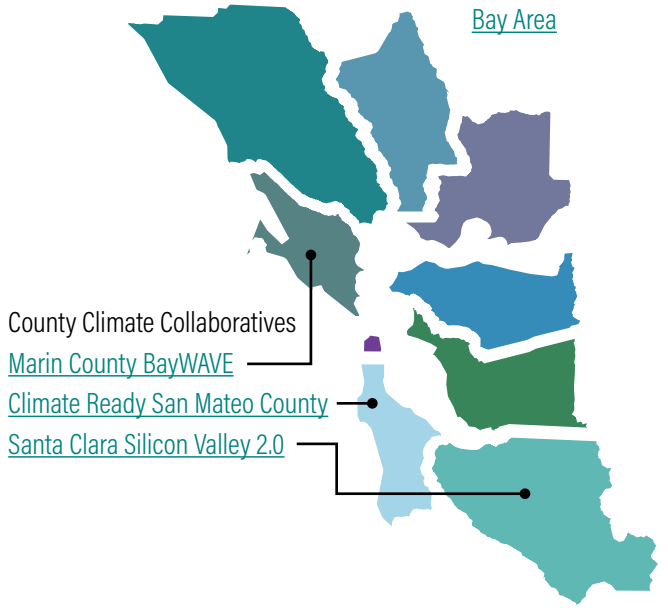
Bay Area Climate Adaptation Network (BayCAN)

Regional Plans or Programs

San Francisco Bay Plan
Suisun Marsh Protection Plan
Plan Bay Area 2050
Estuary Blueprint
Bay Adapt Joint Platform
Baylands Habitat Goals

Regional Studies

ART Bay Area
Sediment For Survival
Bridging the Gap: Funding Sea Level Rise Adaptation in the Bay Area



Example Shoreline Working Groups

North Richmond Horizontal Levee Stakeholder Working Group
Hayward Area Shoreline Planning Agency
San Leandro Bay/Oakland-Alameda Estuary Adaptation Working Group

Box 18 · Regional Coordination Guiding Questions and Resources.

3.2 Integrate Community Values

This section will dive deeper into considerations for having two-way conversations with communities about local issues, perspectives, and building on communities efforts, acknowledging and incorporating local knowledge, and creating shared stories of place to build resilience. You can navigate to the details in each section below:

Community members in East Palo Alto come together to unite and advocate for their community. Photo courtesy of Nuestra Casa.

Use this Section to Learn *With* Communities

The importance of framing adaptation around *people*, not hazards, and making it relatable and accessible to their lives was discussed in Equitable Community-Driven Planning and 2.4 Effective Communications. In this section, we apply those concepts in practice to add another layer of information into the adaptation effort from the perspective of communities and stakeholders to further set the context for local adaptation.

All communities are different and it is important to engage in conversations with communities and stakeholders to understand the nuances of what vulnerabilities exist and what activities or existing social structures may currently be working to improve equity and resilience. This two-way dialogue has many benefits:

- The 2.1.1 Build Your Core Team can better understand what issues exist within communities to gain a more holistic understanding of the problem(s),
- Community members can share and voice their concerns with the core team *and* engage in dialogue with other members of their community, and;
- Existing initiatives, programs, plans and knowledge can be incorporated into climate adaptation solutions.

This holistic human-centered approach appeals to individuals' perspectives about the social culture, norms, and customs we experience together. These perspectives may differ across community and stakeholder groups, but it is valuable to provide an opportunity for these conversations to occur in the context of adaptation planning to ensure outcomes can improve social and economic conditions without exacerbating existing issues or creating new unintentional consequences.

This section is an important opportunity to engage and interact with communities and stakeholders as outlined in the Participation Plans co-created in Workbook 2. As you engage with people, build in opportunities to reflect on how well your strategy is working and how people's input from these conversations are influencing the process. Review the 2.3.3 Decision-Making Process outlined earlier, and adjust as needed as you go.

3.2.1 Build Upon Community Initiatives

Where is the Community Starting From?

The definition of a "community" is fluid – it can refer to a group of people living in the same location, or people with common interests and hobbies, shared values, lifestyles, or experiences. In 2.2 Input in the Process, we asked you to explore the category of "Communities" and we used this term to refer to people *living* in an area impacted, directly or indirectly, by sea level rise.

At the same time, there is also a difference in talking to different community members or "communities" based on their histories and lived experiences. One of the community audiences we discussed are vulnerable communities, which BCDC defines as populations of people with characteristics that could make it more difficult for individuals to prepare for, respond to, or recover from flooding[1]. The State of California has its own designation of "Disadvantaged Communities" based on specific criteria[2].

In this section, we recommend engaging with communities – however you choose to define them with input from 2.1.2 Early Engagement With Key Partners – to understand what local programs, capacities, and initiatives may already exist that should be considered in the context of adaptation planning. This is an opportunity to listen, learn from one another, and explore how to not only meet communities where they are, but help them achieve their goals too.

The questions in Box 1 are written from the perspective of dialogue with community members; however, similar concepts apply and these can be adjusted for other stakeholder groups as well. In a meeting setting, this would be a good place for neutral facilitation with high levels of participatory engagement. These questions can be turned into a variety of activities and two-way dialogue among stakeholder groups and the core team (see 2.3.1 Participatory Engagement). Review your Participation Plans for communities and stakeholders from Workbook 2 and explore the best ways to engage and interact with your audiences. You can have smaller, stakeholder-specific meetings to explore these questions and/or engage all stakeholders together in a larger meeting. Keep a record or detailed notes of these conversations. See Resources for Chapter 2 and Resources for Chapter 3 for more on communications and meaningful community engagement.

Use Worksheet 3F to list relevant notes from these conversations with communities and stakeholders.

1 Community Vulnerability Mapping. BCDC. Accessed online at https://www.bcdc.ca.gov/data/community.html

2 SB 353 Disadvantaged Communities. California Office of Environmental Health Hazard Assessment (OEHHA). Accessed online at https://oehha.ca.gov/calenviroscreen/sb535

Community Engagement Best Practices Learned Through Partnership with Nuestra Casa BARHII, and BCDC's ART Program

The following best practiced have been identified in the Bay Area Regional Health Inequities Initiative's (BARHII) report Farther Together: Seven Best Practices for Engaging Communities to Create A Healthy, Resilient Region for All.

1. **Budget Wisely** for Effective Community Engagement
2. **Expand Engagement** through Interagency Partnerships
3. **Co-Design Your Process** with Communities
4. Make Engagement Activities **Accessible and Relevant** to All
5. Identify **Locally Meaningful Vulnerabilities** and Assets
6. Prioritize **Community-Supported Resilience** Actions
7. **Collaborate** to Bring Equitable Solutions to Fruitition

Many examples in this report come from an effort to pilot deep community engagement in East Palo Alto through a partnership among BARHII, BCDC's Adapting to Rising Tides (ART) Program, and Nuestra Casa in 2018 as part of ART Bay Area. The effort resulted in the co-developed of mutually beneficial goals, including two community forums (in English and Spanish). This partnership further supported Nuestra Casa in developing an Environmental Justice Academy that serves to provide education and community awareness on resilience.

Community Guiding Questions

Framing the Climate Conversation

What is the community's familiarity and/or concern with climate change? Prior to jumping into a discussion about the details of existing concerns, it is important to ensure the conversation is framed appropriately around climate change, given it is the new challenge upon existing social issues. This does not necessarily mean asking if people understand the science and details of climate change and impacts, but instead, questions around how familiar people are with the concepts or impacts of climate change, and what level of concern they may already have (or don't have) with this issue. (See 2.4.3 Make it Relatable). Depending on the answers, you may decide to adjust the following questions to meet communities and stakeholders where they are. In addition, the topics of 4.1.1 Risk Tolerance and Perception and 4.3.2 Strategic Approaches for sea level rise adaptation solutions are discussed further in Chapter 4, but could be included earlier, if appropriate.

Listening to Community Concerns

What are existing community challenges and concerns that should be included in this conversation? In what ways might they be made worse or better by climate impacts? These questions provide space to discuss existing community concerns, issues, challenges and inequities. While it will be important to find the nexus with issues and climate impacts, this dialogue can be an opportunity to share a broad range of concerns that can be noted, and then begin moving the conversations towards connections to climate impacts.

Some issues raised *may not* have a direct connection to climate impacts or what this adaptation effort can solve. It will be important to set expectations that this conversation does not mean the planning process can solve all of these issues. Instead, it is a way to evaluate concerns and highlight opportunities for integration.

Understanding Community Values

What are the things (places, people, values, etc.) that are most important to the community? Within the context of climate change, these questions begin to get at the community's values and things in their community they want to perserve. Understanding community values can be done through various activities, including mapping exercises and two-way interactive dialogue. One way to begin these conversations is focusing on positive assets in the community.

For example, questions may include where are the places you enjoy being (e.g. church, community center, shoreline park, movie theater, etc.), what do you like about your communities (e.g. sense of community, local mom and pop shops, etc.), what are important places you visit (e.g. grocery store, school, parks, etc.). You can use the ART Functions and Values exercise, which asks individuals to put stickers on maps. Mapping exercises should be supplemented with notes from the conversation and include things that cannot be so easily mapped.

Learning From and Building Upon Community Efforts

Are there existing or planned community initiatives, programs, or plans to address community concerns, even if they are not related to climate change? This part of the conversation should focus on understanding existing community leadership and capacity to address local issues. If there are existing plans, programs or initiatives, understand what those are, who is involved, and what issues are being addressed. For example, if there is a program through the local school on environmental stewardship, is there a potential future opportunity to integrate climate education and resilience efforts through that program? For each initiative, program, or plan identified, ask yourself if the person or entity in charge is included in the stakeholder group. If not, consider how to include additional stakeholders into the process. These existing efforts can be part of the solutions you build in Chapters 4 and 5.

Box 19 · Guiding Questions and Considerations for Starting Community Conversations.

3.2.2 Connect to Local Knowledge

Learning from Different Sources of Knowledge

As practitioners working in government, planning, engineering, etc., some might perceive certain kinds of information as having *more* value than others. For example, scientists use the scientific method and process of peer-reviewed research as a way to validate their understanding of the world. In local communities and indigenous cultures, there are also processes and peer-developed methods for understanding the world and information around them. People's own local knowledge, perspectives, and history of experiences have value tool. Both the scientific process and local knowledge can be hold value at the same time.

Sustainable Solano and Suisun City Flood Walks

The non-profit organization Sustinable Solano in partnership with the City of Suisun and with support from BCDC's ART program, began the Suisun City Resilient Neighborhoods program. In an effort to build the capacity of communities members to participate in this effort, they did a series of local "flood walks" where residents were given packets of information and joined an outdoor event to explore and discuss current and future flood issues in their communities.

Sharing results of the 3.1.1 Vulnerability Assessment with communities and stakeholders can occur in different ways and the level of detail should be considered with the previous section of 3.2.1 Build Upon Community Initiatives. For example, it may be useful to translate vulnerability assessment data into maps highlighting specific assets of interest to the community. Creating a "packet" of this information or sharing slides to participants before meetings can be useful ways to help people orient to the information at hand. Interactive activities can also be especially helpful, such as going on "flood walks" or other outdoor activities that bring people along the shoreline.

If communities or stakeholders were involved in shaping the vulnerability assessment, be sure to highlight areas where local knowledge was incorporated into the results. If it becomes clear that communities and stakeholders did not provide sufficient input into the development of the vulnerability assessment, consider if any additions to the analysis may be needed.

Defining Local Knowledge

The Food and Agricultural Organization (FAO) of the United Nations states "Local knowledge is a collection of facts and relates to the entire system of concepts, beliefs and perceptions that people hold about the world around them. This includes the way people observe and measure their surroundings, how they solve problems and validate new information. It includes the processes whereby knowledge is generated, stored, applied and transmitted to others.[1]" It may be useful to have your communities define what local knowledge means to them and be sure to use it in conversations about vulnerability as well as future conversations about adaptation solutions in later chapters.

Local Knowledge Has Value And Should Be Compensated

Just as we pay consultants for their technical or other specialized skillsets to understand information, it is essential to think about community knowledge as specialized and valuable too. Making the best decisions on how to solve the risks and vulnerabilities of flooding from sea level rise, storms, riverine flooding, and groundwater rise, among other hazards, must include local knowledge to ensure that solutions work and are also supported and endorsed by those who live there.

Traditional Ecological Knowledge (TEK)

Traditional ecological knowledge refers to the "evolving knowledge acquired by indigenous and local peoples over hundreds or thousands of years through direct contact with the environment.[2]" There is much we can learn from the knowledge and wisdom generated by people over time. For those with tribal representatives or tribal governments involved in their adaptation effort, take the time to listen and learn from tribal leaders.

Use Worksheet 3G to note how local knowledge is being connected to your effort.

1 What is Local Knowledge? Food and Agriculture Organization (FAO). Accessed January 2022 at https://www.fao.org/3/y5610e/y5610e01.htm
2 Traditional Ecological Knowledge. Accesed January 2022 at https://www.fws.gov/nativeamerican/pdf/tek-fact-sheet.pdf

3.2.3 Stories of Place

Linking Stories of People and Places Over Time

This section builds on the initial conversations in 3.2.1 Build Upon Community Initiatives by adding the elements of time and place. This can be an opportunity to work with communities and stakeholders to explore how the social conditions and landscapes *of today are the result of past choices*, just as the social conditions and landscapes of the *future will be a result of our choices today*. These conversations will set the stage for describing the approach for making adaptation decisions over time in 3.4 Frame Discussion for Uncertain Futures Using Adaptation Pathways.

Landscape Literacy

All places have deep, rich histories and stories for how and why they came to be. Landscape literacy refers to the "ability to read landscapes and the stories they tell."[1] Landscape literacy can be a tool to work with local residents to "read the environmental, social, economic, and political stories embedded in their local landscape and give them a way to formulate new stories, to envision how to transform their neighborhood, to both challenge and work with public officials".[2]

The West Philadelphia Landscape Project uses landscape literacy as a cornerstone of their community development, stating,"to be literate in landscape is to recognize both the problems in a place and its resources, to understand how they came about, by what means they are sustained, and how they are related."[1] Exploring this concept with communities and stakeholders might including discussing and sharing historic maps about the history of a place, from the first indigenous peoples, to colonization, and the social, economic, political and physical conditions that shaped the landscape to what it is today.

1 West Philadelphia Landscape Project. Retrieved July 2021 from https://wplp.net/library/2012/projects/landscapeliteracy.html

2 Landscape Literacy and Design for Ecological Democracy. Paths to Sustainability. Retrieved July 2021 from https://pathstosustainability.com/2017/05/26/landscape-literacy-and-design-for-ecological-democracy-anne-whitson-spirn/

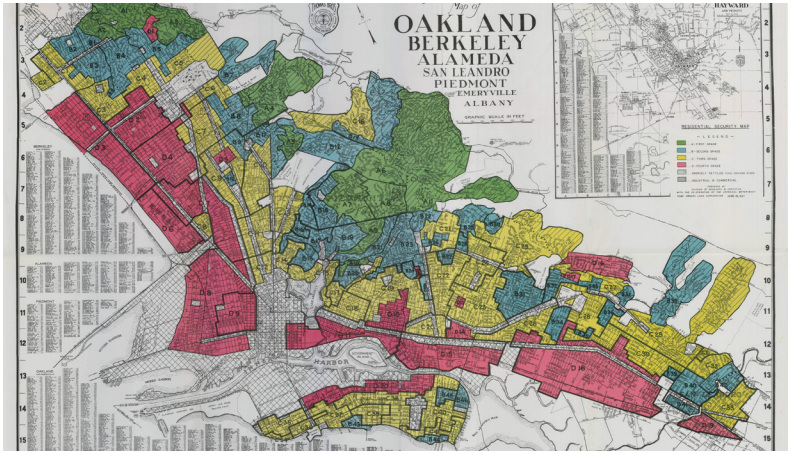


Figure 21 · A historic map of redlining in Oakland, Berkeley and Alameda.. Map courtesy of a KQED story on Government Redlining.

Environmental Justice and Explicit Role of Government

Many of the social and health inequities that exist today can be traced to racist government planning and land use decisions that affected the social and physical landscape. Environmental justice, which described further in Equitable Community-Driven Planning, is a core issue that must be addressed in adaptation efforts. Policies such as redlining that segregated where people could live based on race have led to historic dis-invest in neighborhoods, the placement of contaminated sites and facilities near these communities, health disparities, and other harms to low-income communities of color. An example of a historic map of redlining in Oakland can be seen in Figure 21.

Raising these histories and embedding it as part of the story of a place can serve as "a means for recognizing and redressing those injustices through urban planning and design and community development". *Explicitly* highlighting where and how past government decisions have led to inequitable outcomes can be a powerful step to ensure future decisions change these outcomes. Governments conducting and sharing a review of its historical practices that identify and acknowledge past wrongs can be a valuable way to *begin* re-building trust with communities that have been harmed by these institutions.

Natural Habitats and Ecosystem Changes Over Time

Another way to think about landscapes is through the lens of the natural environment and its array of habitats, species and ecosystems that have changed, and been changed by human use, over time.

In the San Francisco Bay, more than 90 percent of its historic tidal wetlands have been lost of severly damaged by human development[1,2]. As increasing numbers of people arrived in the region in the late 1800s through early 1900s, indigenous populations were displaced, shoreline development increased greatly and habitats were lost. Today, the remaining habitats continue to face risks from development, pollution, and sea level rise.

Indigenous Stewardship

For centuries, indigenous populations have been caring for lands in the Bay Area. Some resources to further explore this topic include the Indigenous History in the Bay Area event hosted by the Open Space Trust that provides recorded videos as well as resources and links to tribes in the Bay Area and current issues they face.

Given the widespread degradation and loss of critical habitats, it is essential to be reminded that *not all human interactions or impacts on natural systems are inherently bad*. There is a long history of humans who have been stewarding, caring for, and in the process, changing the environment around us for millenia, and this is particularly true for indigenous populations. This is helpful to keep in mind because it reminds us that we can make choices that do not harm, but instead, improve and support the quality and diversity of natural habitats. The value and distribution of natural habitats for sea level rise solutions is described further in the next section 3.3.1 Value of Nature.

Raising this topic with communities and stakeholders could include sharing images of historic habitats maps of local areas

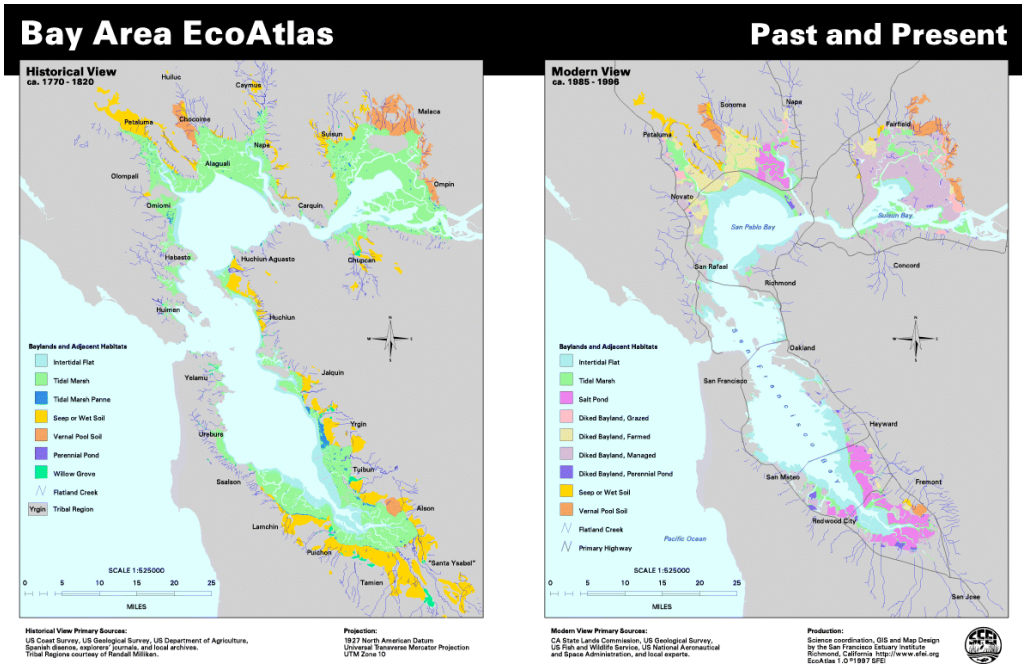


Figure 22 · The figure on the left represents the historic distribution of habitats before 1820, while the map on the right identifies the remaining habitats today. Map courtesy of SFEI.

to improve resident's understanding about what the landscape once looked like and compare to modern maps to understand how land uses and decisions have shaped the physical features of the environment (Figure 22). This can be particularly helpful in the context of sea level rise, as development and other infrastructure projects have changed historic natural environmental features such as river channels, wetlands habitats, and natural drainage areas that can worsen flood risks. This ties into the following section 3.4 Frame Discussion for Uncertain Futures Using Adaptation Pathways.

Use Worksheet 3G to list relevant notes from these conversations with communities and stakeholders.

1 Wetland Conservation and Protection. BayKeeper. Accessed at https://baykeeper.org/our-work/wetland-conservation-and-protection#:~:text=It%20is%20estimated%20that%20in,been%20lost%20or%20seriously%20degraded.
2 Coastal Wetlands and Sediments of the San Francisco Bay System. USGS. Accessed at https://pubs.usgs.gov/fs/coastal-wetlands/

3.3 Incorporate Environmental and Physical Characteristics

This section will dive deeper into identifying nature-based opportunities, incorporating considerations for land uses and major infrastructure, and refining shoreline planning units. You can navigate to the details in each section below:

Use this Section to Map Local Conditions

Building upon the local planning efforts in 3.1 Align Local and Regional Plans or Processes and social, economic and political conditions in 3.2 Integrate Community Values, this section focuses specifically on the physical characteristics of the shoreline and land areas vulnerable to flooding impacts.

In this section, we dive deeper into the local physical conditions so that we can understand the realities, constraints, and opportunities that exist for shoreline solutions. Information gathered in the previous two sections should be integrated and overlaid with this section whenever applicable.

Together, this information will help communities and stakeholders gain clarity of physical realities, and organize planning and social issues into physical places to further support the problem definition in Chapter 4.

The Baylands Priority Conservation Area (PCA) in the South Bay provides a variety of habitats to different species. Map data 2019 by Google Earth Pro.

3.3.1 Value of Nature

How Can We Benefit From and Improve the Natural Environments Around Us?

The San Francisco Bay is the largest estuary on the West Coast. Its shoreline is home to different types of natural habitats, from wetlands, beaches, lagoons and more. Development in the Bay and along its shoreline over the years have changed many of these natural habitats. Yet, we still have many opportunities to improve these habitats while also supporting flood protection and many other benefits for our lives and economies.

How Nature Improves Our Lives

For many, simply the existence of natural habitats brings us joy. **These "good" things we feel from nature are real values.** For far too long our economic systems have failed to recognize the benefits nature has in our lives. Because we often do not quantify these benefits in economic analysis, habitats are often counted as "zero" dollars, the economic equivalent of "worthless". Yet, we know ecosystems are not worthless – they are our life support system, and arguably have the most value of all.

The term "ecosystem services" describes the economic benefits people receive from nature (Figure 23)[1]. These benefits include everything from the essential things we need to survive, such as food and clean water; the goods we can extract, such as fish, and lumber; the regulating services we probably don't even think about, including storing carbon and flood control; even our love for nature – cultural, spiritual, recreational – is a value.

In terms of sea level rise, nature habitats can help reduce the impacts of flooding on people and development. Wetlands have been shown to reduce wave heights that lessen flooding impacts during storms, improve water quality, store carbon in their soils which reduces the impacts of climate change, and support wildlife and biodiversity[2].

Figure 23 · Natural Habitats Provide Essential Ecosystem Services that Support Human Health and Wellbeing. Source: TEEB Europe.

San Mateo County Wetlands Vulnerability Study

Point Blue Conservation Science, San Mateo County and the State Coastal Conservancy created a technical report that measured and quantified the benefits of San Mateo's wetlands and their role in flood protection and human wellbeing. The study included the value of wetlands as bird habitat, carbon sinks, and attenuation of flooding, among others.

Ensuring Connected Ecosystems

The natural habitats and ecosystems around the San Francisco Bay were here long before the shorelines were divided into jurisdictional boundaries. It is essential to recognize and incorporate ecosystems and the processes that sustain them across our human-made boundaries (Box 20).

Use Worksheet 3H to list ecosystem services and the value of nature to your communities.

1 Millennium Ecosystem Assessment

2 Hayden, M.*, L. Salas, N. Elliott, D. Jongsomjit, S. Veloz, N. Nur, J. Wood, H. Papendick, and K. Malinowski. 2019. Informing sea level rise adaptation planning through quantitative assessment of the risks and broader consequences of tidal wetland loss: A case study in San Mateo County. Point Blue Conservation Science (Contribution No. 2217), Petaluma, CA.

Consider Habitat and Health Connections

Whole Watershed Approach

A watershed, sometimes called a drainage basin, is an area of land that captures all water, such as rainfall and snow melt, from an area that drains into an outflow point, such as a Bay or ocean[1]. The San Francisco Bay has four major sub-embayments, which can be refined to even smaller scales[2]. Understanding how water moves across landscapes is essential for creating adaptation solutions that support healthy ecosystems, and this is particularly true when considering how to re-connect shoreline ecosystems to their upstream inputs, such as sediment. Explore maps of San Francisco watersheds, which are incorporated into the Adaptation Atlas boundaries.

Sediment Supply and Management

Wetlands are transitional habitats between the open water of the Bay and shoreline that are inundated daily by the tides and can be capable of keeping pace with rising sea levels if they have access to consistent and adequate sediment supply from upstream and Bay sources. In the Bay Area, sediment is a highly valuable resource and urbanization over the centuries has disconnected wetlands from creeks, streams, and the Bay via rerouting and/or building levees that reduce or eliminate sediment delivery. The availability of sediment from upstream land and watersheds, the Bay, and dredging projects, are critical components to maintaining healthy ecosystems in the face of rising sea levels. BCDC's Sediment Management program and the Long Term Management Strategy for the Placement of Dredged Material in the Bay Region (LTMS) support the reuse of sediment from dredging projects for habitat restoration and adaptation projects. The Sediment for Survival (2021) report is another key resource for understanding the value, distribution, and regional management needs for sediment in the region.

1 NOAA. What is a Watershed? National Ocean Service website. Accessed 01/18/2022 at https://oceanservice.noaa.gov/facts/watershed.html
2 San Francisco Bay Watershed. USGS. Accessed 01/18/2022 at https://ca.water.usgs.gov/projects/baydelta/studyarea.html

Wetlands Migration Space

In order for shoreline habitats such as wetlands to keep pace with rising sea levels, not only do they need access to adequate sediment supply, but they also need *space* to migrate landward. In the Bay Area, many areas behind existing wetlands contain development, such as homes, infrastructure, or other developed land, hindering their ability to migrate and survive. In areas with no development where migration space is possible, it will be necessary to protect these spaces through land use decisions.

Green and Gray Hybrid Infrastructure

Using natural habitats to improve and support flood protection is known as "green" infrastructure, and includes things like restoring or enhancing wetlands, sea grass or oyster reefs. Traditional human-engineered flood protection is known as "gray" infrastructure, and includes things like sea walls or levees that use concrete or other non-living materials. As sea levels rise, it may become increasingly necessary to use hybrid flood protection approaches that use elements of both. Adding natural habitats to traditional infrastructure can improve its longevity while creating opportunities to support ecosystem services.

Contamination Legacies

There are areas along the San Francisco Bay shoreline, and in the Bay itself, with a legacy of harmful toxic chemicals both in the water and soils due to industrial uses. Along the shoreline, some areas have been cleaned, or remediated, but it is essential to identify where methods appropriate for dry land may no longer provide protection from leakage of contamination in wet conditions from rising sea level or shallow groundwater rise. Agencies that monitor or regulate contaminated sites include the Department of Toxic Substances Control (DTSC), San Francisco Bay Regional Water Quality Control Board, BCDC and U.S. Environmental Protection Agency. The movement of contamination from rising sea levels is a significant public health and environmental concern.

Using the Adaptation Atlas

Acknowledging nature's value to our lives is essential. In the Bay Area, we also have a tool to explore *where* natural habitats can be restored or improved so they can continue to provide ecosystem services and support human wellbeing. Use this section alongside findings from your 3.1.1 Vulnerability Assessment on natural habitats vulnerability and consequences.

The San Francisco Estuary Institute (SFEI) and San Francisco Bay Area Planning and Urban Research Association (SPUR) created the Adaptation Atlas in 2019, a science-based framework for developing sea level rise adaptation strategies that are appropriate for diverse shorelines of the Bay[1]. It identifies where natural habitat opportunities exist to support flood protection.

The Adaptation Atlas provides maps of "Nature's Jurisdictions", otherwise known as Operational Landscape Units (OLUs) (Figure 24). These OLUs take into account natural, physical, and ecological processes, as well as the built shoreline, to provide insight into how suitable different types of nature-based solutions are in each OLU. These solutions include creating, restoring, or improving habitats *in* the Bay, such as nearshore reefs and submerged aquatic vegetation, at the Bay *edge*, such as tidal marshes, polder management (or subsided baylands), and ecotone levees (or horizontal levees, which are levees with a gentler slope that support increased habitat use). It also identifies areas *inland* that may provide wetlands migration space to support wetlands ability to adapt to rising sea levels.

Understanding opportunities for improving natural habitats along your shoreline is critical to ensuring those opportunities are carried through the adaptation effort and considered in future visioning (Chapter 4) and adaptation solutions (Chapter 5).

> Use the Adaptation Atlas to identify which OLU you are in, Worksheet 3H to note this information, and your nature-based opportunities.

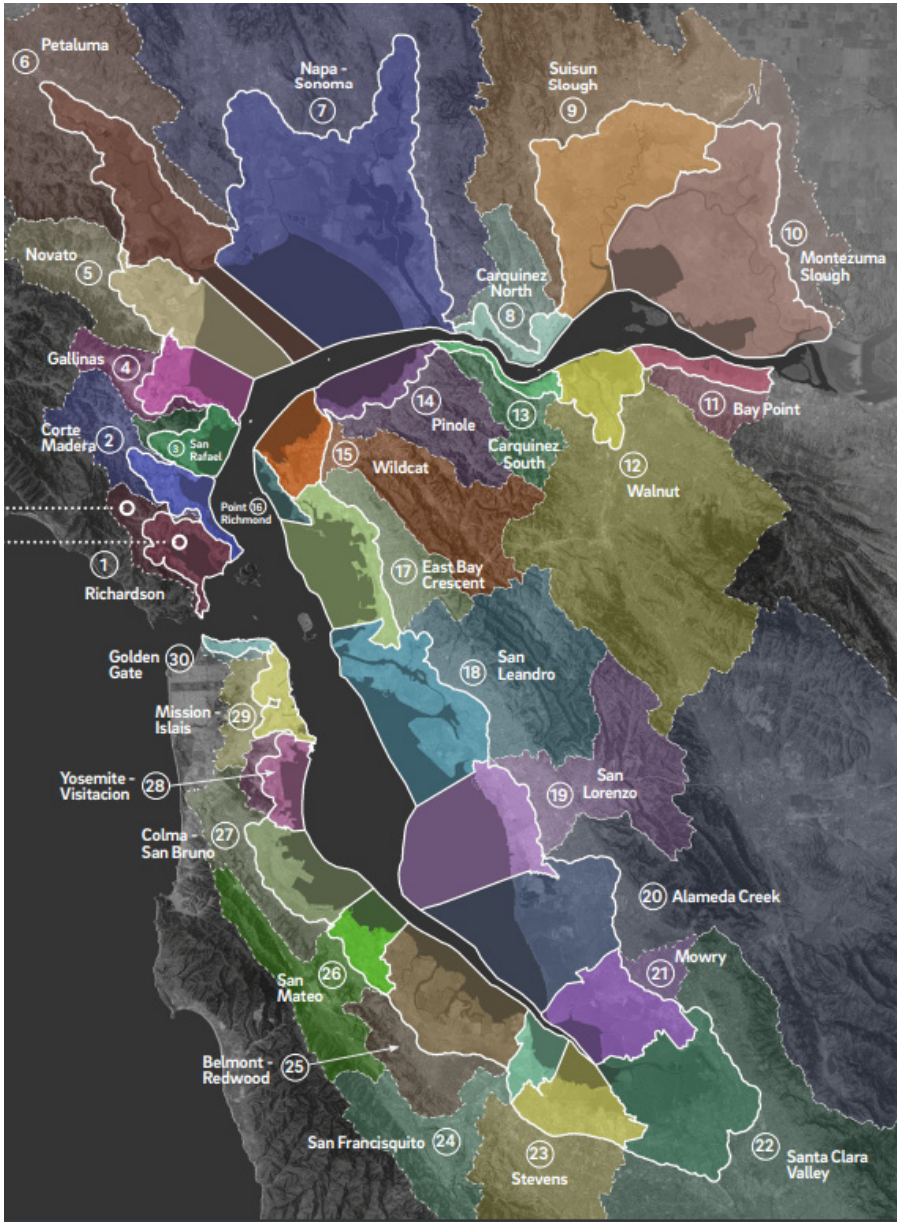


Figure 24 · Operational Landscape Units (OLUs) in the San Francisco Bay Area. Source: Adaptation Atlas.

1 Adaptation Atlas. San Francisco Estuary Institute and San Francisco Bay Area Planning and Urban Research Association. 2019

3.3.2 Projects and Infrastructure

Are There Major Developments to Consider?

This is an opportunity to review findings from 3.1.1 Vulnerability Assessment and identify if there are any significant development, critical infrastructure, or major projects that exist in your planning area that would influence physical landscape conditions. This information will be used to help identify shoreline planning units in the following section, and can support 3.1.2 Local Plan Alignment and incorporation into capital improvement plans. Identifying this information can help improve coordination, alignment and integration of this adaptation effort with other plans and projects, and present new opportunities for co-benefits and even potentially cost-sharing opportunities. Review considerations in Box 21.

Use Worksheet 3I to list key projects or infrastructure, and note opportunities for coordination, integration, or alignment.

The Orange Memorial Park Regional Stormwater Capture Project being constructed in the City of South San Francisco. Photo courtesy of the City of South San Francisco.

Physical Considerations

Critical Infrastructure Upgrades or Improvement Projects

Are there any upgrades, repairs, or developments to utilities or other critical infrastructure? Ensure any major utilities improvement projects are considered alongside adaptation planning, such as for upgrades to water and wastewater utilities. Consider the lifespan of these projects and ensure the adaptation planning effort accounts for this.

Flood Protection or Flood Control Projects

Are there any flood control projects? Do these projects consider riverine, sea level rise, and shallow groundwater rise flooding? Flood control projects can range from building certified levees for flood protection to upgrading channelized rivers, improving drainage areas, building green infrastructure, and/or improving stormwater systems.

Future Development Areas

Are there development projects being constructed or planned? This might include areas planned for zoning or density changes, or future housing and jobs near transit, such as Priority Development Areas.

Habitat Restoration

Are there any habitat or ecosystem restoration projects in the area? This may include upland transition zone restoration, subtidal restoration (e.g. oyster reefs, eelgrass restoration), or Priority Conservation Areas.

Landfills or Other Contamination Areas

Are there landfills or contaminated areas to consider? This may include contaminated or toxic sites or facilities that would constrain or impact adaptation planning options.

Transportation Infrastructure Projects

Are there major transportation projects in development or planned for future development, repairs, or other upgrades? This may include highways, bridges, ports, railroads or other important transit routes impacted by flooding, such as those identified in the ART Bay Area Transportation chapter. Identify any major projects or infrastructure and invite relevant stakeholders to participate in the adaptation process.

Box 21 · Guiding Questions and Considerations for Projects and Infrastructure.

3.3.3 **Shoreline Planning Units**

What's the Scale at the Shoreline?

Scale in adaptation can be a tricky issue because depending on your adaptation *solution* (more on that in 5.1 Explore Actions to Meet Envisioned Futures), the appropriate scale may differ. For example, a program or policy such as building codes or zoning changes may need to occur at broader planning scales, such as city or county-wide. However, site-specific physical shoreline solutions, such as restoring habitats or building levees, are likely suitable for local shoreline scales that are influenced or determined by the environmental and physical features of the landscape. Additionally, solutions at local shoreline scales can influence what adaptation actions are appropriate, for example, a short segment of road may require a different adaptation solution than a large beach.

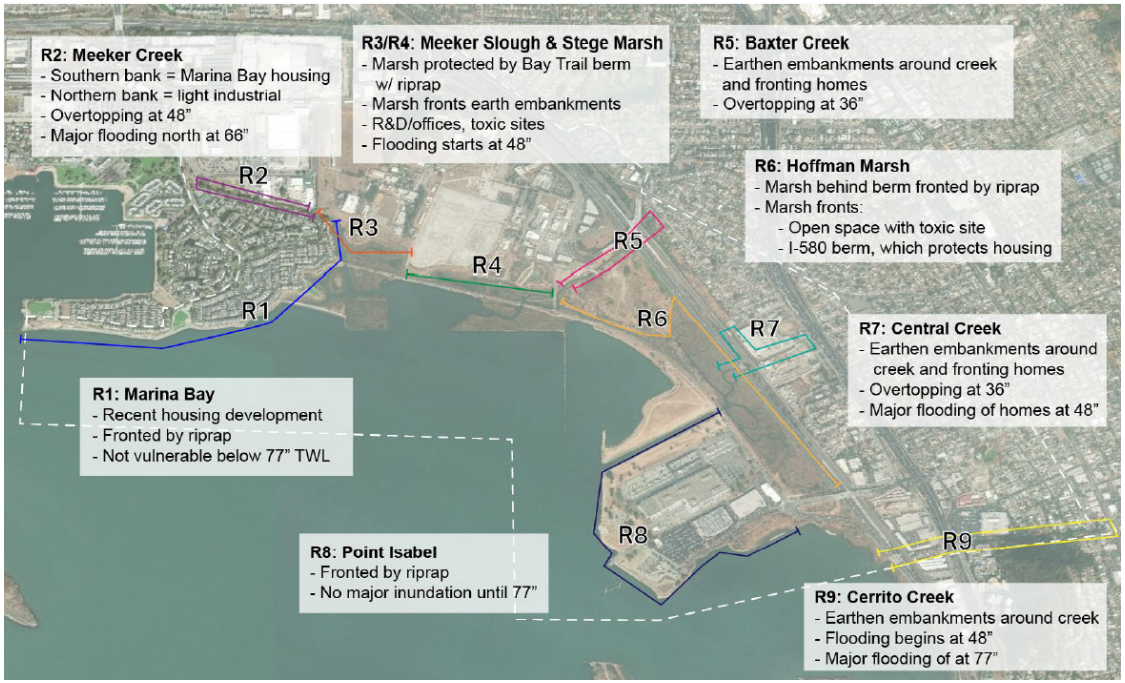


Figure 25 · Shoreline Planning Units in a Hypothetical Case Study of Sea Level Rise Adaptation in Richmond, CA. In this example nine shoreline reaches were identified based on a combination of shoreline edge type, shoreline geometry, and natural features such as marshes and creeks.

In your initial assessment of 1.2.4 Scale, you were asked to identify the *broadest* scale of adaptation planning, while considering smaller scales that may be relevant, such as a neighborhood, specific area, or shoreline. In this section, we bring together the information gathered in 3.2 Integrate Community Values and 3.3 Incorporate Environmental and Physical Characteristics to divide the shoreline into sections, segments, or "reaches", that can help identify physical adaptation strategies that are most suitable to areas with similar shoreline characteristics.

Like other sections in Chapter 3, it will be essential to draw upon the results of sea level rise 3.1.1 Vulnerability Assessment, which should include maps of flooding and details of vulnerability, exposure, and consequence. While this section will walk through considerations for developing shoreline segments, it will be important to consider segments both individually *and* holistically, as adaptation strategies in one location can have impacts on strategies in another location. Similar to the vulnerability assessment, there is no "one" right way to do this. However, it will be critical to describe your approach for a transparent process and to reference again in Chapter 5. Figure 25 provides an example shoreline planning units from a hypothetical case study along the southern shoreline in Richmond.

Use information in Box 22 for ideas and considerations to support determining shoreline segments. *This list is a starting point and not exhaustive*. It should also be noted that each location is different and requires different considerations, and it's most likely that a combination of characteristics taken together will inform shoreline reaches.

Use Worksheet 3J to describe the sources used and descriptions of shoreline planning units.

Creating Shoreline Planning Units

Shoreline Type (or shoreline edge type)

The San Francisco Bay Shoreline Inventory classifies the shoreline into ten categories based on existing conditions:

- Shoreline Protection Structures
- Berm
- Natural Shoreline
- Engineered Levee
- Railroad
- Major Road
- Water Control Structure
- Floodwall

The categories reflect shoreline features which were built for flood risk management (e.g., floodwalls) and natural features (e.g., wetlands) which could indirectly provide coastal protection but were not specifically designed for this purpose. Areas where a shoreline changes from one type to the next may be useful in considering shoreline reaches, for example, a wetlands vs. transportation structure.

Shoreline Vulnerability Index

The Shoreline Vulnerability Index (SVI) is a dataset that considers six characteristics of the shoreline. These include:

1. Shoreline Type (above) Baseline Vulnerability
2. Shoreline Adaptability
3. Shoreline Fortification
4. Frontage and Secondary Defense
5. Shoreline Height (elevation)
6. Wave Energy

These characteristics contribute to the SVI and can also be considered individually.

Flooding and Overtopping Areas

The ART Bay Shoreline Flood Explorer provides mapping data on sea level rise flooding and overtopping. Overtopping refers to areas where sea level rise reaches the elevation of the shoreline and inland flooding occurs. It can be useful to consider where the first flooding and overtopping impacts occur, as well as if these are specific points of the shoreline or widespread. An important note is that these datasets **do not** include other important flooding factors, such as flooding from riverine and shallow groundwater rise, which should also be included.

Natural Environmental or Human-Made Features

Natural or human-made breaks in the shoreline (such as shoreline segments between creeks) are often useful in creating shoreline reaches. Other considerations for natural features include their surrounding landscape such as proximity to waterways, marsh areas, marinas, boat access, or other public access. Refer to 3.3.1 Value of Nature.

Shoreline Projects or Inland Development

The Shoreline Adaptation Mapping Project Mapping spatially tracks adaptation projects that can be viewed online. Different or similar land uses along the shoreline or inland can provide insight into selecting shoreline reaches (e.g. inland development can include neighborhoods, clusters of assets, utilities infrastructure, etc.). Refer to 3.3.2 Projects and Infrastructure.

Social Issues or Opportunities

Based on conversations with communities and stakeholders in 3.2.1 Build Upon Community Initiatives and 2.2.3 Identify and Map Populations, consider if there are certain social concerns issues raised that are appropriate to consider for shoreline reaches. For example, maybe a particular part of shoreline has significant cultural value that makes sense to have a cohesive shoreline solution.

Box 22 · Considerations for Creating Shoreline Planning Units.

3.4 Frame Discussion for Uncertain Futures Using Adaptation Pathways

This section will dive deeper into introducing the conceptual framing for adaptation pathways, and identifying thresholds, considerations for developing triggers and monitoring efforts, and defining a shared time frame of water levels and planning horizons. You can navigate to the details in each section below:

Use this Section to Describe Future Time Horizons

With baseline local information gathered from previous sections of Chapter 3, this section sets up the groundwork to advance an adaptation pathways approach. Adaptation pathways are introduced as a core pillar and Flexible Approach for Decisions Over Time. Adaptation pathways allows decision-makers to plan for and make decisions about adaptation solutions *over time* (Figure 26).

Adaptation pathways can be valuable in different ways – one of which is its ability to provide conceptual framing to brainstorm both short-term and long-term solutions for sea level rise and consider what types of decisions we can make today that provide future opportunities. For example, making decisions today that allow habitats to migrate inland can provide future generations the option of having more nature-based solutions.

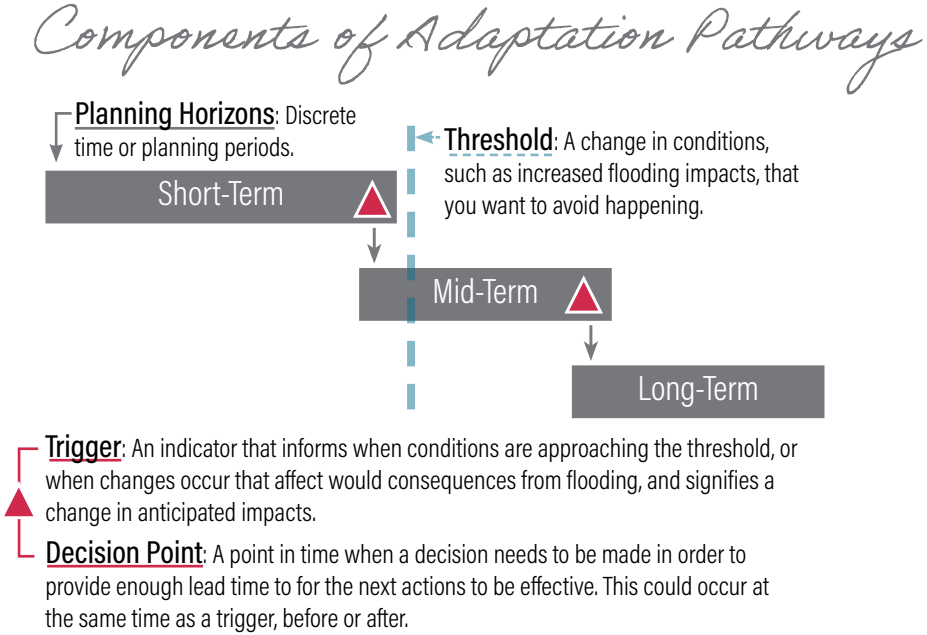


Figure 26 · Conceptual Graphic of Adaptation Pathways. Three key concepts include planning horizons, thresholds, and triggers and decision points that signify a change in strategy.

The adaptation pathways approach also includes applying technical components, which are described further in Chapter 5: Bring Together Shared Solutions and more specifically in 5.3 Phasing and Sequencing Strategies Over Time.

However, before implementing a pathways approach, it is important to work with communities and stakeholders to understand how we can use adaptation pathways for flexible planning. The purpose of this section is to introduce communities and stakeholders to adaptation pathways so it can be used in practice throughout this adaptation effort.

3.4.1 Conceptual Framing

Why Adaptation Pathways for Sea Level Rise?

An essential component underlying all adaptation pathways approaches is the element of ***time***. Like any tool, there are various ways that it can be used, and the success of using this approach depends on the planning content and social conditions in which it is applied[1]. An adaptation pathways approach provides a useful framework around which stakeholders can deliberate future conditions and evaluate what decisions can be made now to support longer-term opportunities (Box 23).

Use Worksheet 3K to record notes and definitions.

1 Zandvoort et al., "Adaptation Pathways in Planning for Uncertain Climate Change."

Talking About Pathways

Foster Shared Dialogue and Vocabulary

Certain terms can be discussed and defined *with* communities and stakeholders to ensure people are discussing the same things. For example, "pathways" is the simply how actions may change over time, "decision points" are moments where a choice must be made, etc. Other terms to define include short-term, mid-term, and long-term 3.4.4 Planning Horizons. Add new definitions and notes to your Build A Shared Vocabulary list.

Highlight Non-Traditional Time Horizons and Iterative Nature

Adaptation differs from traditional planning in that there is no final "end-point." In adaptation pathways, this concept is clear through the use of pathways, which outline actions that must continue to occur over time. By talking about adaptation as a process, instead of an outcome, it can help set expectations for communities and stakeholders that adaptation will be iterative.

Acknowledging Uncertainty and Flexibility Upfront

Sea level rise is *not* uncertain – how *fast* water levels will rise and the choices *people* make in the face of these challenges is where the greatest uncertainty lies. Adaptation pathways does not dictate a single outcome, but instead, illustrates that multiple future options exist and the choices we make in the future will depend on changing future conditions. We can't make those future decisions, but we can be as prepared as possible for them.

Separate Long-Term Thinking from Short-Term Decisions

Adaptation pathways provides a way to conceptually connect choices *today* with the future. Long-term impacts of sea level rise can be challenging to discuss (see 4.4.1 Raising Difficult Topics). However, adaptation pathways can be a tool to ***intentionally separate***: 1) brainstorming long-term options with 2) decisions that made today to protect and prepare ourselves for the risks ahead. This can create "safe" spaces for discussing long-term adaptation options without having to make those decisions yet.

Avoid Undesirable Lock-Ins

Thinking about long-term futures provides an opportunity to consider how choices today can expand or *limit* future options. Some decision can "lock-in" future options, especially if the costs of investment are high or consequences of the decision have long-term impacts. For example, a seawall may provide short-term protection today while reducing the long-term ability of natural habitats to provide future protection (see 4.4.1 Raising Difficult Topics).

Discuss Different Scales and Levels of Detail

The use of adaptation pathways differs depending on the scale at which it is being applied.[1] At larger scales, more emphasis can be placed on broad conceptual ideas about the short and long term options. The smaller the scale, the more detailed the approach can be, including specific actions and strategies.

Box 23 · Conceptual Framing for Adaptation Pathways.

3.4.2 **Thresholds**

When Are There Significant Changes?

In this section, we define a **threshold** as a change in condition that you want to avoid happening – a line you do not want to cross. Use the results of your 3.1.1 Vulnerability Assessment and information gathered in Chapter 3 to inform your responses.

Thresholds can be defined in various ways, such as when one (or more) water levels that, when crossed, leads to flooding impacts to critical assets, significant change in flood exposure and/or impacts, or perpetuates a "tipping point", where a small change can suddenly lead to disproportionate impacts and the system starts to operate in a significantly different way (Box 24).

For example, a threshold could be defined as the water level at which evacuation routes for a community are flooded, or when the majority of a site is flooded. In Figure 27, the ART Bay Shoreline Flood Explorer identifies water levels in East Palo Alto where there is a significant change in exposure that occurs between 24 and 36 inches of Total Water Level (TWL). The identification of thresholds can be somewhat subjective (e.g. visual determination that a water level leads to higher impacts) or objective (e.g. mathematical deviations).

It is often the case that there is not one single threshold, but instead, different thresholds for different assets or parts of the shoreline. It may be helpful to map and identify different thresholds for individual assets within 3.3.3 Shoreline Planning Units. These thresholds will be used to introduce conversations about triggers in 3.4.3 Triggers and Monitoring, and help define 3.4.4 Planning Horizons. This information will be used in Chapter 5: Bring Together Shared Solutions.

Use Worksheet 3L to identify and describe thresholds for shoreline reaches identified.

Identifying Thresholds

Impacts to Critical Assets

At what water level do critical assets (or clusters of assets) first become exposed to flooding? Critical assets may refer to important local assets or infrastructure, including those identified by communities or stakeholders.

Substantial or Disproportionate Change in Flood Exposure

At what water level is there a substantial change in flooding impacts? For example, at one water level there may be minor flooding from one shoreline overtopping point, and at the next water level there is significant flooding across the shoreline.

Tipping Points That Perpetuate a New System-State

At what water level do impacts occur that significantly alter functions in the environment, society or economy? For example, flooding impacts to an important port might change the economic vitality of an area and thus have disproportionate impacts on how the economic system functions.

Box 24 · Identifying When Thresholds Occur.

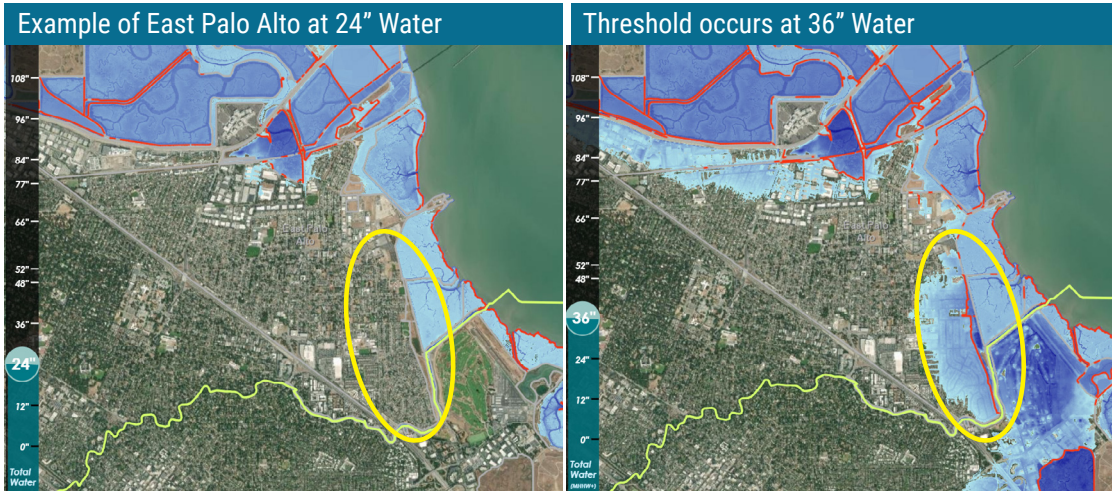


Figure 27 · Example of flooding impacts in East Palo Alto, CA. A Threshold occurs at 36" water when a near area become exposed to flooding.

3.4.3 **Triggers and Monitoring**

How Do We Know When to Take Action?

Triggers serve as critical nodes where these future pathways have flexibility to change. They are important opportunities to make proactive changes, adjustments, or otherwise intervene in an adaptation strategy to avoid future harm. Triggers should alert planners or communities to changes that need to occur and provide enough time for decisions to be made and implemented. The time required to implement a change is called the "lead time," which is necessary to consider when thinking about effective triggers.

In this section, we suggest *introducing* communities and stakeholders to triggers to better understand what they are and how they work. In 5.3.3 Applying Triggers and Decision Points, triggers will be refined and put into practice. We differentiate considerations for triggers for physical flooding (Box 25) and social conditions (Box 26).

Triggers – Physical Flooding

This section outlines considerations to creating triggers that are specific to physical flooding impacts, such as if a roadway or area is subject to future sea level rise exposure and impacts.

Can It Be Easily Measured and Is There Funding to Do So?

Triggers are indicators for initiating a change, and must be able to be measured. For example, the number of times (or number of days) a road floods each year can be measured, provided there is sufficient criteria of what "road flooding" means. There must also be a means to have this trigger measured through existing or new funding sources.

What is the Criteria (or Level of Detail)?

Because triggers indicate action, it is important to have sufficient criteria or level of detail about what a trigger is, in order to understand when it has been crossed. For example, what does it mean for the roadway to be "counted" as flooded? The criteria could be that the flooding is counted when a) water is physically on the roadway for a certain amount of time (e.g. hours or days). Another criteria could be b) when flooding reduces the number or vehicle crossings, or increases local traffic. Being clear about what the trigger is specifically is important for knowing how and when to appropriately measure it.

Can It Be Easily Monitored and Is There Funding to Do So?

In addition to knowing that a trigger can be measured appropriately is understanding the process or mechanism to share or report that information. For example, in the road flooding example, who would be monitoring roadways to know when flood impacts are occurring? And how would that information be shared to the appropriate planners or adaptation team? This is is addressed further in Chapter 5 and 6, and also requires existing or new funding.

Does It Provide Adequate Lead Times?

In order for triggers to be a useful indicator to avoid crossing future thresholds, they need to provide a warning to change or initiate a process *with enough time for action to be taken and implemented*. For example, if a trigger alerts planners to road flooding issues too late, there may not be enough time for the appropriate planning, design, permitting, and construction to next get flood protection in place before a road is permanently flooded and unusable. Part of lead time consideration could be the time it takes to plan, design, permit and develop shoreline infrastructure. It could also include time needed for public education on the change, and/or the political and government support if budget changes are needed. When triggers provide adequate warning time, the appropriate actions and decisions can be made to ensure flood protection occurs before a threshold is crossed.

Box 25 · Considering Physical Flooding Triggers

Triggers – Social Conditions

This section outlines considerations to creating triggers that are based on social, environmental, political, or other changes in the environmental context, such as a change in frequency of use of a roadway, increased density of a neighborhood, etc.

Is there a change in use (e.g. asset, land use, etc.)?

The change in use of something at risk of future flooding may impact what adaptation decisions are made moving forward. Figure 27 provides an example of a change in number of people using a particular road. In this example, the change that triggers renewed action is not greater flooding, but instead increased *consequences* to society in the event the road floods, given that more people are now using it. Another example may be increasing density or new development in a previously undeveloped or low-density area.

Are there population or demographic changes?

If there are major changes to the population or demographics of your community, you may want to consider how this could impact long term adaptation planning. You may also want to consider social triggers for issues such as displacement or gentrification indicating actions need to be taken.

Is there a change in political leadership or political climate?

Social triggers may also be opportunistic ways to advance adaptation. For example, if a change in political leadership may improve the ability to prioritize and implement adaptation options, this could be useful information to know to get effective processes in place.

Is there a new planning or funding opportunity?

This could be another opportunistic way to advance adaptation planning. If a new plan or plan update occurs that can has implications for adaptation planning, a social trigger about this opportunity can ensure plans are being updated effectively.

Box 26 · Considering Social Conditions Triggers

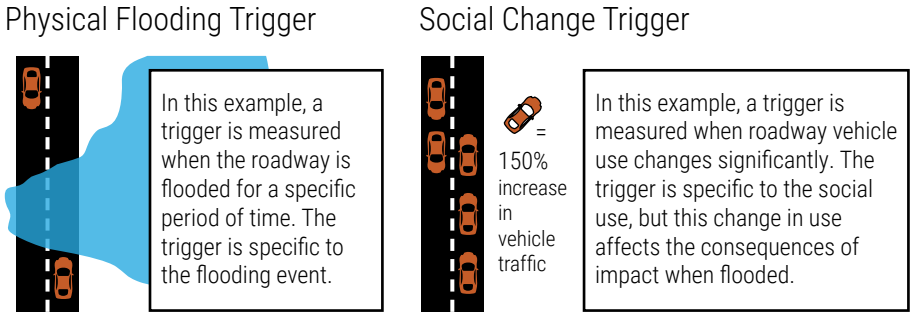


Figure 28 · Physical Flooding and Social Change Triggers. In this example, two different categories of conditions, either the amount of flooding or change in use, serve as the trigger to alert when a review or adjustment in an adaptation approach may be needed.

Social conditions as triggers introduce a whole set of new elements to consider. It may be useful to refer back to information gathered in 2.2.3 Identify and Map Populations, 3.2 Integrate Community Values, and 3.3.2 Projects and Infrastructure.

Using the example of a roadway, consider that a physical flooding trigger could be the number of times the road is flooded, while a social trigger, on the other hand, could be identified as increased use of that roadway (Figure 28). The social trigger does not relate specifically to a flooding event, per se, but it does provide important context that may influence the way we might adjust our adaptation response. There are many different ways to consider and identify how social conditions may change that might influence the way future adaptation proceeds.

The use of any of the social triggers above would require the same basic considerations as a physical trigger, which include being measurable, specific, easily monitored, and providing adequate lead time. Because physical and social triggers are similar, yet measure different things, you can choose to use the terms and language that resonate most with your communities and stakeholders.

Monitoring is the Backbone of Triggers

The success of triggers lies largely in the ability to monitor, report, and respond to them when they occur so that decisions can be made. Monitoring is the ability to check the status or progress of something. Not only is it critical to monitor triggers, but there also needs to be an effective line of communication between what's being monitored and who will use that information to make decisions.

The purpose of this section is to elevate the importance of monitoring and explore early opportunities to integrate monitoring processes in your adaptation effort. At this stage of the process, keep in mind various monitoring considerations (Box 27) that would be advanced and implemented in Chapter 5: Bring Together Shared Solutions and Chapter 6: Pathways Approach to Implementation.

Use Worksheet 3L to identify and describe triggers and monitoring notes for shoreline reaches identified.

Tide gauge at the San Francisco tide station, near Golden Gate bridge. Photo courtesy of NOAA.

Monitoring Considerations

Communicating That Monitoring is an Essential (and Costly) Part of Adaptation

Setting expectations throughout your adaptation effort is important to maintain transparency and trust with communities and stakeholders. Continuing to elevate the importance of monitoring in adaptation pathways is important because monitoring, like other kinds of maintenance, is one of those things that is often under-looked or under-appreciated. It can often be costly to set up monitoring infrastructure, so ensure you go into the process knowing this will be a necessary expense.

Local Tidal Gauges May Be Useful Tools

Tidal gauges are devices used to measure water levels. There are many existing tide gauges around the San Francisco Bay that can provide data. Where possible, explore your nearest tidal gauge and consider if this can be used in monitoring later in the process. You may also find that you need to install additional tidal gauges to receive sea level rise information more locally, which should be considered in your strategies.

Monitoring Existing Levee Condition

If your planning area contains existing certified levees, it may be important to identify who is responsible for their maintenance and if they currently have monitoring plans in place. Characterizing the condition of existing levees, berms or other shoreline features and performing periodic, regular reviews of the conditions can be a useful monitoring approach that can help you identify triggers.

Monitoring Settlement of Development

Local sea level rise depends on the relative movement of water rising compared to land movement. In many places, land is slowly sinking in what is called subsidence. Consider and explore if anyone is measuring or monitoring local settlement so that this information can be incorporated into your effort.

Box 27 · Monitoring Considerations.

3.4.4 Planning Horizons

What Are Your Short, Medium and Long-Term Future Time Horizons?

There are many different ways to depict future sea level rise flooding scenarios. It will be important to build upon the existing 3.1.1 Vulnerability Assessment and sea level rise scenarios used. Building a *shared* vocabulary about future scenarios can help ensure communities and stakeholders are talking about the same thing, especially as you move into Chapter 4: Shape a Shared Vision of the Future

Sea level rise scenarios describe many factors, which may be described differently or based on different underlying data. Some factors include:

- Underlying flood models (e.g. CoSmoS, ART, etc.)
- Water levels (e.g. Total Water Level, see Figure 29)
- Time horizons (e.g. 2030, 2050, 2100)
- Storm surge (e.g. 100-year flood)
- Metrics (e.g. inches, feet, meters, etc.)

Depending on how your 3.1.1 Vulnerability Assessment defined sea level rise scenarios, it may be challenging to update or share data. For example, if time horizons were used for the scenarios (e.g. 2050, 2100), it may be more difficult to update projections in light of new, regularly updated science from the Ocean Protection Council (e.g. State of California Sea Level Rise Guidance (2018 Update)). Additionally, comparing maps of flooding impacts with neighboring jurisdictions can be difficult if different underlying flood models or metrics were used.

As you move into discussions about the future and potential adaptation solutions in Chapters 4 and 5, having clear definitions about these future scenarios will be helpful to facilitate meaningful conversations. Also, be sure to keep your metrics consistent across your adaptation effort (e.g. if using inches, use it across all relevant documents to avoid confusion.)

In the following pages we outline key consideration for creating short, medium, and long-term future planning horizons based on your local conditions (Figure 30 and Box 28).

One Map, Many Futures

The Adapting to Rising Tides (ART) Program uses the "One Map, Many Futures" approach, which uses a single "Total Water Level" (TWL) measured in inches above Mean Higher High Water (MHHW). Note: it is not the same as the engineering term for total water level.

TWL can refer to temporary flooding from storm surge, permanent flooding from sea level rise, or a combination of the both. Timelines can be tied to TWLs, but they can easily be updated as time horizon projections change. A benefit of the TWLs approach used by the ART Program is that because it is not inherently tied to a time horizon, it provides a picture of vulnerability that can be planned for using adaptation pathways, even if the exact timing of that event is may change over time.

The ART Bay Shoreline Flood Explorer and ART East Contra Costa Flood Explorer provide additional information through interactive maps, data downloads, and a learn section.

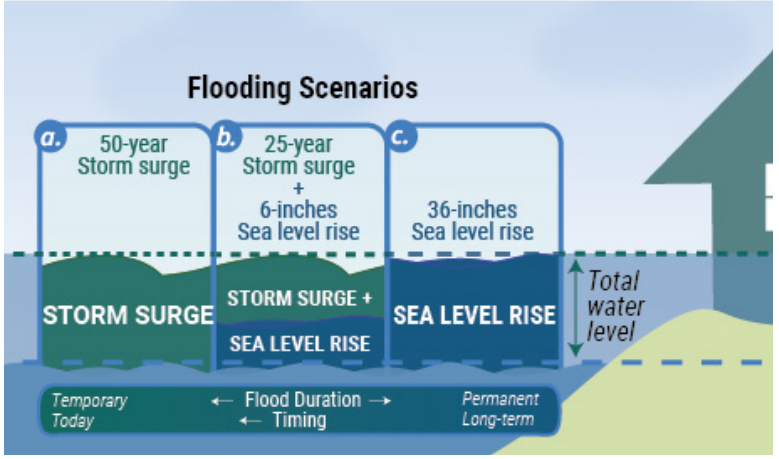


Figure 29 · One Map, Many Futures. This approach uses a Total Water Level (TWL) to signify different combinations of flooding. In the example above 36" TWL can refer to flooding that occurs due to a 50-year storm surge, a combination of a 25-year storm surge and 6" of sea level rise, or 36" of sea level rise.

Create Short, Medium, and Long-Term Planning Horizons

Consider how you can organize existing sea level rise scenarios and impacts from the 3.1.1 Vulnerability Assessment, with the new information you've gathered on 3.2 Integrate Community Values, 3.3 Incorporate Environmental and Physical Characteristics, 3.4.2 Thresholds, and 3.4.3 Triggers and Monitoring to create future planning horizons that will form the basis of the exploration for adaptation solutions in Chapter 4. In this section, we suggest creating three to four planning horizons:

- Immediate / Today
- Short-term / Near-term
- Medium-term / Mid-term
- Long-term / Far-term

The purpose of creating future planning horizons is to support the use of adaptation pathways, where discussing long-term future impacts can help communities and stakeholders understand what actions we can take today to set ourselves up for future opportunities.

> It is important to recognize that while these are called "planning horizons," they *do not have to be tied to a specific time frame*.

Instead, the focus is on grouping or bracketing future impacts into discrete buckets organized by planning horizons that can be named and referenced. It is a way to organize the information gathered in Chapter 3 as you set yourself up for Future Visioning in Chapter 4. Review Box 28 for considerations on creating planning horizons.

How you define these future planning horizons should be based on your local conditions, impacts, and opportunities. It may be helpful to coordinate this with neighboring jurisdictions to ensure there is consistency across this information. They can also be hyper-local as long as you have adequately described them.

> Use Worksheet 3M to describe the planning horizons for your adaptation effort.

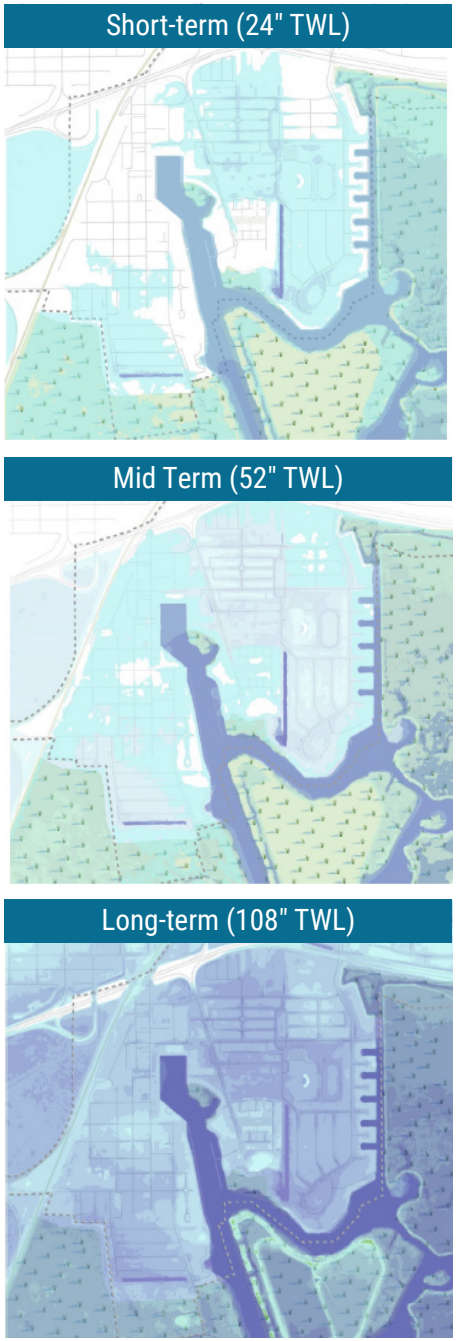


Figure 30 · Examples of three planning horizons from a Hypothetical Case Study of Sea Level Rise Adaptation in Suisun City, CA.

Create Planning Horizons

Consider the following information to help determine what planning horizons make sense for your community.

Water Levels

Include the range of water levels used, including if they represent permanent and/or temporary flooding. For example, a short-term planning horizon of 24" TWL refers to both 24" of permanent flooding from sea level rise and existing flooding conditions today with a 50-year storm. Articulate what the combinations of flooding the water levels represent, and consider only using only a few to avoid confusion.

Impacts or Thresholds

Using the water levels identified, describe the impacts or thresholds that occur in this planning horizon from the vulnerability assessment and/or information gathered in Chapter 3. For example, a short-term planning horizon could be defined as when the first flooding impacts, or first threshold, occurs to critical infrastructure.

Incorporate Time Estimates

It may be helpful to include a range of timing in these planning horizons, acknowledging that this timing of *when* may change as the science continues to evolve. This will be important to continue to emphasize to communities and stakeholders, for example, just because an impact may not be expected until 2100, does not mean that it could occur sooner (or later). For example, in a short-term planning horizon, the timing of impacts is likely to occur between 0-30 years. Review the most updated science for guidance on probabilities of sea level rise projections.

Lifespans of Critical Infrastructure, Development, Habitats

Another potential key determiner and/or detail to include in the description of planning horizons may be the lifespans of infrastructure, development or certain land uses. For example, a medium-term planning horizon may include the end of effective lifespan for existing flood levees.

Relevant Plan Horizons

Include, where possible, how plans (especially if they are being updated in this process) have relevance in these future planning horizons. For example, a medium-term planning horizon may be part of a General Plan 30-year time horizon. This means that the General Plan update should consider adaptation options for this planning horizon.

Build Upon and Embed Community Values

In describing why short, medium, and long-term planning horizons are being developed, bring in examples or inputs from community and stakeholder conversations about what they value and how each planning horizon impacts those values.

Include Maps

When sharing this information with communities and stakeholders, use maps and other visuals whenever possible to help people see and understand future planning horizons. There may be existing maps to use or build upon, such as those found in the 3.1.1 Vulnerability Assessment, materials or maps created during community conversations in 3.2 Integrate Community Values, and/or nature-based and physical shoreline conditions in 3.3 Incorporate Environmental and Physical Characteristics.

Box 28 · Considerations for Creating Planning Horizons.

Download Workbook 3

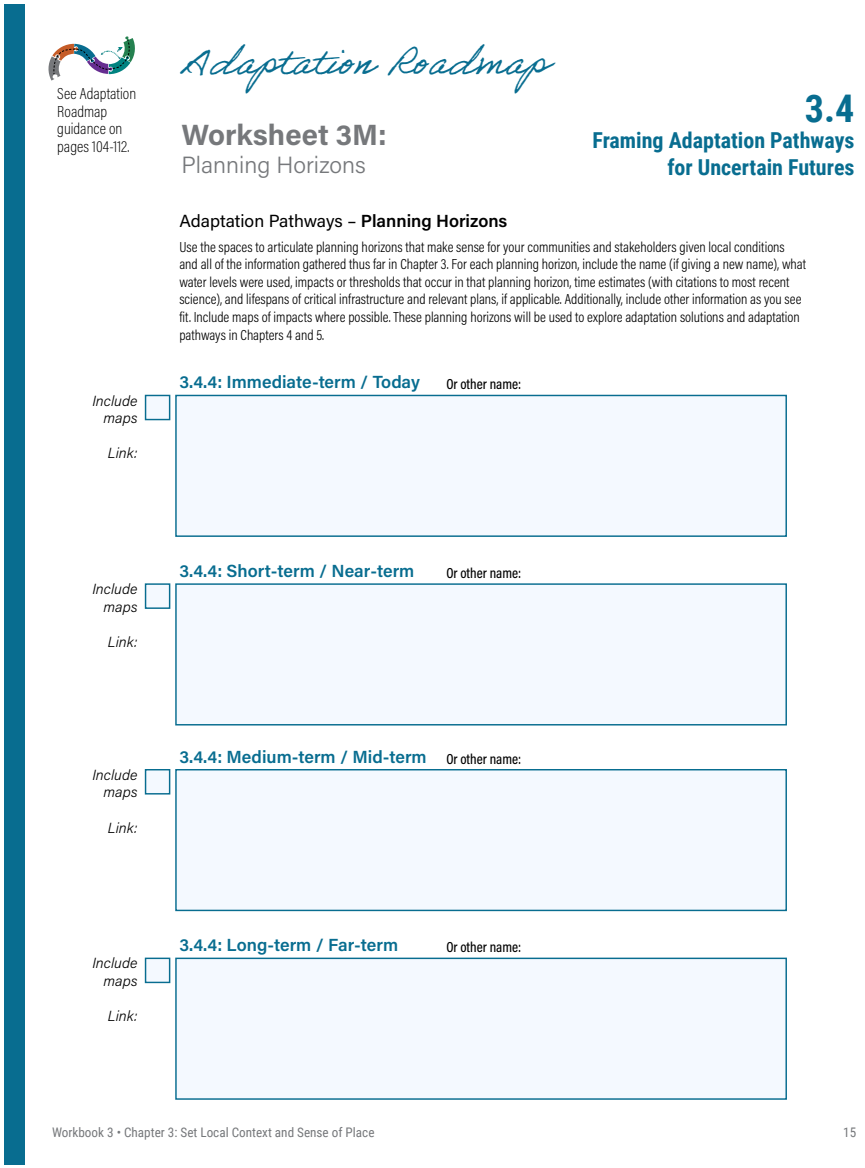
3.5 Use Workbook 3 Outcomes

GATHER KEY DATA TO SHAPE LOCAL CONTEXT

Use the information, along with foundational studies and other elements from Chapter 1 in Workbook 3 to build some of the key elements that will be necessary in the remaining Chapters 4-6. Chapter 3 provides the basis and context for helping define the problems and vision the future in Chapter 4.

Key elements of Chapter 3 include:

- Lists of Plans to Align including how the vulnerability assessment will be used, what local plans to align and how, and regional and neighboring efforts to include. (WORKSHEETS 3A-3E)
- Local Stories of Place from communities and stakeholders that represent their values, concerns, and knowledge, along with understanding of using adaptation pathways concepts to frame future decision-making. (WORKSHEETS 3F-3G, AND 3K)
- Nature-Based and Physical Conditions, and Shoreline Planning Units to understand opportunities and considerations, and consider smaller scale planning units for potential solutions. (WORKSHEETS 3H-3J AND 3L)
- Planning Horizons for Short, Mid, and Long-Term Futures which reflect local conditions, such as flooding thresholds, environmental and physical considerations, community values, and projects and infrastructure. (WORKSHEET 3M)



See Adaptation Roadmap guidance on pages 104-112.

Adaptation Roadmap

Worksheet 3M:
Planning Horizons

3.4
Framing Adaptation Pathways for Uncertain Futures

Adaptation Pathways – **Planning Horizons**

Use the spaces to articulate planning horizons that make sense for your communities and stakeholders given local conditions and all of the information gathered thus far in Chapter 3. For each planning horizon, include the name (if giving a new name), what water levels were used, impacts or thresholds that occur in that planning horizon, time estimates (with citations to most recent science), and lifespans of critical infrastructure and relevant plans, if applicable. Additionally, include other information as you see fit. Include maps of impacts where possible. These planning horizons will be used to explore adaptation solutions and adaptation pathways in Chapters 4 and 5.

3.4.4: Immediate-term / Today Or other name:

Include maps ☐ *Link:*

3.4.4: Short-term / Near-term Or other name:

Include maps ☐ *Link:*

3.4.4: Medium-term / Mid-term Or other name:

Include maps ☐ *Link:*

3.4.4: Long-term / Far-term Or other name:

Include maps ☐ *Link:*

Workbook 3 • Chapter 3: Set Local Context and Sense of Place 15

Example of Worksheet 3M, which provides space to describe planning horizons based on your local conditions that will be used throughout the effort.

Resources for Chapter 3: Set Local Context and Sense of Place

3.1 Align Local and Regional Plans

- Cascading Plans that Can Be Influenced By Resilience Planning (Page 7). Regional Resilience Toolkit: 5 Steps to Build Large-Scale Resilience to Natural Disasters. Brechwald. et al. United States
- Coastal Plan Alignment Compass. National Oceanic and Atmospheric Association, U.S. Geological Survey, California Coastal Commission, California Governor's Office of Emergency Services, California Governor's Office of Planning and Research, California Ocean Protection Council, California State Coastal Conservancy, Federal Emergency Management Agency.
- General Plan Guidelines. California Office of Planning and Research (OPR).
- Step 2. Choose an Approach and Step 3. Do the Assessment. Adapting to Rising Tides (ART) Program Planning Process Design Your Project. San Francisco Bay Conservation and Development Commission (BCDC).
- Types of Plans and Programs (page 37). Adaptation Planning Guidance 2.0. California Governor's Office of Emergency Services.

3.2 Integrate Community Efforts and Values

- See Resources for Chapter 2 for additional resources and guidance on having meaningful conversations with communities and stakeholders.
- A Call to Community Dialogue Guide. Intergroup Resources. Hope in the Cities.
- Landscape Literacy. West Philadelphia Landscape Project.

2.3 Environmental and Physical Characteristics

- Baylands Ecosystem Habitat Goals Project. 2015. San Francisco Estuary Institute.
- San Francisco Bay Shoreline Adaptation Atlas. 2019. San Francisco Estuary Institute and SPUR.

2.4 Frame Discussion for Uncertain Futures

- A Users Guide to Applied Adaptation Pathways Version 1. Siebentritt, M.A. and Stafford Smith, M. (2016). Seed Consulting Services and CSIRO.
- Exploring Adaptation Pathways in the Murray Basin. Dunlop M, Gorddard R, Ryan P, MacKenzie J, Waudby H, Skinner A and Bond T (2016) CSIRO, Australia.
- User Guide for Climate Change Adaptation Pathways Framework Supporting Local Food in B.C. Coulter, L. Prepared for the B.C. Ministry of Agriculture.
- What is a Pathways Approach to Adaptation? Coast Adapt, National Climate Change Adaptation Research Facility and Australian Government Department of Energy and the Environment.

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Flooding of the San Francisco Embarcadero during King Tides, courtesy of California King Tides Project.

CHAPTER 4

Shape a Shared Vision of the Future

Chapter 4 supports laying out the problem, determining the future you what, what success means for your communities and what it could look like to get there.

Introduction | Navigating the Adaptation Roadmap

Chapter **1** Build Your Adaptation Roadmap

Chapter **2** Center People in Decision-Making

Chapter **3** Set Local Context and Sense of Place

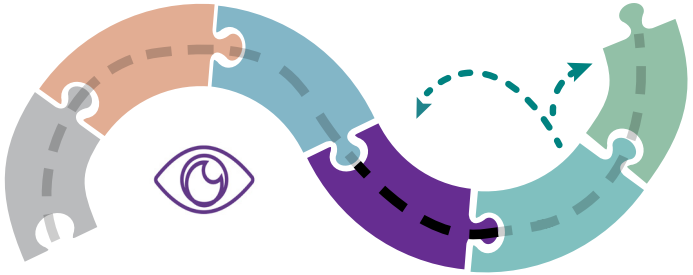
Chapter **4** Shape a Shared Vision of the Future

Chapter **5** Bring Together Shared Solutions

Chapter **6** Pathways Approach to Implementation

Chapter 4

Shape a Shared Vision of the Future



What Will You Find in This Chapter?

This Chapter builds upon the information gathered on the local context from the previous Chapter 3.

Chapter 4 provides essential space to reflect on the big picture – to define and prioritize challenges, develop a shared vision of resilience, and explore and discuss opportunities for future outcomes.

Details in this chapter include how to define the problem exploring risk perception and decision context, building a shared future vision with guiding principles and criteria for success, exploring future scenarios and what adaptation outcomes could look like, and discussing future outcomes and expectations as you transition to creating adaptation actions and strategies in Chapter 5. Sections 4.3 Explore Future Scenarios and 4.4 Discuss Outcomes and Expectations may be done in tandem with the first three sections of Chapter 5, and there is likely to be iteration across Chapters 4 and 5.

Who is This Chapter For?

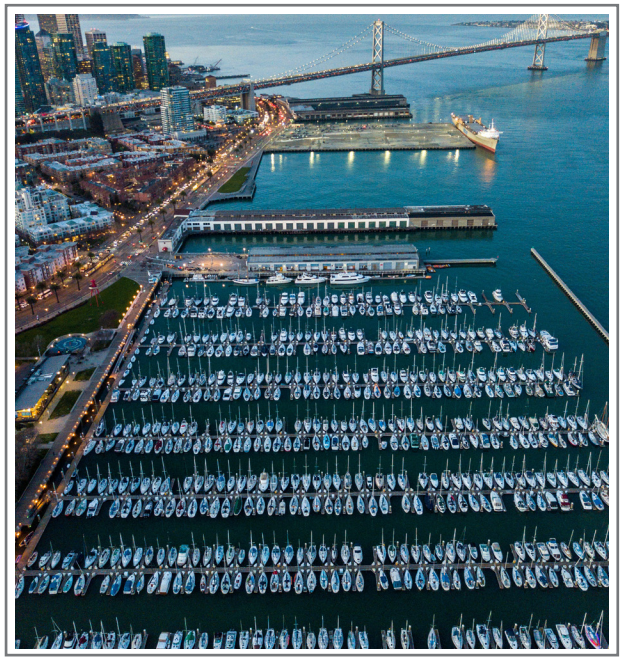
The Core Team should organize and record the information being gathered throughout this chapter, while Key Partners, Champions, and/or facilitators should lead community and stakeholder conversations about risk, problem definition, future visioning and scenario planning. Communities, stakeholders, and governments should participate fully throughout this chapter as Chapter 4 outcomes will drive the remainder of the process.

What Outcomes Will This Get You?

Download 4 to support reaching Chapter 4 outcomes. These outcomes include:

- **Shared Vision and Guiding Principles** that respond to defined issues; and
- **Scenarios** that align with the vision over the short, medium and long-term, and provide the roadmap for how technical experts should apply adaptation strategies.

The outcomes generated from the scenario planning in section 4.3 Explore Future Scenarios and conversations in 4.4 Discuss Outcomes and Expectations will form the basis of what adaptation actions and strategies are identified in Chapter 5: Bring Together Shared Solutions. Depending on the level of technical expertise involved in scenario planning, sections 4.3 Explore Future Scenarios, 4.4 Discuss Outcomes and Expectations, 5.1 Explore Actions to Meet Envisioned Futures and 5.2 Creating Bundled Strategies That Work Together may occur in sequence or concurrently.



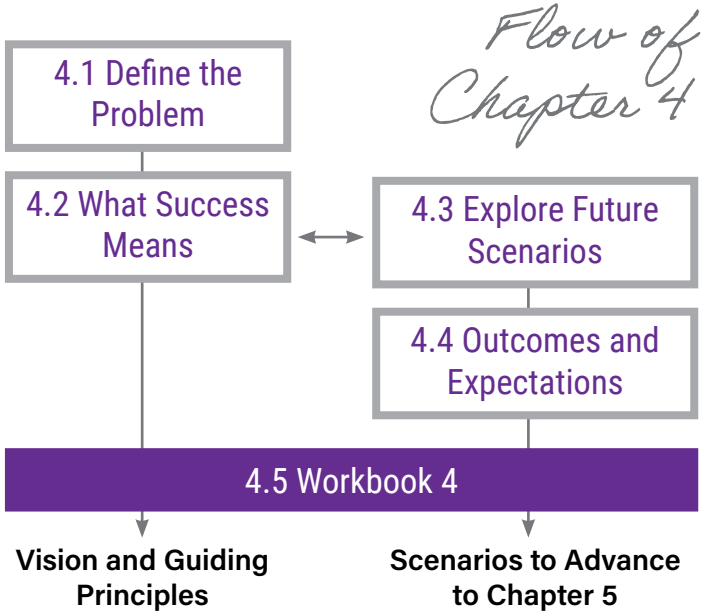


Figure 31 · Two Key Outcomes of Chapter 4. The two parts can be used together to develop the vision and guiding principles, which informs how scenarios are developed, discussed, and advanced to the next Chapter.

Checklist for Chapter 4

Is this chapter for you? Explore the following questions to navigate to where you need to go. See Chapter 4 outcomes in Figure 31.

- ✓ Have you discussed what "risk" means to your communities? > 4.1.1 Risk Tolerance and Perception
- ✓ Have you defined the key issues to address in adaptation? > 4.1.2 Current Decision Context, 4.1.3 Shared Problems to Respond To
- ✓ Have you developed a vision and guiding principles for the future? > 4.2.1 Vision, 4.2.2 Guiding Principles
- ✓ Have you thought about how you might define and evaluate success? > 4.2.3 Evaluation Criteria
- ✓ Have you explored what future adaptation could look like? > 4.3.1 Scenarios as a Pathways Tool, 4.3.2 Strategic Approaches
- ✓ Have you identified how to conduct scenario planning activities? > 4.3.3 Scenario Planning Parameters, 4.3.4 Conducting and Summarizing
- ✓ Have you discussed difficult topics such as managed retreat? > 4.4.1 Raising Difficult Topics
- ✓ Have you identified scenarios to receive greater technical review? > 4.4.2 Future Decision Context, 4.4.3 Advancing Scenarios
- ✓ Have you organized the vision, principles, and scenarios to advance? > 4.5 Use Workbook 4 Outcomes

4.1 Define the Problem

This section will dive deeper into introducing the communicating about tolerance and perception of risk, the current conditions that shape the decision context, and definition of key issues or problems to respond to. You can navigate to the details in each section below:

Use this Section to Determine Key Challenges

There is a wide range of people who will be impacted by sea level rise – with different backgrounds, experiences, and worldviews – which can affect the way each person perceives risks, challenges, and even solutions. The Adaptation Roadmap is a community and stakeholder driven process, and thus, providing communities and stakeholders spaces and opportunities for constructive dialogue about the scope of the problem and their perception of risk is essential for ensuring adaptation solutions reflect their concerns.

In Chapter 2: Center People in Decision-Making, we asked you to consider the values, worldviews, and identities of different communities and stakeholder groups to better understand how to effectively engage people in the adaptation planning process. Now, that information can be applied when considering how to best engage in conversations about risk perception and risk tolerance in order to discuss the overarching decision context and create a shared understanding of the problem and solutions.

People discuss issues along the shoreline in during the 2018 Resilient By Design Challenge. Photo by Kingmond Young.

In Chapter 3: Set Local Context and Sense of Place, we brought together critical resources to help shape our understanding of the problem. These included evaluating the local planning context and opportunities, community and stakeholder concerns and sense of place, environmental and physical conditions, and considering thresholds, triggers and signals.

All of this information should be used throughout Chapter 4 to ensure that the definition of the problem, guiding principles, criteria for success, and future visioning are all building upon the base of knowledge gathered from the communities and stakeholders.

4.1.1 Risk Tolerance and Perception

How Do People Understand Risk?

The concept of risk is not unique to climate change adaptation planning. Risk is discussed and used in businesses such as investing, insurance, and other sectors that make decisions which aim to predict future conditions. There are different definitions of risk specific to the contexts in which they are used.

In the Adaptation Roadmap, we define risk as anything regarded as a threat or likely source of danger. This definition allows us to consider both "real" or quantitative risks as well as perceived risks. Perceived risk *does not* mean imaginary – different people can look at the same situation and interpret its risk differently. For example, someone confident in their swimming skills may not perceive danger from strong surf conditions in the ocean, while someone less comfortable in their swimming skills may perceive the situation much differently. In this example, there may be an objective measurement of surf conditions, but there is also a real, yet different, perception of risks from the two individuals involved.

In sea level rise adaptation, a discussion of risk can be thought of across various dimensions and contexts. There can be risk of inaction – the consequences if we make no choices; and there can be risks of actions – social, financial, environmental, economic, and more. Use the following information to consider how to discuss risk with your communities and stakeholders.

Defining Risk

How you define risk influences the way you discuss it within the adaptation planning process. For example, risk can be considered through its direct physical impacts such as property and ecosystems; indirect physical impacts such as operations and services; and social impacts such as community cohesion, perception of safety, and tolerance of risk. There are also ways we can quantify risk (Box 29) and communicate risk (Box 30).

Quantifying Risk

Numerical or statistical calculation of impacts can be used to measure, or quantify, risk. Quantifying risk can be highly useful, but keep in mind that numbers can help inform conversations, but numbers alone do not capture an individual or community's perceptions of risk, which is more likely to influence what actions should be taken.

Climate projections

This refers to the probabilities associated with sea level rise projections. In the 3.1.1 Vulnerability Assessment, sea level rise projections were already identified and used to assess vulnerability, impacts and consequences of flooding. However, in the State of California Sea Level Rise Guidance (2018 Update), there are different sea rise projections based on risk tolerances, ranging from low, medium to high risk aversion. This might be an opportunity to discuss risk tolerance with your communities and stakeholders.

Direct and Indirect Impacts (Including Choosing No Action)

Another way to quantify risks includes economic valuation of direct and/or indirect impacts. This may include direct physical changes, for example damage to buildings or property, and loss of services such as flood protection provided by natural ecosystems. It could also include valuation of indirect risks, for example economic cost of lost power to neighborhoods in the event of flooding to a substation. When considering economic consequences, it is essential to also include the cost, and choice, of inaction. The cost of choosing to not adapt should be evaluated alongside the cost of adaptation options to understand the true cost of decisions to address climate change.

Other Definitions of Risk

Depending on your 3.1.1 Vulnerability Assessment, there may be others ways to quantify risk. For example, in Santa Clara County Silicon Valley 2.0 report, risk was quantified as a function of exposure multiplied by adaptive capacity.

Box 29 · Considerations for Quantifying Risk.

Communicating Risk

Communicating effectively about risk is essential to find common ground and advance collaborative actions[1,2,3]. We already know that numbers alone are not always the best predictor or driver of action (see 2.4 Effective Communications). Having conversations about risk means acknowledging and exploring how people interpret a given set of information and come to conclusions based on their own internal processes and tolerances.

Differing Perceptions and Tolerance

The idea that individuals can look at the same information and have different views on what that risk means and how much risk is tolerable is perhaps the most critical concept of all regarding risk. Engaging in meaningful dialogue on risk perception and tolerance depends on the community and stakeholder processes that have been established in Chapter 2: Center People in Decision-Making, and the trust building that has occurred. These conversations are essential because the perception of risk and risk tolerance influences what adaptation strategies should occur. For example, the levee paradox[4,5] (Figure 32) is a concept related to perception of risk.

Community-Wide Issue

Sea level rise is not an issue specific to those living only on the shoreline. Hopefully this has already been documented and shared from the 3.1.1 Vulnerability Assessment, such as consequences to inland communities in the event of impacts to wastewater treatment plants, commute routes, power, and more. Discussing the connections between climate impacts and direct and indirect consequences can help elevate this point and remind communities and stakeholders why it is so important to work together to solve these issues.

Changing Risk Over Time

Risk, and an individuals perceptions of risk, changes over time. An adaptation pathways approach introduced the concept of time to our choices and decisions. It is well suited to address risk over time because it plans for impacts at specific intervals (see Flexible Approach for Decisions Over Time), using triggers (3.4.3 Triggers and Monitoring) to indicate when new actions need to occur.

This provides opportunities throughout long-term adaptation to reflect on new information, and make decisions that can change course with new contexts and conditions. Acknowledging that our understanding of, and realities of risk, change over time may be an important concept to elevate with communities and stakeholders.

Use Worksheet 4A to note conversations about risk.

The Levee Paradox

The levee paradox is a social concept that describes a situation where a community's perceived protection from the creation of a levee actually results in increased risk to that community because they overestimate their protection and engage in activities that increase risk, such as increasing development or avoiding other resilience measures[4,5].

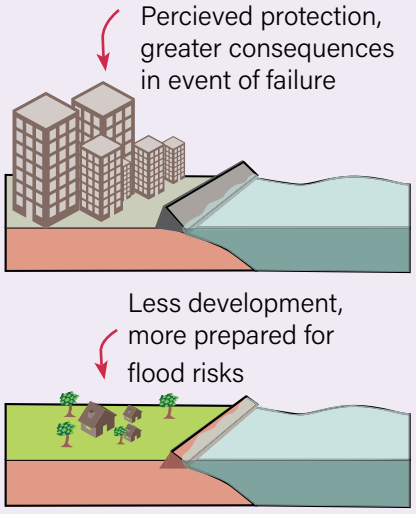


Figure 32 · The Levee Paradox is an example of risk perception and its influence on actions.

1 NOAA, "Risk Communications Basics."
2 Van der Sluijs, "Risk Communication on Climate Change."
3 Volenzo and Odiyo, "Linking Risk Communication and Sustainable Climate Change Action."
4 Gissing, Leeuwen, and Haynes, "Flood Levee Influences on Community Preparedness: A Paradox?"
5 The Safe Development Paradox. An Agent-Based Model for Flood Risk under Climate Change in the European Union | Elsevier Enhanced Reader.

Box 30 · Considerations for Communicating Risk.

4.1.2 **Current Decision Context**

In What Conditions Are Decisions Made?

Part of defining the issues for adaptation is understanding the societal conditions in which decisions are made, referred to as the "decision context"[1]. Consider the decision being made (e.g. restore a wetland) and the social, economic, political *context* that makes the decision possible. As you can imagine, the *context* can play a critical role in determining whether a decision is even possible or not.

In this section, we suggest exploring the *current* decision context with communities and stakeholders. The purpose of this section is to explore: what is *working* - and what is *not working* - in our current societies that affects the decisions we can make today, and in the future. It provides an opportunity to overlay additional societal conditions that can help us understand what the problems are and how we can address them.

Assessing Decision Context Using the "Vrk" Framework

One potentially useful approach to explore the decision context is using the "values, rules, and knowledge" or "vrk" framework[2].

- *Values*: Societal beliefs communities and stakeholders hold
- *Rules*: Institutional laws, policies and social norms
- *Knowledge*: Individual or collective information we have available to understand and address the issue

This framework can help reveal interactions among values, rules and knowledge in communities that can help us better understand our framing of the problem, and how to structure adaptation solutions to include this broader set of social issues[2]. Review Table 6 to explore the decision context in your effort.

Three key benefits to using decision context include[2]:

1. Acknowledgment that **present day decisions will likely be different than future decisions** even with the same options;
2. Understanding that **new options might become available to future decision-makers that are not available today**; and
3. **Decisions can be made today to actively change the decision context** and shape the set of future decisions available.

Use Worksheet 4B to note conversations about decision context, which will be used to support the creation of issue statements.

Exploring Decision Context

	Questions	Sections of the Adaptation Roadmap
Values	What shared values do stakeholders hold that may be negatively affected by sea level rise impacts?	Values were considered early and discussed with communities and stakeholders: ▪ 2.4 Effective Communications ▪ 3.2 Integrate Community Values
Rules	What are the institutional (including regulatory) or social rules or policies that may be barriers or limits to future actions?	Regulatory agencies were identified, as well as local plans and policies, and community concerns that can support institutional or social rules: ▪ 2.2 Input in the Process ▪ 3.1 Align Local and Regional Plans or Processes ▪ 3.2 Integrate Community Values
Knowledge	What information do we have available (or lack) that will help us better understand the problem?	All input gathered in Chapter 3: ▪ 3.1 Align Local and Regional Plans or Processes ▪ 3.2 Integrate Community Values ▪ 3.3 Incorporate Environmental and Physical Characteristics ▪ 3.4 Frame Discussion for Uncertain Futures Using Adaptation Pathways

Table 6 · Guiding questions and Adaptation Roadmap supporting sections to explore the current decision context for adaptation.

1 Dunlop et al., "Exploring Adaptation Pathways in the Murray Basin."
2 Gorddard et al., "Values, Rules and Knowledge."

4.1.3 Shared Problems to Respond To

How Do We Create Shared Definitions of Problem(s)?

Defining the problem is essential for orientating diverse stakeholders to a shared framing of the challenges that will need to be addressed. **This effort should reflect the culmination of information gathered from communities and stakeholders in Chapters 2 and 3.**

Create one or more problem statements that identify key issues, vulnerabilities and/or concerns that can be addressed through this effort. These problem statements should be built upon:

- 3.1.1 Vulnerability Assessment: Results from vulnerability assessment
- 3.2 Integrate Community Values: Community and stakeholder concerns raised that *can be addressed through this effort*
- 3.3 Incorporate Environmental and Physical Characteristics: Considerations and opportunities in the environmental and physical landscape
- 3.4.2 Thresholds: Consider key tipping points in flood impacts
- 4.1.1 Risk Tolerance and Perception: Reflect conversations about how people perceive and accept levels of risk
- 4.1.2 Current Decision Context: Incorporate barriers or opportunities in the decision context that should be changed

An important thing to keep in mind is that while the outcomes of the adaptation process should aim to minimize or eliminate vulnerabilities, it may be impossible to eliminate risk completely. Additionally, setting expectations about what the adaptation process can address will also be essential, particularly for underlying social issues that adaptation outcomes may support, but may not be able to address in full.

The ART Planning Approach already includes the creation of Issue Statements in the Define Step, so if you have already done this, consider revisiting those problem statements with communities and stakeholders to ensure they reflect the information gathered in this effort.

Organizing Issues Into Statements

There are multiple different ways you might organize the information gathered in previous steps to write problem statements. The approach you use will likely depend on the issues at hand.

- **Are the issues broad and overarching, and cover the entire planning area?** If so, organizing by theme may be appropriate For example, the ART Planning Approach organized problem statements by four frames of sustainability: *Society and Equity, Environment, Economy and Government.*
- **Are the issues specific to geographic locations? Or different in different areas of your overall scale?** If so, it may be useful to organize issue statements by shoreline planning units or other metric.

Key Issues in ART Contra Costa County

The Adapting to Rising Tides (ART) Contra Costa Sea Level Rise Vulnerability Study (2017) identified six key planning issues:

1) Water Dependent Industries
2) Creek-side Communities
3) Access to Services
4) Ad-Hoc Flood Protection
5) Jobs and Employment Sites
6) Parks and Open Space

Additional guidance on developing issue or problem statements can be found in the ART How-To Guide: Issue Statements.

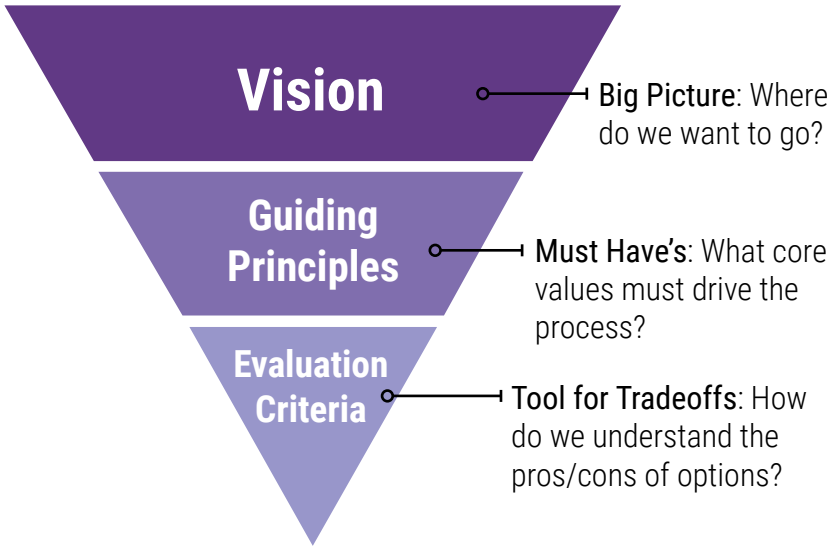
It is likely that you may have a combination of both overarching issues and specific ones. In that case, decide *with* communities and stakeholders how to organize and describe these issues.

Consider how 2.4 Effective Communications can support useful narratives of these issues to ensure people understand the issues and are able to contribute to the development of solutions. These problems to respond to will be used in the next section 4.2 Determine What Success Means, which will shape the vision and guiding principles that will guide the selection and identification of adaptation strategies.

Use Worksheet 4C to write problem statements.

4.2 Determine What Success Means

This section will dive deeper into guidance on how to develop a shared vision and guiding principles that respond to the issues identified earlier in the process. These will be used to explore and define evaluation criteria that reflects what communities and stakeholders envision to be successful adaptation. You can navigate to the details in each section below:



Use this Section to Define Your Future

There are many ways in which a community can respond to sea level rise vulnerabilities. ***Why*** should we choose one set of adaptation solutions over another? The purpose of the Adaptation Roadmap is to help answer this by:

- *Linking* vulnerability assessment results and local context information from Chapter 3: Set Local Context and Sense of Place;
- *With* engaged and empowered communities and stakeholders from Chapter 2: Center People in Decision Making;
- *Who* work together to 4.1 Define the Problem; and
- ***To create*** **a shared vision and principles that guide the selection of adaptation actions in this section**.

All remaining parts of Adaptation Roadmap flow from this critical step of defining what successful adaptation means through co-creating a shared vision and guiding principles that will inform the selection of adaptation options, and defining the criteria to be used when evaluating adaptation options with communities, stakeholders, the core team, and key partners/advisors.

The two components of this section help articulate the priorities, objectives, and must-haves for the adaptation implementation process. There is no single description for what "success" means for adaptation planning. Communities, stakeholders, the core team and key partners must work together to determine what success looks like for your specific community. This section provides insight on how to consider what future adaptation should do and define success in your own way.

4.2.1 **Vision**

What's our Broadest Vision for the Future?

A vision statement is a brief sentence or two that articulates one or more broad, often ambitious and idealistic concepts that give high-level direction for the desired future state.

Creating space in the process for local communities and stakeholders to express a desired future can increase motivation to participate in the process and help frame future options in a way that resonates with their values[1]. The process of developing the vision statement should be community and stakeholder-led[2].

"One Town. One Region. Resilient Together"

The vision statement above comes from the Corte Madera Adaptation Plan for the Town of Corte Madera.

This vision statement is concise and brief while drawing on the identity of Corte Madera as a "Town" that is part of a region that can be resilient together.

The problem statements from 4.1.3 Shared Problems to Respond To should serve as inspiration for writing your vision statement. Try to keep your vision statement brief (Box 31), while keeping detailed notes from the conversation that can be used in developing 4.2.2 Guiding Principles and 4.2.3 Evaluation Criteria.

Given the high-level nature of the vision statement, it may be easier to find consensus or agreement on the vision than the next sections that go into greater detail. Refer back to the 2.3.3 Decision-Making Process identified and take the time and space necessary to discuss and work through tensions that may arise through conversations.

If you used the ART Planning Approach, consider revisiting your Project Resilience Goals with your communities and stakeholders to articulate them into a vision statement.

Use Worksheet 4D to write your vision statement.

1 Beaulieu, Silva, and Plante, "Using a Vision of a Desired Future in Climate Change Adaptation Planning."
2 Kennedy et. al, "Our Communities Our Power: Advancing Resistance and Resilience in Climate Change Adaptation Action Toolkit."

Developing the Vision

Use or Build Upon Existing Visions

Are there existing visioning statements from a vulnerability assessment, General Plan, Community Plan, or other relevant document that can be used or refined? Where possible, look for opportunities to build upon visioning efforts already created by a community. It may be appropriate to use existing visioning statements and/or refine them with stakeholders to ensure the vision represents their value. In some cases, existing vision statements may not be directly related to sea level rise adaptation or resilience, but their elements can be incorporated into a broader vision that does include these concepts.

Look Ahead Broadly and Be Ambitious

What kind of future does your community want? What would that future look like? A visioning exercise should provide an opportunity for communities and stakeholders to consider an *ideal future* that captures the things they value and the kind of world they want to live in. While there may be existing barriers to achieving this ideal future, the vision is an opportunity to set the bar high and be ambitious. Sea level rise adaptation will likely require societies to think outside the box to solve new kinds of challenges - this is a space in your process to explore and discuss a future that your communities want to live in. Though ambitious, it should also feel achievable.

Make it Locally Relevant

How does your statement describe YOUR community? One challenge of vision statements is that they can feel overly broad and thus lose local relevance or sufficient level of detail. While the vision statements are meant to be holistic, consider key local values, ideas, or phrases that can be written in a way that resonates with your communities.

Box 31 · Considerations for Developing a Shared Vision.

4.2.2 Guiding Principles

What Core Values and Principles Drive Us?

Guiding Principles serve to guide decision-making and narrow the suite of options for identifying appropriate strategic approaches to adaptation. While the vision is the big picture, the guiding principles provide an opportunity to address more specific issues. Guiding principles should flow directly from the 4.2.1 Vision, but should include greater level of detail.

Guiding principles can reflect what communities want to see in their future, such as *desired* benefits to society, the environment, economy, government, or something else entirely. They can also reflect *undesired* outcomes – ideas or concepts that communities or stakeholders are unwilling to cede. Guiding principles should respond to the 4.1.3 Shared Problems to Respond To.

We highly recommend developing guiding principles as a way to capture the core values that communities and stakeholders hold so they can be used to frame what adaptation options are considered in 4.3 Explore Future Scenarios (Box 32).

This is a point where priorities, tradeoffs, and tension among communities and stakeholders may emerge. When possible, have a neutral facilitator support two-way dialogue among individuals and groups. Look for opportunities for consensus, but also acknowledge where tensions exist, and even spend time discussing points of contention, if they might lead to more shared understanding. In Chapter 2: Center People in Decision-Making, we acknowledged that challenging aspect of adaptation is bringing together diverse groups of people to have conversations about key issues and make shared decisions. ***This is an inflection point in the adaptation process that is worth the time to find consensus where possible***. The guiding principles developed in this section will inform adaptation solutions created in Chapter 5: Bring Together Shared Solutions.

Use Worksheet 4D to list guiding principles.

Developing the Principles

Reflect Locally Identified Concerns

Guiding principles should respond to the 4.1.3 Shared Problems to Respond To statements, which should reflect the local context information gathered in Chapter 3: Set Local Context and Sense of Place. For example, there may be key vulnerabilities that should be elevated, or important barriers or opportunities that the adaptation actions should address.

Incorporate Key Values

In addition to incorporating key vulnerabilities and information from Chapter 3: Set Local Context and Sense of Place, guiding principles present an opportunity to articulate core values of communities. Community and stakeholder values have been explored across the 2.4 Effective Communications, 3.2 Integrate Community Values and 4.1.2 Current Decision Context. These core values and perspectives should come through in the guiding principles.

Elevate Priorities

Guiding principles should reflect the most important things to a community because they drive what adaptation options are considered. While there are likely many important values and issues within a community, the guiding principles are a way to prioritize and elevate concepts that are "must-haves."

Consider Organization

Guiding principles can be organized in different ways, and it will be important to organize these principles in ways that resonate with communities and stakeholders. Consider how the problem statements in 4.1.3 Shared Problems to Respond To are organized and it if makes sense to follow suit. The ART Planning Approach uses four frames of sustainability: society and equity, economy, environment, and governance.

Box 32 · Considerations for Developing Guiding Principles.

Testing the Adaptation Roadmap in Two Focus Areas

As part of the development of the Adaptation Roadmap, two hypothetical case studies explored how the Adaptation Roadmap can support the development of shared adaptation solutions. Two locations were selected for this work, the south Richmond shoreline and waterfront area of Suisun City. The examples below represent two different ways to consider what guiding principles might look like. The Suisun City example uses an approach of creating priorities for the guiding principles, while the Richmond example demonstrates the use of using guiding principles through the ART program's four frames of sustainability. In the two focus area case studies, these hypothetical guiding questions were then used to help 4.3 Explore Future Scenarios and shape the 4.3.3 Scenario Planning Parameters.

Explore the Suisun City Focus Area: Example Application of the Adaptation Roadmap

Explore the Richmond City Focus Area: Example Application of the Adaptation Roadmap

Suisun Hypothetical Example: Prioritizing Guiding Principles

Prioritize nature-based solutions that preserve, enhance, and restore vibrant ecological systems that align with the surrounding environs and maximize co-benefits whenever possible

Preserve or strengthen vulnerable communities by avoiding displacement or providing equitable relocation

Prioritize strategies that maintain flexibility/avoid lock-in

Prioritize low-cost strategies until tipping points are reached

Protect local and regional multi-modal transportation networks

Preserve maritime access and connections to the waterfront

Preserve (to the maximum extent possible) the unique culture, economic goals, and development plans already approved or in progress

Consider the surrounding landscape and adjacent landowners

Richmond Hypothetical Example: Using ART Frames of Sustainability

Society and Equity: Minimize displacement of socially vulnerable communities due to sea level rise and create structures for equitable relocation when necessary.

Economy: Protect regionally critical transportation network assets and minimize impacts to employment and commercial areas.

Environment: Promote the long-term vitality and biodiversity of natural areas through habitat creation, restoration, preservation, and by minimizing spread of toxic substances from contaminated sites.

Governance: Develop capacity for sea level rise by implementing the policy and governance structures necessary to support physical infrastructure development and community resilience.

4.2.3 **Evaluation Criteria**

What is Our Criteria for Success?

Evaluation criteria are a tool for exploring, in a transparent way, the benefits and trade-offs of different adaptation responses[1]**.** Part of defining what success means for your community is laying out what important criteria future adaptation options should be scored against. They allow communities and stakeholders to qualitatively evaluate potential strategies against the 4.2.2 Guiding Principles while considering impacts and feasibility.

Evaluation criteria can also help identify areas in which strategies do not address vision or guiding principles, which can help identify ways to improve the strategies. They can also be used to compare or filter multiple possible strategies to identify those strategies that would perform better than others and can facilitate in-depth conversation with stakeholders about how actions can balance the needs of several groups and create buy-in from partners. Evaluation criteria should be applied to the suite of actions that make up the strategy as a whole and be considered across the entire defined planning horizon (Box 33).

Work with communities and stakeholders to create and/or vet the evaluation criteria, which will be applied to adaptation actions and strategies in Chapter 5: Bring Together Shared Solutions (Table 7-1 and 7-2). The purpose of this section is to explore what successful adaptation might look like to you, building upon the 4.2.1 Vision and 4.2.2 Guiding Principles.

This is another point in the process where dialogue and conversation among communities and stakeholders may result in tension. Keep in mind that the evaluation criteria are **not a final scorecard**. Instead, they are a tool to explore and discuss tradeoffs among adaptation actions. This tool can support decision making, but decisions will come down to the process identified in Chapter 2: Center People in Decision-Making.

1 BCDC, "Adapting to Rising Tides 'How-To': Evaluation Criteria."

Developing Evaluation Criteria

The development of evaluation criteria should flow from the Vision and Guiding Principles above. When developing evaluation criteria with communities and stakeholders, consider:

When Evaluation Criteria Will be Developed Versus Used

Developing evaluation criteria in this section comes before applying the criteria, which occurs in 5.4 Evaluating Tradeoffs and Making Decisions after adaptation actions and strategies have been identified. The purpose of this section is to ask your communities and stakeholders: what are the important values to compare adaptation actions against?

How Evaluation Criteria will be Developed and Used

Evaluation criteria should be developed with communities and stakeholders. Once developed, they will be used to evaluate how well different adaptation options developed in Chapter 5: Bring Together Shared Solutions, meet each of the criteria. This can include a level of "scoring", as well as more general, "positive", "negative," or "neutral""yes" or "no" type of responses.

Setting Expectations About Using Evaluation Criteria

It will be important to set expectations that once you apply the evaluation criteria, not all actions will likely meet or score "high" on everything. Additionally, the evaluation criteria is not meant to provide the absolute answer. It's purpose is to initiate conversations about trade-offs and further explore the consequences or implications of choosing certain actions over others.

Qualitative vs Quantitative:

Evaluation criteria can be developed and used either qualitatively, quantitatively, or both. There are also other tools available to evaluate tradeoffs. Evaluation criteria have been used in projects in the San Francisco Bay Area, including the Dumbarton Bridge West Approach + Adjacent Communities Resilience Study. Review the Resources for Chapter 4 page for links to other resources.

Box 33 · Considerations for Developing Evaluation Criteria.

Use Worksheet 4E to list potential evaluation criteria that will be visited again and used in **5.4 Evaluating Tradeoffs and Making Decisions.**

Examples of Evaluation Criteria

Criteria Categories	Types of Criteria
Feasibility	▪ **Cost:** Does this action have a reasonable cost compared to other actions? ▪ **Financing:** Can the action be accomplished with existing or expected financing sources? ▪ **Administrative:** Can the action be accomplished with existing operations or procedures? ▪ **Political support:** What is the likelihood of political support? ▪ **Community support:** Is the action supported by a strong advocate or local champion? ▪ **Legal:** Can the action be accomplished with existing authorities or policies
Social Benefits	▪ **Access:** Will the action protect access to transportation (car, public transit, bike or pedestrian), housing, jobs, or services? ▪ **Life safety:** Will the action protect and/or improve public health and safety, especially vulnerable communities? ▪ **Contaminants:** Will the action prevent the mobilization of contaminants from hazardous sites? ▪ **Vulnerable residents:** Will the action help protect vulnerable communities and/or help address chronic issues faced by communities? ▪ **Cost burden:** Will the action protect against increased housing or transit cost burdens? ▪ **Community:** Will the action preserve community function, and/or advances other community objectives? ▪ **Social capacity:** Will the action help build social networks, community capacity, and internal community leadership? ▪ **Recreation:** Will the action create or maintain recreational, educational, and/or shoreline access opportunities? ▪ **Displacement:** Will the action help avoid displacement of vulnerable communities? ▪ **Co-benefits:** Will the action help support or create co-benefits?
Environmental Benefits	▪ **Habitats and biodiversity:** Will the action help create or maintain biodiversity and resilient habitats over time? ▪ **Water quality:** Will the action help maintain or improve water quality (e.g. through green infrastructure, such as wetlands or vegetated swales)? ▪ **Nature-based:** Will the action promote nature-based solutions (e.g. wetlands, beaches, etc.), as opposed to traditional gray/hard infrastructure? ▪ **Greenhouse Gases:** Will the action help reduce greenhouse gases (GHGs), add carbon sequestration, and/or reduce energy use?

Table 7-1 · Evaluation Criteria Categories and Types. List of examples of evaluation criteria that can be used when developing your own evaluation criteria with support from communities and stakeholders. Redrawn from the ART Bay Area Study, 2020.

Criteria Categories	Types of Criteria
Economic Benefits	▪ **Jobs**: Will the action create or retain jobs? ▪ **Tax base:** Will the action help maintain or create revenues from taxes, rates or fees? ▪ **Affordability:** Will the action help maintain tax rate and/or ratepayer affordability (for example, for utility services)? ▪ **Commuter movement:** Will the action help maintain or enhance commuter movement? ▪ **Goods movement:** Will the action help maintain the movement of goods (e.g. by rail, ship or highway)? ▪ **Service and networks:** Will the action help reduce service or network disruptions of infrastructure (e.g. water, electricity, roads, etc.)? ▪ **Infrastructure:** Will the action help protect infrastructure investments and/or address the current need for upgrades to our infrastructure? ▪ **Protect assets:** Will the action help reduce damage to assets (e.g. buildings, community facilities, parks, historic landmarks, infrastructure, etc.)? ▪ **Development:** Does the action help focus new development in more resilient areas and/or help protect existing development? ▪ **Vulnerable communities:** Does the action help protect community services, homes, and businesses of vulnerable communities?
Governance	▪ **Decision-making:** Will the action help support or create transparent decision-making in collaboration with community groups and stakeholders? ▪ **Partnerships:** Does the action encourage broad public and/or private sector partnerships? ▪ **Regulation:** Will the action help streamline regulatory processes when possible? ▪ **Communities:** Will the action help facilitate and fund participation with diverse stakeholders, including vulnerable communities?
Disaster / Lifecycle	▪ **Preparedness:** Does the action help build or enhance disaster preparedness? ▪ **Risk:** Does the action help mitigate risk? ▪ **Response:** Does the action improve disaster response? ▪ **Recovery:** Does the action encourage resilient recovery?
Regional / Neighboring Impacts	▪ **Regional transportation**: Will the action help maintain regional services from airports, ports, highways, rail and/or major transportation hubs? ▪ **Regional habitat:** Does the action help achieve regional habitat goals (for example, Baylands Ecosystem Habitat Goals Project)? ▪ **Neighbors:** Does the action have a positive or neutral impact on neighboring jurisdictions (e.g. doesn't cause flooding to worsen)? ▪ **Housing:** Does the action increase the availability of housing and help relieve the housing crisis?

Table 7-2 · Evaluation Criteria Categories and Types (Continued). List of examples of evaluation criteria that can be used when developing your own evaluation criteria with support from communities and stakeholders. Redrawn from the ART Bay Area Study, 2020.

4.3 Explore What the Future Can Look Like Through Scenario Planning

This section will dive deeper into introducing scenario planning as a tool for adaptation pathways, what adaptation outcomes can look like through five strategic approaches, what planning parameters to select to shape scenarios and incorporate planning horizons, and conducting the exercise and summarizing your results. You can navigate to the details in each section below:

Use this Section to Consider Different Futures

The 4.2.1 Vision and 4.2.2 Guiding Principles provide direction for where the community wants to go, but there are still many different ways for *how to get there* and achieve any given outcome.

For example, a guiding principle about "protecting transportation infrastructure" could be interpreted in different ways: does it mean that the road must be protected, in place, at all costs, indefinitely? Can it be raised? Can it be protected until a certain point, or until an alternative route is built? Can it be moved from one place to another? The different ways we can solve the same problem varies, and introduces different tradeoffs.

Exploring future outcomes brings together existing conditions and vulnerabilities with thresholds, triggers and planning

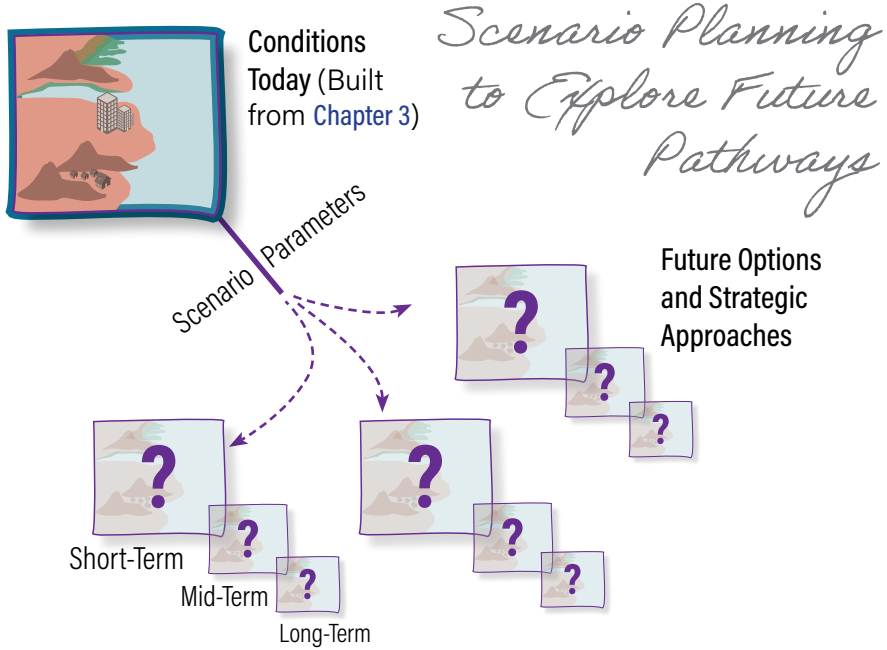


Figure 33 · Conceptual Graphic of Scenario Planning. Based on the conditions and issues identified today, select scenario parameters to explore future options and strategic approaches over planning horizons.

horizons from Chapter 3: Set Local Context and Sense of Place, with the vision and guiding principles from 4.2 Determine What Success Means. This step provides space to brainstorm and explore different ways to reach desired "destinations" using scenario planning (Figure 33).

This section emphasizes how to consider future visioning in your process through using one or various combinations of strategic approaches for adaptation, designing your scenario planning parameters that include level of detail, future trajectories to explore and adding the short, medium, and long-term planning horizons to consider how these futures may change over time and flexibly address increasing sea level rise and flooding.

4.3.1 Scenarios as a Pathways Tool

How Can Scenario Planning Explore Solutions?

Scenario planning is a planning exercise for thinking critically and strategically about future outcomes. It is one of few proven tools for improving stakeholders' capacity to understand and manage uncertainty[1].

Instead of trying to plan for a single predicted future, scenario planning provides an opportunity to plan flexibility for *different* futures that could result from changing social, environmental, or other conditions. Scenario planning has been used as part of an adaptation pathways approach in various planning efforts[2].

Some of the key benefits of using scenario planning is that it encourages diverse stakeholder groups to come together to think about complex systems and offer insights and perspectives that can broaden the discussion on future outcomes[2]. Scenario planning has also been shown to foster creativity and support conversations regarding potentially controversial options. It can help expand participants' thinking, uncover future inevitabilities, and allow participants to challenge conventional thinking[3].

What Does Scenario Planning Look Like?

Scenario planning exercises can be done with communities and stakeholders and occur in different ways[4,5]. For example, scenarios can be represented by qualitative narratives of different futures, and quantitative data such as tables of comparative differences, visualizations such as maps, quantitative model outputs, and other creative approaches. Using narrative storytelling in combination with data can help anchor scenarios in evidence while increasing comprehension.

1 Scearce and Fulton, What If?
2 Dunlop et al., "Exploring Adaptation Pathways in the Murray Basin."
3 Moore, S.S., N.E. Seavy, and M. Gerhart. 2013. Scenario planning for climate change adaptation: A guidance for resource managers. Point Blue Conservation Science and California Coastal Conservancy
4 Kennedy et. al, "Our Communities Our Power: Advancing Resistance and Resilience in Climate Change Adaptation Action Toolkit."
5 DFID, "Tools for Development. A Handbook for Those Engaged in Development Activity."

In the Adaptation Roadmap, we highlight the use of doing mapping activities or other visualizations in scenario planning with communities and stakeholders as they provide a useful spatial reference for communities and stakeholders considering future options. It is important to keep in mind that scenario planning is a decision-support tool – scenarios alone do not make decisions but provide insight into potential futures.

It is also important to recognize that scenario planning can be a time intensive activity to do with communities and stakeholders. Before engaging in this activity, ensure that communities and stakeholders are primed and ready to participate (Chapter 2: Center People in Decision-Making) as this section will ask participants to help shape the parameters of the scenarios and explore potential solutions. The key question driving this entire section is:

How can we use scenarios to explore solutions to our 4.1.3 Shared Problems to Respond To that meet our 4.2.2 Guiding Principles?

Note: Be Prepared for Iteration. Based on your local context, there may be *many* different options for what adaptation actions you can take, or there may be only a few. Scenario planning allows communities and stakeholders to explore these future options and have open dialogue discussions about different possibilities. These conversations may result in adjustments to the 4.2.1 Vision, 4.2.2 Guiding Principles, or 4.2.3 Evaluation Criteria.

Depending on the level of detail you choose to take in scenario planning, you may want to work through this section 4.3 Explore Future Scenarios alongside Chapter 5: Bring Together Shared Solutions. For example, if you have technical or consultant support in these conversations, you might want to identify specific actions. Alternatively, you can also do scenario planning with more general ideas for solutions, which will be reviewed and applied in Chapter 5.

4.3.2 **Strategic Approaches**

What Can Adaptation Look Like?

Before designing scenarios, it is important to explore what types of adaptation outcomes can occur. There are five strategic approaches that can be taken to respond to respond to sea level rise (Figure 34 and Box 34).

These approaches work by creating physical barriers to reduce exposure to the hazard (***protect***), limiting future development to reduce exposure to the hazard (***avoid***), minimizing the consequences of the hazard when exposed (***accommodate***), and re-locating existing development out of areas exposed to the hazard (***managed retreat***). Lastly, the Adaptation Roadmap also considers actions we can take today to build the adaptive capacity of our communities, governments,a and sectors to adapt to future challenges (***prepare***).

It is likely that a combination of strategic approaches, or "hybrids," will be necessary for sea level rise adaptation. These approaches can occur in tandem (such as prepare, protect *and* avoid) or in sequence (protect, then accommodate, then retreat). It is important to note that all approaches will require monitoring and the extent to which depends on what approaches are used and if or how they are sequenced over time.

These five strategic approaches represent broad outcomes, while the specific actions and strategies to *achieve* those outcomes can vary. For example, protecting a shoreline using nature-based solutions can include different strategies such as restoring wetland habitats, constructing ecotone or horizontal levees, building oyster reefs, etc.(see the 3.3.1 Value of Nature). Specific actions and strategies for *how* to achieve these approaches can be found greater detail in Chapter 5, and depending on the level of detail selected in 4.3.3 Scenario Planning Parameters, this level of can be included in the scenario planning exercise if desired.

Review the five strategic approaches with communities and stakeholders to support the scenario planning activities.

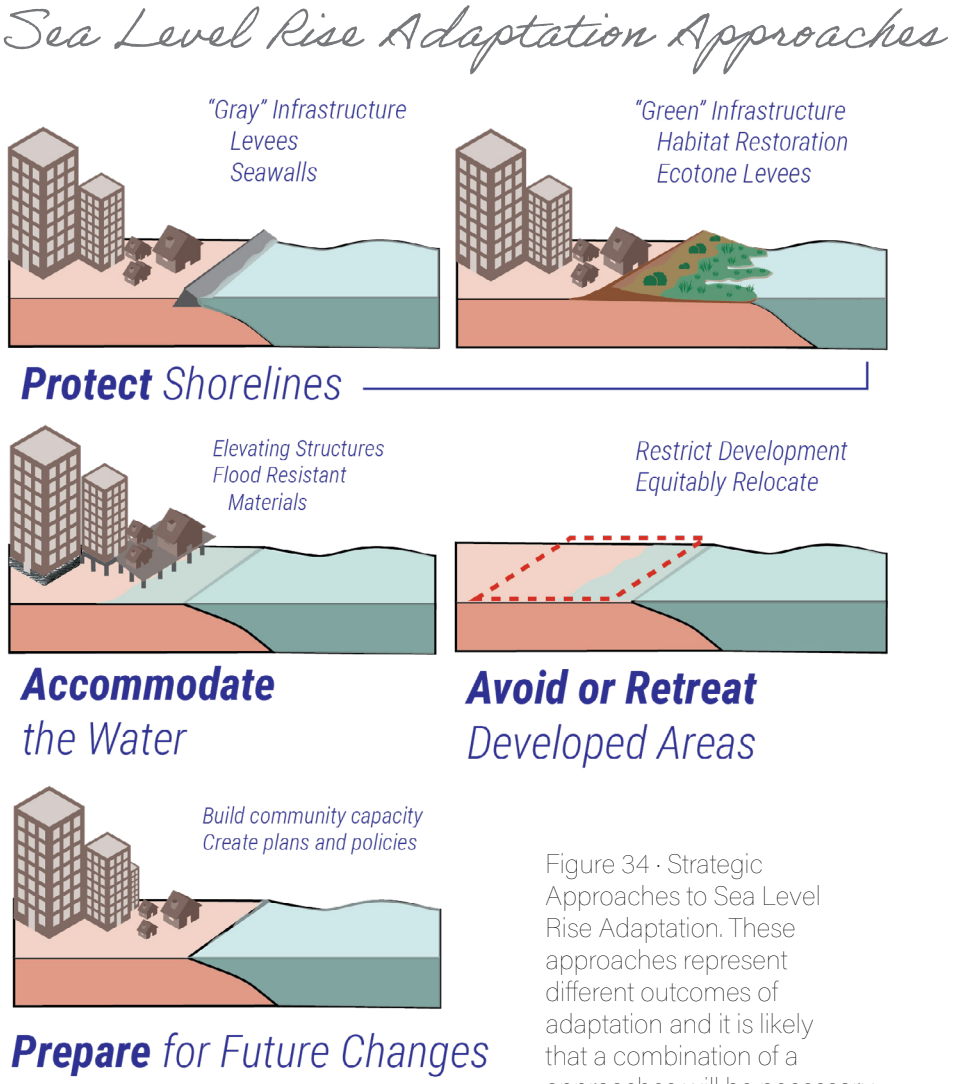


Figure 34 · Strategic Approaches to Sea Level Rise Adaptation. These approaches represent different outcomes of adaptation and it is likely that a combination of a approaches will be necessary along a shoreline and these can change over time.

Details on Strategic Approaches

Protect

Protect refers to strategies that use engineered structures (human designed or natural) or other measures to keep water out and defend development in its current location. Protect strategies can be divided into "gray" (or hard) and "green" (or soft), as well as hybrids of both approaches. Gray strategies include traditional levees, seawalls and other types of human designed infrastructure. Green strategies include using natural processes such as wetlands or other ecological systems to reduce flood risk or impacts. Protect strategies can include physical barriers to prevent water from getting to an area where it is not wanted, redirecting water to an area designed for flooding, or slowing the movement of water and wave impacts to reduce its impacts in a certain area. Protect strategies may be particularly useful in areas with a high density of existing, high-consequence assets that are anticipated to be flooded in the near or medium-term. This can be part of a phased approach where protection functions for a period of time, followed by a transition to a longer-term approach, such as managed retreat.

Accommodate

Accommodate refers to strategies that use methods to modify existing developments or design new developments to decrease hazard risks while still allowing some amount of flooding to occur. These can include making existing development "flood proof" or "floodable." Floodproofing keeps water from reaching vulnerable components of the asset that would impede its function, such as retrofitting existing structures by raising the elevation, or building new structures that are elevated. Floodable assets may get wet, but water does not damage the asset, such as by using floodable materials. Accommodate strategies can be used alongside other strategies, and may be particularly useful in areas of low or medium density that contain critical assets that cannot be moved or phased out by the time flooding is anticipated to occur. This may also be an option in areas with an appetite for an innovative or exploratory approach, such as floating homes.

Avoid

Avoid refers to strategies that limit, restrict, or de-incentivize development within areas at risk of future flooding. For areas that do not currently contain critical assets, avoid strategies would mean ensuring that critical assets are not allowed to be developed there now or in the future. This could be done through easements, land buyouts, changing allowable uses through zoning, or refocusing development in safer areas. Avoid strategies may be particularly useful for areas that are not anticipated to have high development pressure in the future, have such high risk that development would not be financially feasible, or areas well suited to be wetlands migration space.

Managed Retreat

Managed retreat refers to strategies that equitably relocate or remove existing development out of hazard areas. For areas that already contain critical assets and development, managed retreat would involve removing or relocating those assets. This could be done through buyouts, rerouting critical services to different areas, or allowing assets at the end of their useful life to not be replaced. Managed retreat may be appropriate in areas with low density of assets, low consequence assets, or areas that are not anticipated to have significant development pressure in the future. Over long-term horizons, this may become a more viable option and would need to be discussed in greater detail with communities and stakeholder (see 4.4.1 Raising Difficult Topics).

Prepare

Prepare refers to strategies that improve the capacity of communities, governments, and stakeholders to respond to flooding issues over time. This includes any actions that monitor conditions or establishes processes and structures to support future decision-making. In an adaptation pathways approach, prepare is a critical first step outlining what needs to occur before a threshold is reached. Prepare is always followed by another strategic approach outlined above.

Box 34 · Details on the Five Strategic Approaches for Sea Level Rise Adaptation.

4.3.3 Scenario Planning Parameters

How Do We Explore Different Futures and Solutions?

There can be more than one way to solve a problem. Scenario planning is an exercise that provides an opportunity to brainstorm, discuss, and visualize how different solutions can lead to different sets of adaptation options and tradeoffs. Doing a scenario planning activity requires considerations and set-up for how the exercise will be framed and structured. Parameters for scenario planning include defining the level of detail, future trajectory to explore, and using planning horizons.

Level of Detail

The first key consideration is determining what level of detail are you expecting to do in this effort. Scenario activities can take many different shapes and forms, including containing different levels of detail and information (Figure 35). Consider your 1.1.1 Adaptation Outcomes and communities and stakeholders involved to determine how specific this activity may get. If you are planning to explore specific adaptation actions and strategies, consider this doing scenario planning in tandem with Chapter 5: Bring Together Shared Solutions.

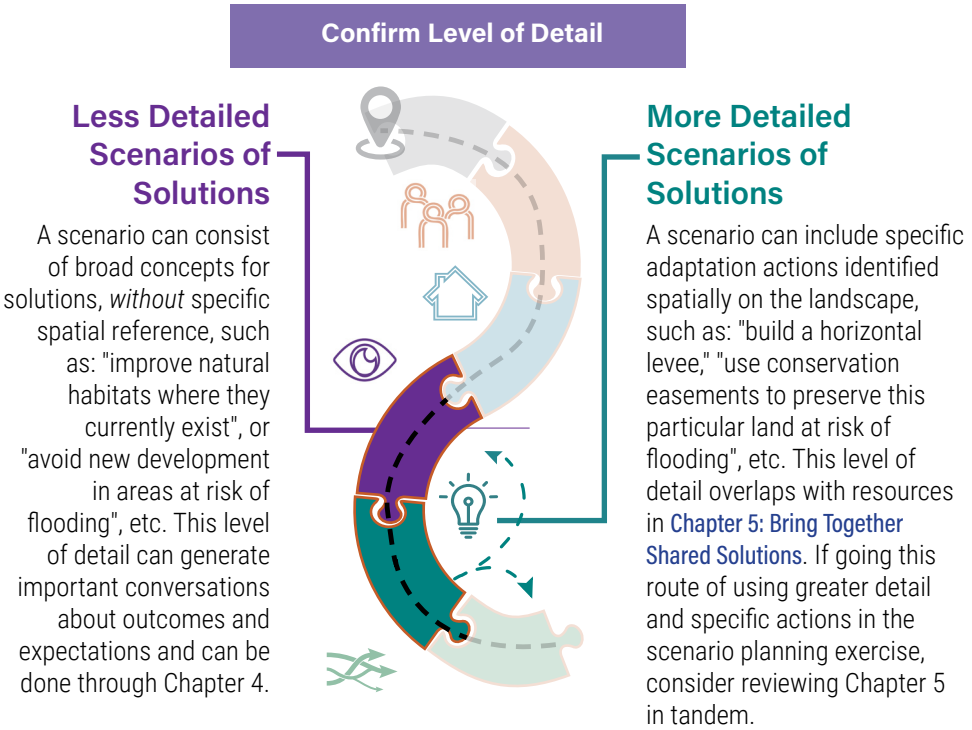


Figure 35 · Level of Detail in Scenario Planning.

Trajectory (or Future Conditions to Be Explored)

We use the term "trajectory" to frame what future conditions will drive the types of adaptation strategies to explore (Figure 36). Choosing which trajectories to use depends on your participants and what you are hoping to get out of the exercise. Types of trajectories in this section include extremes, emphasis, logical, and other (Table 8). Once you have selected a trajectory, describe what that future condition is trying to accomplish. For example, setting up scenarios for a "extreme" trajectory might include exploring: a) Extreme Habitat Protection, b) Extreme Protect in Place, and c) Extreme Recreation Access. Depending on what trajectories you choose, there may be another step of combining options explored in scenarios or creating new hybrid scenarios. Section 4.4 Discuss Outcomes and Expectations will discuss advancing a “preferred” or “hybrid” scenario.

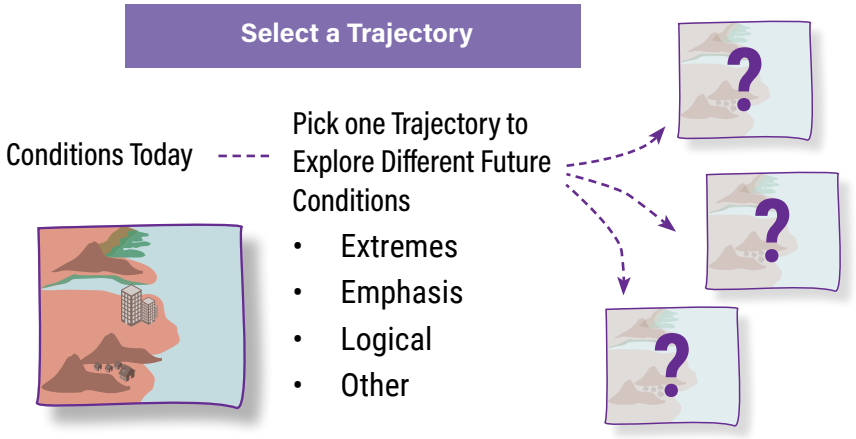


Figure 36 · Trajectory Types Frame Future Options.

Future Trajectories for Scenarios

Extremes	Emphasis on Guiding Principles	Logical	Other
Extreme scenarios refer to choosing exaggerated conditions to explore what one end of an extreme might look like. These scenarios may include unpopular or even unfeasible options but can provide insight into what challenges arise from this approach and why alternatives may be necessary. For example, an extreme "protect" scenario could explore what it would look like to create barriers around an entire shoreline, thereby illuminating why this would likely be infeasible due to issues of cost, land ownership, environmental impacts, etc. An advantage is that extremes can be useful in bringing together diverse stakeholders to explore pros and cons of future outcomes, particularly around contentious issues. It can also facilitate more creative thinking to brainstorm and explore non-traditional approaches. A disadvantage is that they likely will not align with the vision and guiding principles and can result in a longer scenario process, as a hybrid scenario would likely need to be developed for adaptation. In Practice An extreme scenario could include picking only one guiding principle to emphasize for each scenario. It could also include choosing one single strategic approach and exploring what it would look like to achieve it. For example, if you chose "protecting the entire shoreline" as an extreme, you might consider: What kind of adaptation actions would be needed to achieve this scenario? In what ways is this helpful to meet the vision or guiding principles and in what ways is this infeasible? What are the tradeoffs of this kind of approach in different places on the shoreline? This approach was used in State Route 37 Adaptation Planning project.	Emphasis refers to choosing to emphasize a specific part of the vision or guiding principles, while ensuring the scenarios as a whole meets the overall vision. For example, an emphasis on "restoring natural ecosystems" could explore what it would look like to expand natural habitats to the fullest extent possible in an area while also supporting other aspects of the shared vision. These parameters encourage the development of hybrid strategic approaches from the get-go, as the focus is on advancing an aspect of the shared vision and not one strategic approach. An advantage is that it can create more realistic and feasible scenarios that meet the guiding principles (in contrast to the extreme parameters). A disadvantage is that because the parameters are not extreme, you may find similar strategies among all the scenarios and have less of a range to explore options and tradeoffs. At the same time, identifying strategies that work well across different future scenarios can be beneficial and elevate common strategies work well regardless of the future In Practice An emphasis on guiding principles could include trying to maximize a specific principle in each scenario while still meeting as many guiding principles as possible. In these scenarios, you are trying to meet all of the vision and guiding principles, but you might explore alternative ways to do so, or different emphasis. For example, if you chose to maximize a guiding principle of "prioritizing nature-based strategies" as an emphasis on parts of the guiding principles, you might consider: how do we maximize habitats while still achieving other guiding principles as well, such as access to the shoreline and minimizing displacement of vulnerable. This approach was used in Dumbarton Bridge West Approach + Adjacent Communities Resilience Study.	Instead of creating desired futures, this approach asks participants to consider future scenarios that would be most likely to occur given the 4.1.2 Current Decision Context. The purpose of this approach is to explore how our current social, governance, and economic systems might result in likely adaptation outcomes, which may include a no-action scenario. An advantage to exploring what likely future we might be headed in can help us understand how we might want to change those outcomes to align with vision and guiding principles. In Practice A logical future trajectory might include exploring what adaptation actions you think are most likely to occur in the future and what those would look like. For example, an area with high economic development or a dense neighborhood on the shoreline may be likely build a seawall to protect their infrastructure opposed to elevating their properties or paying for a hybrid "green" seawall. In these scenarios, you are not building to a desired future, but instead considering an expected one given the current decision context. Doing so allows communities and stakeholders to explore those future strategies and evaluate what, if anything, should happen to change those trajectories. This approach was used in the Murray Basin Adaptation Pathways project.	There may be other relevant parameters or "bounds" that shape the way you'd like to explore adaptation solutions. An advantage is that because every community and the issues they face differ, this option allows flexibility in creating your own parameters to shape the scenarios to explore. In Practice Other parameters can include combinations of ones stated, or entirely new ones. For example, the Hayward Regional Master Shoreline Plan identified three design alternatives called, "Closer to the Bay," "Down the Middle" and "Further Inland", referring to three scenarios differentiated by how close to keep development near the Bay shoreline. Another example is the Sea Level Rise Adaptation Framework, developed by Point Blue Conservation Science and SFEI. This report developed three vision and scenarios that reflected different priorities: Hold the Line, Buffer with Public Open Space, and Maximize Habitat/Minimize Risk.

Table 8 · Examples of Future Trajectories in Scenario Planning. Different trajectories frame what kinds of adaptation solutions to explore in scenarios. This table is not exhaustive, and the "other" option allows for flexibility in what conditions to use to shape your scenario planning exercise.

Planning Horizons

Another element of developing scenarios is exploring how adaptation actions and outcomes *change* as sea levels rise over time. In 3.4.4 Planning Horizons definitions for short-term, mid-term, and long-term were created. As you conduct scenario planning activities with communities and stakeholders in 4.3.4 Conducting and Summarizing, use these existing definitions to include the element of time. If you determine these planning horizons needs to be adjusted given new information or thinking from the scenario planning, update your definitions and be transparent about the process with communities and stakeholders.

The hypothetical case study in Richmond, California, provides an example of how the adaptation actions in one scenario of maximizing habitats resulted in the development of different adaptation actions and strategies over time (Figure 37).

Use Worksheet 4F to set up your scenario planning exercise.

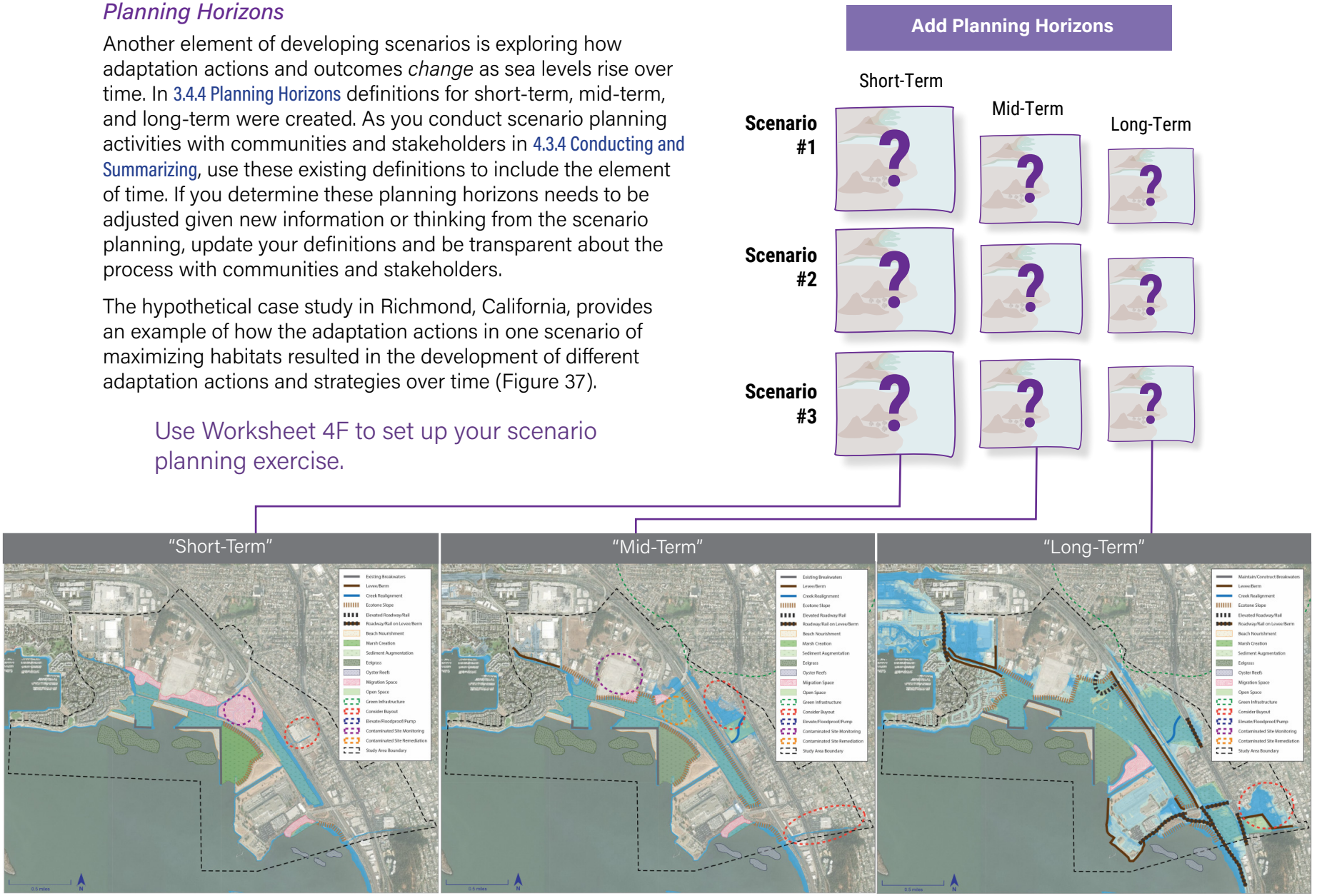


Figure 37 · Adding Planning Horizons for Each Scenario. In a hypothetical case study of sea level rise adaptation in Richmond, CA, this scenario emphasizes maintaining and maximizing habitat opportunities for the short, medium, and long-term future to explore how the adaptation actions would need to be adjusted over time. This scenario includes a greater level of detail and was conducted by engineering consultants.

4.3.4 Conducting and Summarizing

How Do We Explore and Learn from Scenarios?

Once you have set up your scenario planning activity by understanding how to use 4.3.1 Scenarios as a Pathways Tool, what 4.3.2 Strategic Approaches can be used, and which 4.3.3 Scenario Planning Parameters to use to drive the types of adaptation solutions to explore - **the next part is actually engaging in the scenario planning activity *with* communities and stakeholders and learning from it.**

Doing Scenario Planning Activities

Doing the scenario planning activity with input from communities and stakeholders will probably look a little different for everyone. It can range from community members and stakeholders actually looking at maps and identifying areas where they'd like to see specific types of adaptation outcomes, to consultants using the results of the 4.2.1 Vision, 4.2.2 Guiding Principles, and 4.3.3 Scenario Planning Parameters to provide scenario concepts for communities and stakeholders to respond to.

Depending on the level of detail selected, it may be helpful to share an overview about what kinds of adaptation actions exist, such as the five ART Adaptation categories in 5.1 Explore Actions to Meet Envisioned Futures. However, starting with existing adaptation actions (5.1.3 ART Adaptation Catalog) may also limit creative thinking about future solutions. As you work with communities and stakeholders during this activity, you may find the need to 4.4 Discuss Outcomes and Expectations both during and after the activity.

The scenarios generated in this section and advanced in 4.4 Discuss Outcomes and Expectations will be the roadmap to guide the solutions for technical experts in Chapter 5: Bring Together Shared Solutions, which will be brought back to communities and stakeholders in 5.4 Evaluating Tradeoffs and Making Decisions.

> Conduct scenario planning and use Worksheets 4G-4I to record the notes, comments and outcomes from this exercise.

Extremes in Ocean Beach, San Francisco

The Ocean Beach Master Plan was a projected completed in 2012 to develop a long-range vision for San Francisco's Ocean Beach in the face of rising sea levels. To do this, the project used four "test scenarios" that reflected different ideas from stakeholders and the public and represented singular goals to the *extreme*. The four scenarios included: Maximize Habitat, Maximize Recreation, Maximize Green Infrastructure, Maximize Infrastructure. The scenarios were developed by the project team, but drew from the information gathered from public and stakeholder suggestions, which were organized into four priority areas. The four scenarios developed in this project included four time periods and divided into three shoreline reaches for a total of 48 permutations. The scenarios were presented at a public workshop and participants were invited to assemble a preferred alternative/hybrid scenario based on these elements. The use of the extreme scenarios allowed stakeholders to understand trade-offs of different options and come together around new hybrid approaches.

Balanced Approaches in Hayward

The Hayward Regional Master Shoreline Plan was completed in 2021 as a forward looking tool to guide the phased implementation of project. This process used a different scenario approach: instead of extremes, this project developed three scenarios, or "Design Alternatives," that represent different balanced approaches to sea level rise adaptation based on stakeholder and client feedback. The three Design Alternatives include "Closer to the Bay," "Down the Middle," and "Further Inland." During this process it was anticipated that discrete elements and projects from the different design alternatives would be explored with stakeholders and a Preferred Alternative would be selected. The resulting final Preferred Alternative included a hybrid configuration based on the stakeholder feedback that occurred during the Design Alternatives process.

Summarizing and Learning From Scenarios

Scenarios alone do not make decisions – they are tools to explore complex information and consider what outcomes could look like in the future. They serve to provide insight to facilitate meaningful conversations.

Once the scenarios have been developed and shared with communities and stakeholders, take the time to summarize the feedback so that it can be used in future iterations (Box 35). Depending on the type of scenario planning conditions used, you may decide to create hybrid or preferred scenarios with stakeholders in 4.4.3 Advancing Scenarios.

Summarizing key points and outcomes of each scenario will be helpful for communicating feedback from the scenario development process with other stakeholders. Itemizing the important elements of each scenario will also be useful when evaluating how scenarios may need to be combined.

Use Worksheets 4G-4I to summarize the scenarios explored in this section.

Descriptive Names

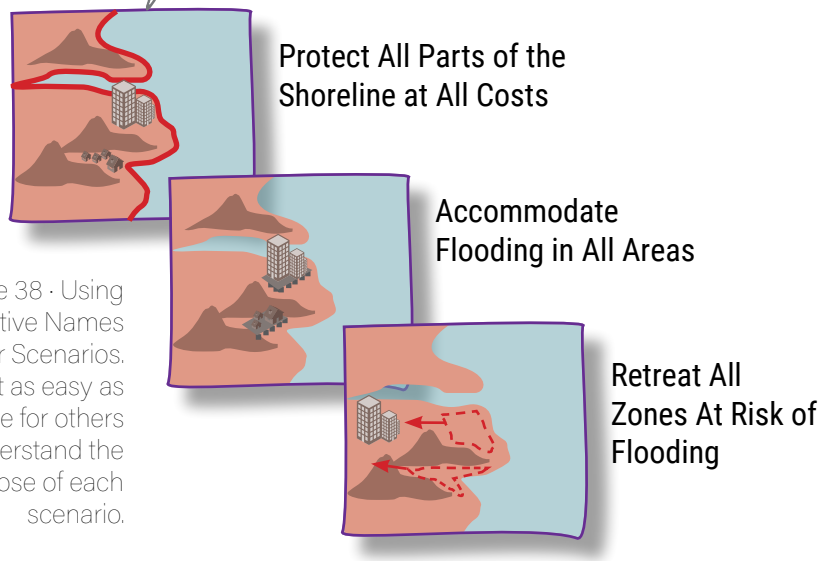


Figure 38 · Using Descriptive Names for Scenarios. Make it as easy as possible for others to understand the key purpose of each scenario.

Summarizing Scenarios

Descriptive Title

Can someone read the title and gain a good sense of the scenario? (See Figure 38.)

Issue Statement

What problem(s) does the scenario primarily respond to?

Planning Parameters

What parameters were used to develop this scenario?

Description of Solutions and Key Strategies

What happens in this scenario and what key things define this scenario compared to others?

Opportunities and Constraints

Does this scenario include key opportunities or key constraints that need to be called out? What does your community look like when vulnerabilities are reduced or eliminated? What other social, environmental, governance, or economic factors are in play, given your guiding principles?

Alignment with Vision and Guiding Principles

Generally, how well does each scenario reflect the vision and guiding principles? The answer will likely vary depending on what parameters you used. For example, extreme scenarios may only align or support one part of the guiding principles, but lead to worse outcomes for other principles. Articulate how these scenarios help to achieve, or hinder your vision and guiding principles

Box 35 · Considerations for Summarizing Scenarios.

4.4 Discuss Outcomes and Expectations

This section will dive deeper into framing challenging topics such as managed retreat, identifying which scenario(s) to advance, and setting up advanced and technical experts with the information they need to refine adaptation solutions that meet community and stakeholders vision and guiding principles. You can navigate to the details in each section below:

Railroad tracks along Contra Costa shoreline near Point Pinole. Photo by SF Baykeeper photographer, Cole Burchiel, and LightHawk.

Use this Section to Set Shared Expectations

Having developed future scenarios, it is likely that concerns may have been raised over what these potential futures means for communities both in the short-term and the long-term. Particularly as we look further ahead, the projections and risks from rising sea levels may feel overwhelming.

In this section, we highlight approaches for engaging with stakeholders about discussing and framing long-term scenario planning outcomes and how we might pull together the best elements from the scenarios to create one or more preferred scenarios that are investigated further by technical consultants in Chapter 5 sections: 5.1 Explore Actions to Meet Envisioned Futures, 5.2 Creating Bundled Strategies That Work Together, and 5.3 Phasing and Sequencing Strategies Over Time.

Additionally, we provide space to compile this information, including exploring what the future decision context may need to look like in order to achieve the preferred scenarios, to help set up the technical experts as they begin bringing together these shared solutions.

Keep in mind that this section does not *have to* come after the scenario planning exercises, but could also be used in setting up the scenario planning exercise, or during the activity as these difficult topics and conversations arise.

4.4.1 Raising Difficult Topics

How Can We Discuss Long-term Futures?

One of the biggest challenges of adaptation planning is bringing diverse communities and stakeholders together and raising the dreaded topic of *what to do when it comes to the worst case scenario, or long-term impacts*, of sea level rise. When communities and stakeholders begin looking at impacts of sea level at higher levels of flooding – say five, ten, or more feet, the picture might look catastrophic.

> Note: While these long-term impacts of sea level rise should have been raised in the 3.1.1 Vulnerability Assessment, it may not be until the scenario planning activities in 4.3 Explore Future Scenarios that communities and stakeholders have a chance to gain of deeper understanding of what these impacts mean for the future.

As you considered how adaptation solutions may change over time in 4.3.3 Scenario Planning Conditions, a difficult reality may arise in the longer-term scenarios. There may be significant costs and tradeoffs – not only monetary, but also socially and environmentally – to adapt to higher water levels. Depending on the solutions explored, you may question the feasibility of using only certain strategic approaches across all 3.4.4 Planning Horizons. For example, is it feasible to a raise levee forever? Do communities want to live behind high walls that carry a risk of failure and catastrophic flooding? Will these solutions protect against increasing groundwater rise or riverine flooding? At the same time, the alternatives can seem daunting. How could you ever move critical infrastructure like a wastewater treatment plant, electrical substations, or even entire neighborhoods?

These long-term options can feel scary to raise, and it might seem easier to avoid these topics altogether given the issues they raise around equity, the economy, environment, and society as a whole. While it is absolutely true that these conversations raise sensitive and important questions, we suggest creating space in your process to *discuss* the long term future in ways that generate thinking, spur conversation, and help inform *what we can do today* to prepare for the future.

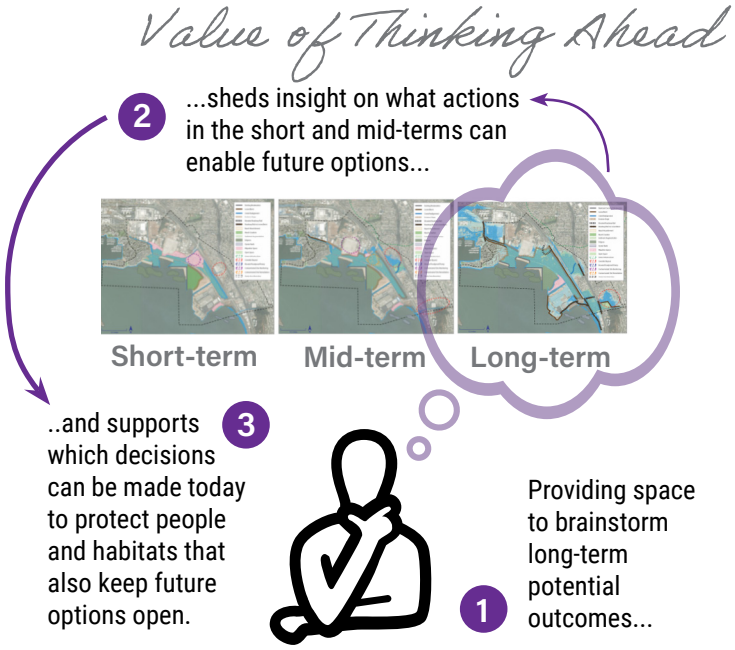


Figure 39 · Thinking About the Future to Make Better Choices Today. 1) Brainstorming the long-term future 2) sheds insight on short and mid-term actions that provide future options, and 3) supports decision-making today to keep those future possibilities open.

Brainstorming the Longer Term to Shape the Shorter Term

The Adaptation Roadmap proposes a way to frame discussions on longer term outcomes by purposefully separating the act of *brainstorming* future actions with *making* decisions (Figure 39).

In a case study of adaptation pathways in Murray Basin, Australia, planners found that using adaptation pathways and discussing the future in discrete increments of time helped stakeholders feel comfortable *exploring* adaptation solutions in the long term future, without worrying about having to make any of those decisions today[1]. Instead, the purpose of exploring longer term futures is to provide insight into what short or mid-term actions might help us make choices today to keep future opportunities open. In the adaptation pathways literature, this concept of thinking about the future to make better choices today is known as preventing undesirable lock-ins.

1 Dunlop et al., "Exploring Adaptation Pathways in the Murray Basin."

A lock-in is a decision made today or in the short term that precludes future options[1,2]. For example, making substantial investments to raise a levee with a roadway situated in an existing wetland may negatively affect the health of that wetland. Investing in that short-term action today can limit future options of having healthy wetlands that support biodiversity, wildlife, and reduce future flooding impacts.

A series of actions can show "path dependencies,"[2,3] illuminating how adaptation solutions in the short-term can create, or *limit*, choices in the longer term. Another way to think about this is that some 4.3.2 Strategic Approaches may be more useful at different 3.4.4 Planning Horizons. For example, protection strategies can provide critical shorter-term benefits, but may not be feasible in longer-term situations due to increased costs, soil geomorphology and foundation stability, increased risk, or other constraints. For example, some places along the San Francisco Bay shoreline are built on Bay "fill[4]." Filled areas built on what were formally tidal wetlands often reside on young bay mud,[5] which affects the feasibility, design, and maintenance of any structures built on it, including the weight and height of flood protection projects.

Accommodation strategies may likewise provide short-term benefits but may not be able to protect against long-term flood levels. Similar to protect strategies, accommodate actions may offer a short, to mid-term strategy that provide protection while transitioning to a longer-term strategy. Avoidance strategies can provide longer-term protection, but must be taken early enough to limit and reduce new development in areas at risk.

In places with existing development and infrastructure, strategies such as managed retreat may be more difficult to achieve in the short-term, but can provide longer-term options to protect people based on the future risks posed by rising sea levels. Planning for an equitable managed retreat process will take time and cannot occur without serious community, stakeholder, and government conversations, dialogue, analysis and review. See the next page for further discussion and additional resources on managed retreat.

It may also be true that not all lock-ins are undesirable. Actions in short or medium terms may also lock-in future conditions that are desired and set the stage for future opportunities. It is important to have conversations about the limitations and opportunities of different types of strategies.

Making Decisions Over Time to Reduce Maladaptation

Even with the best of intentions, sea level rise adaptation presents a challenge of future *uncertainty* (see Flexible Approach for Decisions Over Time). We know the oceans are rising, but the rate of sea level rise become *less certain* the farther ahead we look. At the same time, societies change, technologies open new possibilities, and perhaps most importantly, the *future choices* we might make are less certain as we look decades ahead. When making adaptation decisions, we don't want to make the *wrong* choices. "Maladaptation," a term coined in the 1990s, refers to adaptation choices that do more damage than the hazard itself[6].

By making decisions over time through adaptation pathways, we can make investments in discrete steps that allow for continuous review and potential change as we learn more. The most certainty we have is in the choices we make today. This is why it will likely be important to frame future adaptation choices as potential options, and work our way backwards to explore what decisions we can make today that enable desired future opportunities. Being transparent and setting expectations for the process and outcomes will be essential to having productive conversations about challenging topics as they arise.

1 Haasnoot, et al. 2013. Dynamic adaptive policy pathways: A method for crafting robust decisions for a deeply uncertain world. *Global Environmental Change.*
2 Zandvoort et al. 2019. Designing with Pathways: A Spatial Design Approach for Adaptive and Sustainable Landscapes. *Sustainability.*
3 Werners et al. 2021. Adaptation Pathways: A review of approaches and a learning framework. *Environmental Science and Policy.*
4 Fill for Habitat Amendment Fact Sheet. Bay Conservation and Development Commission. Accessed March 2022 at https://bcdc.ca.gov/BPAFHR/FillHabitatFaqs.html
5 Map showing thickness of young bay mud, southern San Francisco Bay, California. USGS. Accessed March 2022 at https://pubs.er.usgs.gov/publication/mf976

6 Magnan, A., and Mainguy, G. 2014. Avoiding maladaptation to climate change: towards guiding principles. Sapiens.

The Topic of Managed Retreat

In some places, communities are facing a discussion about the long-term prospect of managed retreat: how could we ever possibly consider moving entire neighborhoods, businesses, and economies somewhere else from where we are now?

Managed retreat is the voluntary, coordinated transition of people, ecosystems or infrastructure away from vulnerable coastal areas. It is increasingly becoming seen as a potentially necessary response to long-term climate change impacts[1]. One way to initiate conversations on this topic is to include it within the suite of potential 4.3.2 Strategic Approaches options of protect, accommodate, avoid, retreat, and prepare.

Acknowledging the Realities

Managed retreat raises significant issues – cost, equity, values, and politics – as well as questions: who pays? Where do people go? What will people lose? What will they gain? These issues raise real concerns and fears about losing the cultures, neighborhoods, and ways of life that people know and love. These decisions are significant.

Managed retreat has the potential for very high upfront costs, as property owners may need to be compensated for their properties. However, that upfront cost could be much lower than the long term costs of attempting to protect those properties in place, if that is even feasible. There is also significant concern that areas designated for potential retreat may lose significant property value, impacting the wealth of private property owners and a city's tax base. Who's responsible to pay for the loss of property value and relocation?

1 "Core Concept: Managed Retreat Increasingly Seen as Necessary in Response to Climate Change's Fury | PNAS."core

King tides lead to flooding around the Bay Area. Photo courtesy of the California King Tides Project.

In communities with the least resources and already burdened socially and economically, managed retreat can seem like an attempt to remove people from their communities. Engaging in this topic with communities must be done compassionately and authentically. The choice must be made by the people who live there that this long-term option might be the best choice for them, given the alternative options, and assessed with full transparency and equity at the forefront.

These issues may keep local elected officials or others from engaging in this topic for fear about the implications of discussing these kinds of future decisions. However, it is becoming increasingly recognized that in the long-term, adaptation strategies for avoidance and planned relocation may become the best options over time as the costs and technical capacity of protection in place approaches become infeasible. While it may feel difficult to raise now, considerations for managed retreat may be a necessary conversation to begin sooner rather than later in order to avoid worse issues down the line, as many of the issues identified stem from a lack of thoughtful planning and analysis for an equitable approach.

It is one thing to initiate conversations on potential future managed retreat, and another to begin setting up a legal, governance, and equity framework for what this transition may look like in practice. The details and timing depend on the local conditions of your community and if, or when, managed retreat decisions need to be made. To do this will take time, planning, and continued conversations about what an equitable relocation effort can look like.

The Georgetown Climate Center's Managed Retreat Toolkit provides a guide to communicating managed retreat with stakeholders, and understanding policy options. Their Managing the Retreat from Rising Seas report includes seventeen case studies of managed retreat planning efforts, including examples of buy-out programs, land-swaps, and more.

Framing Through Pathways

Using adaptation pathways provides a useful way to organize the future into discrete 3.4.4 Planning Horizons to 4.3 Explore Future Scenarios. Through these time horizons, it may be possible to initiate conversations and discuss these long-term options and how we might prepare future generations to take on these challenges. Separating out these time horizons can help provide the mental space to discuss the long term future, while focusing on what actions we can make in the short term to prepare ourselves for these future possibilities.

4.4.2 Future Decision Context

What Would it Take to Reach These Futures?

For each of future scenarios developed in 4.3.4 Conducting and Summarizing scenario planning, consider spending time with your communities and stakeholders to explore how the 4.1.2 Current Decision Context might have to *change* to enable these future scenario outcomes to occur. As needed, reflect upon and incorporate the thinking and conversations generated from 4.4.1 Raising Difficult Topics about the future decision context.

In the earlier section of 4.1.2 Current Decision Context, we defined the decision context as culmination of all conditions – social, political, environmental, institutional, or otherwise, that shape or determine what decisions are even possible. We also introduced the values, rules and knowledge, or "vrk" framework, as a means to explore the decision context. Now, as we explore *how* to achieve resilience to sea level rise and flooding in the future through these scenarios, it becomes apparent that part of the solution may be changing the current conditions in which decisions are made.

Changes in the future decision context should be part of the solutions that technical experts are asked to incorporate when developing adaptation actions and strategies in Chapter 5.

For example, if a scenario explored the idea of expanding wetlands for flood protection, but that future solution requires additional space for wetland migration, then part of changing the future decision context may include updating zoning laws in that area to allow for that future decision to occur.

While changing these kinds of institutional barriers, for example, may be relatively straightforward for technical experts to apply in Chapter 5, other changes to other parts of the future decision context, such as our social values or knowledge may be more difficult. This may require additional conversations with communities and stakeholders about what they see as necessary changes in our values, rules, or knowledge to facilitate creating the futures envisioned and explored in the scenarios.

Articulate Changes to the Future Decision Context

Looking at your future scenarios developed, we suggest using this "vrk" framework approach once again to consider: Can we make these choices in our scenarios today given the current decision context? If not, ***what would the decision context in the future have to look like to make these adaptation options feasible?*** For each scenario, consider the questions in Box 36.

Changes to our values?

Would any of our values or priorities have to be different in this future? For example, if a future scenario calls for changes to land uses or re-location of businesses or other assets, would communities and businesses support this?

Changes to our rules?

Would any institutional or social rules need to be different in this future? For example, what changes to rules, permits, policies, or social norms might need to be different for this future to be true?

Changes to our knowledge?

What knowledge would we need to have to achieve this future? For example, what information would we need in this future to achieve this scenario?

Box 36 · Considerations for Changing the Future Decision-Context.

For each of these future changes, consider if there are steps or sequences of actions needed. For example, if we need to change our values or attitudes in the long-term future, consider in what ways can we begin to get there. This section may come before, or after, the following section of 4.4.3 Advancing Scenarios, depending on how communities and stakeholders respond to scenario outcomes created in 4.3 Explore Future Scenarios.

Use the space provided in Worksheets 4G-4I to notes for what may be needed in enable solutions described in the scenarios.

4.4.3 Advancing Scenarios

What Scenarios or Hybrid of Scenarios Should Undergo Detailed Analysis?

After exploring future scenarios in 4.3.4 Conducting and Summarizing, and creating space for 4.4.1 Raising Difficult Topics, the next part is determining which scenarios, or combinations of scenarios, should be advanced into the next chapter to be shared with technical experts for further analysis and identification of specific adaptation solutions.

The amount of work needed in this section likely depends on the types of scenarios you explored, planning parameters used, and how communities and stakeholders felt about scenario outcomes and conversations.

Think of this section as handing off a draft roadmap of instructions to planning and technical experts that help them figure out *how* they should bring together specific solutions to get to the outcomes generated in the scenarios.

Creating Hybrid Scenarios to Advance

If you explored "extreme" scenarios to understand different tradeoffs of adaptation solutions, you may want to develop one or more "hybrid" scenarios that take pieces or components of these extremes to create a more nuanced and practice set of solutions. This may be important to do if extreme scenarios were used, because the purpose of Chapter 4 is to explore and create ideas for adaptation solutions that align with 4.2.1 Vision and 4.2.2 Guiding Principles created earlier in this chapter. An example of how a hybrid scenario developed out of extreme scenarios can be found in the Ocean Beach Master Plan process in San Francisco.

A hybrid approach could also be created from scenarios using other planning parameters as well. Consider with communities and stakeholders if it makes sense to combine adaptation elements together, or explore them separately.

Choosing Original Preferred Approach to Advance

If your original scenario outcomes generated interest, they can be advanced to technical experts for further evaluation. However, it could also be the case that through conversations with communities and stakeholders, a particular approach or set of solutions are identified as *preferred* to advance. For example, maybe conversations generated from the scenario outcomes led to preferences over certain types of adaptation approaches over others. In this instance, it may make sense to advance one, or more, preferred scenarios for further evaluation. The Dumbarton Bridge West Approach + Adjacent Communities Resilience Study provides an example of various preferred "alternatives" that were evaluated.

Considering Number of Scenarios to Advance

The last question to consider is: how many scenarios to advance? Choosing a number of scenarios to hand off to technical experts for further evaluation has tradeoffs, such as:

- **Cost:** More scenarios means more detailed analysis; and
- **Evaluation:** More scenarios add increasing options for what communities, stakeholders, and governments can evaluate, as well as more options to compare actions against and develop adaptation pathways.

The technical review that would occur in Chapter 5: Bring Together Shared Solutions includes asking a technical team (or consultants), such as coastal and hydrology engineers, civil or structural engineers, or other appropriate technical experts with the support of planner, to ensure that the actions identified in the scenarios are technically feasible and sound. This may require adjustments to the scenarios to meet engineering constraints.

> Check boxes in Worksheets 4G-4I to identify which scenarios, or hybrid of scenarios, to advance. You can use Worksheets 4K-4N to describe new hybrids, and add additional notes in Worksheet 4J.

Download Workbook 4

4.5 Use Workbook 4 Outcomes

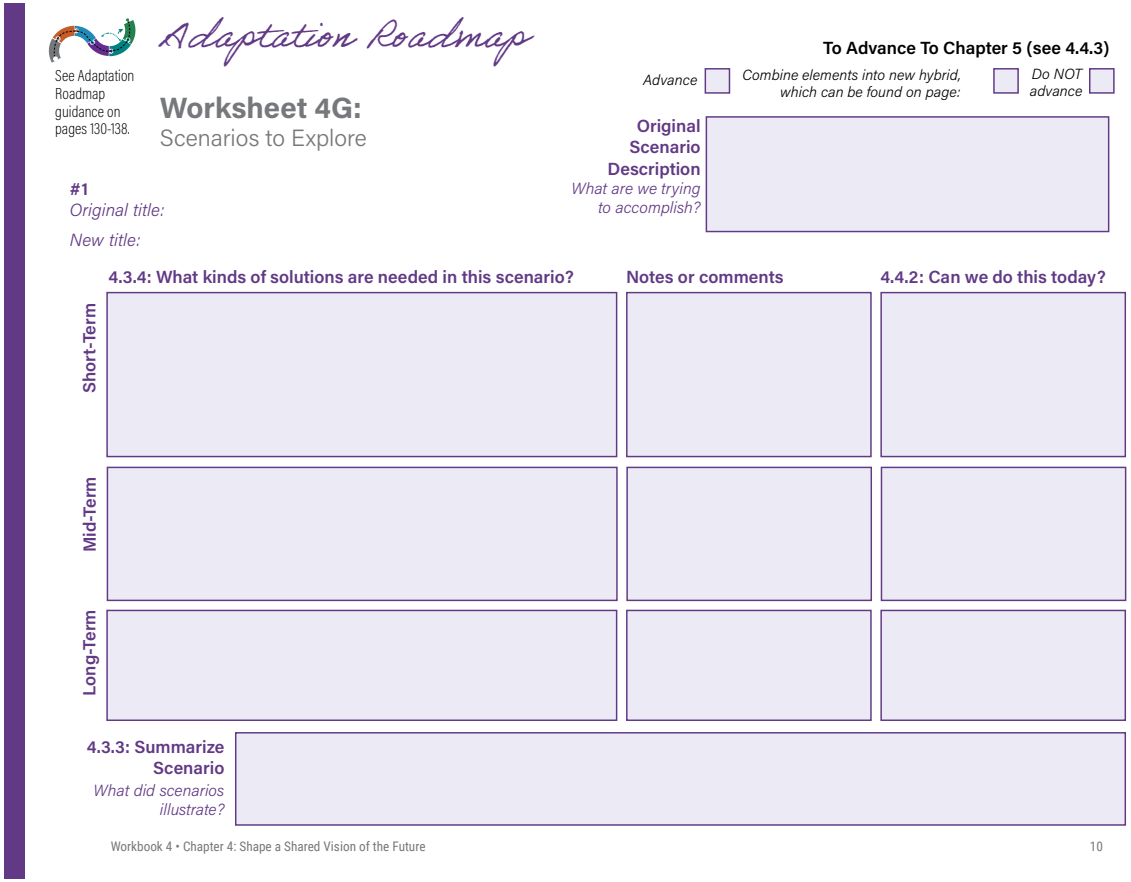
CREATE A SHARED VISION FOR THE FUTURE

Workbook 4 outcomes build upon the outcomes of Chapter 3 by creating shared definitions of the problems, which are built upon the community narratives and other information gathered in Chapter 3.

The two key outcomes from Chapter 4 become the roadmap for what adaptation actions and strategies should be explored in greater detail by planning and technical experts in Chapter 5.

- Shared Vision and Guiding Principles respond to the problems defined and sets the foundation for *why* adaptation actions and strategies are being selected (WORKSHEETS 4A-4E)
- Scenarios and Adaptation Ideas to advance to Chapter 5 that align with the vision over the short, medium and long-term and provide th roadmap for how planning and technical experts can and should apply adaptation strategies (WORKSHEETS 4G-4N).

Share these worksheets with technical experts so they can use the resources in Chapter 5 to bring together these shared solutions in ways that are technically sound and lay out how communities and stakeholders can achieve the futures and visions they've imagined.



Adaptation Roadmap

See Adaptation Roadmap guidance on pages 130-138.

Worksheet 4G:
Scenarios to Explore

To Advance To Chapter 5 (see 4.4.3)

Advance ☐ *Combine elements into new hybrid, which can be found on page:* ☐ *Do NOT advance* ☐

Original Scenario Description
What are we trying to accomplish?

#1
Original title:
New title:

	4.3.4: What kinds of solutions are needed in this scenario?	Notes or comments	4.4.2: Can we do this today?
Short-Term			
Mid-Term			
Long-Term			

4.3.3: Summarize Scenario
What did scenarios illustrate?

Workbook 4 • Chapter 4: Shape a Shared Vision of the Future 10

Example of Worksheet 4G, which provides space to articulate the scenario outcomes and determine what parts of the scenarios to advance to Chapter 5.

Resources for Chapter 4: Shape a Shared Vision of the Future

RESOURCES AND FURTHER READING

4.1 Define the Problem

- How-To Guide Vulnerability and Consequence Statements. Adapting to Rising Tides (ART) Program Planning Process Design Your Project. San Francisco Bay Conservation and Development Commission (BCDC).
- Risk Communication Basics. National Oceanic and Atmospheric Association (NOAA) Office for Coastal Management Digital Coast.
- Step 1. Engagement for Resilience. Regional Resilience Toolkit: 5 Steps to Build Large-Scale Resilience to Natural Disasters. Brechwald. et al. United States

4.2 Determine What Success Means

- Community Vision for Adaptation Resilience (page 40-41). Adaptation Planning Guidance 2.0. California Governor's Office of Emergency Services.
- See Resources for Chapter 2 for additional resources and guidance on having meaningful conversations with communities and stakeholders.

4.3 Explore Future Scenarios

- Scenario planning for climate adaptation. Biggs, C., Edwards, T., Rickards L and Wiseman J. Victorian Center for Cliamte Change Adaptation Research. 2011.
- Scenario planning for climate change adaptation: A guidance for resource managers. Moore, S.S., N.E. Seavy, and M. Gerhart. 2013. Point Blue Conservation Science and California Coastal Conservancy.
- Step 3: Envision Desired Futures. Point Blue Conservation Science, San Francisco Estuary Institute, and County of Marin. 2019. Sea Level Rise Adaptation Framework - A user guide to planning with nature as demonstrated in Marin County. Point Blue Conservation Science (Contribution #2239), Petaluma, CA. San Francisco Estuary Institute (Publication #946), Richmond, CA.
- What If? The Art of Scenario Thinking for Nonprofits. Scearce, D., Fulton, K, and the Global Business Network.

4.4. Discuss Outcomes and Expectations

- Climate Adaptation and Sea Level Rise. Climate Change Adaptation Resource Center. United States Environmental Protection Agency.
- Managed Retreat Toolkit. Georgetown Climate Center.
- Managing the Retreat from Rising Seas: Lesson and Tools from 17 Case Studies. 2020. Georgetown Climate Center.
- Managed retreat increasingly seen as necessary response to climate change's fury. 2020. Carey, J. PNAS.

SELECTED EXAMPLES

- North Richmond Shoreline Vision: A community-based approach to planning for the upland transition zone. Support from the San Francisco Estuary Partnership. November 2017.

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CHAPTER 5

Bring Together Shared Solutions

Chapter 5 supports bringing together all the pieces to build adaptation strategies that reflect community and stakeholders concerns, are bundled, phased, evaluated, and selected.

Introduction | Navigating the Adaptation Roadmap

Chapter **1** Build Your Adaptation Roadmap

Chapter **2** Center People in Decision-Making

Chapter **3** Set Local Context and Sense of Place

Chapter **4** Shape a Shared Vision of the Future

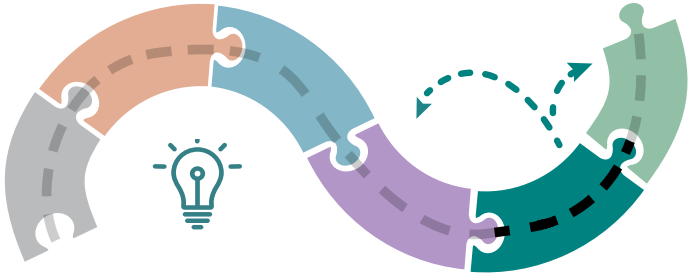
Chapter **5** Bring Together Shared Solutions

Chapter **6** Pathways Approach to Implementation

The San Francisco Bay Trail in Richmond. Photo by Jaclyn Perrin-Martinez.

Chapter 5

Bring Together Shared Solutions



What Will You Find in This Chapter?

Chapter 5 brings together all the pieces of the puzzle generated throughout the process to identify adaptation actions and strategies, built upon:

- The vision and guiding principles from Chapter 4;
- Which address issues and opportunities from Chapter 3; and
- Created and informed by actively engaged communities and stakeholders from Chapter 2.

Details in this chapter include exploring actions across five categories of adaptation using the ART Adaptation Catalog. It includes technical support and resources for developing bundled and phased adaptation strategies that work together over time, and resources on discussing tradeoffs, evaluating strategies, and making final decisions to advance the communities and stakeholders vision of successful adaptation outcomes.

Who is This Chapter For?

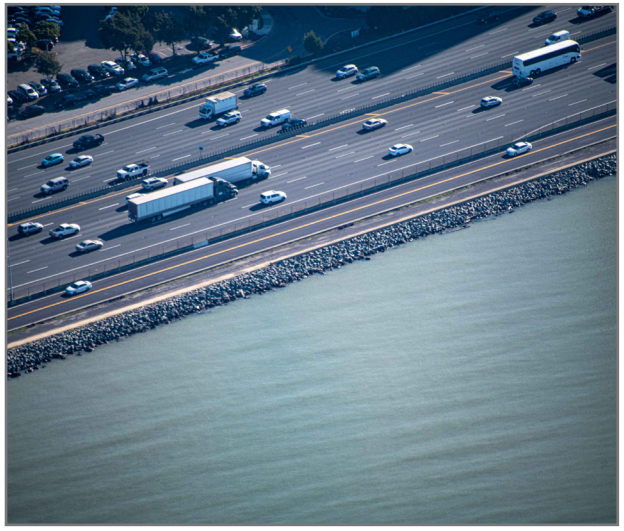
The Core Team should oversee and support internal technical experts and/or external consultants as they *apply* detailed strategies to the scenarios generated in 4.4.3 Advancing Scenarios. In particular, 5.1 Explore Actions, 5.2 Bundled Strategies, and 5.3 Phasing and Sequencing Strategies would benefit from engineering, planning, and other experts working *with* the Core Team. Communities, stakeholders and governments should participate in 5.4 Evaluating Tradeoffs and Making Decisions.

What Outcomes Will This Get You?

Download Workbook 5 and the ART Adaptation Catalog to support reaching Chapter 5 outcomes. These outcomes include:

- **Set of strategies for the short, medium and long term** that meet future vision(s) and have been evaluated, vetted, and decided on by the decision-making process.

As you move through this chapter, you may need to review, reflect upon, and even adjust previous information from this process. Iteration may be particularly prominent across Chapters 4 and 5, depending on how detailed scenarios were from 4.3 Explore Future Can Scenarios. The final outcomes generated and advanced from Chapter 5 will be used for implementation and monitoring in Chapter 6.



Traffic on the San Francisco Oakland Bay Bridge. Photo by SF Baykeeper, Cole Burchiel, and LightHawk.

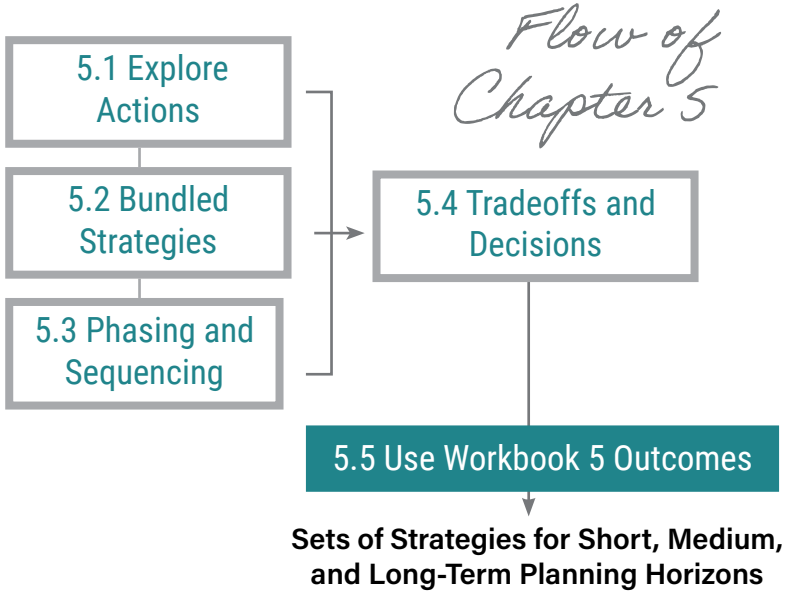


Figure 40 · Outcomes of Chapter 5. The first three sections work together to create adaptation pathways for the scenario advanced, while they should be discussed, vetted, and decided upon by communities and stakeholders.

Checklist for Chapter 5

Is this chapter for you? Explore the following questions to navigate to where you need to go. See Chapter 5 outcomes in Figure 40.

- ✓ Are you familiar with adaptation actions and strategies? > 5.1.1 Actions and Strategies, 5.1.2 Adaptation Action Types
- ✓ Do you need to use the ART Adaptation Catalog? > 5.1.3 ART Adaptation Catalog
- ✓ Have you explored physical actions for adaptation? > 5.2.1 Starting With the End in Mind
- ✓ Have you bundled other adaptation actions together? > 5.2.2 Linking Plans and Programs, 5.2.3 Connecting to People, 5.2.4 Paying for Adaptation
- ✓ Have you laid out actions into pathways? > 5.3.1 Action Lifespan and Time Horizons, 5.3.2 Sequencing and Lead Times
- ✓ Have you identified triggers and decision points? > 5.3.3 Applying Triggers and Decision Points
- ✓ Have you created a pathways diagram? > 5.3.4 Visualizing Adaptation Pathways
- ✓ Have you evaluated strategies with participants? > 5.4.1 Share Results and Apply Evaluation Criteria, 5.4.2 Additional Evaluation Approaches
- ✓ Have you selected final adaptation strategies? > 5.4.3 Make Decisions on Adaptation
- ✓ Have you articulated your local adaptation story? > 5.5 Use Workbook 5 Outcomes

5.1 Explore Actions to Meet Envisioned Futures

This section will dive deeper into introducing adaptation actions and strategies, how five broad categories of adaptation, and guidance on how to use resources in the ART Adaptation Catalog to help identify actions and strategies. You can navigate to the details in each section below:

Use this Section to Consider the Adaptation Actions Available to Meet Envisioned Futures

The entire purpose of the Adaptation Roadmap is to guide the selection of adaptation actions and strategie that meet the community's vision and guiding principles. Chapter 4 provides an opportunity to discuss *what kind of future communities and stakeholders want to achieve,* while Chapter 5 is the place to *identify and describe the specific ways for how to get there.*

In this section, and throughout all of Chapter 5, we build upon the results of 4.4.3 Advancing Scenarios. Have on hand the completed worksheets from Workbook 4 that should now reflect the culmination of ideas, comments, notes, and summaries generated from the visioning efforts in Chapter 4. Consider these worksheets as the foundation that you are building upon as you use Chapter 5 to explore what specific and detailed adaptation actions can be used to achieve the scenarios to advance.

Ferry building in the San Francisco Embarcadero. Photo by Joshua Sortino.

There are many resources that list a whole range of adaptation options. Yet, not every option on those lists will make sense for your community or address the flooding problem you are trying to address. Instead of starting with list of options, the Adaptation Roadmap started with your community, and through the efforts in Chapter 2, Chapter 3, and Chapter 4, your task now in Chapter 5 is to *bring together shared solutions*. This means using these lists of adaptation resources to refine and match adaptation appropriate actions to your community and stakeholders vision.

Depending on the level of detail used to develop future scenarios in 4.3.4 Conducting and Summarizing, this section may already have been used in tandem with Chapter 4.

This section is meant to introduce adaptation actions, while later sections provide guidance on 5.2 Creating Bundled Strategies That Work Together and 5.3 Phasing and Sequencing Strategies Over Time that will be used together to create your adaptation pathways.

5.1.1 Actions and Strategies

What Are Actions Vs. Strategies?

Adaptation refers to any *changes* we can make that better protects us from, or prepares us to respond to, climate impacts. For example, we can change the physical environment by building infrastructure or restoring habitats, removing existing development or avoiding putting new development in areas at risk (see 4.3.2 Strategic Approaches). Other changes we can make include updating plans or policies, or improving a community's understanding of an issue so they may be better equipped to contribute to current and future solutions.

Because there are such a wide array of *changes* we can make, the Adaptation Roadmap differentiates two terms: adaptation *actions* vs. adaptation *strategies* (Figure 41). Adaptation "action" can refer to a single, or relatively self-contained, effort, while we adaptation "strategies" can refer to a series of actions needed to support a given outcome. For example, restoring a wetland could be considered an adaptation "action". However, upon closer inspection, it becomes clear that this single action actually requires a series of multiple connected actions. These might include evaluating existing wetlands conditions, initiating a land use change to rezone areas for wetland migration, creating a project management team and stakeholder group, and ensuring funding for construction and maintenance. In reality, it may be better to call this a "strategy" because it requires a combination and series of different actions.

It is important to note that these definitions are not entirely objective, because as you'll see, almost everything can be broken down further and further. Use your best judgment on what should be considered an action vs. strategy, and determine if or when calling something an action or strategy makes it helpful to discuss and distinguish different adaptation choices.

Differentiating actions and strategies can help set expectations for what is required to achieve certain outcomes. How individual actions work together to create sets of strategies is described in greater detail in 5.2 Bundled Strategies.

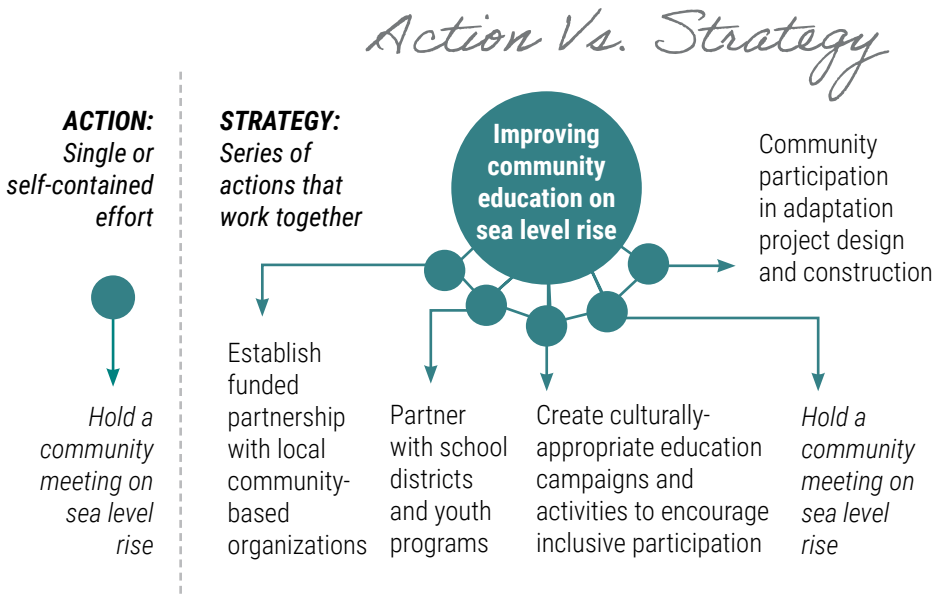


Figure 41 · An Adaptation Strategy Is Made Up of Multiple Actions.

Actions and strategies ultimately make up what becomes an adaptation pathway, which is introduced in 3.4 Frame Discussion for Uncertain Futures Using Adaptation Pathways. A pathway refers to the 5.3 Phasing and Sequencing of both actions and strategies by incorporating decisions points over time. Adding this level of specification can also helpful when we get to implementation and assigning responsibility to achieve outcomes.

Other resources also differentiate actions and strategies. In the Adaptation Atlas, for example, strategies are made up of many different "measures" (which we refer to as 5.1.2 Adaptation Action Types), and these are implemented by multiple actions[1,2]. For the purpose of consistency, we will use the term "action" broadly in this Adaptation Roadmap and "strategy" when discussing how to organize and bundle a series of actions.

1 Hayden, "Sea Level Rise Adaptation Framework: A User Guide to Planning with Nature."
2 SFEI and SPUR, "San Francisco Bay Shoreline Adaptation Atlas."

5.1.2 Adaptation Action Types

What Are Five Broad Adaptation Categories?

To help organize the universe of adaptation options, the ART program grouped actions into five broad categories: Build A Project, Plans and Policies, Programs and Operations, Capacity and Coordination, and Funding and Financing (Table 9). Within each category are many different actions. These actions within categories are *not* mutually exclusive. For example, an action to create a policy that establishes a community resilience program could fall across three categories of: Policies, Programs, *and* Capacity.

Another major point, which will be expanded upon in 5.2 Bundled Strategies, is that actions from these categories work in tandem. For example, a strategy may need to begin with a Capacity action in order to build political consensus for a new policy, program, or financing mechanism. Additionally, Build a Project actions may depend on one or more Funding and Financing actions to build, and result in a monitoring program action under Program and Operations.

The purpose of categorization is to help the core team, communities, stakeholders and consultants conceptually think about different types of actions, which will be used and applied in 5.2 Bundled Strategies and 5.3 Phasing and Sequencing.

Adaptation Categories

Category	Sub-Type	Description and Reference in Adaptation Roadmap
Build A Project	Green Infrastructure Gray Infrastructure Adaptive Design Retrofits	Actions that change or impact the physical landscape or infrastructure to improve flood protection or reduce flood risk. These physical actions may include changing the physical features of a landscape for flood protection, such as building green, gray, or hybrid infrastructure, and updating existing and/or new development to be more resilient to flood events, such as adaptive design or retrofits. Green, gray and hybrid infrastructure is described in greater detail in 3.3 Environmental and Physical Characteristics and the Adaptation Atlas, including green infrastructure or nature-based suitability. These types of actions may have been discussed in 4.3 Explore Future Scenarios, and should be explored in detail in Chapter 5 for technical and engineering feasibility.
Plans and Policies	Plan Creation or Updates Policy Creation or Updates	Actions to update, revise, or develop new plans, policies, and guidelines to address sea level rise. These plans and policies may alter how governance, zoning, ordinances, building codes, design, or permitting decisions are made within a jurisdiction. In 3.1 Align Local and Regional Plans or Processes a list of local plans may have been gathered, which can be an useful starting point for determing plans and policies to be created or updated in this effort.
Programs and Operations	Program Creation or Updates Task Force Maintenance	Actions to create new or update ongoing programs to improve procedures or management activities within a jurisdiction to address climate change. These may include tax incentive programs, financial programs, land acquisition or banking, adaptive management procedures, or disincentive programs. Information gathered from various sections in Chapter 3 (and particularly 3.4.3 Triggers and Monitoring) may have shed light on programs and operations and may be a useful starting point for determining updates or the creation of programs and operations.
Capacity and Coordination	Coordination Education Trainings	Actions that increase the ability of different communities and stakeholders to problem solve and implement actions. These may include education, community engagement, formal or informal partnerships, relationship-building, or creating of new organizational structures. This refers to actions that either: a) increase the capacity of communities, governments, or stakeholders to participate in planning and/or adaptation actions; or b) increase coordination capacity to work together collaboratively. Information gathered in 1.3 Assess Your Capacity and Resources and Chapter 2 may help inform the current level of capacity and how it can be expanded to implement adaptation actions.
Funding and Financing	Budgeting Financing	Actions that support the ability to fund and sustain adaptation outcomes. These actions identify funding mechanisms that may be used for planning and implementing strategies, including creating bonds, private funding, generating funds through assessments or districts, tax incentives, and taxes and fees. Information gathered in 1.3 Assess Your Capacity and Resources may help inform funding and financing needs.

Table 9 · ART categories of adaptation actions. Build a Project refers to actions with physical landscape, while the last four categories (Capacity Building, Plans and Policies, Programs and Operations, and Funding and Financing) are non-physical approaches.

5.1.3 ART Adaptation Catalog

How Can You Explore A Database of Actions?

To support the identification of adaptation actions to meet the envisioned futures from the scenario planning exercises in 4.4.3 Advancing Scenarios, we created the ***ART Adaptation Catalog: Database of Sea Level Rise Actions***. This Excel resource compiles actions from a variety of sources and can be used as a tool for learning more about and identifying adaptation actions.

The Adaptation Catalog contains actions from all five ART Adaptation Categories from 5.1.2 Adaptation Action Types, and includes additional descriptions and supporting information. See Figure 42 for details on what kind of information is in the Catalog.

How Can the Adaptation Catalog Be Used?

The Adaptation Catalog is a resource designed to be used flexibly by a range of different users. While the Adaptation Catalog is a published excel document (Version 1. 2022), it is designed to be a *living resource* updated on a periodic basis to incorporate new information as adaptation continues in the region. We welcome feedback on the use and content of the Adaptation Catalog. This resource can be used:

- **As a Starting Place to Introduce Actions**: Share categories and range of actions with communities and stakeholders to get a sense of solutions to consider for their community;
- **Identifying Universe of Actions**: Using the "Full Library" tab, you can search through filters to explore, brainstorm, compare, and compile possible adaptation strategies;
- **Learning Detailed Information About Actions**: For every action listed, we provide short and full descriptions, examples, links, and considerations (where available); and
- **Cross-check and Reference Actions:** This resource can also help ensure you've considered a range of actions and identify missing actions needed in your adaptation strategy.

As mentioned previously, this section may occur in tandem with the scenario planning activities in 4.3 Explore Future Scenarios. In that case, the Adaptation Catalog can provide examples and ideas for what kinds of actions communities and stakeholders may want to consider. If scenarios were developed using broad concepts and ideas, the Adaptation Catalog can be used to identify and refine specific adaptation actions to meet concepts envisioned.

Download and access the database:

ART Adaptation Catalog: Database of Sea Level Rise Actions

Identifying adaptation actions in the Adaptation Catalog is not, in and of itself, the final step to create a set of adaptation solutions: it is an intermediate reference step. The Adaptation Catalog should be used and referenced alongside 5.2 Bundled Strategies and 5.3 Phasing and Sequencing. Once adaptation actions are bundled into strategies and sequenced, they can be evaluated in 5.4 Tradeoffs and Decisions, and implemented in Chapter 6: Pathways Approach to Implementation.

As you begin developing adaptation actions and strategies throughout Chapter 5, keep in mind ***how adaptation can also serve as mitigation to reduce future climate impacts***. Consider the energy sources of the adaptation actions selected. For example, will a pump to reduce flooding be powered by fossil fuels? Explore how renewable energy and other actions to reduce greenhouse gases can be embedded into adaptation solutions.

> Note: As you move through the following sections in Chapter 5, *do not feel limited* to the actions found in the ART Adaptation Catalog or elsewhere. Consider creative new actions, as needed and with input form technical experts, to help you reach the vision and guiding principles set by communities and stakeholders.

Use Worksheet 5A and download the ART Adaptation Catalog to list potential actions.

ART Adaptation Catalog

Category	Action Name	Tool Type	Detailed Description
Build A Project	**Floodable Designs**	Adaptive Design	Require construction in flood zones to create floodable building designs by
Build A Project	**Flood-Resistant Building Materials**	Adaptive Design	Create floodable buildings by using flood resistant or flood-proof building
Build A Project	**Low Impact Development**	Adaptive Design	Another name for "green infrastructure," low impact development (LID) is
Build A Project	**Barrier Islands**	Green Infrastructure	Design and build barrier islands, which can also have an inland marsh area.
Build A Project	**Beach Creation**	Green Infrastructure	Place course sediments along the shoreline to replenish beaches. These ca
Build A Project	**Beach Nourishment**	Green Infrastructure	Replenish the sand on beaches to prevent erosion and protect structures b
Build A Project	**Beneficial sediment reuse/Dredging/Sediment Capture**	Green Infrastructure	Capture or dredge sediment to be reused elsewhere, such as for wetlands.
Build A Project	**Creek-to-Baylands Reconnection**	Green Infrastructure	A design strategy to reconnect baylands with freshwater creeks to help pro
Build A Project	**Floating wetlands**	Green Infrastructure	Build floating wetland platforms to provide habitat in a changing Bay witho
Build A Project	**Green Stormwater Management**	Green Infrastructure	A system of vegetation, soil, and microbes to slow water down by storing, i
Build A Project	**Horizontal Levee/Ecotone Levee**	Green Infrastructure	Build a levee with a gentle slope on the water-facing side, combining tidal
Build A Project	**Living Levee**	Green Infrastructure	See horizontal levee / ecotone levee. See horizontal levee / ecotone levee
Build A Project	**Living Shorelines**	Green Infrastructure	A system of shoreline management designed to protect or restore natural s
Build A Project	**Living with Water**	Green Infrastructure	A design strategy that allows water to rise by creating space for the water t
Build A Project	**Mudflat Augmentation**	Green Infrastructure	Place fill (fine sediment), possibly from beneficial reuse, to increase mudfl
Build A Project	**Nearshore Reefs/Breakwaters**	Green Infrastructure	Build an artificial reef with a mixture of shell and baycrete to act as low-cre
Build A Project	**Polder ("diked baylands") management**	Green Infrastructure	Build polders, which are low-lying areas protected by levees. Polders can b
Build A Project	**Shore Parallel Breakwaters**	Green Infrastructure	Build hard or soft armoring parallel to the physical shoreline. Detached sho
Build A Project	**Stream Restoration**	Green Infrastructure	Create a widened creek corridor with soft creek edges. This creates the opp
Build A Project	**Submerged Aquatic Vegetation (Eelgrass)**	Green Infrastructure	Plant submerged aquatic vegetation (primarily eelgrass) to create vegetate
Build A Project	**Tidal Marsh Restoration**	Green Infrastructure	Restore or create tidal marsh to lessen storm surge, shoreline erosion, fluv
Build A Project	**Urban Greening for Stormwater Management**	Green Infrastructure	Building or improving green space in urban areas specifically for stormwate
Build A Project	**Bulkheads**	Grey Infrastructure	Build a vertical concrete wall that retains soil but provides protection from

Introduction | All Adaptation Categories | Build A Project | Plans & Policies | Programs & Operations | Capacity & Coordination | Funding and Financing | ...

The Introduction provides a brief overview of the Catalog and references the various sources used in developing the Catalog

The All Adaptation Categories includes all actions across each of the five adaptation category types.

- **Action Name** e.g. Horizontal Levee
- **Tool Type** e.g. Green Infrastructure
- **Description** e.g. Build a levee with a gentle slope on the water-facing side, combining marsh...
- **Example** e.g. South Bay Salt Ponds

Figure 42 · ART Adaptation Catalog Example. A screenshot with descriptions of what kind of information is available in different tabs of the adaptation catalog.

5.2 Creating Bundled Strategies That Work Together

This section will dive deeper into providing a series of questions for each of the five ART Adaptation categories to help you consider how to bundle adaptation actions together to achieve effective strategies. You can navigate to the details in each section below:

Use this Section to Build Comprehensive Strategies

While initial actions may have been identified in 5.1 Explore Actions, this next step is where you will spend significantly more time thinking critically about what actions *should occur together* to create strategies that work over time. The Adaptation Roadmap refers to this concept as "bundling" actions together to create strategies that are cohesive, integrated, and robust. **Bundling strategies means looking at your desired scenario planning outcome and ensuring that all necessary actions are included for how to get there** (Figure 43).

For example, when asking "How do I protect my community?", the first thing that often comes to mind for many people is how do we *physically* stop the water from reaching us. It may be easy to consider physical solutions, such as restoring natural habitats, building horizontal levees, or constructing other physical barriers.

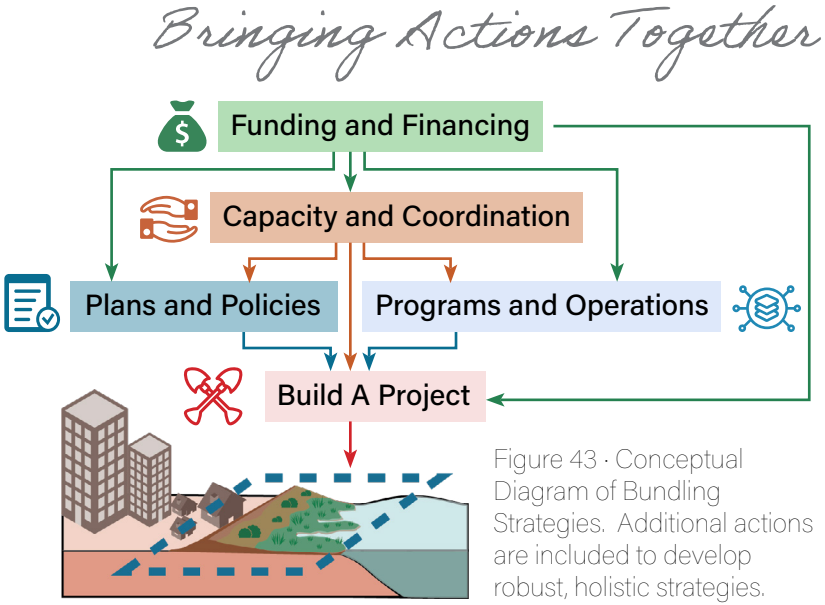


Figure 43 · Conceptual Diagram of Bundling Strategies. Additional actions are included to develop robust, holistic strategies.

Note: Refer back to stakeholders identified in 2.2 Input in the Process throughout this section and ensure regulatory agency perspectives, policies, and regulations are considered early as you begin building adaptation strategies. For example, BCDC requires maximum feasible public access and certain adaptive management strategies consistent with the project. See BCDC's Climate Change Policy Guidance for further instruction. Consider all applicable policies from all relevant agencies to develop successful plans and projects.

However, to get to building a project, many steps are often needed to pave the way and/or adjust the 4.4.2 Future Decision Context so that future decisions can occur. For example, building a horizontal levee for flood protection may require updates to zoning policies, integration into other planning documents, appropriate staffing and resource capacity of stakeholders, effective community engagement to design, construct, and maintain the project, and initial funding. Interrelated actions come together into what we call bundled adaptation strategies.

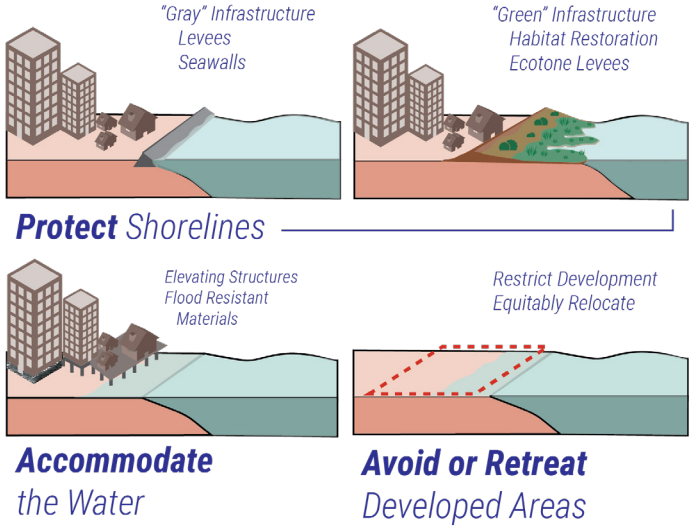
5.2.1 Starting With the End in Mind

Build A Project or Prepare for Flooding

Thinking about adaptation in the *physical sense* can be a helpful way to start piecing together sea level rise adaptation solutions, compared to starting with more abstract, non-physical solutions, such as plan updates or coordination actions. In the previous section we identified five 4.3.2 Strategic Approaches of adaptation: Protect, Accommodate, Avoid, Retreat, and Prepare (Figure 44).

It's likely that adaptation solutions will be made up of multiple strategic approaches along different parts of the shoreline and will change across the short, mid, and long-term. These approaches can be thought about as potential "endpoints", with specific physical actions identified to reach these points.

In this section, draw and build upon the actions and strategies brainstormed from the 5.1.3 ART Adaptation Catalog and definitions for short, medium, and long-term from 3.4.4 Planning Horizons to identify physical actions and strategies to meet futures envisioned in 4.4.3 Advancing Scenarios. Review key considerations in Box 37, and explore Figure 45-1 for examples from a hypothetical case study.



Use Worksheet 5B and the ART Adaptation Catalog to list Build A Project actions or other outcomes.

Figure 44 · Reminder of the Strategic Approaches of Adaptation.

Build A Project Considerations

Actions Affecting the Physical Landscape

- Does the strategy and actions address the flooding problem and reduce risk (see 4.1.1 Risk Tolerance and Perception)? Will the actions be appropriate for the amount and rate of sea-level rise?
- Do the scenarios identify or describe physical changes to the landscape or shoreline? What are they? Are they nature-based green infrastructure, traditional gray infrastructure? Adaptive design? Retrofits? Preserving open space? Keep in mind that changes to the landscape can also include *not* building something.
- Do the physical changes align with information in 3.3 Incorporate Environmental and Physical Characteristics, including nature-based suitability from the Adaptation Atlas, critical infrastructure and/or other development? How do these align with the 3.3.3 Shoreline Planning Units?
- Do the physical changes identified align with the values, vision and guiding principles developed by communities and stakeholders in 4.2 Determine What Success Means?

Actions to Support Preparing Communities for Resilience

As mentioned in the Adaptation Roadmap introduction of What Can Adaptation Look Like? an outcome of adaptation may be increasing the ability of communities and stakeholders to engage and participate in adaptation efforts over time. This section provides flexibility to consider other kinds of supporting actions that are needed to prepare communities, governments, and stakeholders to take on the challenges ahead, even if they do not yet include changing the shoreline. See the 5.1.3 ART Adaptation Catalog to explore actions to prepare communities for resilience.

Box 37 · Considerations for Physical Actions or Actions to Prepare Communities.

Example of Bundling Strategies

BUILD A PROJECT

After that, consider....

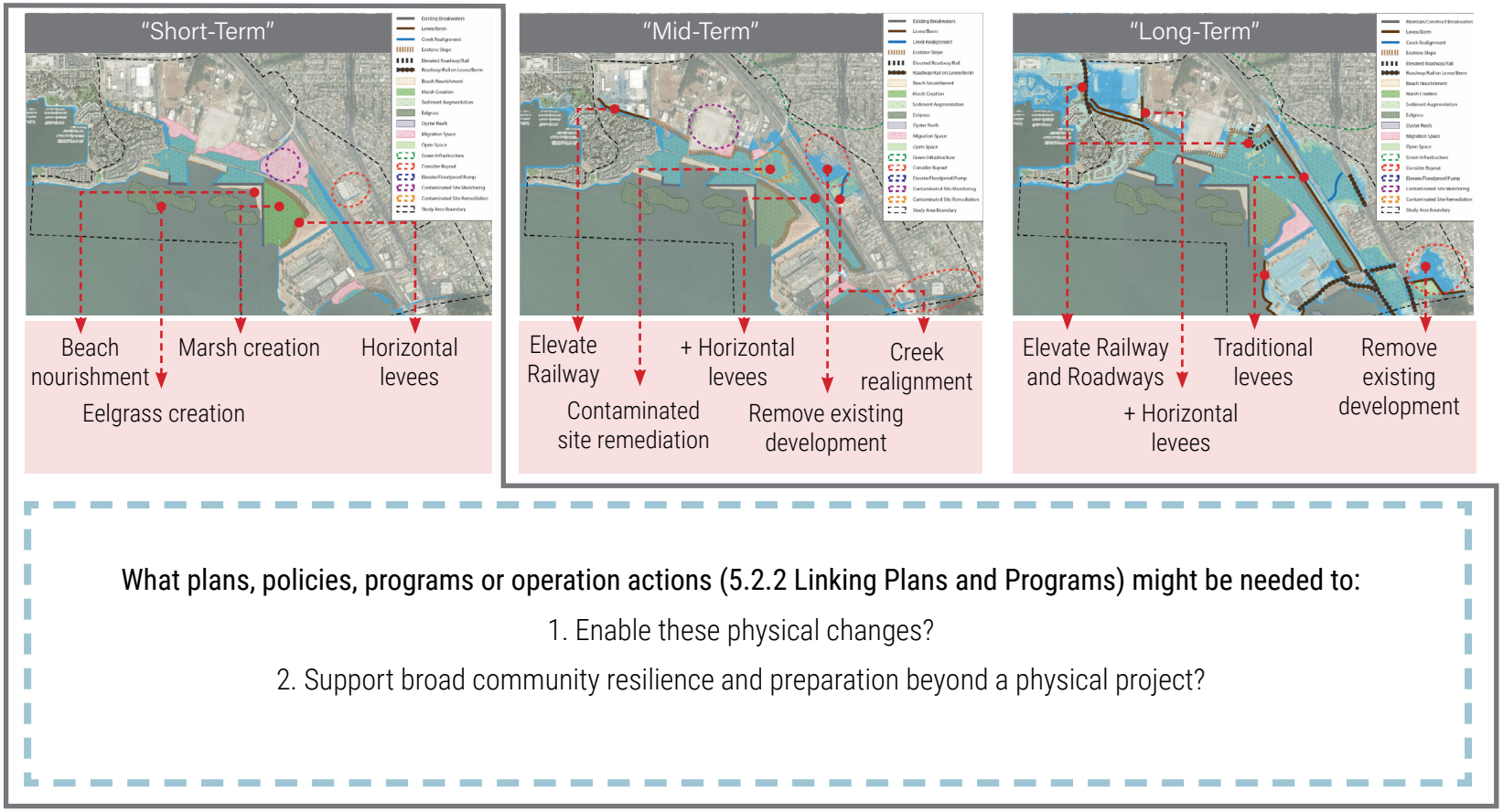


Figure 45-1 · Example of Bundling Strategies in a Hypothetical Case Study of Sea Level Rise Adaptation in Richmond, CA. Consultants at AECOM conducted a desktop exercise to explore how actions and strategies could be brought together to develop adaptation pathways. This figure describes the physical features identified in short, mid, and long-term to protect the community from flooding.

5.2.2 Linking Plans and Programs

Plans, Policies, Programs, and Operations

Physical changes to the landscape often require plans, policies, or other institutional rules and changes to land uses. This section builds upon the physical actions identified in 5.2.1 Starting With the End in Mind to consider what plans, policies, programs or operations may be needed in order to support and facilitate those projects. For example, building a horizontal levee may require changes to a General Plan and local zoning codes, and include a monitoring program and maintenance operations.

This section also include identifying planning, policy, programming, or operation actions that support changes for a community *beyond* the physical needs alone. This is where the information gathered in 3.2 Integrate Community Values may be particularly important. For example, even without a physical project in mind, a community may wish to improve their capacity to participate in planning decisions by creating a community training or youth education program, or take other actions to build resilience to supports their envisioned futures.

Additionally, there may be changes to the institutional rules, laws, or policies that would need to happen for future actions and decisions to be possible. Review any notes in the 4.4.3 Advancing Scenarios on the 4.4.2 Future Decision Context to see if any changes should be incorporated. Some of these changes may be outside the control of your adaptation effort. Listing these desired changes may be helpful in the event that they may be changed in the future. Consider actions for plans, policies, programs and operations across all scenarios advanced and planning horizons. Review considerations in Box 38 and Figure 45-2 for examples from a hypothetical case study.

Use Worksheet 5B and the ART Adaptation Catalog to list Plans and Policies, and Programs and Operations actions.

Policy and Program Considerations

Actions to Support or Enable Physical Landscape Changes

- Can the physical structures be built under existing land use plans, zoning, ordinances, building codes, permitting requirements or policies? If not, what laws, policies or other ***requirements*** would need to be changed?
- Do you need to create or update plans or policies that would ***encourage or incentivize*** the project to be adopted and built?
- Do you have the appropriate programs and operations procedures set up to successfully support your project? Do you need a new program to manage it or can you adjust an existing one?
- Do existing operations and maintenance procedures consider sea level rise? Are new policies needed to address this going forward?
- Do any of these projects need to be incorporated into planning efforts or budgets from 3.1 Align Local and Regional Plans or Processes?
- Are there policies, programs, or operational changes that can improve equity outcomes, such as local hiring practice policies for flood protection infrastructure?

Actions to Support Preparing Communities for Resilience

- Are there any updates needed to community development plans or programs related to resilience?
- Is there any information needed that should be gathered for future planning?
- Do scenarios suggest any future consideration for managed retreat? If so, what kinds of studies and community engagement efforts might be needed and when?

Box 38 · Considerations for Plans and Policies, Programs and Operations Actions or Actions to Prepare Communities.

Example of Bundling Strategies

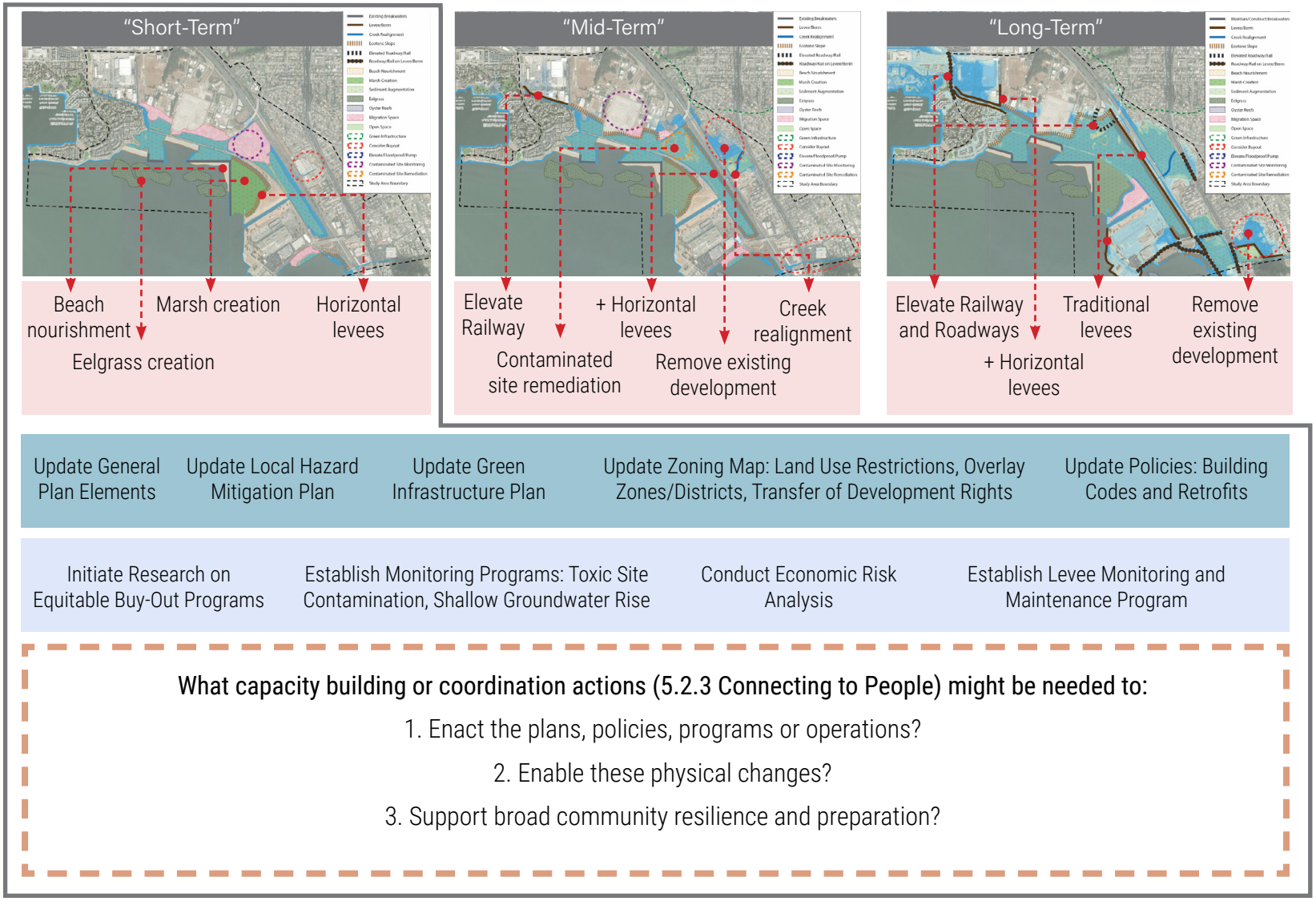


Figure 45-2 · Example of Bundling Strategies in Hypothetical Case Study of Sea Level Rise Adaptation in Richmond, CA. Consultants at AECOM conducted a desktop exercise to explore how actions and strategies could be brought together to develop adaptation pathways. This figure describes the plans, policies, programs and operations necessary to support the physical actions identified in the near-term. These actions set the stage for mid and long-term actions.

5.2.3 Connecting to People

Capacity Building and Coordination

For any of the actions identified so far to occur, there must be people across scales of government, communities, and stakeholders who are appropriately resourced, knowledgeable, and trained to implement and manage this work. Building upon the previous sections of 5.2.1 Starting With the End in Mind and 5.2.2 Linking Plans and Programs, this section adds actions related to training, capacity building, and coordination efforts among government staff, communities, and/or other stakeholders.

Capacity building, as described in Chapter 2: Center People in Decision-Making, is the process of developing and strengthening the skills, abilities, and resources to fulfill an outcome[1]: in this case, to participate and engage in the development, decisions, and implementation of sea level rise adaptation.

Coordination actions emphasize the ability of people to work together effectively by ensuring they have the proper channels of communication, information needed to work together, and structures, such as meeting spaces or programs to facilitate coordination.

Consider what capacity building or coordination efforts are necessary to support the actions and strategies you've identified, which could include altering existing efforts and groups or creating new ones. Review considerations in Box 39 and Figure 45-3 for examples from a hypothetical case study.

Use Worksheet 5B and the ART Adaptation Catalog to list Capacity and Coordination actions.

1 United Nations. Capacity Building. Accessed August 2021 at https://www.un.org/en/academic-impact/capacity-building

Capacity and Coordination Considerations

Actions to Support Plans, Policies, Programs, Operations

- Does government have the information and training to conduct planning or policy actions identified above and/or integrate information across planning documents? Do they have the training and capacity to engage with community-based organizations and communities? If not, what training and/or relationship building activities are needed?
- Do communities and other stakeholders have the information and training they need to actively participate and engage in planning and policy activities? If not, how do communities and stakeholders want to build their capacity?
- Can the planning or policy actions identified above be completed with existing coordination structures (e.g. departments already meet regularly and can do this work) or are new coordination structures and meetings needed (e.g. interdepartmental standing meetings, multi-jurisdiction meetings, etc.)?

Actions to Support or Enable Physical Landscape Changes

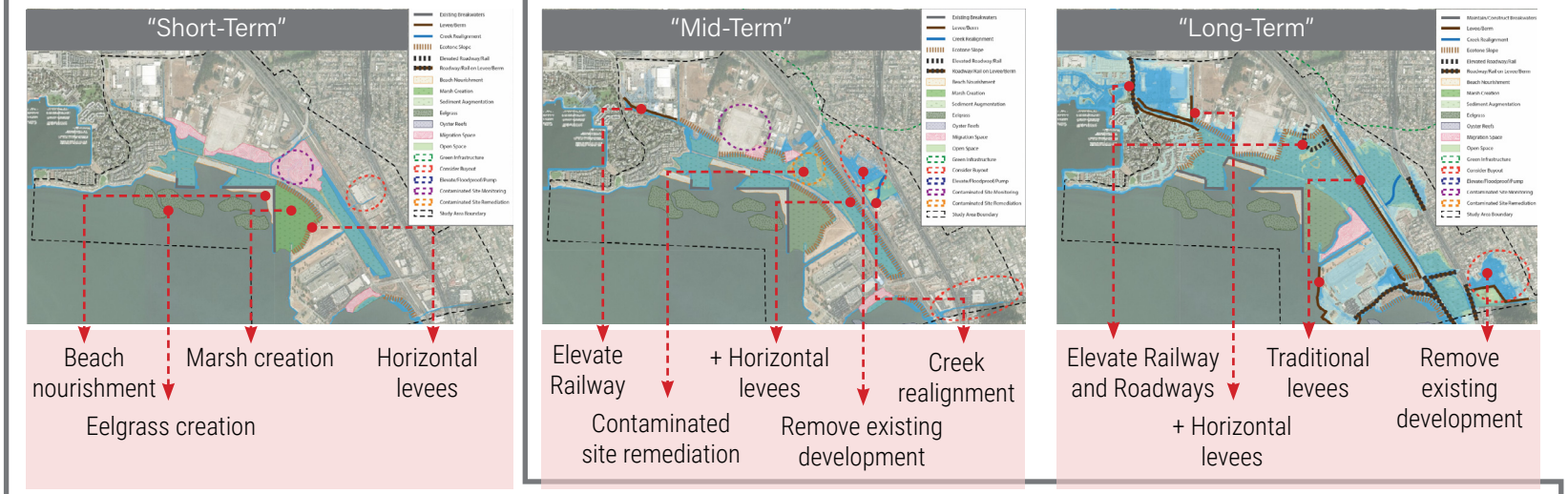
- Do you need to add capacity to your team or educate your community before this project can accepted by the community?
- Do you have standing groups of stakeholders, including communities, that can serve on an adaptation project design and implementation team when built projects move into design and construction phases?
- Is there a local workforce that can be hired for project design and construction? Are there any programs needed to train for these jobs?

Actions to Support Preparing Communities for Resilience

- Do communities feel they have the information, education and knowledge they need to be leaders in their community on this issue? If not, what kind of public education is needed and what are the appropriate avenues to bring this to the community?
- Do local elected officials have the information, education and knowledge they need to respond to the challenge? If not, what do they need?
- Are schools involved in educating or training youth on climate adaptation and providing opportunities for local participation in decision-making?

Box 39 · Considerations for Capacity Building and Coordination Actions to Build Strategies.

Example of Bundling Strategies



BUILD A PROJECT

PLANS AND POLICIES

Update General Plan Elements | Update Local Hazard Mitigation Plan | Update Green Infrastructure Plan | Update Zoning Map: Land Use Restrictions, Overlay Zones/Districts, Transfer of Development Rights | Update Policies: Building Codes and Retrofits

PROGRAMS AND OPERATIONS

Initiate Research on Equitable Buy-Out Programs | Establish Monitoring Programs: Toxic Site Contamination, Shallow Groundwater Rise | Conduct Economic Risk Analysis | Establish Levee Monitoring and Maintenance Program

CAPACITY AND COORDINATION

Establish Cooperative Shoreline Management Program | Proactive Relationships with Regulatory Agencies | Public Workshops to Educate Private Landowners on Climate Risks | Develop Citizen Science Sensing Stations and Monitoring Program

After that, consider....

What funding and financing needs (5.2.4 Paying for Adaptation) might be needed to:

1. Support capacity and coordination?
2. Enact the plans, policies, programs or operations?
3. Enable these physical changes?
4. Support broad community resilience and preparation?

Figure 45-3 · Example of Bundling Strategies in Hypothetical Case Study of Sea Level Rise Adaptation in Richmond, CA. Consultants at AECOM conducted a desktop exercise to explore how actions and strategies could be brought together to develop adaptation pathways. This figure describes the capacity and coordination actions necessary to support physical, planning, and operations actions identified in the near-term. These actions set the stage for mid and long-term actions.

5.2.4 **Paying for Adaptation**

Funding and Financing

The big question that always arises in adaptation planning is: **how will we pay for adaptation today and in the long term?** There are costs for planning, contructing, maintaining, and even removing or re-location infrastructure and the whole life cost might be accounted for. Understanding and identifying options for funding and financing adaptation and building mechanisms to pay for adaptation over time should be considered as part of the adaptation strategy, and not as an afterthought, or implementation strategy alone. Review 1.3.4 Resources and Funding and ART Bridging the Gap: Funding Sea Level Rise Adaptation in the Bay Area report for more.

The extent of funding or financing actions may vary depending on what adaptation actions are needed for your community and when. However, there should be at least an initial plan and consideration for what funding and financing actions are potentially feasible options to support the actions needed to ensure these are part of the conversation when moving into the evaluation of tradeoffs. For each of these, consider if this funding gap can be met with changes to existing budgets, or if new funding or financing avenues are necessary. Review key considerations in Box 40 and explore Figure 45-4 for examples from a hypothetical case study.

Use Worksheet 5B and the ART Adaptation Catalog to list Funding and Financing actions.

Funding and Financing Considerations

Actions to Support Capacity and Coordination

- Do you have adequate funding for staff to meet the capacity or coordination needs of the adaptation actions for planning, policies, programs, or operations?
- Do you have adequate funding to meaningfully engage with communities, including paying communities for their time and input and providing essential meeting amenities such as food, water, transportation and childcare?
- Have you identified and/or applied to specific grants or other funding sources that could provide funding to meet these needs? Do you have a long-term funding plan in place to ensure these needs are met over time?

Actions to Support Plans, Policies, Programs or Operations

- What are estimated costs for all planning and policy actions? Programs and operations? Are Public Works departments funded adequately to update policies or integrate new operations into their duties?
- Are there specific grants that provide planning, policy, and program support? How will these needs be met over time?
- What financing actions are available using planning and policy tools such as financing districts based on location, zoning, or other geographic boundaries? What types of equity or other analysis would be needed to understand the implications of different options?

Actions to Support Physical Changes

- What are the estimated costs of built infrastructure identified? If the project is a habitat restoration and green infrastructure project, what funding sources are available for those types of projects? If the project is primarily grey infrastructure, are there opportunities to add "green" elements (e.g. habitat shelves on a sea wall) that may make the project eligible for additional funding opportunities?
- Does the project align with a planned infrastructure upgrade that is already budgeted? For example, can Bay Trail improvements be expanded to include an adaptation component?

Actions to Support Preparing Communities for Resilience

- Are there broader changes that need to be made in local budget processes to incorporate and fund sea level rise adaptation actions more efficiently?

Box 40 · Considerations for Funding and Financing Actions to Build Strategies.

Example of Bundling Strategies

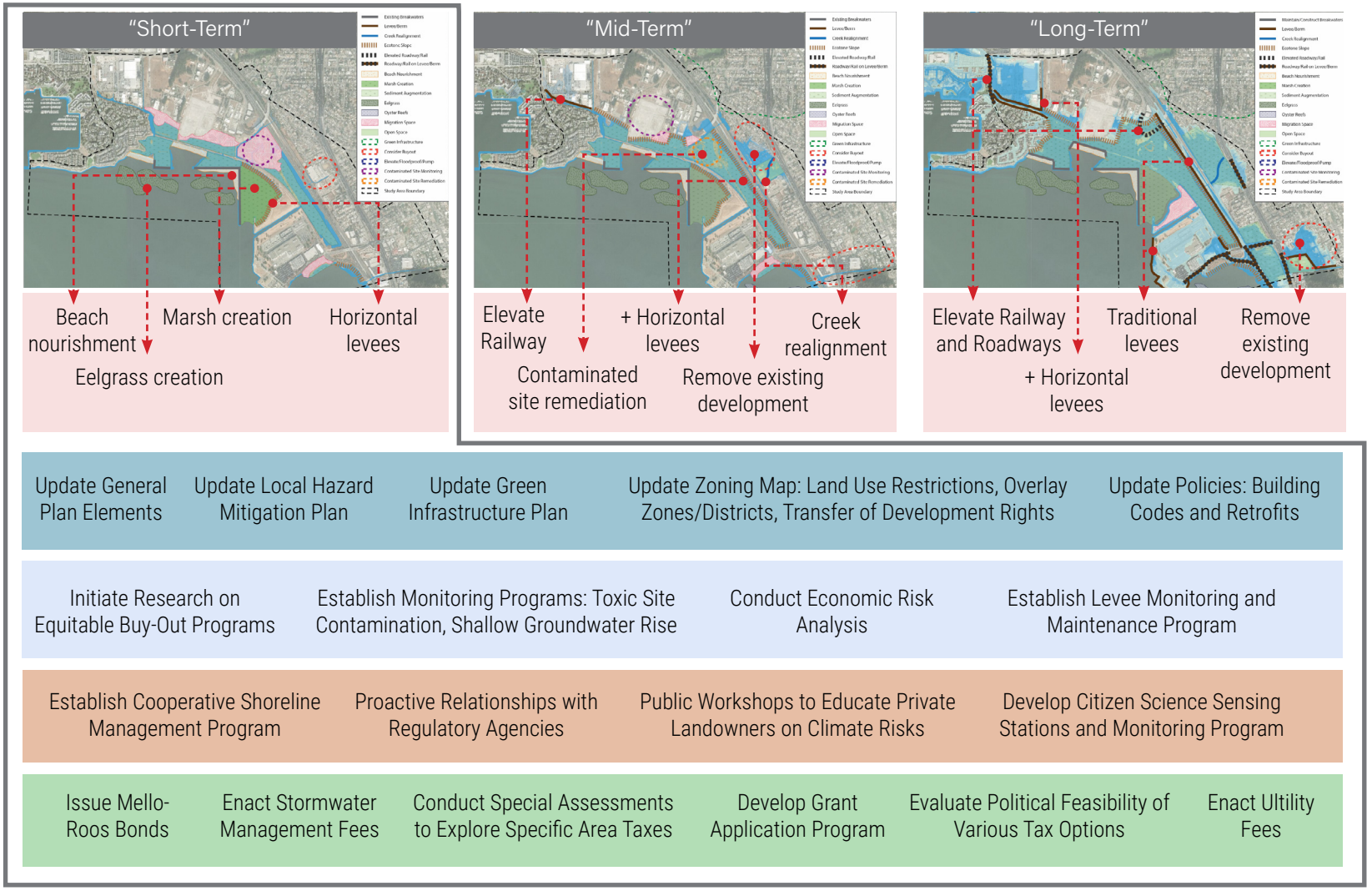


Figure 45-4 · Example of Bundling Strategies in Hypothetical Case Study of Sea Level Rise Adaptation in Richmond, CA. Consultants at AECOM conducted a desktop exercise to explore how actions and strategies could be brought together to develop adaptation pathways. This figure describes the funding and financing actions necessary to support physical, planning, operations, capacity, and coordination actions identified in the near-term. These actions set the stage for mid and long-term actions.

5.3 Phasing and Sequencing Strategies Over Time

This section will dive deeper into providing guidance to support identifying effective action lifespans, incorporating lead times to sequence action, applying triggers to decision points, and visualizing the adaptation pathways diagram. You can navigate to the details in each section below:

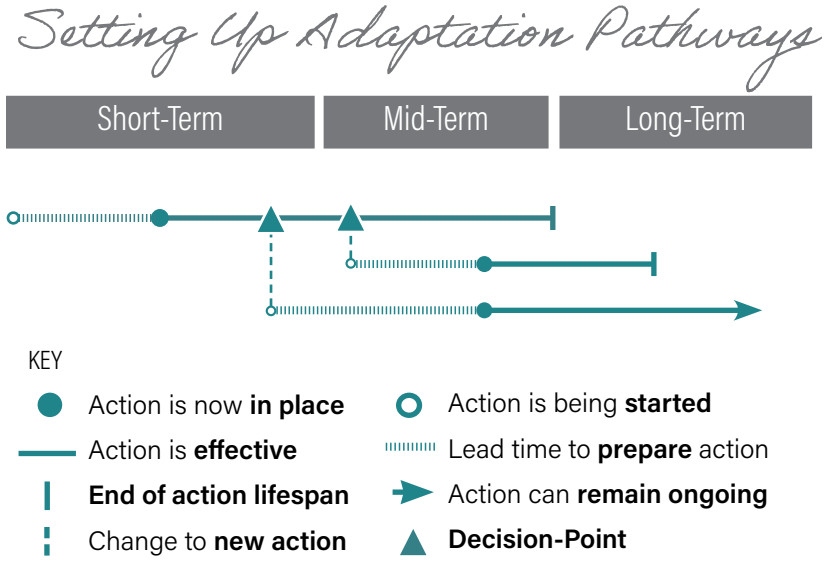


Figure 46 · Conceptual Graphic of Adaptation Pathways. The main components are described in further detail throughout this section.

Use this Section to Lay Out the Timing of Adaptation

In 5.1 Explore Actions and 5.2 Bundled Strategies, adaptation actions were identified to ensure the adaptation strategies included not only built infrastructure actions, but also the necessary planning and policy, program and operations, capacity building, and funding and financing actions to support those actions, and/or help prepare communities to make future decisions on adaptation (see 4.4.2 Future Decision Context).

However, not all of the actions or strategies identified can, or should, occur at the same time. For example, some actions such as building a horizontal levee, it may be necessary to complete other actions first, such as updating a land use policy for future wetland migration space or establishing a shoreline working group to guide project design and construction. Throughout 5.2 Bundled Strategies, we asked you to note dependencies between actions or where it may be appropriate to link actions or information together. This section builds upon the information presented in the earlier section of 3.4 Frame Discussion for Uncertain Futures Using Adaptation Pathways, where adaptation pathways, thresholds, triggers and planning horizons were introduced and defined. Now these concepts are put into practice.

The goal of this section is to understand and connect the actions and strategies you've created so far to the appropriate time horizons that includes the sequencing of actions, and phasing how those actions can change over time (Figure 46).

It is highly recommended that this section be done with or by technical experts who can weigh in on engineering and other feasibility considerations of this section. This section might also be done in tandem with 5.4.2 Additional Evaluation Approaches depending on the level of detail conducted in this section.

5.3.1 Action Lifespan and Time Horizons

When Do Actions Start and Stop Being Effective?

For each action and strategy identified in 5.1 Explore Actions and 5.2 Bundled Strategies, you should have already included under which planning horizon (immediate, short, medium, or long-term planning horizon) these actions should occur in, as defined in 3.4.4 Planning Horizons. Using your list of 5.2 Bundled Strategies, go through each individual action and identify specifically:

1. When (at what water level or time) the action ***needs to be effective by*** (e.g. "in place" at the right time)?
2. When the action is ***no longer effective*** (e.g. action lifespan)?

What does it mean to be "in place" at the right time?

Look ahead to identify *when* the action needs to be ready to work. *When* can refer to a specific water level (see Total Water Level in 3.4.4 Planning Horizons) which can then have an associated future date on it, which may change as sea level rise projections adjust (Figure 47). Identifying when actions need to be in place can coincide with thresholds or other changes in flood impacts. Review your local conditions from 3.5 Use Workbook 3 Outcomes and 4.5 Use Workbook 4 Outcomes to identify ***when*** adaptation actions need to be built or fully developed by to prevent flooding impacts and/or prepare communities.

What is the lifespan of each action?

Once you've determined when an action needs to be in place to be effective, consider the action lifespan – how long it will be effective for. Certain actions have different expected lifespans, and the reality is that a specific lifespan is highly dependent on local conditions and context. Consider at what water level or time horizon each action will stop being effective (Box 41).

Use Worksheet 5C to list when actions need to be effective by and how long they will last.

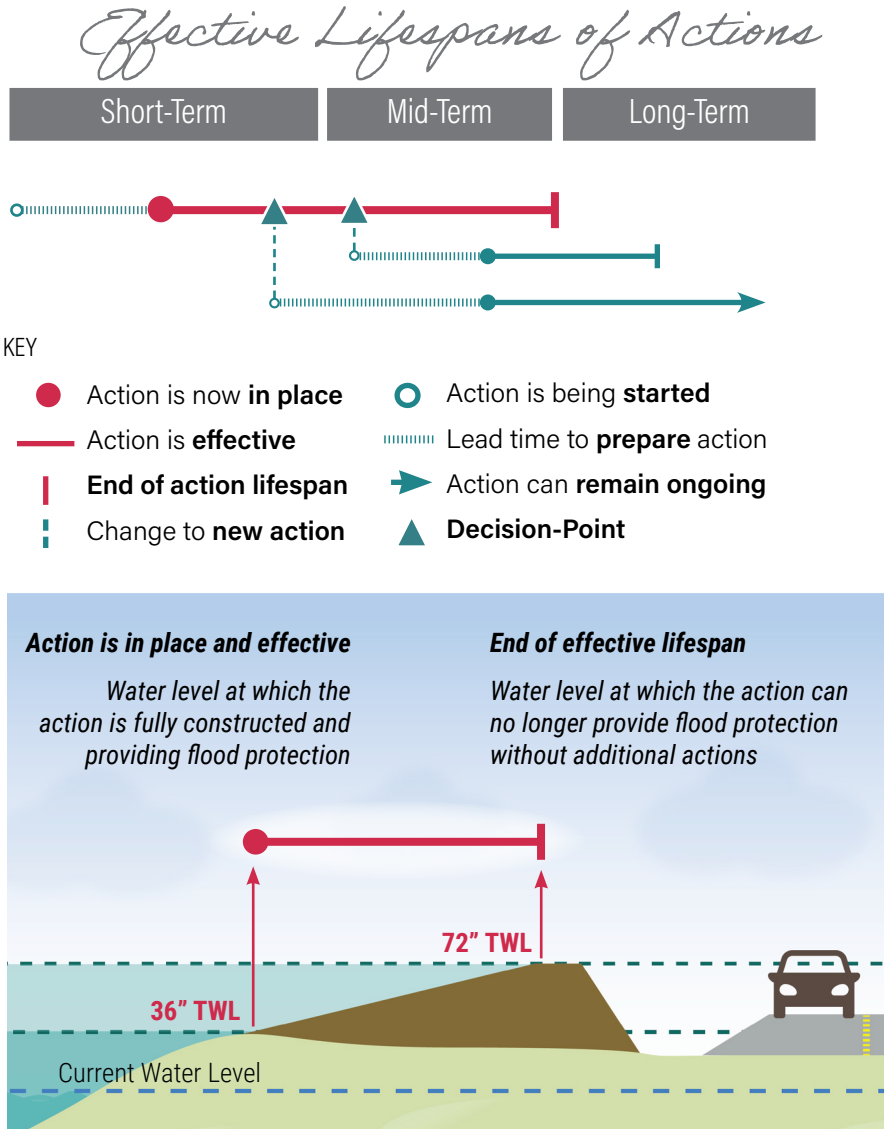


Figure 47 · Effective Lifespans of Actions. This graphic illustrates a conceptual example of an effective lifespan for the action of a horizontal levee, where the action needs to be in place at 36" TWL to prevent flooding impacts. It will then be effective at providing flood protection up until the water level rises and reaches 72" TWL, which is the end of its effective lifespan.

Connecting Time to Water Levels

The Adapting to Rising Tides (ART) Program uses "Total Water Levels" (TWLs) in the ART Bay Shoreline Flood Explorer as it provides the ability to identify what impacts occur at a given water level, and then link the timing for when sea level rise may reach that water level based on update sea level rise projections. At the time of this publication, the State of California's 2018 Sea Level Rise Guidance provides the best available science on when we might see water levels from 2030 to 2100 (Table 10).

COMPARING CALIFORNIA STATE GUIDANCE ON SEA LEVEL RISE TO ART TOTAL WATER LEVELS

			Likely Range*	1-200 Chance*
2030	**State Guidance (High Emissions)**		**6″**	**9.6″**
	ART Maps Equivalent	***MHHW+***	********	***12″***
	Sea Level Rise + 5-Year Storm	MHHW+	**	36″
	Sea Level Rise + 50-Year Storm	MHHW+	**	48″
	Sea Level Rise + 100-Year Storm	MHHW+	48″	52″
2040	**State Guidance (High Emissions)**		**9.6″**	**15.6″**
	ART Maps Equivalent	***MHHW+***	***12″***	********
	Sea Level Rise + 5-Year Storm	MHHW+	36″	36″
	Sea Level Rise + 50-Year Storm	MHHW+	48″	52″
	Sea Level Rise + 100-Year Storm	MHHW+	52″	**
2050	**State Guidance (High Emissions)**		**13.2″**	**22.8**
	ART Maps Equivalent	***MHHW+***	***12″***	***24″***
	Sea Level Rise + 5-Year Storm	MHHW+	36″	48″
	Sea Level Rise + 50-Year Storm	MHHW+	48″	**
	Sea Level Rise + 100-Year Storm	MHHW+	52″	66″

Table 10 · Comparing California State Guidance to ART Total Water Levels. The table compares the California State Guidance from the Ocean Protection Council (2018) to the Total Water Levels (TWLs) used in the ART Flood Mapping data to understand how our project water levels may relate to time horizons for sea level rise.

Action Lifespan Considerations

How long an adaptation action will be effective can depend on a variety of local factors and conditions and should be evaluated by qualified coastal engineers. Below are some considerations.

Height and Soil Conditions of Built Projects

The length of time a built adaptation action can protect a community from flooding is connected to the height a structure is built to (relative to local land elevations) in the *initial phase*, as well as the height increase opportunities in *subsequent phases*. It is important to note that soil conditions vary in their ability to hold increased weight.

Quality of Maintenance for Traditional Grey Infrastructure

Human-engineered flood protection structures, such as levees, floodwalls, seawalls, etc., must be monitored and maintained consistently in order to continue providing flood protection. Local conditions such as erosion can affect projected lifespans.

Ecosystem Conditions that Enable Natural Resilience

The ability of natural habitats such as wetlands to buffer flooding impacts and provide ecosystem services depends on their adequate health, space to migrate landward, and connection to sediments to keep pace with sea levels. Their effective lifespans rely on access to sustained conditions that enable their natural ability to adapt.

Expected Vs. Actual Lifespans

Infrastructure, such as highways and bridges, and commercial and residential homes have expected lifespans. In reality, these developments may last well beyond these intended years. For example, most bridges in U.S. were built with an expected lifespan of 50 years, while in the Bay Area, the Golden Gate bridge is over 80 years old.

Changing Rates of Sea Level Rise and Related Impacts

As the science continues to evolve, there may be changes to how quickly sea levels are rising or new information on related impacts. These can affect the length of a time a given adaptation action may be effective for, which is why we stress the importance of 5.3.3 Applying Triggers and Decision Points to monitor conditions and adjust adaptation.

Box 41 · Considerations for Effective Lifespans.

5.3.2 Sequencing and Lead Times

What Order and Time Is Needed for Action to Occur?

In order for the actions or strategies to be "in place" and effective at the right time in 5.3.1 Action Lifespan and Time Horizons, there may be multiple other actions that need to occur, or be constructed, first, and in a certain sequence. We refer to these actions, and the time it takes to complete them, as the "lead time". Using your list of 5.2 Bundled Strategies, we ask you to consider:

1. What actions need to occur and in what ***order or sequence***?
2. What ***length of time*** is needed to complete each action?

Is there a sequencing that needs to occur for actions?

Starting with physical actions may be a useful for considering the sequencing of actions and strategies. What actions need to occur to get a built project *in place*?

Are there multiple actions that need to occur in a specific order and result in a cascade of actions that inform and build on one another (Figure 48)? Do these actions overlap while in progress, or are there clear endpoints that should occur before a new action can start? See 5.3.4 Visualizing Adaptation Pathways for visual perspective of different pathways. Include if the actions can or should occur concurrently versus those that *require* sequencing. For some actions, there may not be any ordering at all.

What is the length of time needed for those actions?

Estimate the likely length of time it would take to complete each action. You may use general time frame estimates, or add greater specificity. Another way to consider this is asking yourself: when do we need to start the first action in a sequence of actions so that the project can be built in time to protect the community from flooding, or the actions we are taking can prepare communities at the appropriate time as listed in 5.3.1 Action Lifespan and Time Horizons? Review key considerations in Box 42.

Use Worksheet 5C to list the order or sequencing or actions and lead time.

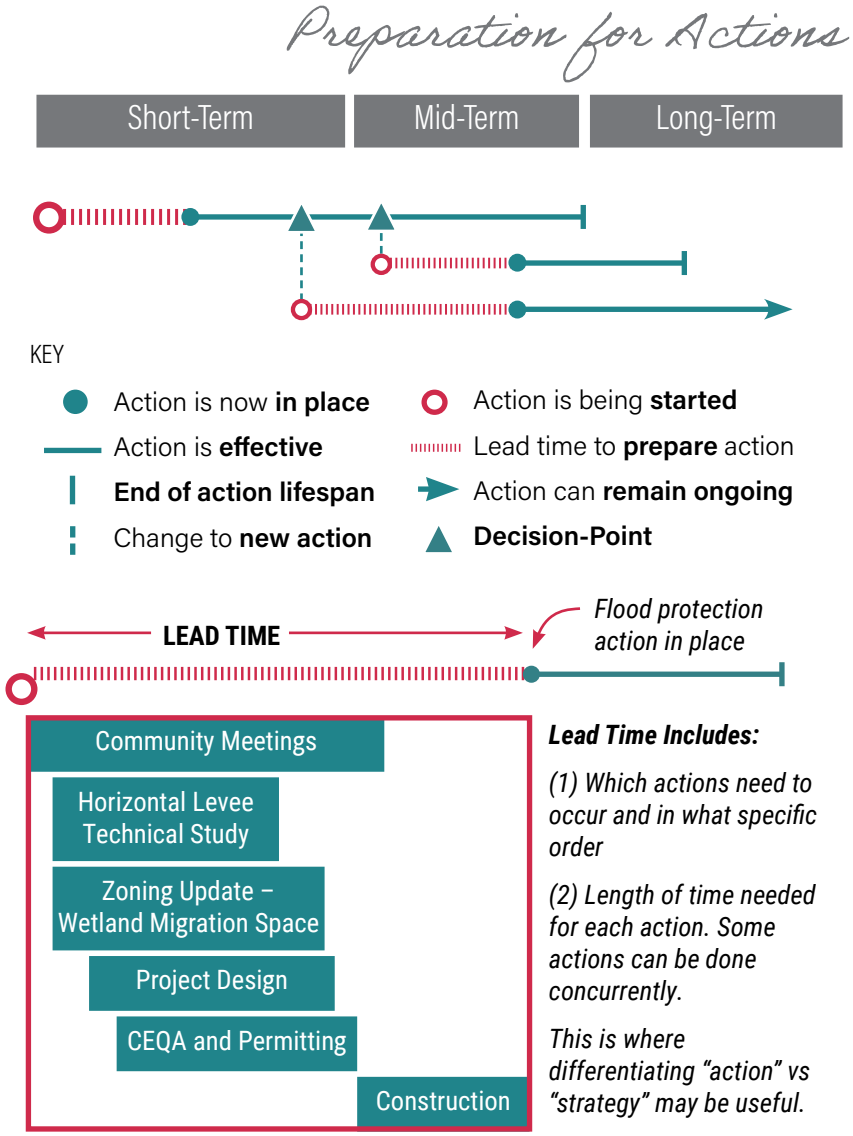


Figure 48 · Lead Time and Sequencing of Actions. This graphic illustrates a conceptual example of how numerous actions are required, in a specific order, to enable the construction of a horizontal levee. In this case, the sequence requires there to be community meetings, a horizontal levee technical study, and zoning updates must occur before the project can be fully designed permitted and constructed. Together, these contribute to the lead time it takes before the physical action can be in place and effective.

Action Sequencing Considerations

The sequence of adaptation actions can depend on a variety of factors and can include the sequence of actions to prepare for a strategy, or the sequencing of multiple strategies. Below are some considerations.

Order Actions that Are Dependent on One Another

Some actions depend on the information gathered, or the processes initiated, by another action. For example, studying and researching an equitable approach for specific area buy-outs should be required before any actions for managed retreat occur.

Incorporate Time for Legal and Permitting Processes

Projects that may have significant environmental impacts are often required to conduct a California Environmental Quality Act (CEQA) analysis, which can be costly and take time depending on the scale and potential impacts of the projects. The time necessary to secure federal, state, or regional permits should also be considered. Many agencies will participate in early conversations to help improve the permitting application process to support faster permitting.

Consider Appropriate Buffers in Estimating Lead Time

While it may be tempting to think preparation actions can be rushed, it will be helpful to consider realistic time frames for when the lead time actions can be done, including existing staff time and capacity. There can often be unexpected priorities that arise and it may be helpful to build appropriate buffer time into estimating lengths of time.

Build on Momemtum, Low-Hanging Fruit and Unlocking Actions

For some actions without a clear sequence it might make sense to capitalize on existing momentum. It can be helpful to order actions that are easier to achieve first to provide some early and easy "wins" for adaptation. Unlocking actions are those that open the door to other actions and can make it easier to achieve. For example, initating a General Plan update and opening up the Land Use and Zoning Map can "unlock" opportunities to update zoning areas for near-term actions and pave the way for mid and long-term solutions.

Box 42 · Considerations for Sequencing and Lead Times.

The Montezuma Tidal and Seasonal Wetlands Restoration Project Phase I was funded in 2018, and restored tidal marshes were breached in 2020, following years of planning and permits. Photo courtesy of the San Francisco Bay Restoration Authority.

Expert Advice on Lead Times

It is challenging to provide exact estimates for how long different adaptation actions and lead times may take given the wide range of different projects and scales at which they may occur. In the San Francisco Bay Area, some of the largest projects associated with sea level rise, such as the Sears Point Restoration Project and South Bay Shoreline Restoration Project, have taken decades to plan and implement. As these were some of the first large-scale shoreline habitat restoration projects in the region, it took a significant amount of time to develop and implement the right approach.

As more sea level rise adaptation projects of different scales and scopes are planned and built in the coming years, it is anticipated that they can be developed and implemented more quickly to address the risks of rising sea levels. One suggestion is to consider the following times below as a *baseline*, which can be adjusted based on the details of your project:

Baseline: 7-8 Years in Total

2 Years: Plan and Preliminary Design + 2 Years: Final Design and Permitting + 3 Years: Construction and Implementation

An important note is that these phases do not necessary happen consecutively, which means these times might still extend across a decade. It also depends on the specific project details, for example, if land acquisition is required, that will likely include a longer process.

5.3.3 **Applying Triggers and Decision Points**

When Do We Change Action and Strategies?

Climate change adaptation will require us to repeatedly re-evaluate the science and projections of climate impacts, track how well our adaptation strategies are working, and monitor various conditions of flooding or other social, governance, or environmental indicators to provide insight on how to proceed.

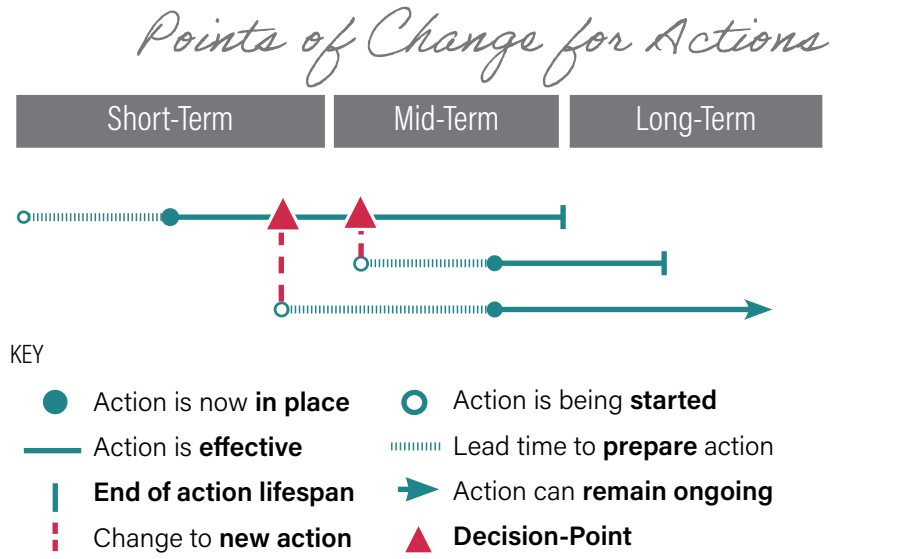
In previous sections on 3.4.2 Thresholds and 3.4.3 Triggers and Monitoring, you were asked to consider thresholds for flooding in your community and begin identifying potential triggers (flooding or social cues). In this section, the triggers previously considered should be reviewed and adjusted as necessary to meet your adaptation action and strategies. Understanding ***when to change or phase strategies from one set of solutions to the next comes from applying triggers to your actions and making decisions at specific points in time***. Review Figure 49 and Box 43 for key considerations on using triggers and decision points.

Use Worksheet 5C to list the triggers or decision points, if needed.

Trigger: An indicator that informs when conditions are approaching a threshold, or when changes occur that would affect the consequences from flooding. An effective trigger should embed the mechanism for monitoring and be designed to alert you to an issue before a threshold is crossed with enough time make choices.

Decision Point: A point in time when a decision needs to be made in order to provide enough lead time to for the next action(s) to be effective[1]. A decision point is a type of trigger in is driven largely by the lead time (5.3.2 Sequencing and Lead Times) required to implement an alternative action, or begin the next phase in a sequence. A decision point may come before or after a trigger, and a trigger being crossed will likely initiate a decision point, even before one might be estimated to occur.

1 Coulter, L. (2019). U . ser Guide for the Climate Change Adaptation Pathways Framework: Supporting Sustainable Local Food in B.C.. Prepared for the B.C. Ministry of Agriculture through the 2018-19 Mitacs Science Policy Fellowship. Victoria, B.C.



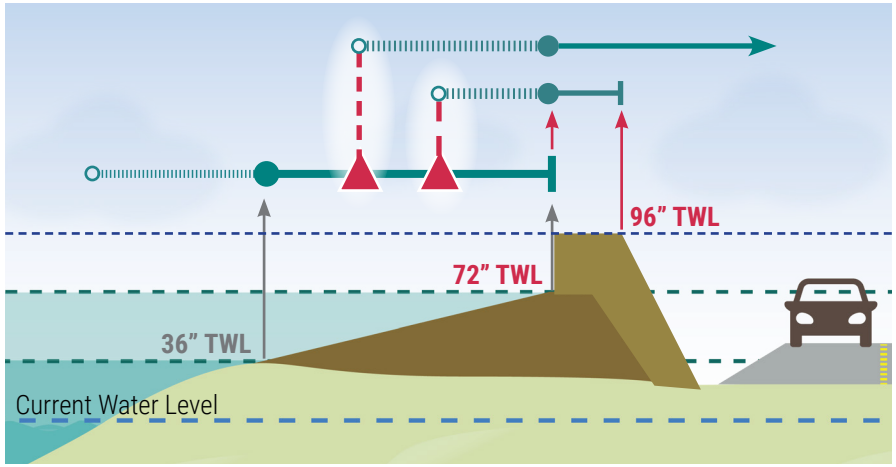


Figure 49 · Phasing and Changing to New Actions or Strategies. This graphic illustrates a conceptual example of two alternative choices to continue flood protection beyond 72" TWL. In this example, one choice is to raise the existing levee to provide protection up until 96" TWL, which will ultimately have an end of effective lifespan. An alternative choice could be to not raise the levee and instead conduct research and outreach to implement an equitable relocation of existing development behind the levee to avoid future impacts, which will result in ongoing protection. In this second option, the lead time necessary to implement this choice is significantly longer than the lead time to raise the levee. There are two decision points that provide necessary lead time for different choices.

Decision Points and Triggers Considerations

While the Adaptation Roadmap advocates for using decision points and triggers to build flexible adaptation pathways, it is important to note that this is a developing field of practice with both benefits and challenges. Below are some considerations as you explore how to use and apply decision points and triggers in your effort.

Should Decision Points and Triggers Be Considered the Same or Separate Things?

The Adaptation Roadmap defines a trigger as informing a change in environmental or social conditions, while a decision point is a type of trigger driven primarily by the lead time necessary to phase to subsequent actions, or when there is a point of alternative options to choose. Similar to the argument for using the terms actions or strategies, using the terms triggers and decision points as being the same or slightly nuanced may depend on how useful it feels in your process to differentiate them.

How to Quantify Decision Points or Triggers?

In 3.4.3 Triggers and Monitoring we outlined key challenges and considerations for developing triggers. These include: can it be easily measured what is the criteria or level of detail being triggered, can it be easily monitored, and does it provide adequate lead time. Understanding the lead time required can be challenging and murky, especially as sea level rise accelerates in the coming decades, and new research on related impacts such as shallow groundwater rise or contamination mobility change our understanding of risk or our choices.

Do All Actions Need a Decision Point or Trigger?

While triggers inform when a change in environmental or social conditions occurs, decision points inform when the phasing of an action or strategy may need to occur. The question is do all actions need a trigger or decision point? Are there instances when actions are discrete "one-off" choices that are not phased or part of a larger, long-term strategy? Do coordination or capacity building groups need triggers or decision points? Consider decision points for actions that are part of a phased strategy, and triggers when a change in environmental conditions would affect the effectiveness or functionality of that action.

Decision Points or Triggers for Individual Actions, Sets of Strategies, or Areas Along the Shoreline?

Depending on the scale and complexity of your adaptation effort, it may be important to consider the scale of the decision points or triggers. Across a large scale, it may make sense to consider them for a set of actions along a specific shoreline. For example, for a shoreline plan with a series of interrelated actions such as wetland restoration, horizontal levee design, General Plan land use change, and zoning wetland migration space, a single decision point might support the series of actions opposed to individual decision points for each action alone.

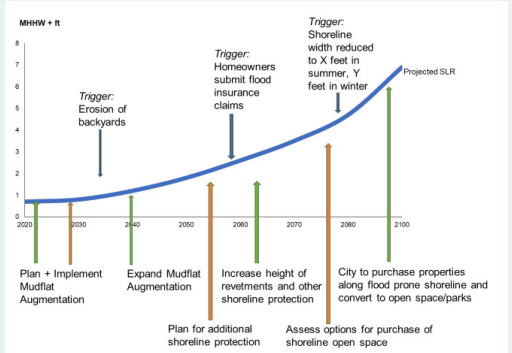


Figure 6-2. Hypothetical example of adaptation pathway for the Alameda shoreline.

Hypothetical Triggers in Alameda's Climate and Resiliency Plan (CARP)

The City of Alameda's Climate and Resiliency Plan (CARP) incorporates triggers into Chapter 6: Plan to Action under the "Monitoring, Reporting, and Metrics" section. According to the CARP, the City will establish a tracking and reporting system to include triggers that algin with the actions.

One example of this tied to a strategy is the CARP adaptation strategy for "Limit building and encourage open space in risk zones," that would create overlay zones, it is acknowledged that potential triggers can be developed to help define how these zones may need to be adjusted in the future.

Box 43 · Considerations for Using and Applying Decision Points and Triggers.

5.3.4 Visualizing Adaptation Pathways

Creating Pathways Diagrams for Communication

The use and value of creating a visual diagram of adaptation pathways in your process depends on understanding the purpose of what the visual is intended to achieve and then using the right elements to most effectively communicate those points.

Visualizing adaptation pathways can help communities, stakeholders, politicans, and decision-makers understand how decisions in the short-term affect long-term options[1] (see Flexible Approach for Decisions Over Time). These visual diagrams can also serve as useful tools to facilitates conversations about tradeoffs and the decision context over time, and support the development of more robust details for implementation.

There are many different types of adaptation pathways visuals and diagrams that can be created based upon the strategies identified throughout 5.1 Explore Actions and 5.2 Bundled Strategies.

> Note: The Adaptation Roadmap provides guidance on developing adaptation pathways diagrams to support conversations on 5.4 Tradeoffs and Decisions in the next section. However, you may instead choose to evaluate adaptation options and strategies first before developing adaptation pathway diagrams. Use whichever order makes the most sense for your community and stakeholders.

Before creating a visual diagram, consider the various factors that can inform how pathways diagram and developed and used. These considerations include identifying the intended audience(s) and purpose (Box 44), being selective about scale and type of pathway (Box 45), and exploring the types of details that can be emphasized (Box 46).

Use Worksheet 5D to list details of audience and purpose of adaptation pathways.

1 Bloemen et al. 2018. Lessons learned from applying adaptation pathways in flood risk management and challenges for the further development of this approach. Mitig Adapt Strateg Glob Change (2018) 23:1083–1108

Define Intended Audience(s) and Purpose

A diagram or visual can be created to highlight or emphasize different kinds of information at different levels of detail. Just like a data specialist will use different kinds of charts or graphs depending on the data they have and the point they want to make, choosing the visual for an adaptation pathway diagram should depend on what you want to emphasize in the process, and then tailoring that information to specific audiences (Box 44).

Emphasize Key Concepts

Consider using the pathways diagram to highlight or emphasize key concepts from the 4.2.1 Vision or 4.2.2 Guiding Principles. For example, if the guiding principles emphasize expanding natural habitats and nature based adaptation, you can build an adaptation pathways diagram focused on the steps and actions necessary to expand natural habitats and create wetlands migration space for future habitats.

Create Different Diagrams for Different Audiences

Determine what audiences will benefit from a visual diagram and consider what they would want to see from it. This does not mean you have to create dozens of different diagrams, but it might be helpful to consider at least two, one for a more public stakeholder and community audience, and one for the core team. For example, a diagram for a general audience may be higher-level with less detailed than one for a core team.

Box 44 · Considerations for Audience and Purpose.

Be Selective About What You Include

Choose the scale, level of detail, and types of actions to display in a pathway. While it might be helpful for a planner, for example, to visualize when a General Plan Update aligns with a series of policy strategies on a visual diagram, a different audience may find that additional information confusing. The main message behind what you want to communicate should drive what information is displayed in the adaptation pathways visual (Box 45).

Shoreline Reaches or General Big Picture Strategy

Based on what you want to communicate, you may decide to create a diagram about a single shoreline section with specific details. Alternatively, you may want to create a broad diagram that includes strategies across a shoreline, but with an intended purpose of highlighting when all of these different actions need to begin, for example.

Single or Simplified Pathways

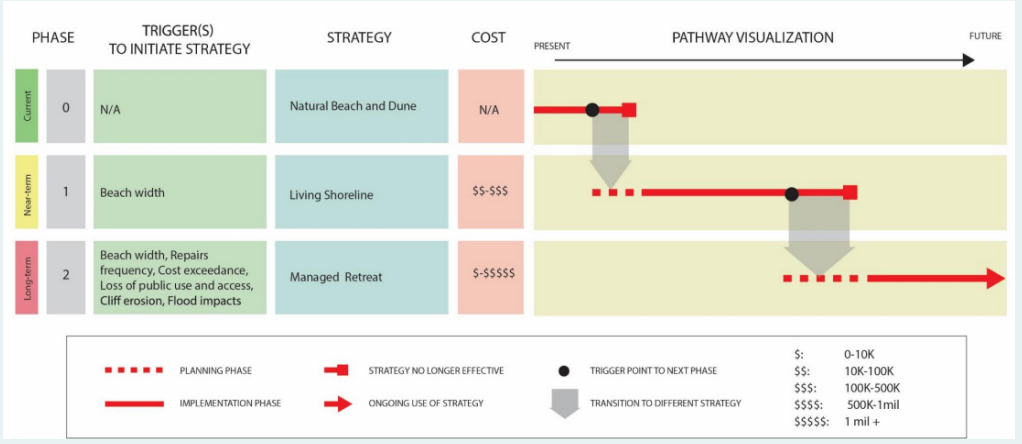
It is okay to to create a single pathway or simplified diagram that emphases a few key points. For example, the purpose of a diagram could be to illustrate how three actions are connected to one another over time. The City of Santa Cruz developed simplified adaptation pathways to highlight simple pathways along different parts of their shoreline.

Complex or Cascading Pathways

Another use of adaptation pathways is using a diagram to illustrate multiple actions or a combinations of different action types together. Figure 50 provides an example from the Richmond hypothetical case study of a complex pathway that highlights two different set of complimentary actions. Using a complex or cascading diagram can help communicate what actions are needed to occur first to prepare for a variety of diverse adaptation strategies that ultimately work together.

City of Santa Cruz Adaptation Pathway

The City of Santa Cruz (City) and Central Coast Wetlands Group, with funding provided by the California Coastal Commission developed a report: City of Santa Cruz Beaches: Urban Climate Adaptation Policy Implication & Response Strategy Evaluation Technical Report that outline adaptation pathways for various beach segments. An adaptation pathway diagram and description accompanied each beach segment to provide a visual representation of actions selected and how they can change over time.



Alternative or Divergent Pathways

It may also be helpful to use an adaptation pathways visual to identify future adaptation pathways that *do not work together,* but instead represent *different* adaptation choices that can be made. There are certain instances where you must make choices on the direction you want to go, and alternative pathways diagrams can help visualize those options to emphasize when decision points need to occur in order to implement different adaptation strategies over time.

Box 45 · Considerations for Types of Pathways to Highlight.

Types of Details to Emphasize

Consider how a pathways diagram can support conversations on 5.4 Evaluating Tradeoffs and Making Decisions. All diagrams should be designed to communicate something to a particular audience effectively. As part of this design, it may be helpful to consider what other elements in the adaptation pathways diagram might be useful to include that can facilitate and inform conversations around tradeoffs and decisions (Box 46).

No Action/Existing Condition Starting Point

Since a pathways diagram is meant to show transitions in actions and strategies over time, it may be helpful to include a starting point that designates "No Action" or "Existing Conditions" options. From there, adaptation actions and strategy choices stem from this starting point. This point also signify when the No Action approach reaches its effective lifespan to illustrate why actions to prevent flooding need to be taken early.

Cost Estimates

Including the expected cost for each adaptation action or strategy, where possible, can be useful in discussing tradeoffs with communities and stakeholders. This could be more detailed if an economic analysis was done, or a high-level approximation done by an experienced member of the team in public works, for example, could designate cost buckets such as 1-3, or $-$$$, which can be useful in helping individuals visualize differences in cost for different actions or pathways.

Dependencies and Lock-ins

Consider including which actions may be dependent upon, or a prerequisite to, other actions. A major advantage to using an adaptation pathways approach is understanding how choices in the near-term affect longer-tern options. If you are visualizing alternative pathways on the same diagram, include or highlight areas where a decision made at one decision point impacts, or takes away the opportunity to go down, a different path.

Types of Actions

Another level of detail to consider is differentiating types of actions and strategies. For example, colors or other visual elements, such as lines and shapes can be used to designate planning actions vs. community and capacity building actions vs. built projects. This could be useful if sharing the diagram with audiences that might be implementing different actions, such as a planning, public works, or community organizations that might lead some of these efforts.

Bundled Strategies

Another way to organize a pathways diagram might be signifying what actions work together as bundled strategies vs. actions that are not directly connected to one another. These may include using certain colors for bundled sets of actions, letters, numbers, or other elements to highlight the relationship among bundled actions.

Decision Points and Triggers

Highlighting decision points in an adaptation pathway using the triggers identified can be a valuable addition to the conversation on tradeoffs. It also helps to ground the conversations on specific triggers in the real-world example. Triggers and decision points should be discussed and evaluated with communities and stakeholders to ensure they are feasible and useful.

Box 46 · Considerations for Details to Include in A Pathways Diagram.

Conceptual Adaptation Pathway

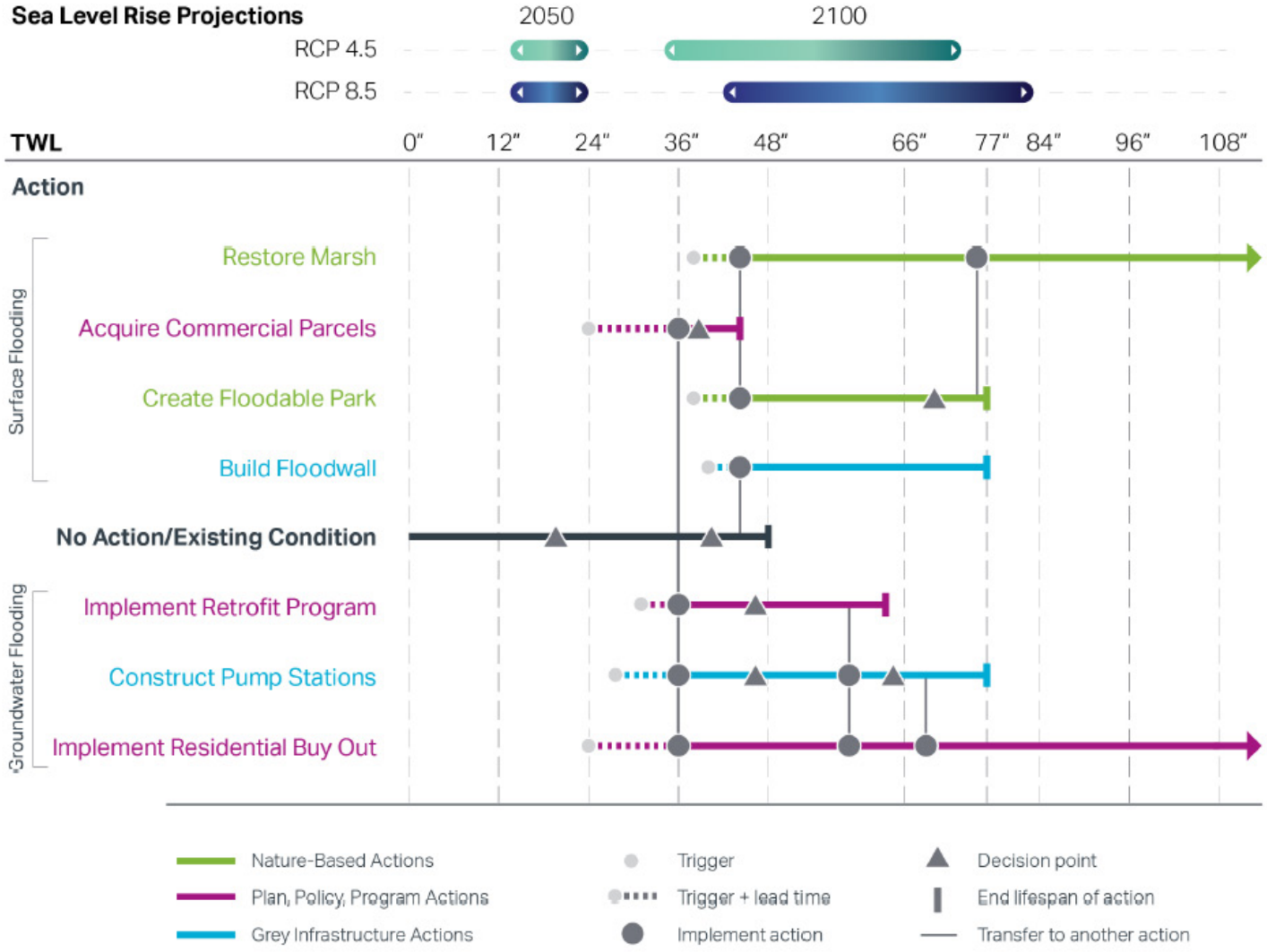


Figure 50 · Conceptual Example of an Adaptation Pathway in Hypothetical Case Study in Richmond, CA. Consultants at AECOM conducted a desktop exercise to explore how actions and strategies could be brought together to develop adaptation pathways. This conceptual example illustrates various different actions required to protect against surface and groundwater flooding. Beginning at a No Action/Existing Conditions point, the pathway diagram illustrates the first decision point, which can initiate a series of actions that need to begin given their necessary lead time. From there, actions build upon one another and demonstrate the sequencing and phasing necessary to adapt to increase sea level rise and groundwater flooding impacts over time.

5.4 Evaluating Tradeoffs and Making Decisions

This section will dive deeper into applying the evaluation criteria developed previously, exploring additional evaluation tools, and using the decision making process established in Chapter 2 to make decisions that advance shared adaptation strategies. You can navigate to the details in each section below:

Use this Section to Make Decisions on Adaptation

At this point, adaptation actions and strategies have now been developed, sequenced, and phased (5.1 Explore Actions, 5.2 Bundled Strategies, and 5.3 Phasing and Sequencing) for one or more future scenarios (4.3 Explore Future Scenarios) to align with the vision and guiding principles set by the community and stakeholders in 4.2 Determine What Success Means. Exciting!

Now the refined actions and strategies must be shared back with the community and stakeholders to communicate *how* their vision was translated by the technical experts and/or consultants and engage in conversations about tradeoffs of different decisions. These conversations should include an overview of what actions and strategies were identified and what decision points and triggers were used to support the phasing and transition of adaptation actions over time.

Having conversations with people about what they care about is essential, as seen in the Adapting to Rising Tides Bay Area project. Photo by Jaclyn Perrin-Martinez, BCDC.

Evaluating strategies can generate robust conversations that may even illuminate changes to the guiding principles, highlight additional challenges and opportunities, or even identify new stakeholders that need to be in the room.

This may lead to iteration of previous steps as you explore what actions and strategies are feasible given your local conditions, values, and desired future outcomes.

In this section, we highlight how to *apply* the evaluation criteria developed in the visioning process from 4.2 Determine What Success Means to the adaptation strategies developed. We also highlight additional tools and approaches that can be used to conduct additional evaluation, as well as provide space to initiate or conduct additional analysis as needed, such as populations impacts analysis or other data gaps, in order to advance outcomes that meet the community and stakeholder visions and expectations.

Ultimately, the outcome of this section is to engage in tradeoff conversations with communities and stakeholders and **make decisions** following the equitable 2.3.3 Decision-Making Process identified earlier in the process.

5.4.1 Share Results and Apply Evaluation Criteria

How Do Adaptation Strategies Align With Our Values?

Now that adaptation strategies have been developed with the support from technical, engineering, and planning experts to meet the community's envisioned futures, now is a key opportunity to re-engage with communities and stakeholders to share the findings on the preliminary adaptation strategies developed and discuss how to advance options forward. The Adaptation Roadmap breaks down this section into three parts:

1. Share Preliminary Adaptation Strategies with Communities and Stakeholders
2. Revisit and Define Role of Evaluation Criteria
3. Apply Evaluation Criteria and Engage in Conversations

Sharing Preliminary Adaptation Strategies with Communities and Stakeholders

This is a very exciting time! The adaptation strategies developed should now reflect realistic options that take into account local opportunities and considerations, community values, physical and environmental conditions, shared problems that incorporate a deliberation of risk, and meet – to the best of its ability – the scenarios envisioned by communities and stakeholders.

In order to help set the stage for productive conversations about the adaptation strategies, it may be helpful to remind communities and stakeholders about this process you've taken together to ensure it is clear that these adaptation strategies stemmed directly from their input. **The purpose of sharing the adaptation strategies at this point is to discuss and evaluate the adaptation strategies and decide what else needs to occur before finalizing adaptation strategies to advance through shared decision making.**

To support these conversations, it can be helpful to review definitions for key terms such as evaluation, tradeoffs, and decision making.

Key Definitions

Consider the following terms below, and adjust these definitions as needed to best reflect community and stakeholder understanding:

Evaluation refers to the process of critically examining a set of options and making judgments about it's effectiveness in achieving a desired outcome. Evaluation of adaptation actions and strategies can take many different forms, include using different kinds of tools and analysis. Most importantly, the process of evaluation does not make decisions, but instead spurs important conversations about tradeoffs.

Evaluation Criteria refers to a process to objectively assess the effectiveness of an alternative in achieving a desired outcome.. In 4.2 Determine What Success Means, communities and stakeholders created a shared vision, guiding principles, and developed ideas for 4.2.3 Evaluation Criteria to help define what successful adaptation outcomes would mean to them.

Tradeoffs refers to the process of exploring and discussing the pros and cons of different actions and strategies, or as a "balancing of factors that cannot be attained at the same time or in combination, involving, for example, pathways to achieve various social, economic and environmental goals"[1]. Similarly, conversations about tradeoffs support the decision making process.

Decision Making refers to the process of selecting options among a set of alternatives. In the Adaptation Roadmap, we encourage the use of shared decision making approaches that lead to higher levels of support for decisions and greater influence from communities and stakeholders on outcomes. Refer to the shared decision making processes discussed in 2.3 Determine Structures for Participation and Decision-Making.

1 Wiréhn et al. 2020. Analysing trade-offs in adaptation decision-making-agricultural management under climate change in Finland and Sweden. Regional Environmental Change.

Revisit and Define Role of Evaluation Criteria

As adaptation strategies were developed, new insights on constraints or opportunities may have come to light. After sharing the results of adaptation strategies with communities and stakeholders, consider if any of the initially developed 4.2.3 Evaluation Criteria might need to be revisited or adjusted to reflect what was learned through developing adaptation strategies. This is also the time to add more definition to how the evaluation criteria will be used in practice (Box 47).

Ranking System for Evaluation

There are many ways to rank evaluation criteria. In the Adapting to Rising Tides (ART) program, adaptation actions or strategies are ranked qualitatively using three tiers: "+" general agreement, "-" general disagreement, and "0" neutral. In the Dumbarton Bridge West Approach and Adjacent Communities Study, an ordinal ranking system was used which included five tiers and corresponding descriptions of what each ranking meant for each criteria (example in Figure 51). While quantitative scoring may be appealing, the ART program encourages qualitative ranks that spur conversations about options opposed to replying on numerical rankings alone.

Evaluating Actions or Strategies

For each evaluation criteria question identified, you must consider if every individual action will be evaluated against the criteria; or if an adaptation strategy (set of actions) will be evaluated together. There are tradeoffs to each approach, assessing each individual action provides greater resolution of detail, but can be time consuming and difficult to achieve.

Interpretation and Use of Criteria

Prior to applying the criteria, discuss what it would mean for actions or strategies to score a certain way. For example, if something scores low, is it automatically disqualified, or can it be adjusted to improve it based on conversations about tradeoffs?

Box 47 · Articulating Use of Evaluation Criteria in Practice.

Apply Evaluation Criteria and Have Tradeoff Conversations

Once you've clarified how evaluation criteria might be used, apply the criteria with support from communities and stakeholders. This may be a challenging process and raise a lot of questions – *that is the point*. Discussing *how* adaptation actions and strategies work to achieve the 4.2.1 Vision or 4.2.2 Guiding Principles is a key part of an Equitable Community-Driven Planning approach. During these conversations, encourage communities and stakeholders to discuss tradeoffs – that is, the pros and cons, of alternative options. When applying evaluation criteria, consider how to ensure the process is documented, responsive to additional concerns, and feedback is equitably used (Box 48).

Documenting Tradeoffs Conversations

The process and resulting outcomes should generate feedback that should be used in follow-up conversations on community and stakeholders' concerns about tradeoffs. Your adaptation effort should create the appropriate space for conversations to occur, either with specific stakeholder or community groups and/or everyone together. Document conversations so they can be referenced across groups.

Additional Evaluation Tools and Analysis

While evaluation criteria is one useful tool, there are other evaluation tools to consider alongside evaluation criteria in 5.4.2 Additional Evaluation Approaches. During this process, there may also be additional analysis necessary to understand the impacts of certain actions and strategies.

How Feedback is Used and Integrated

Stakeholder and community participation should never be "a box to check". Input from communities and stakeholders should be integrated meaningfully into the process. Consider how to ensure that people who provide input can see the ways in which their feedback was considered and/or integrated into the final outcomes of adaptation. Refer to the 2.3.3 Decision-Making Process established.

Box 48 · Using Evaluation Criteria in Practice.

Drawn upon Worksheet 4E from Workbook 4 and use Worksheets 5E-5F to document updated evaluation criteria, application of criteria, and notes from conversations with communities and stakeholders.

TABLE 24. ALTERNATIVES EVALUATION RESULTS

CRITERIA ID	CRITERIA	Near-Term		Long --Term	
		Alt 1	Alt 2	Alt 3 Option 1	Alt 3 Option 2
Engineering (N) Criteria					
N1	Construction access and impacts e.g. traffic disruption, environmental impact (feasibility is accounted for in cost)	+	0	-	--
N2	Ability of alternative to adapt to higher levels of SLR beyond design level	--	++	++	++
N3	Ability of alternative to be integrated into large-scale or regional flood protection plans and regional restoration plans (i.e., ability to tie-in to adjacent protective features)	--	++	++	++
N4	Ability of alternative to not preclude other strategies or adaptation pathways	++	--	++	++
Environmental (E) Criteria					
E1	Ability of alternative to align with or make progress towards regional habitat goals	+	+	+	++
E2	Ability of alternative to protect/enhance/expand/utilize ecosystem value/functions/ services (through nature-based solutions such as wetlands, living levees)	0	+	++	++
E3	Ability of alternative to protect/enhance/expand sensitive habitat and special status species	0	+	++	++
E4	Ability of alternative to maintain or improve Bay water quality (wetlands, vegetated swales)	0	+	+	+
E5	Ability of alternative to provide carbon sequestration benefits	0	+	++	++
Feasibility (F) Criteria					
F1	Capital Cost	+	0	-	--

Figure 51 · Example of Evaluation Criteria Used in the Dumbarton Bridge West Approach + Adjacent Communities Resilience Study. This example illustrates a variety of criteria within three categories of Engineering, Environmental, and Feasibility, as well as a key for how the criteria was applied and scored.

5.4.2 Additional Evaluation Approaches

What Are Other Ways to Evaluate Adaptation?

There are a variety of ways to evaluate options and make decisions about what solutions to advance. **Many of these evaluation approaches can be used together and at different points throughout the process**. Choosing what approaches, or combinations of approaches, to use for evaluation and *when* in the process comes with their own sets of tradeoffs and considerations.

Some tools are more straightforward to use, such as evaluation criteria, while other tools and approaches require more technical and quantitative analysis. Understanding which tools to use will also depend on the level of effort and level of design in your project, and information and data available when selecting evaluation approaches. In Table 11, we've included some evaluation approaches to consider, many of which may be used in tandem while developing the adaptation strategies in 5.3 Phasing and Sequencing Strategies.

Based on the the outcomes of 5.4.1 Share Results and Apply Evaluation Criteria, it may become apparent from community and stakeholder feedback that certain actions and strategies require additional analysis or insight into their implications and consequences. When possible, doing these additional analysis can provide more information to ensure the actions and strategies identified do in fact, provide the desired outcomes. See considerations for analysis in Box 49.

Use Worksheet 5F to list details of additional analysis used during the development of adaptation strategies or additional analysis to be conducted following evaluation criteria.

Types of Analysis

Population Impacts Analysis

While population and demographics assessment was conducted earlier in Chapter 2, this analysis is instead about understanding what impacts a particular adaptation action or strategy may have on specific populations. For example, if a horizontal levee is identified as a desirable action, a follow-up analysis on impacts to neighborhood views may be helpful to ensure communities and stakeholders understand the implications of the action.

Equity Analysis and Checklist

Embedding equity into the outcomes of adaptation requires ensuring that the evaluation and decision making process follows key principles of equity developed and/or vetted by community members. The Bay Adapt Implementation Report includes an example Equity Checklist.

Neighboring Flood Impacts Analysis:

Flood modeling conducted or used earlier in the vulnerability assessment may not have incorporated flooding impacts to neighboring jurisdictions with anticipated adaptation actions or strategies in place. Re-running flood modeling programs that include specific adaptation actions or strategies can provide insight into potential consequences to neighbors, such impacts to neighboring jurisdictions, or even impacts to those on the other side of the Bay.

CEQA and Environmental Impact Report (EIR)

The California Environmental Quality Act (CEQA) provides public disclosure on any significant adverse impacts to the environment that a project or program may cause. This could be an opportunity to initiate an Environmental Impact Report (EIR) as part of the CEQA process if adaptation strategies are likely to be advanced (see 3.1.2 Local Plan Alignment for more considerations).

Other Analysis As Needed

Given the wide range of potential impacts and considerations, other types of analysis may be important at this stage of evaluation. Listen to communities and stakeholders about their concerns and explore additional ways to evaluate impacts as needed.

Foster City Levees

A draft Environmental Impact Report (EIR) was created for the Foster City Levee Protection Planning and Improvements Project that evaluated two sea level rise scenarios across three levee improvement types. EIRs provide a way to evaluate potential impacts.

Box 49 · Types of Additional Analysis

Evaluation Tools and Approaches

Approach	Overview	Considerations	When to Use	Case Study	Resources to Use Tool
Evaluation Criteria	Tool for scoring or ranking how the criteria (developed in section 4.2.3 Evaluation Criteria) are met by individual actions or strategies.	Common approach that can be applied qualitatively or quantitatively and is relatively straightforward to use with communities and stakeholders in a planning process.	Consider early in 4.2.3 Evaluation Criteria and apply as needed.	Dumbarton Bridge West Approach + Adjacent Communities Resilience Study	ART How-To Guide: Developing Evaluation Criteria
Multi-Criteria Decision-Making (MCDM) Analysis	Tool for evaluating multiple conflicting types of criteria and helps rank, prioritize or choose from finite series of alternatives.	A more technical quantitative approach that requires specific framing of a problem to be applied correctly. Useful for comparison of policy options. Similar in theory to a cost-benefit analysis but provides for more than one criteria (e.g. money).	Consider during the 5.3 Phasing and Sequencing component.	Coastal Management Issues in Queensland and Application of the Multi-Criteria Decision Making Techniques	Multi-Criteria Analysis: A Manual. 2009. Department for Communities and Local Government: London.
Robust Options (RO) Analysis	Tool that helps identify actions or strategies that perform well over multiple different futures, rather than identifying an "optimal" action or strategy.	A more technical quantitative approach using probability modeling that requires large amounts of input data. This can refer to the probability of an event occurring, of multiple events occurring simultaneously, etc. Useful in analysis regarding large uncertainty, such as climate adaptation.	Consider during the 5.3 Phasing and Sequencing component.	"We want to know where the line is": comparing current planning for future sea-level rise with three core principles of robust decision support approaches	A Practical Guide to Robust Optimization. Gorissen et al. 2019. Omega Journal.
Cost-Benefit Analysis (CBA)	Systematic method for comparing the associated costs and benefits of alternative options.	A widely used tool for adding clarity to costs of alternative options, however, they often do not account for all variables that are difficult to quantify, such as community and ecosystem values.	Consider during or after the 5.3 Phasing and Sequencing component.	Sea Level Rise Adaptation Costs-Benefit Analysis Case Study (San Juan Islands)	FEMA's Benefit-Cost Analysis (BCA) Toolkit
Ecosystem Services Tools	Tool for quantifying and accounting for the value of ecosystems and the benefits they provide to people.	Traditional tools, such as CBA, often overlook the benefits of natural habitats and thus undervalue their contribution. Various tools exist to integrate the value of ecosystems into a CBA analysis.	Consider during or after the 5.3 Phasing and Sequencing component.	Sea Level Rise Adaptation Framework. 2019. Point Blue Conservation Science and the San Francisco Estuary Institute.	Natural Capital Project InVEST (Integrated Valuation of Ecosystem Services and Tradeoffs)
Triple Bottom Line Analysis (TBL)	Sustainability-based accounting method to consider dimensions of economic, environmental and social factors.	Different metrics can go into accounting the different three dimensions. This could be a way to bring together CBA and Ecosystem Service Tools with metrics to define social outcomes and success.	Consider during or after the 5.3 Phasing and Sequencing component.	The triple bottom line: bringing a sustainability framework to prioritize climate change investments for infrastructure planning.	Future trends and guidance for the triple bottom line and sustainability: a data driven bibliometric analysis

Table 11 · Types of Evaluation Tools and Approaches. Additional evaluation tools and approaches that can be used at various points in the adaptation process. Consult with experts to understand what approaches or combination of approaches can be used in your effort. This list of analysis, examples, and tools are not exhaustive.

5.4.3 Make Decisions on Adaptation

How Do We Advance Desired Actions and Strategies?

Once these actions and strategies have been evaluated, there must be explicit reasons for why the decisions were made for the actions and strategies to advance. These include why they have been selected and how they work to fulfill the community and stakeholders vision. **Use the 2.3.3 Decision-Making Process established in Chapter 2 in order to ensure equitable and collaborative outcomes to advance sea level rise adaptation in your community.** Box 50 provides some guidance on what to consider when selecting adaptation actions and strategies and how to document and articulate why they were selected.

Use Worksheets 5G-5J to describe what decisions are being made to advance actions and strategies and why.

Determine Planning Horizon(s) to Advance

Adaptation pathways enable us to think through short, mid, and long-term time horizons to ensure that short and mid-term actions pave the way for long-term opportunities. However, it may or may not be necessary to include longer term actions in an adaptation plan created from this adaptation planning process. The decision on what time horizon of actions to identify may depend on your specific communities and stakeholders, and/or any legal concerns or considerations for calling out specific actions. The intention of adaptation pathways is not to pre-decide what long term adaptation looks like, but to ensure actions today provide the opportunities for additional decisions to be made later.

Select Actions and Strategies Based on Evaluation Criteria, Feedback, and Additional Analysis

Refer to the process established for how to use evaluation criteria and how feedback from the conversations on trade offs will be integrated. If additional analysis was done on any action or strategy, ensure that the community and stakeholders groups have a chance to review that information and potentially re-evaluate the actions and strategies in light of new information.

Frame Choices in Context of Planning Effort

Frame the identification of strategies around the process used to identify them. Consider storytelling elements to draw together all the pieces of the process and highlight how these outcomes were selected:

1. What are the actions and strategies being chosen?
2. How do they meet the vision and guiding principles identified in 4.2 Determine What Success Means?
3. How do they protect or prepare communities for sea level rise?
4. How did they score on the evaluation criteria and what tradeoff conversations informed their elevation as the final choices?
5. How is equity, the environmental, the economy, and/or other key values intentionally embedded across the actions and strategies?

Share Outcomes Broadly

Once the actions and strategies are identified, consider broader public awareness to share the outcomes. Ensuring that not only the communities and stakeholders you've been engaging with are on board with the adaptation strategies, but also the general public more broadly, will be key. This may be an important part in your process to pause and initiate broader communications that seek to raise awareness about this process from even more stakeholder groups. Consider 2.4 Effective Communications, including framing, key messages and messengers. An online website (if one doesn't already exist) may be valuable to use here to reach a broader audience and support 6.2.3 Sustaining Momentum over time.

Box 50. Describing What Adaptation Decisions Were Made and Why

Download Workbook 5

5.5 Use Workbook 5 Outcomes

MAKE DECISIONS ON ADAPTATION

Workbook 5 outcome is the set of adaptation strategies for the short, medium, and long-term futures as defined by 5.3.1 Action Lifespan and Time Horizons that meet the envisioned futures from 4.4.3 Advancing Scenarios, and vision and guiding principles set by communities and stakeholders from 4.2 Determine What Success Means.

- Adaptation Strategies for short, medium, and long-term futures that have been evalated, vetted, and decided on by the agreed collaborative decision making process (ART ADAPTATION CATALOG "CREATE YOUR STRATEGIES" AND WORKSHEETS 5G-5J).

These sets of adaptation strategies should now be the foundation for your adaptation plan or other documented outcome of this planning process.

Copy from ART Catalog Tabs or Create Your Own	*Review 5.3.1 Action Lifespan and Time Horizons*		*Review 5.3.2 Sequencing and Lead Times*		*Review 5.3.3 Applying Triggers and Decision Points*	
Action Name	**In Place By**	**End Lifespan**	**Sequence**	**Lead Time**	**Trigger Needed**	**Decision Point**
Create/Update Local Hazard Mitigation Plan	2022	2027	A	12 months	No	No
Tidal Marsh Restoration	24" TWL	Ongoing benefits	A	12-18 months	No	No
Update General Plan	2025	Indefinite (~20 years)	A	12 months	No	No
Resilience Overlay Zones/Districts	Horizontal Levee	Indefinite (~20 years)	A	3 months	No	
Permitting	Horizontal Levee		A	2 years	No	
Convene Workshops	Immediate		A1	Before levee construction	No	
Horizontal Levee Study	Horizontal Levee		A2-	6 months	No	
Horizontal Levee Design	Horizontal Levee		A3-	6 months	No	
Levee Maintenance Program	Horizontal Levee	Horizontal Levee	A	1 month	Yes - Flooding or Social	Yes
Horizontal Levee/Ecotone Levee	36" TWL	72" TWL	A0	12-18 months to build	No	
Raise horizontal levees					Yes - Flooding or Social	Yes
Beach Nourishment	12" TWL	24" TWL	B		No	No
Submerged Aquatic Vegetation (Eelgrass)	12" TWL	Ongoing benefits	B		No	
Contaminated Lands/Soil Monitoring Program	12" TWL	36" TWL	C	6 months	Yes - Flooding or Social	
Soil contamination management coordination	12" TWL	24" TWL	C		No	
Elevate Infrastucture (railway)	42" TWL	84" TWL	D		Yes - Flooding or Social	Yes
Seek grant funding	Immediate		None		No	
Annual Budget	Immediate		None		No	
Contamianted site remediation	36" TWL				Yes - Flooding or Social	
Add horizontal levees					Yes - Flooding or Social	Yes

Operations | Capacity & Coordination | Funding and Financing | CREATE YOUR STRATEGIES | Example "Create Your Strategies"

Example from the ART Adaptation Catalog Example "Create Your Strategies" tab, which provides space to gather and organize adaptation actions and strategies, bundle and phase them over time, and even explore creating conceptual adaptation pathways diagrams.

Resources for Chapter 5: Bring Together Shared Solutions

RESOURCES AND FURTHER READING

5.1 Explore Actions to Meet Envisioned Futures

- Adaptation Strategies. National Oceanic and Atmospheric Association.
- Adaptation Strategies for Sea Level Rise. Environmental Resilience Institute. Indiana University.
- Adaptation Toolkit: Sea-Level Rise and Coastal Land Use. How Governments Can Use Land-Use Practices to Adapt to Sea-Level Rise. Grannis J. 2011. Georgetown Climate Center.
- Beyond Vulnerability Assessment: Moving from Sea Level Rise Adaptation Planning to Implementation in the San Francisco Bay Area. Clesi Bennett. California State Coastal Conservancy. September 2017.
- California Climate Adaptation Clearinghouse.
- Chapter 4. Adaptation Measures San Francisco Bay Shoreline Adaptation Atlas. San Francisco Estuary Institute and SPUR. 2019.
- Climate Adaptation Knowledge Exchange (CakeX).
- Coastal Adaptation Policy Briefs. Stanford Center for Ocean Solutions.
- MTC/ABAG Regional Housing Technical Assistance Tools and Resources. Metropolitan Transportation Commission and Association of Bay Area Governments.
- Phase 3: Define Adaptation Framework and Strategies (page 105). Adaptation Planning Guidance 2.0. California Governor's Office of Emergency Services.
- Resilience Playbook. Greenbelt Alliance.
- Sea Level Rise Adaptation Guide. Wetlands Watch.
- Step 6. Develop Responses. Adapting to Rising Tides (ART) Program Planning Process Design Your Project. San Francisco Bay Conservation and Development Commission (BCDC).
- Step 3. ACT: Identify and Prioritize Strategies. Regional Resilience Toolkit: 5 Steps to Build Large-Scale Resilience to Natural Disasters. Brechwald. et al. United States.

5.2 Bundling Actions into Strategies

- Adapting to Rising Tides (ART) Program Planning Process Design Your Project. San Francisco Bay Conservation and Development Commission (BCDC).
  - How-To Guide: ART Developing Adaptation Responses.
  - ART Subregional Adaptation Responses
  - ART Subregional Adaptation Responses Spreadsheet
- Capacity building on climate change adaptation. Climate ADAPT.
- Capacity Building. U.S. Climate Resilience Toolkit.
- Investing in Adaptation. ResilientCA.org.
- Financing and Funding Adaptation and Resilience Working Group. 2020. Prepared for the Connecticut Governor's Council on Climate Change.
- Paying for Climate Adaptation in California: A primer for practitioners. Prepared by AECOM for the Resources Legacy Fund.

5.3 Phasing and Sequencing

- Chapter 4. Adaptation Measures San Francisco Bay Shoreline Adaptation Atlas. San Francisco Estuary Institute and SPUR. 2019.
- Climate Resilience Design Guidelines. Resilient MA: Massachusetts Climate Change Clearinghouse.
- Guidance for Flood Risk Analysis and Mapping: Levees. December 2020. FEMA

Resources for Chapter 5: Bring Together Shared Solutions

- Hirschfeld, D., Hill, K.E., Plane, E. Adapting to Sea Level Rise: Insights from a New Evaluation Framework of Physical Design Projects. 2021. Coastal Management.
- Reducing Flood Risk to Residential Buildings that Cannot Be Elevated. FEMA P- 1037 / September 2015

5.4 Evaluating Tradeoffs and Making Decisions

- Adapting to Rising Tides (ART) Program Planning Process Design Your Project. San Francisco Bay Conservation and Development Commission (BCDC).
  - Step 7. Evaluate Responses
  - How-to Guide Developing Evaluation Criteria
- C40 Action Selection and Prioritisation (ASAP) resources.
- Cost Benefit Analysis Toolkit. FEMA
- Cost-Benefit Analysis for Sea Level Rise Adaptation Scenarios. 2018. ARCCA Learning Session.
- Integrating Ecosystem Values into Cost-Benefit Analysis: Recommendations for USAID and Practitioners. August 2018.
- Managed Retreat Toolkit. Georgetown Climate Center.
- Mardani et. al. 2015. Multiple criteria decision-making techniques and their applications – a review of literature from 200 to 2014. Economic Research. Volume 28 - Issue 1.
- Step 5. Evaluate tradeoffs and prioritize strategies. Sea Level Rise Adaptation Framework: A user guide to planning with nature, as demonstrated in Marin County. Point Blue Conservation Science and the San Francisco Estuary Institute. August 2019.

SELECTED EXAMPLES

- City of Santa Cruz Beaches: Urban Climate Adaptation Policy Implication & Response Strategy Evaluation Technical Report. June 2020. Prepared by the Central Coastl Wetlands Group at Moss Landing Marine Labs and Integral Consulting for the City of Santa Cruz.
- Alameda Climate Action and Resiliency Plan (CARP). City of Alameda. September 2019.
- Mission Creek Sea Level Rise Adaptation Study: Waterfront Strategies for Long Term Urban Resiliency. September 2016.
- Sea Level Rise Adaptation Strategy Report. January 2018. Prepared by Moffatt & Nichol for the City of Morro Bay.
- Sea-Level Rise Adaptation Plan Pacifica, CA. Prepared by ESA for the City of Pacifica.

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CHAPTER 6

Pathways Approach to Implementation

Chapter 6 supports advancing adaptation outcomes through appropriate plans, processes, and people with an approach for implementing next steps and monitoring over time.

Introduction | Navigating the Adaptation Roadmap

Chapter **1** Build Your Adaptation Roadmap

Chapter **2** Center People in Decision-Making

Chapter **3** Set Local Context and Sense of Place

Chapter **4** Shape a Shared Vision of the Future

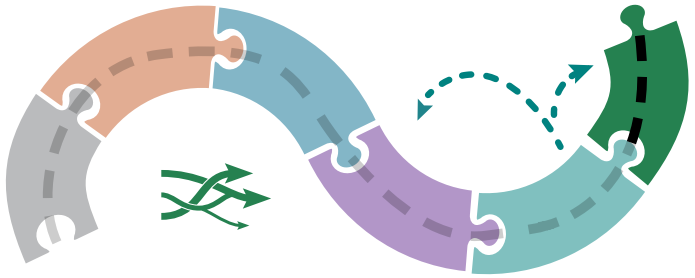
Chapter **5** Bring Together Shared Solutions

Chapter **6** Pathways Approach to Implementation

Wetlands supports a diversity of habitats for wildlife. Map data 2019 by Google Earth Pro.

Chapter 6

Pathways Approach to Implementation



What Will You Find in This Chapter?

Once a community-driven process has discussed, evaluated, and found support for adaptation strategies, **Chapter 6 lays out how the actions and strategies identified will be implemented across plans and processes and define who holds responsibility for implementing and monitoring over time.** This chapter should weave in various steps from earlier in the process, including:

- Connecting plans or projects identified from 3.1 Align Local and Regional Plans or Processes and 3.3 Environmental and Physical Characteristics to the appropriate avenues;
- Connecting local champions identified in Chapter 2, or anywhere in the process, to take implementation responsibilities;
- Applying triggers developed in 3.4.3 Triggers and Monitoring and 5.3.3 Applying Triggers and Decision Points

Who is This Chapter For?

The Core Team and Key Partners identified should take the lead on organizing the outcomes of this chapter, while Advisory Committee(s), Champions, and other engaged participants who want to be part of the implementation process can be included in the development of final materials, documents, and processes as part of a potential *Implementation Working Group*, or other longer-term process.

What Outcomes Will This Get You?

Download Workbook 6 to support Chapter 6 outcomes. These outcomes include:

- **Adopted Adaptation Plan** (or other document); and
- **Implementation Work Plan** with actions, roles and responsibilities outlined for government, communities, and stakeholders that includes the monitoring strategy integrated appropriately to prepare for changes over time.

In some ways, the end of this chapter signifies an ending – yet in many more ways, the end of this chapter is only a beginning. Our hope is that the Adaptation Roadmap helped set up relationships and processes for communities, governments, and stakeholders to remain involved in the ongoing process of adaptation and are more ready and prepared to take on the challenges of sea level rise ahead, together.

6.1 Link Strategies to Outcomes

6.1.1 Creating (Or Connecting To) Plans
6.1.2 Connecting Processes and Projects
6.1.3 Connecting People

6.2 Advance Near-Term Strategies

6.2.1 Implementation Work Plan
6.2.2 Order of Implementation
6.2.3 Sustaining Momentum

6.3 Prepare for Changes Over Time

6.3.1 Monitoring and Tracking
6.3.2 Reacting to Changes
6.3.3 Love Letter to the Future

6.4 Workbook 6

Download Workbook 6

6.4 Use Workbook 6 Outcomes

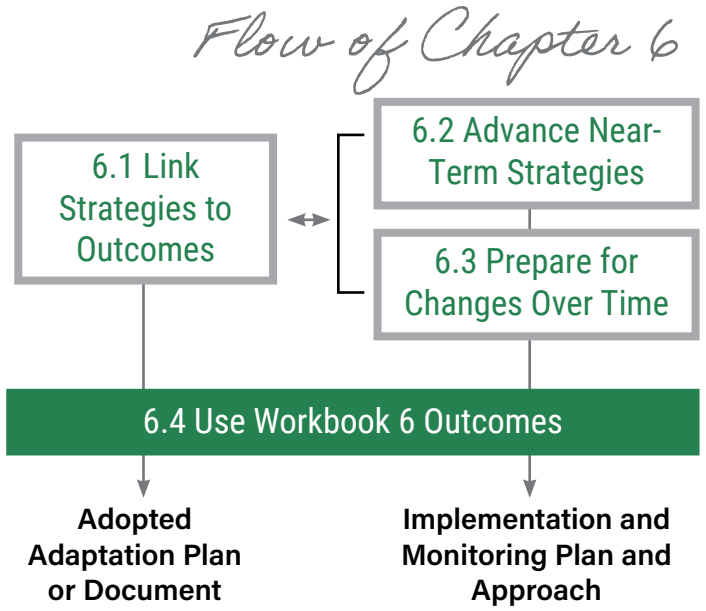


Figure 52 · Two Key Outcomes of Chapter 6. The first section supports having a final adaptation plan or document, while the second two sections support creating an implementation work plan and monitoring approach to respond to change over time,.

Checklist for Chapter 6

Is this chapter for you? Explore the following questions to navigate to where you need to go. See Chapter 6 outcomes in Figure 52.

- ✓ Have you documented your adaptation effort? > 6.1.1 Creating (Or Connecting To) Plans
- ✓ Have you identified and distributed responsibilities? > 6.1.2 Connecting Processes and Projects, 6.1.3 Connecting People
- ✓ Have you developed and prioritized an implementation approach? > 6.2.1 Implementation Work Plan, 6.2.2 Order of Implementation
- ✓ Have you considered how to keep participants engaged over time? > 6.2.3 Sustaining Momentum
- ✓ Have you established a monitoring and tracking approach? > 6.3.1 Monitoring and Tracking, 6.3.2 Reacting to Changes
- ✓ Have you made shared commitments to address our changing future? > 6.3.3 Love Letter to the Future
- ✓ Have you organized and documented next steps of implementation? > 6.4 Use Workbook 6 Outcomes

6.1 Link Strategies to Outcomes

This section will dive deeper into highlighting the importance of documentation and the types of plans that can be useful avenues for implementation, considerations for connecting actions and strategies to existing processes, and assigning responsibility to the appropriate partners and people. You can navigate to the details in each section below:

Use this Section to Advance Adaptation Outcomes

With adaptation actions and strategies identified and evaluated by communities and stakeholders from Chapter 5: Bring Together Shared Solutions, is it now time to disseminate and advance these actions and strategies through the appropriate avenues. This means including adaptation strategies outcomes in relevant plans and documents identified from 3.1 Align Local and Regional Plans or Processes, projects from 3.3 Incorporate Environmental and Physical Characteristics, and existing community and stakeholder processes from 2.3 Participation and Decision-Makings, as well as assigning the responsibility of different actions and strategies to partners and other responsible parties.

Downtown Napa along the Napa River. Photo by Jaclyn Perrin-Martinez.

The purpose of this step is to advance adaptation outcomes in ways that enable them to be most actionable and useful for implementation. This means considering what the most effective planning documents are for disseminating and directing this information, how to share adaptation outcomes through the right processes and connected to the relevant projects, and how to ensure that everyone involved in the next steps of implementation are aware of their roles and committed to the responsibilities ahead.

6.1.1 Creating (Or Connecting To) Plans

Where Do Adaptation Outcomes Live in Documents?

Plans are an important means to an end: getting adaptation actions and strategies in place. In 3.1 Align Local and Regional Plans or Processes you may have identified one (or more) plans that are relevant to sea level rise adaptation or that should use the same or complementary data that are aligned across multiple planning documents. Different plans have different purposes, goals, or even audiences, as well as different legal implications. In this section, we ask you to identify the planning documents for adaptation outcomes to be disseminated through in order for them to be actionable and enforceable (Box 51).

Use Worksheet 6A to describe how the adaptation effort will be documented and where adaptation actions and strategies will live.

Finalizing Where Information Goes

Will There Be a New "Stand Alone" Adaptation Plan or Integrated into Existing?

As discusssed in 3.1.2 Local Plan Alignment, it may be useful to have a stand alone plan in addition to integration across multiple plans to maximize the benefits different plans offer. For example, a stand alone plan can provide an overview of the planning process and strategies, while other plans such as the Safety Element of a General Plan can add the underlying legal basis for implementation. Linking to a Local Hazard Mitigation Plan (LHMP), Annual Budgets, or Capital Infrastructure Plan (CIP) can be ways to tie in funding critical sources.

What Information is Linked Across Integrated Plans?

Review your definition of plan *integration* from 3.1.2 Local Plan Alignment and update it as necessay as you consider what kind of information, as well as what level of detail, is appropriate across different plans. Having all actions and strategies exist in one place can improve coordination efforts across multiple implementors to more cleary communicate and track how various actions function as a cohesive adaptation strategy. At the same time, consider where information about the adaptation *process* will go that captures the community and stakeholder participant activities and *why* specific adaptation actions and strategies were selected so they can be referenced in future iterations.

What Could a Useful and Living Document Look Like?

With equity and accessibility in mind, this could be an opportunity to re-consider what a final "plan" or product looks and feels like for the different people who might use it. Huge documents with pages of technical information might sit on a shelf and doesn't invite communities to share and learn from it. Are there ways to create more palatable and easily updatable pieces of information that can be more easily shared and understood? It is also important to think about what we call these documents and the expectations that might come with those names. For some people, the word "plan" itself may elicit specific expectations of what the document is. Instead, it may be helpful to give a new name to a document that contains adaptation information. It is also essential to create useful documents that do not only "check a box," but are truly actionable and useful. Consider being creative with how the document (or plan) can be used. Is it a public facing document that is part of a communications strategy to ensure stakeholders understand the outcomes to expect in the coming years? Does it include a work plan for implementation (See 6.2 Advance Near-Term Strategies)? Refer to 2.4 Effective Communications for ideas on creating an documents with easily updatable components or sections to reflect the adaptive nature of planning over time.

Box 51 · Considerations for Where Adaptation Information Will Live.

6.1.2 Connecting Processes and Projects

How Are Strategies Integrated Into Existing Efforts?

Documenting the adaptation effort, knowing where the adaptation strategies live, and how they are connected to other planning documents is important. However, a plan(s) is not enough. *Plans are tools to achieve and direct desired outcomes.* Advancing adaptation strategies through the right processes and projects is often necessary to move efforts forward.

After the adaptation plan(s) or other documents are completed, it will likely be important to share these documents with a broader group of stakeholders, particularly decision-makers who need to support this work in order for it to move forward. It will also be important to consider if any of the coordination structures that were put in place for the purpose of creating the adaptation effort should continue to support implementation. Additionally, this is an opportunity to think through adaptation outcomes and ensure anyone with a potential role in adaptation is brought into the discussion as you move into the implementation plan in 6.2 Advance Near-Term Strategies.

Review guiding questions in Box 52 and consider how you might schedule and prepare for any appropriate meetings that need to occur in order to communicate the adaptation plan(s) and outcomes to the relevant stakeholders and decision-makers. Consider how adaptation outcomes can or should be linked to existing or new processes to facilitate conversations on implementation.

Use Worksheet 6B to document what processes need to be incorporated into the advancement of adaptation strategies.

Advancing the Right Processes

Does This Need to Be Presented or Adopted by a Government Board?

Cities or counties may be required to present the findings of the adaptation effort to a city council or a county board of supervisors, and/or formal adoption or "resolution" of the adaptation effort. Refer back to 2.3 Participation and Decision-Making and the decision points identified earlier in the process to see if this was already noted.

What Kind of Authorizations May be Needed by Decision-Makers to Be Able to Implement the Adaptation Plan?

Implementing adaptation strategies will likely require a shifting or allocation of resources and/or new funding and capacity for specific departments or teams. In order to develop an implementation plan in 6.2 Advance Near-Term Strategies, who needs to sign off on the adaptation strategies and allocation of resources? Consider what presentations need to make and/or what decisions need to be made for this to happen.

What Meeting Structures Need to Be Put into Place for Adaptation Planning Need to be Maintained for Ongoing Implementation?

Consider how you can build upon the community and stakeholder group structured identified in 2.3 Participation and Decision-Making and used throughout this adaptation effort. For example, if a new inter-departmental monthly meeting was established to share information related to this adaptation effort, it may be useful to continue using these newly established meetings to guide and support the next steps of implementation. Consider how you can build upon the capacity that has been developed during your adaptation effort.

Are There New Development or Infrastructure Projects that Should be Linked to the Adaptation Outcomes?

For example, if an adaptation plan identifies sewer maintenance upgrades, ensure that appropriate departments are brought into the conversation as adaptation strategies move to implementation so that the appropriate people can be part of the development of an implementation plan. Additionally, if any adaptation outcomes propose to adjust any major development or infrastructure projects, be sure that there is a line of communication available to engage with those groups.

Box 52 · Considerations for Aligning Relevant Processes

6.1.3 **Connecting People**

Who is Taking Responsibility for Implementation?

It was established earlier that a single sector – government, community, private businesses, etc. – *cannot solve these problems alone.* This is an important part of the process where individuals, organizations or entities that have been engaged in the adaptation effort since Chapter 2: Center People in Decision-Making, or anyone who has contributed solutions asked to step up and lead on implementation where it makes sense. **This is an important opportunity to assign and distribute shared responsibility of adaptation outcomes.**

In the next section 6.2 Advance Near-Term Strategies, we suggest building a work plan for implementation. However, in order to create that work plan, all relevant individuals who have a role to play in implementation should be involved in creating that plan and ensuring that their roles are then integrated in their own organization or entities processes (Box 53). In this section, we suggest engaging in more detailed conversations with individuals about what their roles may be. It may be helpful to consider creating an "Implementation Working Group" to facilitate this process.

Use Worksheet 6C to document how responsibility will be distributed to advance adaptation and what structures may be necessary to ensure effective coordination.

Distributing Responsibilities

Where Should Government Lead?

Identify which actions or strategies must be done by a local government. For example, land use or zoning changes, or government policies, will need to be done by the local government. However, there may be opportunities for other stakeholders or communities to support these efforts. Local government departments, individuals, and/or other stakeholder supporters should be identified here.

Where Should the Community Lead?

Identify which actions or strategies should be led by community based organizations or other relevant local groups. Ideally, community members and organizations who were involved in developing the adaptation outcomes provided input and details for local community adaptation actions. Local community groups, key partnerships, and/or other stakeholder supports should be identified. This may include school districts, local faith organizations, or other nonprofit community serving organizations (if they were not already involved).

Where Should the Private Sector Lead?

Businesses and others in the private sector also have a role to play in adaptation. Identify if there are any actions that private sector participants should lead and/or support. It may be that continued cooperation and collaboration are an important responsibility for private businesses while adaptation projects are developed. Additionally, it could be that private businesses take on actions that reduce their own energy use, engage in more sustainable businesses practices, and/or improve awareness and education to the business community on issues and solutions related to sea level rise adaptation.

Do you need to create a new "Implementation Working Group" or project team to lead the Implementation Plan and monitor implementation?

Adaptation is an iterative process, and it will be important to determine if the core team of the planning process should lead the implementation work plan development, or if a new working group or team should be established to facilitate this process. This is also an important step to ensure that engineers are most engaged so that the adaptation outcomes can transition from planning documents into shovel-ready projects.

Box 53 · Considerations for Assigning Implementation Responsibility

6.2 Advance Near-Term Strategies

This section will dive deeper into providing guidance on ordering prioritization for implementation, creating an implementation and work plan, and sustaining momentum in community and stakeholder engagement and participation. You can navigate to the details in each section below:

Use this Section to Initiate the Next Steps

With the completed adaptation documents, relevant city or council approvals and coordination, and identification of key responsible parties for implementation from 6.1 Link Strategies to Outcomes, this step is about deciding which actions can and should be advanced today and taking the appropriate steps to make the short-term actions happen.

The purpose of this step is to build an implementation work plan that lays out which actions need to be accomplished by which responsible parties, the timing of when these will happen, and any coordination or other relevant information that supports actions and strategies working together. If you created an "Implementation Working Group/Task Force", this step will provide guidance for how that group can create the work plan to advance adaptation outcomes.

Stakeholders identifying adaptation preferences and priorities to advance first in the Adapting to Rising Tides (ART) East Contra Costa study in 2019. Photo by Jaclyn Perrin-Martinez.

6.2.1 **Order of Implementation**

What Actions or Strategies Can and Should Move Forward Today/in the Immediate Term?

The purpose of using adaptation pathways is to lay out short, mid, and long-term adaptation strategies is to ensure that the actions taken today address current flooding risk, prepare communities and stakeholders for flood protection and consider and pave the way for mid and long-term strategies and future opportunities.

It may be true for your process that all actions listed as "short-term" that were evaluated and identified in 5.4 Tradeoffs and Decisions should move forward into an implementation plan. However, it may also be true that there is a priority and order to how short-term actions should be implemented and advanced.

This section is an opportunity to consider what actions from those developed and evaluated in 5.4 Tradeoffs and Decisions should be part of the implementation work plan (Box 54). These actions to be advanced and implemented first may be informed by the information gathered during the evaluation and tradeoffs conversation, political or funding opportunity, and/or other reasons.

Use Worksheet 6D to list the order of prioritizing implementation of actions and strategies and why.

Prioritizing Implementation

Low-Hanging Fruit Strategies That Are Easy to Implemenet

In some cases, there may be actions that can be implemented relatively simply, but require initiative to put it into action. These kinds of actions should likely be advanced in an implementation plan as they are "easy wins" that can be seen as tangible outcomes and help maintain momentum for adaptation planning.

Low Regret Strategies That Make Sense

In some cases, it may be true that certain actions should be done regardless of different long term future scenarios and/or don't limit different future options. Another way to think about "no/low-regret" strategies is to consider what actions can be justified by other economic, social or environmental reasons with or without the future hazard. For example, improving habitat connectivity in wetlands has benefits beyond flood protection and may be a good option for habitat biodiversity, water quality and local public access and recreation even without future sea level rise.

High Priority or High Momentum Strategies

During the evaluation, it may have become apparent that some actions are a high priority or particularly important, even if they may be more difficult to implement. If these high priority, important actions, or those with existing momentum need to occur soon in order to advance or unlock other actions, it may be important to include them in the implementation plan.

Require Long Lead Times

In reviewing the adaptation pathways diagram, it may become apparent that some actions for the short or mid-term actually require advanced lead time and steps should be taken soon to ensure these actions can be put in place at the right time to be effective. In this case, it may be important to include these in the implementation plan so that the appropriate next steps can occur.

Political or Funding Opportunities

Take advantage of opportunities that can support implementation of actions. Consider if any of the actions or strategies are supported by existing political or funding support and include them if appropriate.

Box 54 · Considerations for Prioritizing Actions and Strategies to Implement.

6.2.2 Implementation Work Plan

How Do These Actions Get Done?

The adaptation effort (or final document) provides a big picture view of adaptation across a local jurisdiction, community or shoreline. However, it likely does not include all the individual details that are needed to turn action and strategy concepts into real outcomes. It may also be helpful to consider the following section 6.2.1 Order of Implementation in tandem with this section to explore the prioritization of strategies in the implementation work plan.

An implementation plan should be developed around these priority actions and focus on key information needed to provide direction for the appropriate implementers and initiate action. Consider the key components from Table 12-1 and 12-2 when designing and implementation plan.

Create an implementation plan with appropriate partners and include relevant and key information. Ensure there is a commitment from the lead entity responsible for implementing and that the lines of communication are open and everyone has a realistic understanding of what they are being asked to do. An overarching coordination strategy may be necessary to ensure actions are carried out effectively by multiple different partners.

Use Worksheets 6G-6M to describe implementation details for actions and strategies.

Creating the Work Plan

	Section	Details
WHAT	**Name** *(Action or Strategy)*	Name the actions or strategies in a way that makes the most sense and resonate with the people who will be implementing it. Consider who is leading the effort and determine if actions should be listed individually or grouped together a strategy.
	Brief Summary	Provide enough detail so that someone unfamiliar with the process can have a broad understanding of what the action or strategy is. For example, a summary of the Horizontal Levee strategy may be as simple as: Construct a horizontal levee along the western shoreline between X and Y creek that will provide flood protection up to Z" TWL.
	Type	Include the adaptation action category and/or tool type to make it clear to those implementing or reviewing implementation to understand what type of action this is.
	Hazard(s)	if you conducted a multi-hazard approach, it may be helpful to include hazard(s) being addressed (if more than flooding/sea level rise).
	Links and Dependencies	Include details if the action or strategies are highly connected to other actions or strategies so that it's clear to those implementing how all of the pieces are interconnected. For example, a Horizontal Levee strategy may require a series of planning updates such as zoning or policy changes. Since these actions are likely going to be implemented by different individuals, it may make sense for them to be listed as separate actions, but linked to one another in their descriptions.
WHO	**Partners/ Support**	For each action or strategy identified, identify a lead department, program, or entity. Be as specific as possible. For example, instead of listing the "county," include the specific department(s). Ideally, those responsible for implementing are part of the development of this plan and can go further to identify specific programs or teams within departments that should be tasked to carry out this work.
	Coordination Structure	How will the responsible lead and partners work together, and work cohesively across other actions to implement? Determine what mechanism for coordination will be used among action or strategy implementation and across action or strategies themselves. For some complex actions or strategies, particularly if they are multi-jurisdictional, consider development of new coordination structures (refer to 2.3.2 Types of Participation Structures). Additionally, these new structures, such as a Joint Powers Authority, for example, may be an action itself. If so, identify and link strategies to illustrate important connections.

Table 12-1. Implementation Work Plan Components. Resources compiled from the Adapting to Rising Tides Planning Process, FEMA Resilience Toolkit, and Adaptation Planning Guidance 2.0.

Creating the Work Plan

HOW

Section	Details
Estimated Cost	If costing information is available, even at an order of magnitude level, be sure to include it. If possible, differentiate costing for additional planning, permitting or coordination versus construction and development costs (is applicable).
Funding	Funding and financing mechanisms should have been considered in the development of adaptation actions and strategies, and may be their own actions and strategies. List information related to how this action or strategy will be funded, even if it includes a funding or financing mechanism that is also part of the implementation plan.
Timing and Details	• Initiating/Coordination Meetings: When might the group need to first meet? Provide an estimated timeline if appropriate, as well as any notes of details. • Additional Stakeholder Engagement: If additional stakeholders or communities need to participate in the further development or implementation of this action, include details on who those groups are and how additional stakeholder engagement and participation will proceed. • Tentative Timeline for Implementation: Provide any estimated timelines for planning steps to implementation that may be needed.
Equity, Environmental and/or other Priority Issue Analysis	It may be important to include a note on how a specific action or strategy advances key issues or concerns raised by communities and stakeholders in the planning process. For example, advancing equitable outcomes means ensuring that implementation of actions are also done equitably.
Next Steps To Implement	• Feasible: What are the appropriate and realistic next steps to get this action moving forward? • Challenges/Roadblocks/Barriers to Overcome: Are there any anticipated challenges you see to moving forward? List roadblocks and ideas for addressing these preemptively. • Sources of Information: Is there any other important information that would help implementers with this action or strategy? For example, was specific data or research used in the development of the adaptation action that would be valuable for them to have (e.g. data sources, metrics, etc.). • Permits and Regulatory Agencies to Engage With: Identify and list which permitting agencies may be required (if appropriate) and consider how and when to engage with them. • Missing Information: Is there any information you need that is not currently available? How will this missing information be addressed in the next steps.
Phased Strategies/ Monitoring and Tracking	If this action or strategy is part of a series of actions that may be phased over time, include information on the relevant triggers or signals developed in 5.3 Phasing and Sequencing Strategies Connect this information to the Monitoring and Tracking plan/program recommended to be developed in 6.3 Prepare for Changes Over Time.
Other Relevant Information	This may include additional details that add important context to the action or strategy.

Table 12-2. Implementation Work Plan Components. Resources compiled from the Adapting to Rising Tides Planning Process, FEMA Resilience Toolkit, and Adaptation Planning Guidance 2.0.

6.2.3 **Sustaining Momentum**

How Should Participants Stay Involved?

The creation of the implementation plan that follows an adaptation plan or relevant documents is a huge success! It is the end of a major planning process and accomplishment. However, it is not the end of the work or engagement with communities and stakeholders. In many ways, the completion of an implementation plan is the start of a new chapter of adaptation focused on moving the strategies forward. Ideally, community and stakeholders leaders were identified in 6.1 Link Strategies to Outcomes and helped develop the implementation plan for actions that they should lead. In addition to sustaining coordination with actions or strategy implementers, it will also be important to continue keeping community and stakeholders groups informed about the progress of adaptation implementation.

Consider how the individuals who have been engaged in the adaptation planning process should continue to be informed and updated about adaptation progress outcomes. The following approaches in Box 55 may be useful to consider.

Begin with ideas and ultimately create a strategy for how communities and stakeholders will remain engaged in adaptation implementation. Keeping communities and stakeholder engaged may or may not have already been part of the adaptation actions and strategies outcomes. If so, this information may already be captured in the implementation plan. If it was not outlined in an action or strategy, consider how you intend to keep communities updates and if this information should be integrated as part of the implementation plan or if it should exist separately. If it is not part of the implementation plan, similar questions should be answered about who will lead this continued engagement, how it will be coordinated, and how it will be funded.

Use Worksheets 6E to list ideas for sustaining momentum with communities and stakeholders.

Keeping Communities Involved

Communications Campaign

If it is not already an adaptation action or strategy, it may be useful to consider how adaptation implementation and outcomes will be communicated to the public broadly. This strategy should build upon the information gathered throughout the process, particularly local stories from Chapter 3 and visioning from Chapter 4. Use 2.4 Effective Communications to ensure information is framed and communicated to specific audiences appropriately.

Website/Online Resources

If a website is already in place for the adaptation process, consider if a new design and/or section can be dedicated to updates and tracking projects. If a website was not created, this may be a useful addition as part of a communications campaign.

Community-wide Forums and Meetings

Depending on your community and stakeholders, it might make sense to continue providing updates at the existing forums or meetings that were used for the adaptation planning process. The frequency of meetings may be less, but this could remain an effective channel for ongoing updates and participation.

Sustained Partnerships or Smaller Project Focused Groups

It may make sense to break the participants into smaller groups who can engage and get updates on specific adaptation actions or strategies they are most interested in. Community and stakeholders champions and leaders should be tapped to support these efforts. While broad overall updates can help ensure people see overall progress, that level of detail may not be enough for those interested in the specific details of implementation.

Citizen Monitoring

Providing opportunities for communities to participate in citizen science by collecting or reviewing data can build local capacity. and help people get involved in solutions.

Box 55 · Considerations for Keeping Communities Involved.

6.3 Prepare for Changes Over Time

This section will dive deeper into key considerations for creating a monitoring and tracking program or strategy, identifying when to revisit program or strategy, and making shared commitments to continue this work together. You can navigate to the details in each section below:

Use this Section to Advance Adaptation Outcomes

At this point you will have completed a number of essential components for sea level rise adaptation. This includes:

- An **adaptation document** disseminated adaptation actions and strategies through multiple plans
- A **series of actions and strategies selected by communities and stakeholders** that reflect their concerns, priorities, and function cohesively to meet the shared vision and guiding principles
- Consideration of **timing, phasing, triggers and signals** to inform decision points and changes over time
- A **prioritized list of immediate and short-term actions** and strategies ready to be implemented with ongoing support from communities and stakeholders.

The final component is ensuring that the appropriate monitoring, tracking, and coordination structures are in place to be able to respond to and embrace changes as they come.

The purpose of this final section in the Adaptation Roadmap is to set yourself up for an iterative process that is responsive and adaptive to change. Various sections of the Adaptation Roadmap have been designed specifically to help create a monitoring plan and/or program that can track adaptation actions and strategies, and/or physical, governance or social conditions, such as 3.4 Frame Discussion for Uncertain Futures Using Adaptation Pathways, 5.3 Phasing and Sequencing, and 6.1 Link Strategies to Outcomes. Additionally, as part of this longer term monitoring effort, it will be important to build in commitments for review and ensure that the work is transparent so that people can stay engaged and informed about adaptation outcomes and opportunities over time.

6.3.1 Monitoring and Tracking

How Do We Know When to Intervene and Make New Decisions?

One of the most exciting and promising uses of the adaptation pathways approach is the development and use of triggers and decision points to inform when important decision points are reached. These serve to alert individuals or entities to an opportunity to review and revisit the adaptation actions or strategies and consider how to move forward.

Triggers and its associated monitoring were initially introduced in 3.4 Frame Discussion for Uncertain Futures Using Adaptation Pathways, which should have been further identified and refined in 5.3 Phasing and Sequencing, and ultimately reviewed, decided upon and advanced by communities and stakeholders in 5.4 Tradeoffs and Decisions.

In 6.1 Link Strategies to Outcomes, and 6.2 Advance Near-Term Strategies, short-term or immediate term actions were identified and outlined in an implementation plan. In this section, use the previous information outlined above to inform a longer term strategy, plan, and/or program to ensure these triggers are appropriately monitored and utilized as part of the adaptation outcomes. See considerations in Box 56.

Due to the relative novelty of the adaptation pathways approach to addressing climate change and the experimental use of triggers, this information represents guidance on what we believe are important considerations. However, we encourage innovative thinking and new ways to address the issues identified and/or organize a monitoring and tracking program to be responsive and effective.

The use of new and emerging technology may be especially useful, such as data dashboards or other automated systems. Given the complexity of sea level rise adaptation planning, new methods, technology, and infrastructure will likely be needed and this monitoring guidance is expected to change and be updated as more local jurisdictions and communities explore new ways to advance adaptation pathways.

King Tides impact the Lucy Evans Baylands Nature Interpretive Center, Palo Alto. Photo courtesy of California King Tides Project.

Develop a plan, program or system that effectively monitors, measures and tracks metrics associated with triggers and signals, and identifies how to respond once a trigger or signal is reached. Consider if this plan or program should be part of the implementation plan developed in 6.2 Advance Near-Term Strategies and what resources and capacity are available to do this work. Additionally, it will be critical to ensure the appropriate coordination and communication are in place to ensure this information can be used to inform critical decision points to advance the adaptation pathways approach.

Use Worksheets 6F and 6G-6M to list key information needed for development a monitoring plan, strategy, or program.

Creating A Monitoring Approach

Using Triggers

Review information identified from 5.3 Phasing and Sequencing Strategies and chosen to be advanced in 5.4 Tradeoffs and Decisions to understand what is being measured and monitored baaed on the actions and strategies to be advanced, including short, mid, and long-term actions, as well as any triggers and signals developed. What kind of information is required to measure the trigger or signal? Are the trigger and signals developed across advanced actions similar or different? Look for any patterns or areas of overlap, for example, if two different actions and strategies are informed by a similar metric, such as an increase in water levels as measured by a tidal gauge, note where those similarities exist. It may be helpful to group triggers and thresholds by category to make it easier to understand what kinds of things need to be measured.

Equipment, Infrastructure and/or Capacity

Determine if the equipment, infrastructure and/or capacity to measure and monitor exists, is sufficient, or needs to be created. Depending on the details of the trigger and/or signal, there may be missing infrastructure and/or capacity in place. For example, there may not be a local tide gauge available to measure water levels. Instead, there may be a tide gauge located some distance away. This is an important opportunity to consider if that tide gauge is sufficient at this point or if there should be investment in local infrastructure. If so, review the implementation plan in 6.2 Advance Near-Term Strategies and consider including action to advance effective monitoring.

Focus on Short-Term Actions and Strategies

While 5.4 Tradeoffs and Decisions includes actions and strategies for the short, mid, and long-term, it will be important to focus resources and effort on ensuring the appropriate infrastructure, capacity and/or resources are in place for the actions identified in the short-term through the implementation plan.

Responsible Entities

Refer back to 6.1.3 Connecting People to identify who will be responsible for monitoring, measuring and tracking triggers. Depending on the details of the triggers, responsibility may fall one or two entities, organizations or government departments, or it may be distributed among many different stakeholders.

Coordination

Determine coordination and structure of monitoring and tracking efforts. How will information be coordinated and communicated to the appropriate implementers and connected to the overall adaptation implementation plan? Is this effort a strategy, plan, and/or program, is it an annex to or part of the implementation plan, and how will it be resources and/or funded?

What To Do When Trigger is Met

Know who to contact if a trigger or signal is met. Ensure the monitoring and tracking plan or program includes clear instruction for what to do once a trigger or signal is crossed. Are coordination and channel of communication clear? Will it be clear who to inform even as things change over time? While you don't have to have all the answers for what to do when a trigger or signal is crossed today, it may be helpful to outline a potential approach for who might be involved and what it would look like for a group of stakeholders to come together in light of a trigger or signal being crossed. For example, you may outline that in the event of a trigger such as a tidal gauge measuring a specific water level value, individuals from specific government departments and/or stakeholder groups should be alerted to forming a working group to evaluate new information and determine if any new course of action should be initiated. In the event that a more comprehensive decision needs to be made, such that it changes the direction or the adaptation pathway outlined or is significant enough that it requires community and stakeholder review, an new planning process should commence to meet the new challenges.

Box 56 · Considerations for Monitoring and Tracking Adaptation Strategies.

6.3.2 **Reacting to Changes**

When and How Should This Information Be Reviewed and Updated?

Maintaining momentum for monitoring and tracking information over time can be difficult as people are often drawn to new or exciting projects. In order to build iteration into the final outcomes of the adaptation process, it may be helpful to develop a timelines for periodic review, re-evaluation and potential reiteration or adjustments of the adaptation actions and strategies implementation and/or monitoring plan. This time interval can be coupled with language on triggers, signals and unforeseen opportunities. Consider the following information in Box 57 for review.

For example, Foster City Levee Improvements Project included in their adaptation plan that the project will be reviewed every five years or when a trigger is crossed, whichever comes first.

It may be helpful to include language in the adaptation, implementation, monitoring and/or other relevant plans that commits to regular review and reevaluation of the adaptation actions and strategies. This information may be most appropriate in an implementation and/or monitoring plan because it provides a specific process for how to advance the adaptation outcomes identified in the adaptation plan or relevant documents. It is tied to the monitoring above and should be coordinated and integrated appropriately.

Use Worksheets 6G-6M to incorporate key considerations for monitoring and tracking approach.

Re-visiting the Approach

At Least Within Specific Time Interval

It may be helpful to include language within the adaptation, implementation and/or monitoring plan(s) that provides a time interval for review and re-evaluation. This time horizon may be chosen at specified intervals or based on associated timelines for adaptation. It may be useful to strategically identify a time horizon that corresponds to adaptation implementation to align with significant steps in the implementation project. For example, if the lead time for a horizontal levee to be constructed is three years, consider a three year time interval that would strategically time the review of the adaptation outcomes with significant construction projects and other progress on adaptation implementation.

When Trigger/Signal Is Reached

Discussed in detail in the section above, it may also be important to include language on reviewing and revisiting adaptation actions and strategies when one (or more) triggers are reached. It may also be worth mentioning if specific triggers or signals would initiate an overall review of the adaptation implementation or if a certain number of triggers or signals would need to occur to initiate a review process. This will likely depend on what specific triggers and signals were identified and how that information might inform or change future strategies in the adaptation pathway.

Opportunistic

In creating a flexible process, it may be helpful to include language that states the adaptation implementation and monitoring can be reviewed if there is political will or other important opportunity that warrants a review.

Outline Review Process

Once the periodic review, trigger crossing and/or opportunity selected above occurs, outline what the "review" process might look like. Who is responsible for initiating this review? Who will do it? What information needs to be reviewed? Is there a report or assessment that should be provided to document how actions and strategies are progressing or where they are in terms of triggers or signals monitoring? How will information be made and communicated in a transparent way? Who needs to be informed when these reviews happen?

Box 57 · Considerations for Reviewing Monitoring and Tracking Approach.

6.3.3 **Love Letter to the Future**

You Have Your People, Strategies, and Plans – What's Next?

You did it! Having followed the broad strokes of the Adaptation Roadmap and tailoring it to your local jurisdiction, community and stakeholder values, you have hopefully completed an adaptation effort resulting in the creation of one or more integrated plans or documents with forward looking shared visioning, one or more sets of strategies and approaches to meet communities visions and core principles, improved capacity within government, communities and stakeholders to remain active participants in the future of their communities, and next steps to take action as well as prepared to adapt to changes over time.

This last and final section is brief: we encourage you to come together with your communities and stakeholder, core team, key partners, and those you've met along the way to make a key commitments looking forward.

In the example to the right, we suggest some ways you can make shared commitments together. Use these statements, or tailor them to suit your needs. Either way, you are all in this together, and your future depends on the ability to turn shared challenges into shared opportunities.

> Use Worksheets 6N to create your own shared commitments.

We wish you the best of luck on your adaptation journey together. Please let the Adapting to Rising Tides program know how the Adaptation Roadmap has supported your work so we can continue to advance efforts in this field together!

Shared Commitments

A commitment to move forward, together, with intention and integrity to advance the actions and strategies that maintain the core values and principles built from the community and stakeholder visioning. We must acknowledge the historic imbalance of power, that past decisions have created the inequities that exist today, and only through conscience intention and action can we change the future for the better. To do so requires an understanding that we must continuously learn and grow as we work together to transform our systems to be equitable for all.

A commitment to honest, transparent, and collaborative dialogue. Adapting to sea level rise will challenge relationships between people, economies, infrastructure, ecosystems, and society in new and uncomfortable ways. The decisions we will make today and in the future may not always be easy. Yet if we commit to looking at new information and decisions as opportunities for positive change, we can continue to find creative solutions together.

A commitment to flexibility, reflection, refinement, and the courage change as we move forward. A shared recognition that we do not have all the answers today, yet today we can take actions that prepare future generations and decision-makers with more opportunities instead of less. It is a commitment to continue building trust among different sectors of society to advance shared benefits and take on these shared challenges, and opportunities, together.

Download Workbook 6

6.4 Use Workbook 6 Outcomes

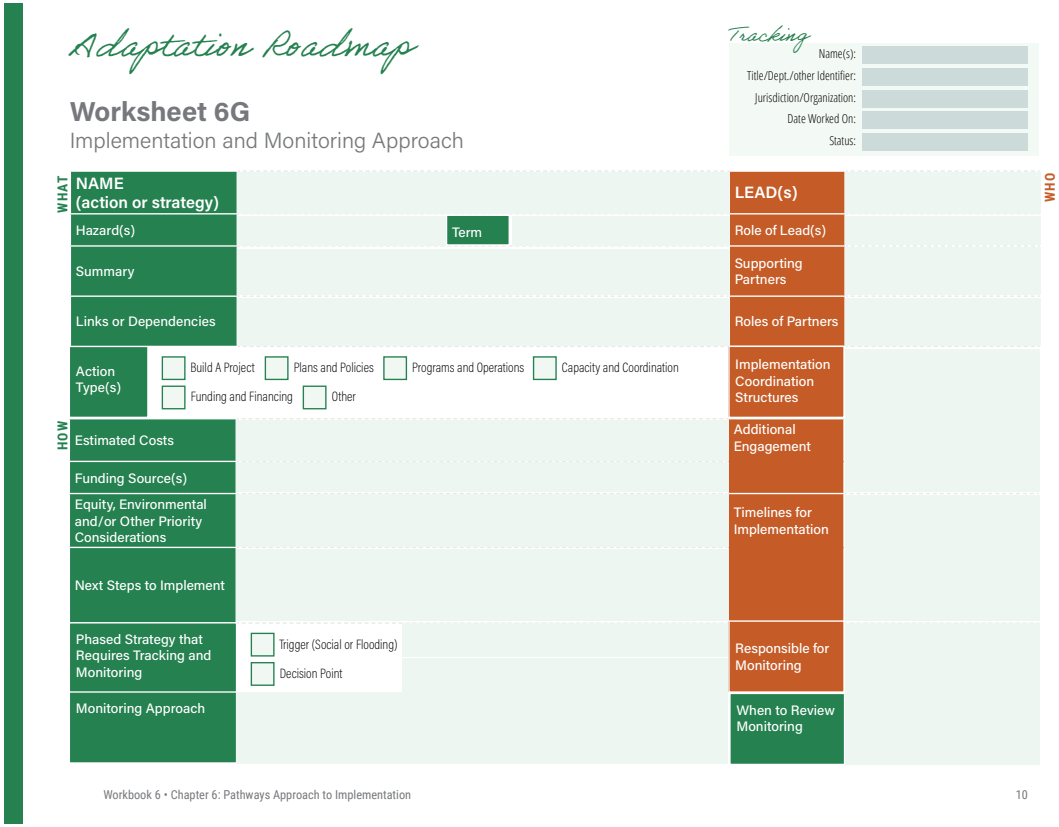
ADVANCE AND IMPLEMENT ADAPTATION

This final chapter is about advancing the selected adaptation strategies from Chapter 5 through the appropriate avenues, including appropriate plans, people, and processes.

Three key outcomes of Chapter 6 include:

- Documentation of the adaptation effort, either within a stand alone climate adaptation "plan," distributed across plans, and/or described in another type of document (WORKSHEET 6A)
- Implementation and Monitoring Approach that reflects how to advance the first set of necessary actions or strategies identified and selected from Chapter 5 and the appropriate triggers, signals, and/or time intervals, as well as the appropriate people, to come together to monitor and reassess adaptation efforts over time (WORKSHEETS 6G-6N)

Your documentation and implementation and monitoring approach should used as you advance the strategies from Chapter 5. Re-visit these as needed to ensure you are adapting to changing conditions.



Example of Worksheet 6G, which provides space to bring together multiple pieces and articulate the Implementation and Monitoring Approach used to advance the adaptation actions and strategies identified in Chapter 5.

Resources for Chapter 6: Pathways Approach to Implementation

Resources and Further Reading

6.1 Linking Strategies to Outcomes

- Coastal Plan Alignment Compass. National Oceanic and Atmospheric Association, U.S. Geological Survey, California Coastal Commission, California Governor's Office of Emergency Services, California Governor's Office of Planning and Research, California Ocean Protection Council, California State Coastal Conservancy, Federal Emergency Management Agency.
- Step 8. Advance Options. Adapting to Rising Tides (ART) Program Planning Process Design Your Project. San Francisco Bay Conservation and Development Commission (BCDC).

6.2 Advancing Near-Term Strategies and 6.3 Preparing for Changes Over Time

- Design Your Project: 8 Advance Implementation Options. Adapting to Rising Tides (ART) Program Planning Process Design Your Project. San Francisco Bay Conservation and Development Commission (BCDC).
- Phase 4: Implement, Monitor, Evaluate, Adjust (Page 131). Adaptation Planning Guidance 2.0. California Governor's Office of Emergency Services.
- Step 3. Act Develop Implementation Plans, and Appendix B Step 3 ACT Worksheets and Tools. Regional Resilience Toolkit: 5 Steps to Build Large-Scale Resilience to Natural Disasters. Brechwald. et al. United States

King Tides impact the shoreline at Jack London Square in Oakland, California.. Photo courtesy of California King Tides Project.

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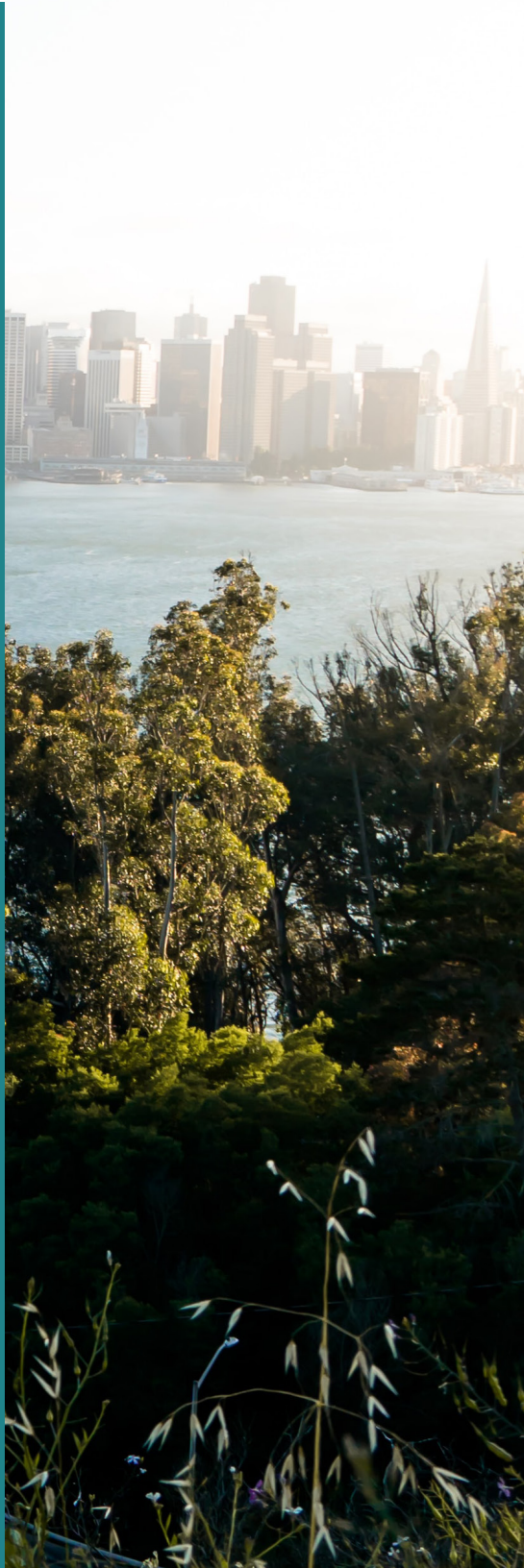

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