

University of San Diego

**Digital USD**

---

San Diego Regional Climate Collaborative

The Nonprofit Institute

---

6-2023

## **San Diego Region Coastal Resilience Roadmap**

San Diego Regional Climate Collaborative

Resilient Cities Catalyst

CivicWell

Follow this and additional works at: <https://digital.sandiego.edu/npi-sdclimate>

---

# **SAN DIEGO REGION COASTAL RESILIENCE ROADMAP**





**1**

**INTRODUCTION 2**

Letter from Director, San Diego Regional Climate Collaborative ..... 3

Executive Summary ..... 4

Roadmap Intent & Purpose ..... 7

Introduction to Coastal Resilience ..... 8

A Region Defined by the Coast ..... 10

The San Diego Region’s Shocks and Stresses, and Resilience-Building Opportunities ..... 12

Implementation and Tracking ..... 20

**2**

**SUMMARY OF ANALYSIS AND ENGAGEMENT 22**

Roadmap Development ..... 24

Network Analysis ..... 26

Literature Review ..... 28

Communications and Engagement ..... 29


**3**


**PRINCIPLES AND GOALS 32**


Roadmap Structure ..... 34


Underlying Theme: Equity & Accessibility ..... 36


How to Read an Action ..... 37

<b>PRINCIPLE 1</b>	Support and Connect Empowered Partners throughout the Region to Lead the Way in Driving towards Collective Goals	38	
--------------------	--	----	---

<b>PRINCIPLE 2</b>	Increase Biodiversity of San Diego’s Coastal Ecosystems	56	
--------------------	---	----	---

<b>PRINCIPLE 3</b>	Design and Build Infrastructure to Strengthen Coastal Resilience across the San Diego Region, including in both Coastal and Inland Communities	70	
--------------------	--	----	---

<b>PRINCIPLE 4</b>	Model Tools for Understanding Risk, and Test Solutions that Mitigate Vulnerability to Future Hazards while Increasing Community Preparedness	86	
--------------------	--	----	---

<b>PRINCIPLE 5</b>	Grow an Innovative, Equity-Driven Climate Economy through Workforce Development, Capacity Building, Policy, and Systems Change	98	
--------------------	--	----	---

<b>PRINCIPLE 6</b>	Center Approaches to Community Resilience Around the Persistent Confrontation with Loss and Trauma in Living with Changing Coastal Landscapes	110	
--------------------	---	-----	---

Endnotes ..... 122

**CHAPTER 1**

# **INTRODUCTION**

# LETTER FROM DIRECTOR, SAN DIEGO REGIONAL CLIMATE COLLABORATIVE

The impacts of our changing climate have been making headlines for more than two decades. San Diegans are no stranger to these ever strengthening impacts, experiencing some of the state's largest and most catastrophic wildfires in 2003 and 2007. These events catalyzed our region into early action. As early leaders in addressing climate change, we have executed countless examples of innovative, bold action to reduce polluting carbon emissions and build more climate-resilient communities.

While we have a strong foundation to build upon, we now face an urgent need to do more. Many of the challenges our coastal and inland residents face are being addressed through discrete and siloed efforts. The San Diego region is not unique in this respect—coastal cities everywhere struggle with this continuously evolving challenge, and more particularly, with converting plans into concrete actions that reduce vulnerabilities and build resilience. To continue adapting successfully to an ever changing future, we must elevate coordinated solutions and implement projects that directly address inequities and promote shared prosperity in a way that works with nature, not against it.

Enhancing our region's resilience to climate-driven impacts along our coastline will not only protect San Diego's biodiverse ecosystems, but will also support the long-term economic livelihood of our communities. By working collectively, and ensuring that coastal resilience projects are designed, financed, and built through our work together, we can continue to ensure a high quality of life for all San Diegans.

Over the past decade, academia, business, government, nonprofits, and philanthropy have come together to invest in and build localized scientific and technical expertise to guide cities and public agencies in an increasingly comprehensive effort to plan for and act on climate change. We also have begun to take important steps to address the historic and compounding disparities that have resulted in significant inequities. Partners across our region have continued to entrust the San Diego Regional Climate Collaborative (SDRCC) with the role of serving and leading as a regional convener and research partner. Many of these dedicated and committed partners played an essential role in developing this Roadmap, which aims to uplift and amplify their work. We are hopeful that this document will serve as an anchoring next step in driving towards an even bolder next phase of climate leadership, setting forth a call for continued action among multi-sector partners across our region.

Now is the time to advance catalytic actions, such as those outlined in this Roadmap, that work collectively in partnership with nature and our communities and are grounded in an equity-first approach.

Together, we are prosperous and resilient.



*Darbi Berry*

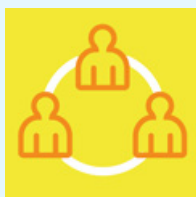
## EXECUTIVE SUMMARY

We are living in unprecedented times as we experience the global confluence of climate change, growing social inequities, and increasing affordability challenges. In the San Diego region, and across California, we are already witnessing the impacts of climate change through more extreme coastal flooding, more severe wildfires, and intensified heat and drought. No one city or agency can adequately face these challenges alone. With this Roadmap, our region is taking the next step forward in responding.

Over the last decade, San Diego has worked as a collective and developed one of the most comprehensive regional understandings nationwide of our polluting emissions and the projected impacts of climate change. Academia, government, nonprofits, businesses, philanthropy, and communities have come together to invest in and build localized scientific and technical expertise to guide cities and public agencies in an increasingly comprehensive effort to plan for and act on climate change.

As communities across the region grapple with how to plan for greater risk and damages as a result of coastal flooding, annual storm surges, king tides, and other shocks and stresses, there is growing recognition of the need to strengthen our collaboration across jurisdictions and across sectors. Through 6 Principles, 30 Goals, and 76 specific Actions, this Roadmap aims to amplify tangible opportunities to implement aligned multi-benefit projects that address our region's most urgent shocks and stresses. This Roadmap is grounded in equity, with an approach that considers the region's holistic social-ecological coastal system and fosters a regional capacity to transform and become more resilient.

The Roadmap is reflective of our regional system—one of individuals, projects, initiatives, and aspirations—aimed at fostering a thriving, more connected future. Developed through analysis of existing planning efforts, surveys, focus groups, dialogues, and intentional partnerships, this Roadmap serves as an aligned agenda for partners across our region, and spans six Principles:



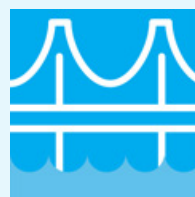
### Principle 1

Support and Connect Empowered Partners throughout the Region to Lead the Way in Driving towards Collective Goals



### Principle 2

Increase Biodiversity of San Diego's Coastal Ecosystems



### Principle 3

Design and Build Infrastructure to Strengthen Coastal Resilience across the San Diego Region, including in both Coastal and Inland Communities

Actions set forth within these Principles are not exclusively focused on achieving outcomes for natural, ecological systems, nor are they focused solely on economic or social impacts—rather, each Action drives towards multiple benefits. These Actions showcase how partners across our region can and will continue to lead the way across a diverse set of initiatives, ranging from expanding an incubator to support the growth of blue-economy startups, to piloting new insurance models, to integrating multiple benefits into the Imperial Beach Bayshore Bikeway corridor, to increasing coordinated philanthropic commitments into community-driven resilience projects across our binational region.

For centuries, our region’s 70 miles of coastline have shaped residents’ identity, economy, and way of life—and San Diegans have a track record of protecting this essential natural asset. Regional leaders came together over a decade ago to establish the San Diego Regional Climate Collaborative (SDRCC) in response to the growing need for collective and collaborative climate action. Since then, SDRCC has facilitated peer-to-peer networking, information sharing, and partnerships among our region’s local jurisdictions, public agencies, and other partners to catalyze and to strengthen regional action on climate change. Confronting our current and future challenges will require partners across San Diego to expand and build upon this history of leadership. With this Roadmap as a guiding framework for bolder continued action, we now must work together in implementation. By coming together as partners representing diverse sectors and communities across our region, we can meet the challenges we face in this urgent moment and build a more resilient San Diego for future generations.

**Confronting our current and future challenges will require partners across San Diego to expand and build upon this history of leadership.**



**Principle 4**

Model Tools for Understanding Risk, and Test Solutions that Mitigate Vulnerability to Future Hazards while Increasing Community Preparedness



**Principle 5**

Grow an Innovative, Equity-Driven Climate Economy through Workforce Development, Capacity Building, Policy, and Systems Change



**Principle 6**

Center Approaches to Community Resilience around the Persistent Confrontation with Loss and Trauma in Living with Changing Coastal Landscapes





# ROADMAP INTENT & PURPOSE

Our Roadmap, a strategic plan, aims to facilitate accelerated action for coastal resilience projects and investments that prioritize benefits to underserved communities in the region. As communities across the region grapple with how to plan for greater risk and damages as a result of coastal flooding, annual storm surges, king tides, and other shocks and stresses, there is growing recognition of the need to strengthen interjurisdictional collaboration. This Roadmap aims to amplify tangible opportunities to align regional climate action planning efforts through the implementation of policies and projects that demonstrate measurable benefits in reducing vulnerabilities to local climate change impacts—while avoiding the potential negative impacts of misaligned or locally-specific planning that lack regional coordination.

Jurisdictions and entities across the region have been engaged directly in questions of resilience and climate change for more than a decade—in many cases, leading the way. However, numerous studies, local planning efforts, and governing documents reveal various partners tackling the shocks and stresses that residents face on a city by city basis—elevating a critical opportunity to strengthen alignment and coordination and, ultimately, lead to implementation of multi-benefit projects that build regional resilience.

**By aligning planning goals on a regional scale, this Roadmap aims to foster multi-jurisdictional resilience through coordinated planning that leads to high-impact initiatives and projects.**

By aligning planning goals on a regional scale, this Roadmap aims to foster multi-jurisdictional resilience through coordinated planning that leads to high-impact initiatives and projects. Through specific Principles and Goals, this Roadmap elevates and outlines comprehensive, practical, and tangible pathways to build multi-sectoral consensus around a high-level vision, and delivers a set of prioritized actions to guide implementation for decades to come.

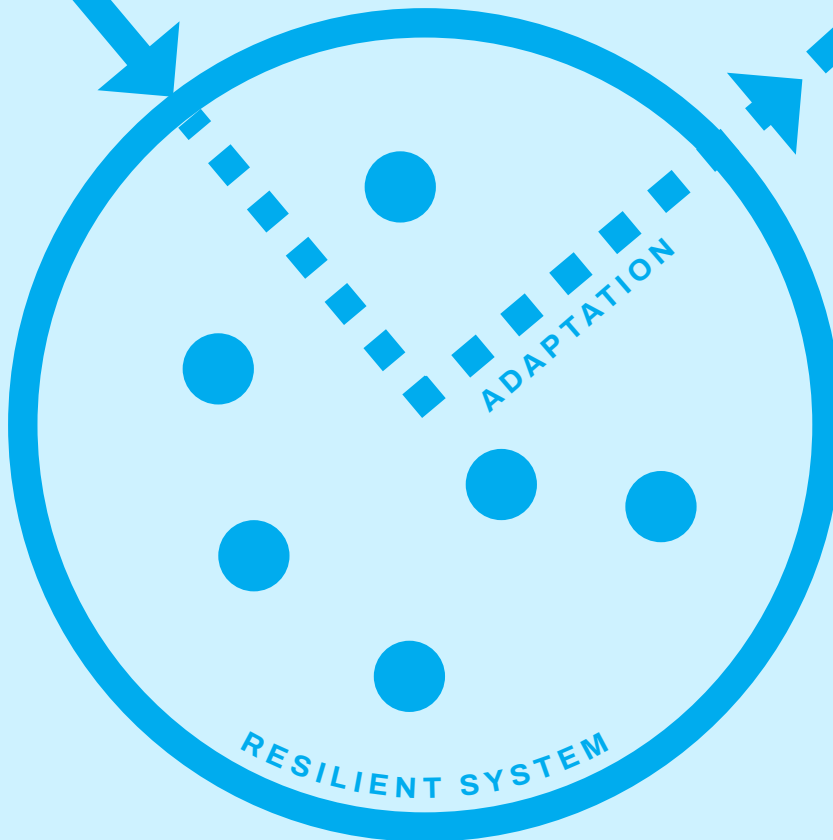


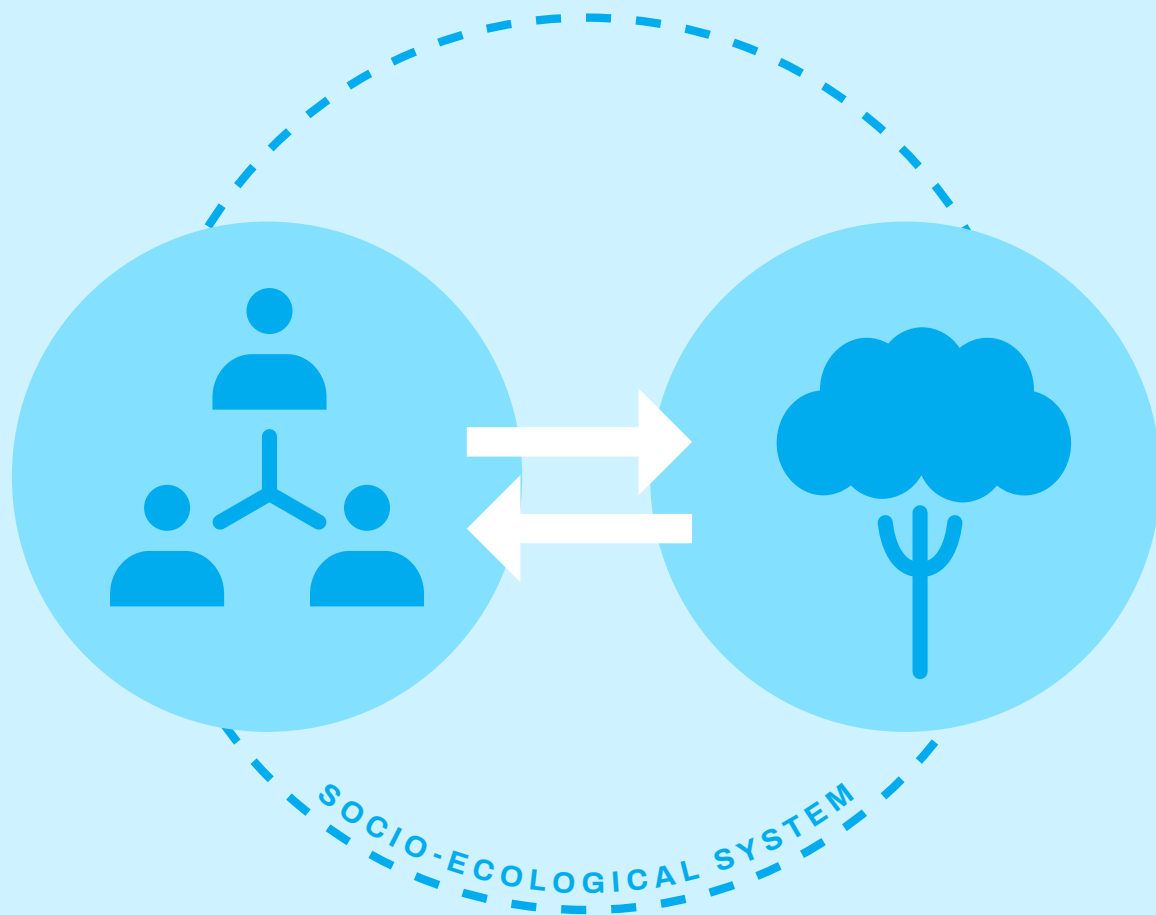
## INTRODUCTION TO COASTAL RESILIENCE

Resilience is the capacity of any system—an organization, a municipality, or an ecosystem—to survive and thrive in the face of current and future challenges. Resilient systems generally demonstrate common qualities, including the ability to absorb and distribute impacts following a crisis in ways that allow the system to keep functioning; to adapt by reconfiguring over time to accommodate changing environments; and even to transform, fundamentally changing when conditions require.

SHOCK

REBOUND





This Roadmap features Actions that build the resilience of San Diego’s coastal system by fostering these qualities. In addition, we think about our coastal system holistically, as a “social-ecological system,” where human and natural systems interact and develop over time, with interdependencies and conflicts.<sup>1</sup> Therefore, Actions set forth in this Roadmap are not exclusively focused on achieving outcomes for natural, ecological systems, nor are they focused solely on a set of human infrastructure outcomes—rather, each Action drives towards multiple benefits. We have identified six principles of coastal resilience, which, taken together and centered in equity, lay the foundation for resilient coastal communities across the San Diego region.

The principles, grounded in themes ranging from governance to biodiversity to infrastructure, reflect this holistic understanding, which we see as necessary to build absorptive, adaptive, and transformative capacities necessary to build resilience.

Given the San Diego coastal system’s complex and dynamic nature, multiple owners and agents are ultimately responsible for driving a coastal resilience agenda. Taken together, however, and by establishing a unified and coordinated framework, the Actions outlined in this Roadmap will increase the capacity of communities across the region to absorb and accommodate shocks, to adapt over time to accommodate change, and to transform through innovation to develop fundamentally new ways of organizing human and natural systems in this liminal environment.

## A REGION DEFINED BY THE COAST

Our region boasts a stunning 70-mile coastline that currently spans 10 cities and encompasses a broad array of coastal dune, beach, wetland, and lagoon habitats. The history of our connection to the region's coastal assets is a challenging one. Before colonization, the Kumeyaay, Luiseño/Payónkawichum, Cahuilla, and Cupeño/Kuupangaxwichen people utilized and stewarded San Diego's natural coastal resources and land for millennia.<sup>2</sup> Today, San Diego's indigenous people have only 500,000 acres of their original 8.5 million acres of land, none of which includes access to the coast.

**We think about our coastal system holistically, as a “social-ecological system,” where human and natural systems interact and develop over time, with interdependencies and conflicts.**

In addition to natural resources, the San Diego coast today contains major transportation arteries, including Amtrak rail lines and highways, seven major military installations, State parks and marine protected areas, and water and energy infrastructure including power plants and desalination plants. Jurisdictions and entities across the broader San Diego region include 18 cities, the County, 18 federally recognized Native American reservations represented by 17 tribal governments, and numerous special jurisdictions such as the Port of San Diego, the San Diego Association of Governments, the San Diego Regional Airport Authority,

and the United States Navy: all with deep connections to and an invested interest in our coastline. The region straddles an international border which supports a vibrant binational region where ecosystems, the economy, and communities are connected across the United States-Mexico border.

Besides creating the opportunity to connect residents to world-class natural assets, the region's coastline helps to define local culture, with surfing and coastal recreation activities underpinning daily life for many San Diegans. Major commercial and industrial properties are located on the waterfront, including the Port of San Diego, and industries responsible for significant employment and economic activity, including tourism and defense, are linked to our coast.

While our region's coastline is critical to the region's prosperity and quality of life, it is also increasingly vulnerable to rising sea levels, coastal storm events, erosion, and beach pollution. Day to day, the region's beaches and coastal cliffs are slowly eroding, driven not only by sea level rise but also by human impacts on the watershed, such as damming and urbanization, that have reduced sediment yield and natural beach nourishment. Beyond slowly narrowing the low-lying beaches and coastal ecosystems that have come to define life in the region, erosion has resulted in landslides and cliff failures that have tragically caused injuries and even deaths.

Fortunately, San Diegans have a track record of protecting and restoring the coast as an essential natural asset core to our region. Confronting our current and future challenges will require partners across San Diego to expand and build upon this history of leadership.

# Coastal Typologies across the San Diego Region

San Diego's dramatic coastal geology provides space for a range of coastal ecosystems.

## 1 UNDEVELOPED BEACH

While many beaches are directly adjacent to residential or commercial districts with little space for movement, there are still some larger coastal spaces that have been preserved from impacts of urban development. Many are managed by public entities, including State and Federal agencies whose primary focus is public access and ecosystem management.

OCEANSIDE

CARLSBAD

1

2

ENCINITAS

## 2 BLUFF-BACKED BEACH

Dramatic sedimentary bluffs rising 80-120 feet-high line stretches of the San Diego coast. Many sandy beaches along these stretches have narrowed as a result of development and sea level rise. In many cases, cities have allowed development all the way up to the bluff's edge, leaving little room for natural bluff retreat, erosion, and collapse.

SOLANA BEACH

DEL MAR

## 3 LOW-LYING DEVELOPED BEACH

Residents and tourists alike enjoy and recreate along the region's wide, sandy beaches. Many are low-lying, making them more accessible to beach-goers. However, these beaches are also commonly located near dense urban areas and are more heavily subject to coastal flooding from high tides and are even more susceptible to sea level rise.

3

SAN DIEGO

## 4 DEVELOPED BAY FRONT

Multiple large bays across the region provide natural and engineered harbors and ports critical for industry, recreation, and movement of goods. While bays are often more secluded and protected from impacts of larger coastal wave action, many of them are heavily engineered or armored—with little flexibility for movement and retreat in response to rising sea levels.

4

CORONADO

NATIONAL CITY

## 5 COASTAL WETLANDS

The San Diego coast is punctuated by creeks and rivers, which aid in the formation of diverse estuaries and wetlands that provide critical habitat for species and create opportunities for recreation and coastal access. Coastal wetlands serve as a natural buffer, protecting shoreline development from high tides and wave attenuation while helping to capture and filter pollution from watershed runoff.

CHULA VISTA

5

IMPERIAL BEACH

# THE SAN DIEGO REGION'S SHOCKS AND STRESSES, AND RESILIENCE-BUILDING OPPORTUNITIES

Our region faces multiple shocks and stresses driven by climate change, long-standing inequities, structural racism, and other factors. These challenges can manifest as shocks—acute events or crises, including not only natural disasters like severe storms or heatwaves, but human-driven disasters like a cyberattack or economic crisis. Residents across our region also face stresses—underlying challenges, like a lack of affordable housing, structural racism, and aging infrastructure.

The accumulating impacts of stresses can be just as acute as a shock for residents facing these challenges everyday. Moreover, shocks and stresses can have compounding impacts—as communities vulnerable to underlying stresses tend to experience more severe effects when acute shocks occur.

**Shocks and stresses can have compounding impacts—as communities vulnerable to underlying stresses tend to experience more severe effects when acute shocks occur.**

At the same time, our region is in a strong position to address these shocks and stresses because we have a wealth of assets upon which we can build. Our region is fortunate to draw upon a history of climate leadership among institutions, communities, and tribes. We have a rich ecosystem of strategic partnerships, planning efforts, and other assets to build upon, including world-class research institutions and academic centers as well as one of the most robust philanthropic sectors in the nation, investing \$7.5 billion in total assets—a significant portion of which is directed towards almost 12,500 nonprofits based

in the region.<sup>3</sup> The region's coastal ecosystems are among the most vibrant in the world, and include coastal dune, beach, wetland, and lagoon habitats. We are a global biodiversity hotspot, with more types of plants and mammals than any other region nationally, helping to foster a culture shaped by these treasured natural assets.<sup>4</sup> Our thriving economy is one of the largest in the state, propelled in large part by blue and green jobs that make up a growing economic cluster. Blue tech businesses drive \$9.9 billion in economic impact regionally, with job growth in the blue tech and maritime sectors accounting for 9% of employment countywide.<sup>5</sup>

# 1

**biodiverse  
region**

a global biodiversity  
hotspot

# \$7.5

**billion**

one of the most robust  
philanthropic sectors in  
the nation

# \$9.9

**billion**

economic regional impact of  
blue tech businesses

Finally, we leverage the cultural and regional strengths of our connected binational region, where major economic and environmental assets span borders. Our region makes up the largest economic zone along the U.S.-Mexico border and supports a regional GDP of \$250 billion along with an estimated \$70 billion in cross-border trade flows; more than 90 million people cross the border each year.<sup>6</sup>

This Roadmap outlines a pathway for partners across our region to harness these strengths in order to build resilience and tackle our current and future challenges. By building this capacity, families, businesses, neighborhoods, institutions, and systems across our region can adapt and thrive in the face of both shocks and stresses.

While our region faces a range of shocks and stresses, the analysis and engagement conducted over the course of developing this Roadmap has elevated several shocks and stresses as critical priorities. Our Roadmap is organized into Principles, Goals, and Actions that focus on addressing these prioritized shocks and stresses, which span three major categories: Climate and Environment, Infrastructure and Public Systems, and Inequities.



**\$70**  
billion

cross-border trade flows

**12,500**  
nonprofits

based in the region

**\$250**  
billion

regional GDP



# Climate and Environment Shocks and Stresses



## WATER INSECURITY

Regional water resources are expected to face increased challenges due to climate change, which will strain supply while increasing demand. This continues to increase the need for diverse water sources and conservation techniques.<sup>7</sup>



## CLIMATE CHANGE

Recent global analyses issued by the Intergovernmental Panel on Climate Change warn of the record pace of climate change and increasingly dire impacts in the absence of bold immediate additional action. For San Diegans, where temperatures are expected to increase between 5-10 degrees Fahrenheit by the end of the century, climate change results in multiple impacts including more severe storms, longer droughts, rising heat temperatures, higher sea levels, and more frequent flooding.<sup>11</sup>



## DROUGHT

The region's most recent droughts occurred in 2001-2004, 2007-2010 and 2012-2015. Driven by increased variability in precipitation, droughts are expected to become more frequent and intense.<sup>8</sup>



## COASTAL OR TIDAL FLOODING

Flooding along San Diego's coast is compounded by rising sea levels, increasing the frequency of tidal flooding.<sup>9</sup> Under the most severe scenario, one study found that \$6.1 billion in contribution to the County's gross domestic product is vulnerable, with \$2.2-\$2.6 billion in buildings and equipment on commercial property is at risk of damage due to flooding.<sup>10</sup>



## EXTREME HEAT

By the end of the century, the region is expected to experience more frequent extreme heat days—defined as 96.3°F or higher—increasing from 4 days per year to between 33-67 days per year. The number of heat waves—5 or more consecutive days of extreme heat—is also expected to increase from 2 to up to 16 per year by the end of the century.<sup>12</sup>



## SEVERE STORMS

Severe storms, such as cyclones, atmospheric rivers, and other events that cause significant rainfall and wind, are expected to become more extreme.<sup>13</sup> Through their intensity, severe storms contribute to other shocks and stresses like coastal erosion, flooding, and landslides.<sup>14</sup>

 **5-10+ degrees**

**\$2+ BILLION**  
at risk of damage  
due to flooding

**+30% MORE**  
wet days



### RAINFALL FLOODING / STORMWATER

In 2023, the atmospheric rivers California experienced are an example of rainfall flooding and stormwater events, bringing historically high levels of precipitation to the region. Precipitation levels are expected to become more volatile, with the average wettest day every 5 years projected to increase by up to 30%.<sup>15</sup> Stormwater runoff following precipitation events can contaminate coastal canyons and watersheds with pollutants and threaten ecosystem health.



### WILDFIRE

Recent increases in wildfire frequency have been driven by Santa Ana winds, increased temperatures, and development patterns. Projected changes in the precipitation regime, with increasing drought and drier autumns, will increase wildfire risk during the dangerous fire weather conditions, including when Santa Ana winds are present.<sup>16</sup>



### SEA LEVEL RISE & COASTAL EROSION

State projections anticipate one foot of sea level rise in the region by 2050 and at least 3 feet, or potentially much more, by the end of the century.<sup>17</sup> The impacts of sea level rise can be seen in more persistent flooding events, damage to coastal infrastructure and inundation, including inundation of freshwater resources causing salination, referred to as saltwater intrusion.

**MORE  
INTENSE**  
droughts

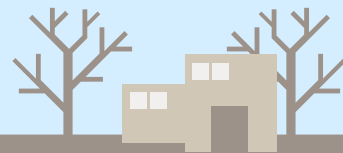


### LOSS OF BIODIVERSITY

Marine Protected Areas have succeeded in increasing biodiversity, fostering a broad range of healthy organisms within a single ecosystem, by providing healthy coastal spaces for organisms to thrive. As climate change impacts—such as rising ocean temperatures, ocean acidification, and toxic waste runoff from severe storms—increase, they subsequently threaten the survival of diverse organisms.<sup>18</sup>



**1-3FT.**  
of sea level  
rise



# Infrastructure and Public Systems Shocks and Stresses



## DAM FAILURE

Much of California’s fresh drinking water is controlled through intricate and complex dam systems. The failure of these systems can result in catastrophic flooding and immediate loss of accessible clean drinking water. In an analysis of 150 regional plans, dam failure was listed as one of the top five most critical shocks for inland jurisdictions. Aging infrastructure coupled with impacts from climate change can increase risk of failure.



## FUNDING CHALLENGES

Partners and regional actors widely align around the need to fund long-term solutions to protect coastal infrastructure, ecosystems, economies, and communities, but identify persistent obstacles in accessing sustained funding. In a survey conducted in developing this Roadmap, 82% of respondents identified a lack of funding as a top challenge.

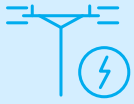


## AGING OR INADEQUATE INFRASTRUCTURE

From the energy grid to water pipes to public transportation, infrastructure is critical to how San Diegans access goods and services. The suspension of Amtrak passenger service for several months in 2022-2023—a rail corridor responsible for transporting over \$1 billion in goods annually—to support stabilization is one example of the need to maintain infrastructure. The region also faces challenges related to supporting adequate public transportation. Only 12% of low-income residents, those most likely to rely upon public transportation, live within a half-mile of a commuter rail, light rail, or rapid transit stop.<sup>19</sup>

**GRID FAILURE**  
Increased frequency of power outages





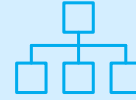
## GRID RELIABILITY

Increasing frequency and severity of heat waves places additional strain on the power grid. Unprecedented strain on the grid during a heat wave in the summer of 2022 left thousands of San Diegans without power—with the region potentially facing more outages in the future.



## EARTHQUAKE

While earthquake risk is lower in San Diego compared to elsewhere in Southern California, most San Diegans live within 15 miles of a fault.<sup>20</sup>



## GOVERNANCE CHALLENGES

A recent Regional Adaptation Needs Assessment identified enhanced collaboration among jurisdictions as a priority to advance local and regional adaptation planning. Almost one quarter of those interviewed for the report indicated a need for greater cross-jurisdictional coordination, and 60% indicated a lack of awareness of their role in the region.<sup>21</sup>

**JUST 12%**  
of low-income  
residents live near  
public transportation



## Shocks and Stresses Driven by Inequities



### FOOD INSECURITY & AGRICULTURE

While agriculture is responsible for \$1.8 billion in sales, 25% of census tracts across the county are considered food deserts, with limited access to healthy and affordable food.<sup>22</sup>



### HOMELESSNESS

Partially driven by housing affordability pressures, the number of San Diegans experiencing homelessness is increasing. Last year, over 8,400 individuals were unhoused.<sup>23</sup>



### HOUSING ACCESS & AFFORDABILITY

Like the rest of California and many other urban areas across the country, affordability poses a growing stress to families across the region. While a significant portion of the affordability crisis is driven by housing costs—and San Diego has among the highest median home prices in the nation—high transportation and other costs contribute to these pressures as well. A recent study found that 34 percent of homeowners and 57 percent of renters in the region were cost burdened, meaning that housing costs accounted for over 30 percent of their income.<sup>24</sup>

**57%**  
of renters are  
cost burdened



### LACK OF OR DISPARITIES IN ACCESS TO OPEN SPACE

Access to a park within a 10-minute walk varies substantially by neighborhood and by jurisdiction across the region. While 93% of residents in Del Mar and 81% of residents in San Diego are within a 10-minute walk of a park, this figure stands at 51% and 50%, respectively, for residents in the cities of Vista and Carlsbad.<sup>25</sup>



### STRUCTURAL RACISM

An abundance of indicators illustrate the lingering impacts of centuries of structural racism. The Climate Safe Neighborhoods (CSN) partnership traces racist practices, such as redlining, to a variety of disparities that persist today in communities of color compared to other neighborhoods, across income, environmental hazards, investment in infrastructure, and vulnerability to heat and flooding.<sup>26</sup>



### POVERTY & ECONOMIC INEQUALITY

Entrenched economic inequality, largely the result of racist practices and decades of underinvestment particularly in communities of color, is exemplified by neighborhood level economic disparities. A study comparing San Diego Promise Zone (SDPZ) neighborhoods (spanning Barrio Logan to Encanto) to surrounding neighborhoods found that the annual median income in the SDPZ was nearly half that of the County, while an average of 82% of residents live in poverty—a rate that is almost double the City’s average of 42%.<sup>27</sup>

8,000+  
unhoused  
individuals



## IMPLEMENTATION AND TRACKING

Our region faces multiple, interconnected shocks and stresses—but by working together with a focus on implementation, we will be able to build upon our region’s history of climate leadership, drawing upon our significant assets and strengths to support more resilient communities. This Roadmap is designed to serve as a dynamic document to facilitate and strengthen this collaboration, motivating and inspiring coordinated ongoing action among regional partners. By tracking progress and engaging with partners around current and new Actions, we will ensure our continued focus on implementation.

In response to growing recognition of the need for comprehensive regional action to address climate change, leaders representing philanthropy, academic institutions, government, and the community came together over a decade ago to establish the San Diego Regional Climate Collaborative (SDRCC). Since then, SDRCC’s purpose has been to facilitate peer-to-peer networking, information sharing, and partnerships among local jurisdictions to catalyze and strengthen regional action on climate change. SDRCC is committed to stewarding and supporting the ongoing progress of this Roadmap to ensure it drives toward implementation. In alignment with and complementing the Roadmap, SDRCC will also support and host a project database, advancing current and new actions towards our shared collective vision. Also complementing the Roadmap, SDRCC hosts an online [Cost of Inaction Toolkit](#) that helps practitioners understand and visualize the compounding impacts of shocks and stresses on communities, alongside the benefits of potential projects and investments.

While SDRCC will host the [project database](#); track our collective progress in advancing the Actions, Goals, and Principles of this Roadmap; and share regular updates among partners, our collective success will require continued action and engagement among partners across every sector—including not only jurisdictions and municipalities across the region, but also academic institutions, nonprofit and community-based organizations, businesses, and philanthropies, as well as residents. This Roadmap and the resulting [project database](#) will help to support this ongoing effort. Partners will be able to share new actions that advance progress towards Roadmap Goals and Principles, report on ongoing project updates, and learn more about our shared progress at our Roadmap website. We envision the database as an evergreen, implementation-oriented resource for resilience builders across the region, where practitioners and partners can learn more about efforts that may be ripe for scaling or replication, understand the best way to get involved, and build mutual support for aligned efforts.

**We all have a role to play in building our region’s resilience. We encourage residents, institutions, and organizations across San Diego to come together and contribute to our shared effort. Here are some of the ways you can get involved:**



**Identify Actions in this Roadmap that resonate with your work and explore how you can support, scale, or otherwise amplify these efforts.**



**Continue to share updates and new efforts by engaging via our [project database](#) ↗.**



**Share this Roadmap widely among regional partners to promote awareness, build momentum, and spur additional partnerships and collaboration.**



## **CHAPTER 2**

# **SUMMARY OF ANALYSIS AND ENGAGEMENT**



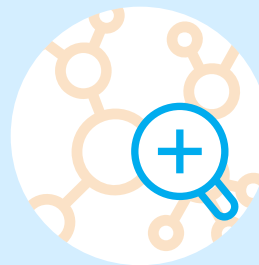
## ROADMAP DEVELOPMENT

The Regional Adaptation Needs Assessment (NA), prepared by SDRCC in 2020, at the direction of the San Diego Association of Governments (SANDAG), revealed a critical need for enhanced collaboration to advance local and regional adaptation planning. Additionally in 2020, SDRCC and partner Resilient Cities Catalyst (RCC) facilitated the San Diego Region Coastal Exchange, which convened global experts, along with key leaders in the region representing diverse community perspectives, to explore innovative design options that address coastal resilience challenges, and surfaced a set of viable projects and policies that are ripe for further advancement. Exchange participants identified the development of a “Regional Resilience Roadmap” as an opportunity to achieve greater impact through strengthened collaboration and coordination towards a singular vision for the coastline. Through this Roadmap, we have set out to make this vision a reality.

### CONTEXTUALIZING



Coastal  
Resilience  
Survey



NETWORK  
ANALYSIS

2020



FEEDBACK

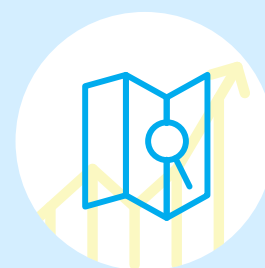
REGIONAL COASTAL RESILIENCE AMBASSADORS PROGRAM

2023

DEVELOPMENT



Cost Of Inaction Toolkit



REGIONAL ROADMAP

It was critical that these efforts and goals at the regional scale align with supportive and actionable pathways Statewide. The California Ocean Protection Council (OPC) [Strategic Plan to Protect California's Coasts 2020-2025](#) plan highlights the need for advancing focused, high-value interagency collaboration to meet the goals of the plan and calls for an increase in collaboration and partnerships among agencies on the frontlines of regulating, funding, and developing policies that guide coastal actions.

Over the past two and a half years, development of the Roadmap included three critical phases: Network Analysis and Literature Review, Regional Coastal Resilience Ambassadors Program, and Roadmap Development. Throughout all of these phases, in its methodology the team sought to build upon the wealth of climate leadership and planning already conducted in jurisdictions and entities across the region, rather than duplicating previous efforts. For these reasons, the analyses and processes summarized in the following pages of this chapter leverage an approach of scanning and aggregating existing analytical work, and partnering with a cohort of local climate leaders deeply engaged in communities across the county, to ensure that this Roadmap builds upon and connects these abundant underlying efforts.

**The synthesis of these varied efforts directly led to the identification of shocks and stresses prioritized in this Roadmap, as well as the development of our Principles, Goals, and Actions.**

## NETWORK ANALYSIS

As an early step in developing this Roadmap, the team developed an analysis aimed at better understanding the current and potential roles of key regional partners in building a more resilient coastal region. This [Network Analysis](#) helps to describe the connections between institutions, agencies, and actors. Our goal in creating this analysis was to understand better how the region is organized, identify efficacies in collaborative partnerships and relationships, and illuminate any gaps in investment and planning. Ultimately, this work illuminated project and funding needs addressed in this regional Roadmap.

### Methodology

We conducted our analysis primarily through an online survey, distributed in the spring of 2022, that targeted multisector, regional partners connected to coastal resilience. We asked individuals a series of targeted questions aimed at better understanding their perceptions of how key actors are connected to coastal resilience and how these relationships might be strengthened to facilitate additional collaborative action.

Of 130 respondents, most represented are nonprofits or local or State government representatives. While the diversity of this sector breakdown enhances the validity of our study, results are skewed towards nonprofit organizations and local government and academic entities that had the capacity to respond to our survey. Therefore, our analysis may not capture the perspectives of lower-capacity community organizations. Finally, a higher response rate would further enhance the validity of our study. Despite these challenges, this analysis still provides useful insights into current and potential roles of organizations in building regional resilience.



## Opportunities for Action and Next Steps

The Network Analysis identified four opportunities for action that are advanced by the Actions in this Roadmap. The full Network Analysis, including full results and discussion, is [available online](#), but these opportunities are summarized below.

- 1. Developing a Shared Vision** Respondents have diverse perspectives on what a resilient coastline means for the San Diego region. Many factors contribute to our coastal future: ecosystems and the environment; the economy; and communities. By bringing together regional actors across sectors and diverse communities, and identifying our common hopes and goals for the region, we can create opportunities to mobilize through collaborative action.
- 2. Making Funding More Accessible** Respondents widely agree that we need to fund long-term solutions to protect coastal infrastructure, ecosystems, economies, and communities, but face obstacles in aligning around short-term mechanisms to drive sustained funding. Depending on the scale of interventions (project scale or region-wide), a greater number of respondents tend to understand the cost of inaction at a broader scale as compared to a project specific level. Making the costs and benefits of coastal resilience, including the cost of inaction, more understandable could potentially help relevant partners overcome funding barriers.
- 3. Amplifying Knowledge Sharing Networks** Our coastline has been deeply interconnected with society and culture for communities across our region for millennia. Coastal resources have contributed to vibrant cultural assets, but also to persistent inequities that, to this day, fall along racialized lines. Education presents us with a critical opportunity to strengthen connections to our coastline for all communities in the greater San Diego region—which must include honest conversations and reflections on historic disparities.
- 4. Supporting Cross-Sector Engagement** Practitioners across sectors report that they feel siloed, while underscoring the importance of cross-sectoral collaboration to drive coastal resilience impacts. These siloes further limit potential solutions by perpetuating approaches that are traditional and less effective, rather than community-driven and equitable. By supporting diverse regional actors in approaching their work through a holistic and regional resilience lens, we can disrupt traditional power dynamics while enhancing collaboration and creating new opportunities for diverse actors to engage in coastal resilience actions.

## LITERATURE REVIEW

State mandated documents and plans, developed by local and regional jurisdictions, are intended to inform jurisdictions in analyzing hazards and risk, including those from climate change impacts. We conducted a literature review that analyzed 150 regional documents and plans to explore, understand, and synthesize how our region identifies exposure to shocks and stresses; as well as what actions are underway to mitigate and adapt to these impacts. The team scanned documents from all 18 local jurisdictions, the County of San Diego and other regional agencies including SANDAG.

Through this process, we cataloged all shocks and stresses that were mentioned across the documents, taking additional note of those that were identified as priorities over others. The team was able to identify the extent to which climate impacts and other related, often compounding, challenges are being addressed by jurisdictions across the region. The results and findings were validated in two workshops with practitioners, where practitioners shared feedback and input that informed final findings.

### Overall, a few distinct findings emerged:

- **Across all plans, jurisdictions most strongly identified direct coastal related shocks and stresses, including: rainfall or stormwater flooding, coastal or tidal flooding, sea level rise, coastal erosion, as well as wildfire and earthquake.**
- **However, when accounting for prioritized impacts across the region, wildfire was of increased importance.**
- **An additional analysis that counted shocks and stresses by overall mention across plans elevated additional shocks and stresses related to infrastructure.**

Practitioner workshops led to additional findings that supplemented the original analysis. While practitioners emphasized a prioritization of direct coastal shocks and stresses consistent with the document review, they also underscored the need to place a greater emphasis on extreme heat and the need to elevate economic and community stresses. These stresses include many that result in compounding impacts for communities experiencing coastal shocks and stresses, and include: economic inequality, lack of affordable housing, and disparities in access to open space.

The actions laid out in the plans and documents show a breadth of activity and prioritization along the coast, with a need for additional project implementation. In analyzing the shocks and stresses, there is an opportunity to elevate the local experience into municipal action through regional coordination.

This review reinforces many of the themes echoed throughout this Roadmap, including the need to staff climate change, adaptation, and risk or hazard mitigation to the scale of the region's challenges. Existing leaders need support to continue, scale, and implement their efforts, driving towards a shared vision that enables communities to address intersecting issues and challenges associated with sea level rise.

# COMMUNICATIONS AND ENGAGEMENT

In addition to these analytical underpinnings, the team developed a communications and outreach program to inform the development of the Roadmap and complementary toolkits. Our goal was to build a supportive network of empowered community leaders in the San Diego region to ground this work in a common vision for coastal resilience, and elevate and influence the coastal resilience efforts in this Roadmap. By conducting various forms of outreach and engagement with key partners, practitioners, and local leaders throughout the region, we looked to support relationship building and lay the foundation for a coalition of partners to support implementation in the region.



**18** REGIONAL COASTAL RESILIENCE AMBASSADORS  
engaged throughout Roadmap development



**3** WORKSHOPS  
to support Roadmap development



**6** FOCUS GROUPS  
40 total participants



**10** ONE-ON-ONE INTERVIEWS  
with experts and partners

## ADDITIONAL ENGAGEMENT REACHED PRACTITIONERS THROUGH EXISTING CHANNELS



**ALLIANCE OF REGIONAL COLLABORATIVES FOR CLIMATE ADAPTATION (ARCCA) MEETING**  
engagement of ARCCA network partners



**SDRCC SEA LEVEL RISE WORKING GROUP**  
4 meetings held, with over 65 people engaged



**CONVENING OF PRACTITIONERS**  
working across the Oceanside Littoral Cell, reaching 22 participants





## Oceanside Littoral Cell Convening

We held an initial convening with representatives from cities within the Oceanside Littoral Cell to begin to identify specific opportunities to support priority coastal resilience projects and facilitate a regional conversation on collaborative opportunities at the scale of the littoral cell. This convening helped lay the groundwork in identifying gaps and collaborative project opportunities addressed across the Roadmap.



## Regional Coastal Resilience Ambassadors Cohort

Through the Regional Coastal Resilience Ambassadors (RCRA) initiative, we sought to build a supportive network to align around a shared regional vision for coastal resilience in the San Diego region. The RCRA cohort was made up of about 20 community members, spanning advocates, researchers, public agencies, institutions, and representatives of local Tribes. The cohort was strategically designed to include representatives from diverse sectors, each of whom provided unique perspectives that shaped our regional vision for this Roadmap and ensure the document reflects diverse contexts, experiences, needs and pathways to coastal resilience.

The RCRA Cohort participated in three workshops where we gathered feedback. They helped the team elevate existing expertise and projects, and partnered to help develop a shared definition of coastal resilience with equity as its underlying theme. The dialogue and discussions hosted with the RCRA cohort also aided efforts to identify common threads between multiple sectors to directly inform the development of our Principles and Goals. Finally, the cohort's input provided important guidance for the design and dissemination of the Cost of Inaction and Decision Making Toolkits.



## Focus Groups

To ensure a robust dialogue and to gather comprehensive information that could best be uplifted in the Roadmap, we sought to identify and connect with multiple organizations leading important work in their communities. In addition to RCRA Cohort working sessions, we hosted smaller, targeted focus groups and complementary one-on-one meetings organized by Principle with robust participation among the RCRA cohort, as well as other key relevant partners, for deep-dive conversations. These conversations sought to compile current, planned, and potential actions that various public agencies, nonprofit and community-based organizations, academic researchers, and tribal representatives, were leading or would like to advance across each of the Principles.

The focus groups had two main objectives. First, we wanted to identify actions that are already underway in the region, including those being led by attendees and their partners, ripe for amplification in the Roadmap. Second, we wanted to identify new ideas so that our Roadmap fills key gaps identified by participants. These meetings and the focus groups played a critical role in informing Roadmap Actions. They also helped shape the ways in which this Roadmap will support regional efforts to advance climate resilience.

## Special Considerations

Although we aimed to connect with individuals and leaders across multiple, diverse sectors and relevant groups, these conversations did not include the opinions and perspectives of all of the communities and groups that are impacted by climate change and other oppressive systems tied to San Diego's coastline. Still, through this Roadmap we are working to foster an action-driven pathway that supports strengthened community engagement as we move to implement resilience-building projects in the region. We will utilize the positive learnings, and shortcomings, from this experience as we continue to identify and expand our engagement throughout the Roadmap's implementation.

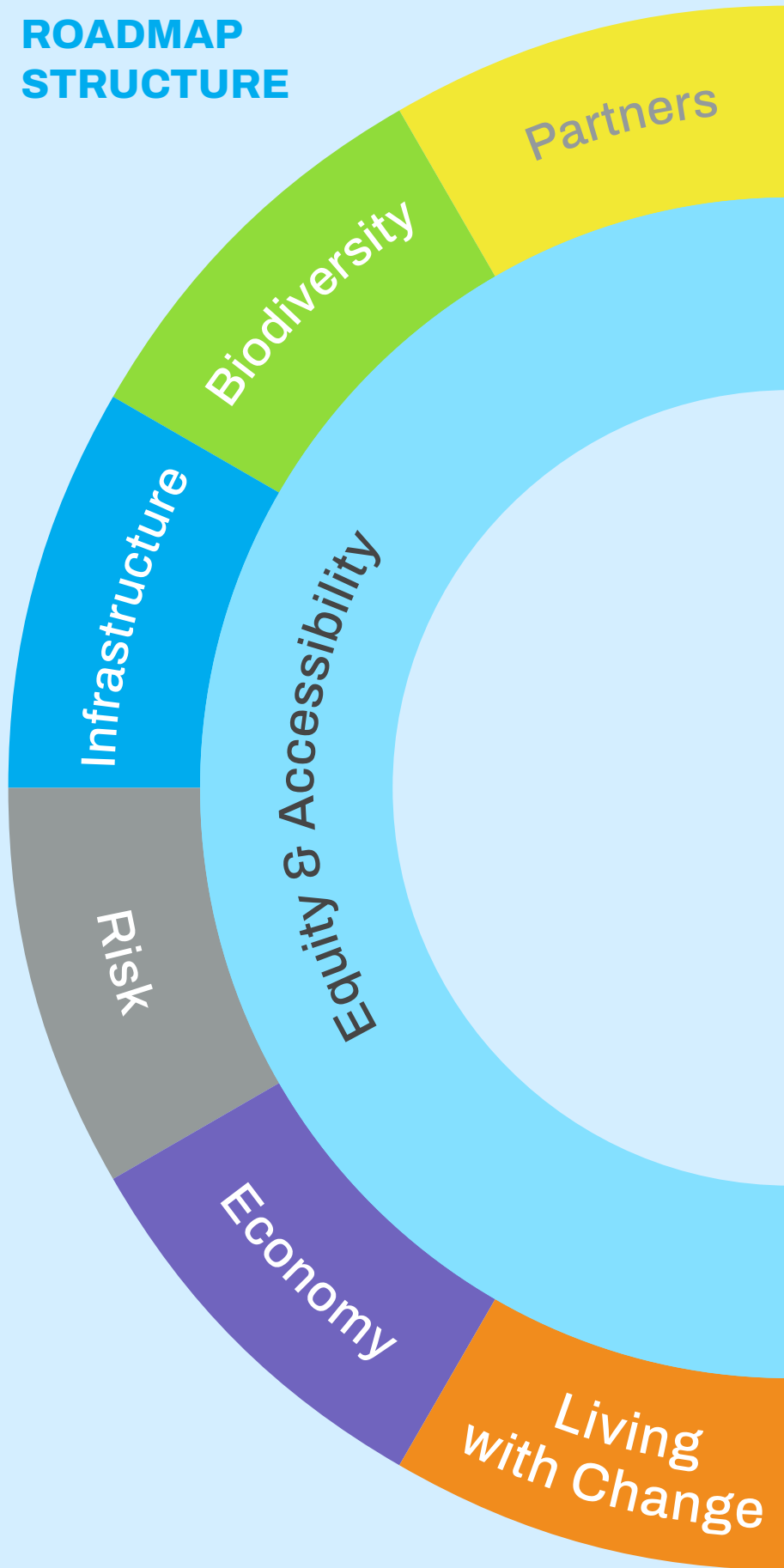


## **CHAPTER 3**

# **PRINCIPLES AND GOALS**



# ROADMAP STRUCTURE



## PRINCIPLES

**Principle 1** Support and Connect Empowered Partners throughout the Region to Lead the Way in Driving towards Collective Goals

**Principle 2** Increase Biodiversity of San Diego's Coastal Ecosystems

**Principle 3** Design and Build Infrastructure to Strengthen Coastal Resilience across the San Diego Region, including in both Coastal and Inland Communities

**Principle 4** Model Tools for Understanding Risk, and Test Solutions that Mitigate Vulnerability to Future Hazards while Increasing Community Preparedness

**Principle 5** Grow an Innovative, Equity-Driven Climate Economy through Workforce Development, Capacity Building, Policy, and Systems Change

**Principle 6** Center Approaches to Community Resilience around the Persistent Confrontation with Loss and Trauma in Living with Changing Coastal Landscapes

## GOALS

1. Foster greater connectivity and cohesion among inland and coastal communities

2. Harness the region's vibrant philanthropies and institutions more effectively to meet shared community coastal resilience agenda

3. Support partners in navigating green tape and other regulatory hurdles to smooth the pathway in implementing prioritized projects

4. Ensure all communities have access to capacity-building, tools, and resources to develop coastal actions and advocate for their vision for the coastline

5. Clarify roles and ensure coordination among local, regional, state, and tribal actors around projects, knowledge sharing, and funding

6. Increase access to funding and financing for promising pilot projects, including through blended and innovative funding models



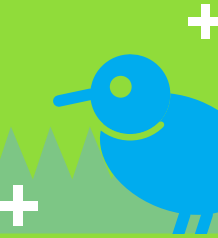
1. Center conservation practices in tribal ecological knowledge

2. Strengthen understanding of project impacts on organisms and ecosystems to support decision making

3. Foster multi-jurisdictional partnerships to enable the consideration of land and green spaces at the bioregion scale

4. Encourage new nature-based solutions through rapid development of pilot projects that integrate and share research

5. Restore estuarine, coastal, and inland ecosystems



1. Increase equitable access to coastal open spaces including strategies to enhance multi-modal and public transportation

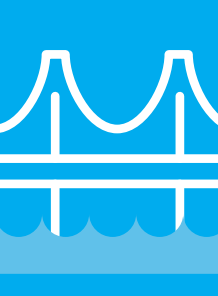
2. Accelerate implementation of multi-benefit infrastructure projects such as cooling, flood protection, and increased access to open space

3. Support integrated water management strategies that serve all communities across the region and are sustainable over the long term

4. Support increased coordination that leads to investments in coastal flood protection, adaptation, and managed retreat

5. Increase energy redundancy and reliability through grid resilience

6. Advance policies and projects that reduce exposure of critical infrastructure, including housing, in vulnerable coastal zones



1. Use policy tools, innovative funding strategies, and incentives to channel development towards areas less vulnerable to climate hazards

2. Support more regular and granular risk and scenario modeling

3. Develop models and communication tools to increase shared understanding of risks and opportunities

4. Pilot and test new financial mechanisms that transfer risk and more fully capture environmental, social, and other costs and benefits

5. Cultivate spaces for cross-sector dialogue and coordination



1. Increase economic mobility and wealth-building opportunities for all to reduce long-standing disparities

2. Build upon the strengths of the growing binational region to promote investments that support thriving, equitable communities

3. Nurture and promote diverse career pathways to high paying jobs in traditional and emerging climate-supportive sectors

4. Continue growing blue and green economy clusters to foster quality jobs across diverse sectors and economic activity, as well as climate benefits



1. Increase awareness of a pluralistic history of the region that re-centers the indigenous relationship to the coast

2. Foster a shared science-based understanding and recognition of both the threat of climate change and the range of alternatives for adaptation

3. Increase access to services, spaces for dialogue, and other resources that promote well being, including through an understanding of the role of the coast as a place for both healing and persistent confrontation with climate uncertainty

4. Mobilize San Diego's youth as continued future advocates and stewards for the coast



## FOUR DIMENSIONS OF EQUITY



### PROCEDURAL

Establish trusted and ongoing (mutually-beneficial) relationships with the community, community groups, and community-based organizations.



### STRUCTURAL

Recognize systemic injustice and persistent inequities embedded in systems including policies, procedures, and the distribution of resources.



### INTERACTIONAL

Enhance the community's adaptive capacity through accessible, trust-based engagement that is mutually beneficial.



### DISTRIBUTIVE

Direct resources to communities that have experienced racism, chronic disinvestment, carry pollution burden, high unemployment, etc.

## Underlying Theme: Equity & Accessibility

Systemic practices, such as colonization and historical redlining, have dictated where people of color and indigenous tribes live in relation to the coast and coastal assets. These boundaries and their consequences persist today.

Throughout development of this Roadmap, we adopted an equity-first approach to coastal resilience in which we acknowledge and seek to address how historical inequities connect to present-day climate change concerns; identify vulnerable populations across the San Diego region; and elevate opportunities that address starting-point vulnerabilities to climate hazards. We believe that understanding our region from an equity-first lens and prioritizing communities that are most vulnerable is key to becoming more resilient. We believe that equity is fundamental to building a climate-adapted future and to fostering resilient communities.

As a result of our region's vast diversity and historical inequities that have forcibly removed many of our communities from the coast, a "coastal community" refers to more than just those in direct proximity to or in contact with the coast itself. Sea level rise, flooding, and other coastal risks have an outsized effect on communities in the San Diego region, regardless of their proximity to the coast. Ensuring that all of San Diego's communities have the necessary resources and capacities to implement climate adaptation is key to fostering resilience. Therefore, throughout Roadmap development we made an intentional effort to expand our engagement beyond communities and organizations working directly on the coast, and elevated strategies that support the coastal adaptation needs for all communities in the San Diego region.

Throughout this process we adopted SDRCC's Equity-First Approach to Climate Adaptation, which views foundational adaptation planning and processes through four dimensions of equity: structural, distributive, procedural, and interactional. Through this lens, our Roadmap process was rooted in first recognizing the structures and systems that created inequities in our coastal landscape and communities, while also anticipating the potential impacts of our region's mitigation and adaptation strategies to prevent unintended, or additional, harmful consequences to vulnerable communities. Second, we worked to elevate diverse resources and developed the Roadmap to serve as a tool to improve upon the current distribution of resources in the region—facilitating implementation and access to funding for collective resilience. Third, we highlighted best practices as well as gaps related to the region's existing or perceived decision-making procedures when it comes to coastal resilience efforts. We focused on centering community-driven needs in identifying policies, building capacity, and creating additional spaces for engagement. Finally, we engaged with multi-sector entities and diverse practitioners to amplify their knowledge, culture, and communities as we aimed to address systemic challenges and imbalances in our work to implement coastal resilience.

# HOW TO READ AN ACTION

This Roadmap includes 76 Actions, organized across 6 Principles that are divided into 30 Goals. These Actions will guide the implementation of high-impact, multi-benefit resilience projects throughout our region. Each Action page provides important information, including:

## TAGLINE:

A brief summary of the Action.

**1.2 NATIVE PLANTING**  
Honor tribal ecological knowledge and increase native flora through strategic and intentional planting.

Due to increasing pressures of urbanization, globalization, and climate change, our local flora have been eradicated from their traditional habitats and often are out-competed for growing space in natural spaces by invasive species. Native plants provide critical habitat for flora and fauna and are more equipped to handle climate fluctuations, such as drought, than many invasive species that are not well adapted for the region. To support the restoration of native plant populations, public libraries in San Diego have opted to house seed libraries that are available to the public and help encourage education about the benefits of native planting. Other approaches include the incorporation of traditional practices and centering tribal ecological knowledge by fostering efforts in collaboration with tribal nations. The Resilient Restoration program, supported by the Climate Science Alliance's Tribal Working Group, UC Riverside, and San Diego State University, is actively working to support actions that enhance the persistence of cultural practices while preserving ecosystems by planting culturally important species. Improving education efforts and mainstreaming programs that prioritize native plants will ensure our region's biodiversity continues to be supported while also building resilience with climate-adapted habitats.

**Biodiversity**

**SHOCKS & STRESSES**

- Climate Change
- Drought
- Lack of or Disparities in Access to Open Space
- Loss of Biodiversity
- Structural Racism/Inequality

**SCALE**

- Ecosystem

**STATUS**

- Underway

**TIMEFRAME**

- Long: 5+ years

**PROJECT OWNER**

- Our Canyons
- SD Department of Urban Planning
- Canyon Enhancing Program
- Plant Native Plants
- Native Seed Library
- Climate Science Alliance



**SHOCKS AND STRESSES:**  
Which primary shocks and stresses the Action aims to address.



**SCALE:**  
The breadth of impact for who the Action will reach, from one specific community, to a local or regional jurisdiction, to an ecosystem, to the San Diego region, or beyond.



**ACTION STATUS:**  
Stage of implementation, ranging from planned to underway to piloted and ready to scale to proposed.



**TIMEFRAME:**  
Timeline for implementation, ranging from short (less than 1 year), to medium (1 to 5 years), to long (more than 5 years).



**PROJECT OWNER:**  
The entity or organization that is primarily responsible for leading the Action.

## ACTION DESCRIPTION:

Context that explains why the Action is needed to meet Roadmap goals along with additional details related to partners, key activities, and next steps.



PRINCIPLE 1

## **Support and Connect Empowered Partners throughout the Region to Lead the Way in Driving towards Collective Goals**

Like many other climate-driven impacts, challenges along our coastline are not confined to municipal boundaries. Many of the macro challenges resulting from climate change that San Diego's coastal and inland residents face are being addressed on a city by city—or even a parcel-by-parcel basis. Through coordinated efforts, and by aligning our planning goals on a regional scale, we can accelerate multi-jurisdictional resilience while mitigating negative impacts often associated with siloed localized planning. Additionally, regional coordination and support are particularly important for organizations that have less funding and capacity, which includes our region's smaller jurisdictions, tribes, and community-based organizations (CBOs).

Collectively, the region's governments and communities have been engaged directly in questions of resilience and climate change for more than a decade. The San Diego Regional Climate Collaborative (SDRCC) has been working since 2011 to facilitate collaborative action between public and private agencies, academia, philanthropy, nonprofit organizations, and community-based organizations across the region. Long-standing regional working groups like the Shoreline Preservation Working Group facilitated by the San Diego Association of Governments (SANDAG), and the Sea Level Rise Working Group facilitated by SDRCC, provide resources, discussion outlets, and networking opportunities for local leaders to talk about coastal resilience and are actively collaborating to address many of these issues.

Despite these efforts, challenges in accelerating effective and cross-jurisdictional collaboration remain. Actions in this Roadmap outline key opportunities directed at fostering greater regional connectivity and localized capacity building. Partners and regional leaders have also acknowledged that the State has enacted strong policies and numerous funding opportunities to support climate mitigation efforts. However, many feel the State's guidance on adaptation and resilience is less clear and more difficult to access. Local and regional jurisdictions face challenges due to an unclear understanding of program and priority coordination and a lack of concrete regulations or guidance at the State level. Actions within this Principle provide pathways to operationalize strategies that move the needle on regulatory hurdles that have historically slowed progress.

### **Goals**

- 1** Foster greater connectivity and cohesion among inland and coastal communities
- 2** Harness the region's vibrant philanthropies and institutions more effectively to meet shared community coastal resilience agenda
- 3** Support partners in navigating green tape and other regulatory hurdles to smooth the pathway in implementing prioritized projects
- 4** Ensure all communities have access to capacity-building, tools, and resources to develop coastal actions and advocate for their vision for the coastline
- 5** Clarify roles and ensure coordination among local, regional, state, and tribal actors around projects, knowledge sharing, and funding
- 6** Increase access to funding and financing for promising pilot projects, including through blended and innovative funding models



PRINCIPLE 1

# PARTNERS

# Goal 1. Foster greater connectivity and cohesion among inland and coastal communities

## SHOCKS & STRESSES

- Governance Challenges
- Sea Level Rise & Coastal Erosion

## SCALE

- San Diego Region

## STATUS

- Underway

## TIMEFRAME

- Long: 5+ years

## PROJECT OWNER

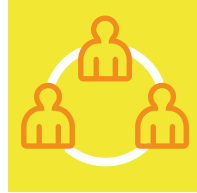
- SANDAG
- SDRCC

## 1.1 WORKING GROUP COLLABORATION

**Leverage and enhance Working Groups for continued collaboration.**

Long-standing regional working groups, like the Shoreline Preservation Working Group facilitated by the SANDAG and the Sea Level Rise Working Group facilitated by SDRCC, provide resources, discussion outlets, and networking opportunities for local leaders to discuss coastal resilience and to support active coordination. These forums are essential for creating continued opportunities for strong project coordination, enhanced communication with funding agencies to align on potential funding streams, and amplification of best-available science. Maintaining and supporting existing regional forums is critical, as well as expanding opportunities and pathways for additional voices and partners, such as nonprofits and tribes, and other partners in non-coastal municipalities, to join and benefit. Additionally, more capacity would enable existing forums to better and directly connect with other existing or emerging statewide and nationwide networks of practitioners and funding agencies.





## Partners



### SHOCKS & STRESSES

- Poverty & Economic Inequality
- Structural Racism / Inequality



### SCALE

- San Diego Region



### STATUS

- Underway



### TIMEFRAME

- Long: 5+ years



### PROJECT OWNER

- City of San Diego

## 1.2 EQUITY-FIRST DECISION MAKING

**Identify additional, equitable pathways for decision and information sharing forums.**

Impacts from climate change often compound existing structural inequities and challenges that the most vulnerable communities already face everyday. Ensuring that our planning processes and approaches for regional resilience building are grounded in equity is therefore critical for success. Current regional forums, both formal and informal, offer pathways primarily for local, regional, and state public agencies to participate and provide insight and influence. As we expand implementation efforts, we must also expand decision-making opportunities to meet a broader set of community members, leaders and voices. All projects, plans, and programs should include robust community and partner engagement methods and metrics that expand the traditional lens of “coastal stakeholder,” intentionally including communities that have been historically removed or disenfranchised from accessing the region’s coastal assets, like many tribal and indigenous peoples. While many recent State grant programs prioritize projects that include tribal engagement, it is also important that we work intentionally to build trusted partnerships and opportunities to align with tribes that may not be federally recognized, or that no longer own coastal lands. Wherever possible, we should also ensure that opportunities, like the Binational Resilience Initiative, leverage community knowledge and expertise to ensure they work for our communities at scale.



Photo credit: Ocean Discovery Institute

## Goal 2. Harness the region’s vibrant philanthropies and institutions more effectively to meet shared community coastal resilience agenda

### SHOCKS & STRESSES

- Climate Change
- Coastal or Tidal Flooding
- Funding Challenges
- Governance Challenges
- Lack of or Disparities in Access to Open Space
- Loss of Biodiversity
- Poverty & Economic Inequality
- Sea Level Rise & Coastal Erosion
- Structural Racism / Inequality

### SCALE

- Beyond the Region

### STATUS

- Underway

### TIMEFRAME

- Medium: 1 - 5 years

### PROJECT OWNER

- San Diego Foundation
- International Community Foundation

## 2.1 BINATIONAL RESILIENCE INITIATIVE

### Deploy resources towards binational coastal resilience, including through broadened philanthropic commitment.

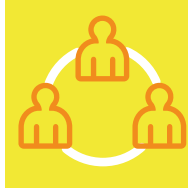
Launched in 2022 through the leadership of the San Diego Foundation and the International Community Foundation, and with additional partnership from SDRCC and Resilient Cities Catalyst (RCC), the Binational Resilience Initiative (BRI) places geographic focus on the Cali-Baja coastline region that spans from Oceanside in North San Diego County in the U.S. to Ensenada in Northern Baja California (Baja Norte), Mexico. BRI has awarded, or anticipates shortly awarding, approximately \$1 million in grants supporting high impact community-driven coastal projects across the binational region. By continuing to grow BRI, which aims to secure at least \$3 million from sources including philanthropy in the coming years to support this work, regional partners can scale a replicable model that channels dedicated multi-donor resources towards community-driven binational resilience projects.

Along with a land border, San Diego and Baja Norte share a curved coastline known as the Southern California Bight, a 430-mile coastline extending from Point Conception in Santa Barbara County to Punta Colonet in Mexico. Altogether, this binational coastal region is home to more than 22 million people, hosts a wide range of economic, military, and recreational activities, and is considered one of the most productive coastal ecosystems in the Americas. This is the largest economic zone along the U.S.-Mexico border, with a regional GDP of \$250 billion, an estimated \$70 billion in cross-border trade flows, and more than 90 million people crossing the border each year. This interconnected and complex region calls for unique intersectional projects and collaborations to build binational resilience.

The Binational Resilience Initiative has four main goals:

- Improve Coastal Resilience
- Reduce Pollution Impacts
- Champion Local Leadership
- Build a Knowledge Base

This initiative addresses our cross-border region’s climate vulnerabilities by empowering binational collaborations between civil organizations, scientists, community leaders, and other stakeholders. It primarily operates through open funding calls for coastal resilience projects with binational impact. In the coming years, the San Diego Foundation and International Community Foundation will collaborate with the San Diego Regional Climate Collaborative, Resilient Cities Catalyst, and other core project partners to expand the Initiative’s scope beyond coastal resilience to support other identified resilience challenges impacting the broader Cali-Baja region and become a scalable regional model.



## Partners

### 2.2 CLIMATE FUNDERS' COLLABORATIVE

**Align and prioritize climate across philanthropic portfolios to increase collective impact.**

Established in 2022 by Smart Growth California and Catalyst of San Diego & Imperial Counties and with leadership from the San Diego Foundation, The California Endowment, and the International Community Foundation, the Climate Funders Collaborative supports funder learning and collaboration to promote healthy, equitable, and sustainable communities in the Baja/Imperial/ San Diego Region.

Philanthropies can play an important role in ensuring that policies and public investments benefit all residents, particularly traditionally underserved people and communities. The Climate Funders Collaborative focuses on building funder knowledge in a supportive, interactive and generative environment to collectively learn and enable action supporting critical climate-related issues.

The group focuses on intersectional issues relating to climate justice, as well as philanthropic and community-based practices and trends relevant to the region. Together, funders are working to identify new opportunities and areas of alignment, and activate philanthropic resources to support frontline communities impacted by climate change while uplifting locally driven solutions that build climate resilience and integrate a trust-based and racial justice lens.



#### SHOCKS & STRESSES

- Climate Change
- Coastal or Tidal Flooding
- Drought
- Extreme Heat
- Funding Challenges
- Grid Reliability
- Lack of or Disparities in Access to Open Space
- Loss of Biodiversity
- Poverty & Economic Inequality
- Sea Level Rise & Coastal Erosion
- Severe Storms
- Structural Racism / Inequality
- Water Insecurity



#### SCALE

- San Diego Region



#### STATUS

- Underway



#### TIMEFRAME

- Medium: 1 - 5 years



#### PROJECT OWNER

- Smart Growth California
- Catalyst of San Diego & Imperial Counties

## SHOCKS & STRESSES

- Climate Change
- Funding Challenges

---

## SCALE

- San Diego Region

---

## STATUS

- Proposed

---

## TIMEFRAME

- Medium: 1 - 5 years

---

## PROJECT OWNER

- SDRCC
- The Nonprofit Institute
- San Diego Foundation

## 2.3 CATALYZING PHILANTHROPY

### **Activate philanthropy for coastal resilience through education and leadership.**

As our climate changes, philanthropic funders face a knowledge gap around what's at stake—surfacing the need to help the philanthropic community understand the policy levers and mechanisms that can help spur investment and impact. At the same time, as smaller cities and nonprofits face significant obstacles in accessing impactful government dollars, philanthropy can play an important role in providing initial resources to ease the glidepath toward larger public funds. Recent research led by The Nonprofit Institute, in partnership with San Diego Foundation, revealed that environmental nonprofits in our region rely more on philanthropy (individual donations, foundations, and corporate grants) and less on government and fee-for-service revenue compared to the nonprofit sector as a whole—in part due to capacity and technical support constraints. Communications tools are needed to help tell the story of climate investments being sound investments. Philanthropies also need support partnering with specific communities. For instance, there are early signs of new collaboration and trust building between philanthropies and tribal communities that should be fostered and supported.

The San Diego Regional Climate Collaborative, in partnership with the San Diego Foundation and The Nonprofit Institute, will educate local philanthropic leaders and also demonstrate best practices in philanthropy to catalyze the region's donors and foundations around coordinated and impactful investments in coastal resilience. Increased philanthropic prioritization of coastal resilience can help scale community-driven climate projects that advance multiple benefits across community and the environment.

---

## SHOCKS & STRESSES

- Climate Change
- Coastal or Tidal Flooding
- Funding Challenges
- Governance Challenges
- Sea Level Rise & Coastal Erosion

---

## SCALE

- San Diego Region

---

## STATUS

- Proposed

---

## TIMEFRAME

- Medium: 1 - 5 years

---

## PROJECT OWNER

- SANDAG

## 2.4 WAREHOUSING SHORELINE MONITORING

### **Aggregate and analyze the region's shoreline monitoring programs to inform coastal project design and stakeholder decision-making.**

Across the region, various actors are collecting valuable data that measure beach width, tidal shifts, public usage, and biodiversity at different intervals, with different tools, and through different methods. Agencies and municipalities regularly hire coastal experts and scientists to sift through the available data, conduct additional research, and then guide project and funding decisions. These efforts can be streamlined through a data warehousing effort that aggregates and maintains comprehensive shoreline data across the region drawing from multiple sources, including institutional researchers, community data-collection efforts, and public agencies. SANDAG is an appropriate lead for this effort, given their leadership in establishing a Regional Shoreline Monitoring Program. This program measures the changes in beach width over time, documents the benefits of sand replenishment projects, and improves the design and effectiveness of beach fills. This comprehensive approach to monitoring the shoreline has already provided valuable data for the design of 2001 and 2012 Regional Beach Sand Replenishment efforts and helped guide the selection of candidate beach sites for replenishment. Supporting regionally-scaled and streamlined efforts will help accelerate projects, drive efficiency, and create more cohesion among data, advancing more impactful projects across the region.



Partners



# Goal 3. Support partners in navigating green tape and other regulatory hurdles to smooth the pathway in implementing prioritized projects

## SHOCKS & STRESSES

- Climate Change
- Coastal or Tidal Flooding
- Funding Challenges
- Governance Challenges
- Sea Level Rise & Coastal Erosion

## SCALE

- Beyond the Region

## STATUS

- Proposed

## TIMEFRAME

- Medium: 1 - 5 years

## PROJECT OWNER

- SDRCC

### 3.1 COASTAL PROJECT PRE-PERMITTING

**Establish a mechanism to allow permitting agencies to pre-authorize the design and engineering of projects.**

Across the San Diego region, municipalities and public agencies struggle to develop coastal projects to improve livability, increase beach access, and keep up with climate impacts as they encounter risks and hurdles posed by California's permitting processes. The many laws and regulations—crafted to ensure California's coastal assets are safeguarded and available for public use and to protect natural benefits now and into the future—can be difficult and challenging to navigate, making projects expensive and uncertain. A typical coastal project can cost \$3-5 million just to prepare the information required for a permit review process—not including the cost of municipal and agency staff time, political energy, and public attention. SDRCC will explore opportunities to establish feedback loops for its members and partners with the California Coastal Commission and other key permitting agencies, where projects in development can get review, technical assistance, and guidance earlier in the process, and save costs and time in order to accelerate implementation.

## SHOCKS & STRESSES

- Climate Change
- Coastal or Tidal Flooding
- Funding Challenges
- Governance Challenges
- Sea Level Rise & Coastal Erosion

## SCALE

- San Diego Region

## STATUS

- Planned

## TIMEFRAME

- Medium: 1 - 5 years

## PROJECT OWNER

- SANDAG

### 3.2 REGIONAL BEACH SAND REPLENISHMENT

**Pool resources across the region to replenish beach sand collectively.**

In most managed coastal systems, regular dredging and replenishment of sand is required to maintain the broad, sandy beaches that fuel recreation and tourism. With the increase of climate impacts, the pace and demand of replenishment is accelerating, as are the costs. SANDAG is inviting local municipalities to work collaboratively and share the cost of both the study and implementation of a coordinated effort to replenish beach sand across the region, from Oceanside to Imperial Beach. This effort would represent the third time the region has come together to shoulder the collective burden to continue sustaining beach building activities. The initial \$200,000 commitment would initiate planning, feasibility studies, and economic analysis. These resources would identify off-shore sources for sand that ultimately would be needed as dredge material and strategically placed across the region's coastline. Following the proposed initial study, if the region moves forward with the project, further engineering and environmental work would cost approximately \$3 million, with ultimate implementation estimated at \$37 million, for which State and federal grants should be available.

# Goal 4. Ensure all communities have access to capacity-building, tools, and resources to develop coastal actions and advocate for their vision for the coastline

## 4.1 SEA LEVEL RISE RESEARCH

**Expand research on impacts of sea level rise and coastal flooding extremes.**

Long-term sea level rise will continue to affect the extent, frequency, and duration of coastal flooding events: in our region, high-tide flooding events that today occur only a few times per year may occur once per month—or even once per week—in the coming decades. Sea level rise (SLR) scenarios help us plan in the face of uncertainty by providing a range of possible futures. Ensuring our communities have access to the best available science and data on SLR impacts and extremes will strengthen our ability to identify common SLR scenarios that public agencies, tribes, and coastal land managers can use to foster greater alignment across the region. Researchers at Scripps Institution of Oceanography and other partner institutions are working to better analyze and understand localized impacts and effects along our coast in response to sea level extremes. Through these efforts, they are working to create a more accessible database of possible impacts from SLR. This database will be utilized to create and evaluate potential metrics that will further aid regional partners in supporting more effective implementation of adaptation pathways and strategies.

### SHOCKS & STRESSES

- Coastal or Tidal Flooding
- Sea Level Rise & Coastal Erosion
- Severe Storms

### SCALE

- San Diego Region

### STATUS

- Underway

### TIMEFRAME

- Medium: 1 - 5 years

### PROJECT OWNER

- Scripps, UCSD





### SHOCKS & STRESSES

- Climate Change
- Coastal or Tidal Flooding
- Governance Challenges
- Loss of Biodiversity
- Sea Level Rise & Coastal Erosion
- Severe Storms



### SCALE

- San Diego Region



### STATUS

- Proposed



### TIMEFRAME

- Medium: 1 - 5 years



### PROJECT OWNER

- SANDAG

## 4.2 REGIONAL SHORELINE MONITORING PROGRAM

### Increase regional shoreline monitoring data frequency and accessibility.

Beaches and coastal landscapes are dynamic and constantly evolving. In the summer, many of San Diego’s beaches experience an influx of sand deposition, widening the beaches just in time for summer crowds. This comes following the winter months, where beaches shrink and feature a larger array of cobble stones. These seasonal changes are shifting due to climate change. Severe storms, flooding, and coastal developments all contribute to varying beach widths. However, the process of gathering data on beach width is currently dispersed and inconsistent, and is typically executed on an as-needed basis by community science groups, local scientists, and municipalities. Understanding beach width changes over time, and at a regional scale, will help municipalities understand their shared challenges, and greatest areas of sediment need, across the region. SANDAG is looking for funding to support a regional initiative, the Regional Shoreline Monitoring Program, to collect and evaluate data on evolving beach widths. If funded, this work would become available to communities and municipalities across the entire region, enabling a broader understanding of ecosystem-scale changes over time and helping to inform resilience strategies and projects.



### SHOCKS & STRESSES

- Climate Change
- Governance Challenges
- Loss of Biodiversity
- Sea Level Rise & Coastal Erosion
- Severe Storms



### SCALE

- San Diego Region



### STATUS

- Underway



### TIMEFRAME

- Medium: 1 - 5 years



### PROJECT OWNER

- SANDAG

## 4.3 REGIONAL RESILIENCE FRAMEWORK

### Develop a suite of tools, resources, and supportive data that will support local jurisdictions in advancing adaptation planning and projects.

The San Diego Association of Governments (SANDAG) works with and supports local cities and agencies to meet their climate goals and has been a leader in supporting regional adaptation planning efforts. The Regional Adaptation Needs Assessment developed by SANDAG and the San Diego Regional Climate Collaborative in 2020 identified access to enhanced data and technical assistance as the greatest need to advance adaptation planning in our region. Additionally, the 2021 Regional Plan outlined the opportunity for SANDAG to develop a Regional Resilience Framework (Roadmap) that identifies a regional vision, roles, and ongoing coordination opportunities across agencies, sectors, and organizations. SANDAG has begun efforts to lead the development of this Regional Resilience Roadmap which will be composed of a suite of tools, resources, and supportive data that will aid local jurisdictions to advance adaptation planning and projects.



# Goal 5. Clarify roles and ensure coordination among local, regional, state, and tribal actors around projects, knowledge sharing, and funding

## SHOCKS & STRESSES

- Climate Change
- Coastal or Tidal Flooding
- Governance Challenges

## SCALE

- San Diego Region

## STATUS

- Underway

## TIMEFRAME

- Short: <1 year

## PROJECT OWNER

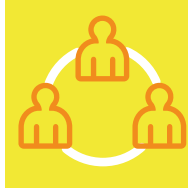
- Coastal Quest
- State Parks

## 5.1 COMPREHENSIVE VULNERABILITY ASSESSMENTS

**Ensure robust, aligned, and regionally comprehensive vulnerability assessments are available.**

Vulnerability Assessments are an important tool for planning, enabling communities to identify vulnerabilities comprehensively and to prioritize adaptation strategies that reduce risk and impact of climate stresses. Because climate impacts are often felt beyond jurisdictional borders, it is important that these assessments are geographically inclusive and based on the best-available science. Ensuring that our region cultivates a strong understanding of our vulnerabilities at scale will support efforts to align implementation of adaptation strategies effectively. Coastal Quest and California State Parks are currently piloting a project across the San Diego region to assess vulnerabilities. State Parks manages nearly one-quarter of the state’s coastline across 128 coastal park units. Many coastal park units, including those in the San Diego Coast District, are already impacted by episodic coastal erosion and flooding caused by waves and storms, which is expected to increase as sea levels continue to rise. Through this project, Vulnerability Assessments are being developed using a holistic approach to vulnerability and adaptation planning that includes unique State Park assets, including access, recreation, cultural and natural resources, and facilities—assets not typically addressed in other assessments. These assessments fill a critical knowledge gap and will help pave the way for more holistic adaptation and resilience projects once complete.





## Partners



### SHOCKS & STRESSES

- Climate Change
- Governance Challenges
- Structural Racism / Inequality



### SCALE

- San Diego Region



### STATUS

- Underway



### TIMEFRAME

- Long: 5+ years



### PROJECT OWNER

- Multiple

## 5.2 TRIBAL PARTNERSHIP

**Advance culturally appropriate and respectful engagement and partnership-building efforts with tribes.**

The San Diego County region is home to the largest number of tribal nations of any county in the United States, including 18 federally recognized tribal nation reservations and 17 tribal governments. While tribal nations are subject to Federal laws and regulations, they are not subject to State and local environmental laws and regulations and many tribal governments have environmental departments that have established their own regulations. Beyond these formal structures, tribes have been managing natural resources, their land, and those lands that were unceded for thousands of years based on Tribal Ecological Knowledge (TEK). Partners across the region can now take critical steps to work more collaboratively with tribes and to identify clear pathways for deeper partnership by supporting tribal values, building trust, and creating a shared vision for climate and coastal resilience. Tribal engagement should be authentic, proactive, and culturally-sensitive, recognizing that tribal nations have different decision-making and engagement protocols. Partners can turn to existing efforts, including the Climate Science Alliance’s Tribal Working Group and SANDAG’s Tribal Governments Taskforce and Regional Tribal Summits, as existing pathways for engagement.





### SHOCKS & STRESSES

- Climate Change
- Coastal or Tidal Flooding
- Governance Challenges
- Sea Level Rise & Coastal Erosion



### SCALE

- Ecosystem



### STATUS

- Underway



### TIMEFRAME

- Long: 5+ years



### PROJECT OWNER

- Port of San Diego
- United States Navy

## 5.3 PRIORITIZING INTER-AGENCY COOPERATION

### Establish a first-of-its-kind agreement on sea level rise between the Port of San Diego and the United States Navy.

In 2018, the Port of San Diego and the U.S. Navy formally agreed to coordinate with one another to prepare for potential impacts of sea level rise along San Diego's bayfront. This is the first agreement of its kind between the U.S. Navy and a west coast port, with the goal of supporting both agencies' operations and missions. The Port and the Navy will share information, evaluate the best available scientific information and modeling related to sea level rise, and collaborate to identify complementary adaptation policies and measures. Impacts and challenges resulting from sea level rise are felt beyond jurisdictional boundaries; innovative agreements like this one help set the stage for deeper and stronger collaboration. Wherever appropriate, our region should prioritize sharing of multi-jurisdictional data, information, and resources.





## Partners

### 5.4 MILITARY INSTALLATION RESILIENCE

**Continue coordination among military installations and local governments.**

In June 2020, the San Diego Association of Governments (SANDAG) was awarded a grant from the Office of Local Defense Community Cooperation (OLDCC) through the Department of Defense (DoD) to support local governments' efforts to analyze and implement actions necessary to foster, protect, and enhance Military Installation Resilience (MIR). SANDAG and the Navy worked with regional stakeholders to complete an initial assessment of climate change threats to military installations and surrounding transportation infrastructure. In 2021, SANDAG was awarded a second grant from the OLDCC to narrow the study area analyzed in Phase 1 down to three key transportation corridors that have high strategic importance for Navy mission readiness and are at highest risk of climate impacts. Phase 2 focuses on the specific needs of the SR 75/282, Harbor Drive, and Pacific Coast Highway corridors, and developed a framework that uses data to inform resilient infrastructure solution recommendations and sustainable transportation strategies to mitigate climate impacts to installations.



#### SHOCKS & STRESSES

- Aging or Inadequate Infrastructure (including transportation)
- Climate Change
- Governance Challenges



#### SCALE

- San Diego Region



#### STATUS

- Underway



#### TIMEFRAME

- Long: 5+ years



#### PROJECT OWNER

- SANDAG





# Goal 6. Increase access to funding and financing for promising pilot projects, including through blended and innovative funding models

## SHOCKS & STRESSES

- Aging or Inadequate Infrastructure (including transportation)
- Climate Change
- Funding Challenges

## SCALE

- San Diego Region

## STATUS

- Proposed

## TIMEFRAME

- Medium: 1 - 5 years

## PROJECT OWNER

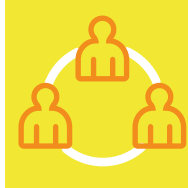
- Not Yet Identified

## 6.1 PROJECT AND PILOT MAPPING

**Advance promising pilots while strengthening the region’s capacity for experimentation.**

Advancing a coordinated set of coastal pilot projects that collectively help achieve the region’s identified resilience goals will help to scale promising efforts among collaborating jurisdictions and partners. Pilot projects offer numerous advantages, creating an opportunity to develop and test innovative coastal resilience solutions—particularly, multibenefit nature-based solutions—with low financial risk, on a rapid timeline, and with an eye towards learning. By strengthening connections and partnerships, including through close collaboration with leading local academic institutions and through a readily accessible project and pilot map, partners can accelerate future implementation of projects that foster cross-jurisdictional collaboration. These projects should prioritize opportunities for enhanced monitoring and data collection that will continue to provide the region with real-time examples of resilience dividends. By encompassing holistic projects and pilots, the database can provide insight across multiple coastal typologies and habitats, as well as across various socioeconomic factors and communities.





## Partners



### SHOCKS & STRESSES

- Aging or Inadequate Infrastructure (including transportation)
- Climate Change
- Funding Challenges
- Governance Challenges



### SCALE

- Local / Regional Jurisdiction



### STATUS

- Proposed



### TIMEFRAME

- Long: 5+ years



### PROJECT OWNER

- Not Yet Identified

## 6.2 SUB-REGIONAL COLLABORATION

**Enable and mobilize opportunities to develop specific and effective sub-regional approaches to projects and collaboration.**

San Diego's 70 miles of coastline encompass three littoral cells that uniquely affect sediment transport and movement: the Oceanside Littoral Cell (from Dana Point to La Jolla), the Mission Bay Littoral Cell (from La Jolla to Point Loma), and the Silver Strand Littoral Cell (from the end of Point Loma to Ensenada, Mexico). These cells experience varying degrees of coastal erosion and influence the sand supply of the region's diverse coastlines and coastal ecosystems—just one example demonstrating how impacts from climate change are not constrained by social and geopolitical borders. While most cities and land-owning agencies have their own plans and priorities, many of these projects and adaptation strategies require coordination, consideration, and participation of neighboring entities to address climate impacts at scale successfully. Regionally scaled approaches to planning can achieve multiple benefits, while misaligned or locally specific planning without regional coordination can have potential negative impacts.

By considering project impacts and coordination at the sub-regional scale, there are opportunities to pool or leverage funding, ensure multiple needs are supported, and scale solutions that work with natural systems, not against them. In 2022, the State of California passed Senate Bill 852, which would authorize a city, county, special district, or a combination of any of those entities to form a Climate Resilience District for the purposes of raising and allocating funding, as well as operating expenses, for eligible projects. The bill would deem each district to be an Enhanced Infrastructure Financing District (EIFD) and would require each district to comply with existing law concerning EIFDs, except as specified. This is one promising example that may be operationalized to sub-regional and regional project financing efforts.



Credit: Reinhard E Flick

PRINCIPLE 2

## Increase Biodiversity of San Diego's Coastal Ecosystems

California's coasts and ocean are among our most treasured resources: the productive, biodiverse ecosystems located here are central both to California's and to San Diego's identity, culture, and economy. In fact, San Diego is the most biodiverse county in the continental United States. Biologically, our coastal ecosystems, both on land and in the water, serve as critical nursery and spawning sites to several commercially important marine species, ranging from fish to oysters. Our wetlands and marshes, such as Kendall Frost Marsh and the Tijuana River Estuary, provide sanctuary to native and migratory birds, plants, rodents, and fish.

The need to safeguard the long-term health of California's marine life was recognized by the California Legislature in 1999 with the passage of the Marine Life Protection Act. Since the Act's passing, the San Diego region is now home to 11 Marine Protected Areas, four of which are estuarine systems. However, across our coastal ecosystems, plants, animals, and people alike are at risk, under the increasing pressures of climate change.

We envision a region that is not only committed to maintaining our existing biomes and ecosystems, but also to enhancing and restoring lost ecosystems to foster more diverse native life in the region. Through pilot projects that recognize and value traditional ecological knowledge, we envision a collaborative region that creates space to adopt conservation and management practices that have persisted through generations within the indigenous peoples of the San Diego region. Working with and embracing knowledge from Native San Diegans will ensure our efforts holistically reflect the relationship between our local communities and ecosystems, and allow us to conserve and restore our region's natural systems in a way that is culturally responsive, socially just, and ecologically effective.

Although our region is separated politically by an international border, it is important to recognize that our bioregion—the connected ecosystem—reaches far beyond the US-Mexico border. Ecosystems themselves are not bound by jurisdictional boundaries: therefore, conservation efforts must be integrated to adapt at a scale reflective of the ecological boundaries of the system. By fostering partnerships across the bioregion, conservation and restoration efforts will be more coordinated and effective, offering new opportunities for our green spaces to be managed in a way that fully reflects ecological boundaries. By working collectively, we can more rapidly continue to expand our estuarine, coastal, and inland ecosystems that are essential for the health and well-being of organisms and local communities alike.

### Goals

1

**Center conservation practices in tribal ecological knowledge**

2

**Strengthen understanding of project impacts on organisms and ecosystems to support decision making**

3

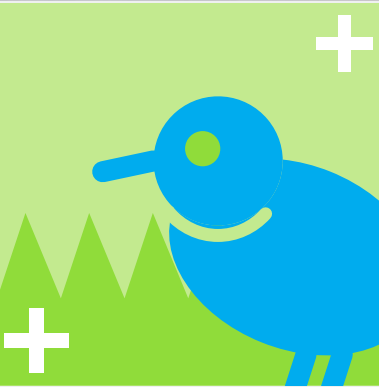
**Foster multi-jurisdictional partnerships to enable the consideration of land and green spaces at the bioregion scale**

4

**Encourage new nature-based solutions through rapid development of pilot projects that integrate and share research**

5

**Restore estuarine, coastal, and inland ecosystems**



PRINCIPLE 2

# BIODIVERSITY

# Goal 1. Center conservation practices in tribal ecological knowledge



## SHOCKS & STRESSES

- Governance Challenges
- Lack of or Disparities in Access to Open Space
- Loss of Biodiversity
- Structural Racism / Inequality



## SCALE

- Beyond the Region



## STATUS

- Piloted and ready to scale



## TIMEFRAME

- Long: 5+ years



## PROJECT OWNER

- Yaqui Divers

## 1.1 TRIBAL ECOLOGICAL KNOWLEDGE

### Elevate cultural values and tribal ecological knowledge as part of curricula for coastal education.

Historically, tribal ecological knowledge has been overlooked and invalidated in favor of westernized, colonial-centric academic practices and research. As a result, tribal ecological knowledge (TEK), which prioritizes the balance of anthropogenic interference with nature, has been lost or left unpracticed. This omission, in tandem with the historical exclusion of indigenous communities in many land use decision making processes, has resulted in loss of culture and connection to the coast for many of the indigenous communities that reside in the San Diego region. Outreach groups and indigenous-led organizations, like Yaqui Divers, are actively working to reclaim opportunities to elevate their culture and ways of knowing, including through language and land practices, while sharing and strengthening these learning opportunities and connections for their community's youth. The Yaqui Divers program is built off the Yaqui cultural history in Southern California and connection to the Yaqui settlements in Baja California, particularly Mulejé, where the preservation of pearl diving and other ocean traditions has continued for hundreds of years. Yaqui Divers are committed to marine habitat restoration and actively engage in community science to fulfill this spiritual obligation, aiming to help community members reconnect with the coast, get participants in the water, and learn traditional practices. Programs like these strengthen the presence and influence of TEK, elevating indigenous communities as leaders in identifying and building resilience solutions.



## Biodiversity

### 1.2 NATIVE PLANTING

**Honor tribal ecological knowledge and increase native flora through strategic and intentional planting.**

Due to increasing pressures of urbanization, globalization, and climate change, our local flora have been eradicated from their traditional habitats and often are out-competed for growing space in natural spaces by invasive species. Native plants provide critical habitat for flora and fauna and are more equipped to handle climate fluctuations, such as drought, than many invasive species that are not well adapted for the region. To support the restoration of native plant populations, public libraries in San Diego have opted to house seed libraries that are available to the public and help encourage education about the benefits of native planting. Other approaches include the incorporation of traditional practices and centering tribal ecological knowledge by fostering efforts in collaboration with tribal nations. The Resilient Restoration program, supported by the Climate Science Alliance’s Tribal Working Group, UC Riverside, and San Diego State University, is actively working to support actions that enhance the persistence of cultural practices while preserving ecosystems by planting culturally important species. Improving education efforts and mainstreaming programs that prioritize native plants will ensure our region’s biodiversity continues to be supported while also building resilience with climate-adapted habitats.



#### SHOCKS & STRESSES

- Climate Change
- Drought
- Lack of or Disparities in Access to Open Space
- Loss of Biodiversity
- Structural Racism / Inequality



#### SCALE

- Ecosystem



#### STATUS

- Underway



#### TIMEFRAME

- Long: 5+ years



#### PROJECT OWNER

- Our Canyons
- SD Canyonlands
- Urban Greening
- Canyon Enhancing Program
- Plant Native Plants
- Native Seed Library
- Climate Science Alliance



## Goal 2. Strengthen understanding of project impacts on non-human species and ecosystems to support decision making

### SHOCKS & STRESSES

- Funding Challenges
- Loss of Biodiversity

### SCALE

- San Diego Region

### STATUS

- Proposed

### TIMEFRAME

- Medium: 1 - 5 years

### PROJECT OWNER

- SDRCC

## 2.1 QUANTIFYING THE VALUE OF BIODIVERSITY

**Share best practices and develop additional resources that help make the business case for resilience investments.**

Municipalities and jurisdictions often face challenges securing needed resources for investments in conservation, restoration, and nature-based approaches that increase biodiversity. At first glance these investments may appear costly for entities facing constrained resources. However, when weighing options, many partners lack the tools and data needed to fully capture the true benefits and costs of projects as well as those associated with inaction. SDRCC will work with existing regional experts and partners to identify, amplify, and share best practices—working towards standardized approaches across the region—that help to quantify in economic terms the multiple environmental and social benefits of solutions that prioritize biodiversity. These will include locally appropriate and best-in-class cost/benefit analyses that drive improved understanding of the value of coastal assets from multiple perspectives—not just ecosystems themselves, but economic and community systems as well. By quantifying both the cost of inaction as well as capturing the true value of a range of alternatives, these resources can help make the business case for partners across the region for coordinated investments in coastal resilience projects that increase biodiversity.





## Biodiversity

### 2.2 MAINSTREAMING BIODIVERSITY

**Integrate biodiversity as a resilience priority across policy, advocacy, and regulatory efforts.**

Approaching policy, advocacy, and regulatory action from an integrated and intersectional perspective is important to ensure these approaches fully encompass the diverse climate impacts affecting communities across our region. Both traditional decision-makers and community leaders should consider the positive benefits of prioritizing biodiversity in policy actions and projects. Training and a curriculum to support these efforts are already underway through the Audubon Society. San Diego Audubon’s Advocate Training Program is aimed at supporting community members in their attempts to best advocate for birds, other wildlife, and their habitats. The program includes free training sessions, which cover skills such as reviewing environmental documents, understanding the legal mechanisms of conservation in our area, and engaging with elected officials. Experts and regional partners, such as The Nonprofit Institute and Leaders 20/20, that offer leadership development and training should work to align their efforts to include a holistic approach that mainstreams increased biodiversity as a resilience pathway.

#### SHOCKS & STRESSES

- Climate Change
- Funding Challenges
- Loss of Biodiversity
- Structural Racism / Inequality

#### SCALE

- Ecosystem

#### STATUS

- Proposed

#### TIMEFRAME

- Long: 5+ years

#### PROJECT OWNER

- Not Yet Identified







### SHOCKS & STRESSES

- Lack of or Disparities in Access to Open Space
- Poverty & Economic Inequality
- Structural Racism / Inequality



### SCALE

- San Diego Region



### STATUS

- Proposed



### TIMEFRAME

- Long: 5+ years



### PROJECT OWNER

- Not Yet Identified

## 2.3 EQUITABLE COASTAL ACCESS

**Incorporate equity and affordability considerations when planning and designing coastal access projects or improvements.**

Coastal communities harbor sought-after and lucrative real estate, as well as many geologic and structural features such as cliffs and sea walls that have made coastal spaces unaffordable and difficult to access. In addition, other existing and historic systematic practices such as redlining and structural racism have also deepened the inaccessibility of coastal spaces for low income communities and communities of color. With increased frequency and prolonged duration of extreme heat waves in inland areas expected to prevail as our climate changes, accessible routes, transportation, and access points to beaches and other coastal spaces serve as an important mechanism for those seeking natural cool zones. By centering equity and affordability when planning and designing coastal access projects or improvements, we can continue to ensure that all San Diegans have access to the many benefits, social and otherwise, these spaces offer. Implementing broader community recommendations, including inland communities in coastal decision-making processes, and following best practices for more equitable permitting processes will improve access. Accessibility enhancements for permitted activities, or actions increasing access to affordable overnight coastal accommodations, can all help increase access to coastal benefits for more communities.




# Goal 3. Foster multi-jurisdictional partnerships to enable the consideration of land and green spaces at the bioregion scale

## 3.1 WATERSHED CONNECTIVITY

**Address the complex interconnections between inland watersheds and the coast.**

The San Diego region is home to a complex system of 11 coastal watersheds, or areas of land that drain water from our inland ecosystems down to the ocean. Rainfall events wash harmful pollutants, such as pesticides, heavy metals, and bacteria, into the water, while putting low-lying watersheds and coastal systems at risk. Increasing our understanding of the critical relationship among our watersheds and our coasts is an essential first step in developing stronger coastal resilience strategies. As a part of its 150th anniversary celebration, the San Diego Natural History Museum is building upon this understanding and proposing a ten-year fund that will identify and address various challenges related to our watersheds, particularly in our inland areas and communities. Shifting to a more holistic approach to restoring and safeguarding our watershed systems broadens our view of who and what is affected by coastal issues, and helps expand our efforts thoughtfully into inland communities that are indirectly affected by these issues but have historically been overlooked in the past.

 **SHOCKS & STRESSES**  
- Climate Change  
- Lack of or Disparities in Access to Open Space  
- Loss of Biodiversity

 **SCALE**  
- San Diego Region

 **STATUS**  
- Proposed

 **TIMEFRAME**  
- Long: 5+ years

 **PROJECT OWNER**  
- San Diego Natural History Museum





### SHOCKS & STRESSES

- Climate Change
- Lack of or Disparities in Access to Open Space
- Loss of Biodiversity
- Structural Racism / Inequality



### SCALE

- San Diego Region



### STATUS

- Piloted and ready to scale



### TIMEFRAME

- Medium: 1 - 5 years



### PROJECT OWNER

- San Diego Natural History Museum

## 3.2 BIODIVERSITY COMMUNICATION CAMPAIGNS

**Design audience-specific outreach to cultivate an informed constituency about regional biodiversity and climate change impacts.**

Among the many roles museums play in connecting residents and visitors to treasured collections, they serve as an accessible hub for science conservation, education, and community outreach. The San Diego Natural History Museum (The Nat) provides several community science programs, including its Bio Blitz. These events utilize apps like iNaturalist to encourage residents and community members to get outside, in their neighborhoods or beyond, and to digitally identify and log the plants, insects, and animals they encounter. Additionally, specific exhibits, like the newly launched Exhibition Baja, and other in-house events, like featured scientist talks, provide information in engaging formats about the natural and changing landscape of the Cali-Baja region. Building upon the existing expertise and success of work led by The Nat, communication and outreach should provide an educational experience and connection to regional biodiversity in formats such as seminars, hikes, social media, and more. By expanding and supporting efforts to include additional partners to lead this engagement, we can enhance outreach to even broader audiences.



# Goal 4. Encourage new nature-based solutions through rapid development of pilot projects that integrate and share research

## 4.1 NATURE BASED SOLUTIONS FRAMEWORK

**Develop a dynamic nature-based solutions framework, representative of regional priorities, to support planning, funding, and implementation processes.**

Aligning partners across the region to foster a deeper collective definition and understanding of nature-based solutions, including defining priority guidelines and outlining examples of regional nature-based projects, will support planning, funding, and implementation processes. Nature-based solutions work with nature, providing additional benefits beyond traditional resilience and adaptation metrics, while also supporting strategies that increase biodiversity of our ecosystems. Creating a framework and database that houses resources related to nature-based solutions, opportunities for funding, and shovel-worthy projects ready for implementation would advance collaborative biodiversity efforts across the region. The framework would define existing and potential nature-based solutions, pathways, and projects, including their strengths and shortcomings. This database could be modeled after the [30x30 project database developed in the Bay Area](#) which includes over 100 projects that are ready to implement and meet the objectives of the State of California's Pathways to 30x30 Strategy.

### SHOCKS & STRESSES

- Climate Change
- Funding Challenges
- Governance Challenges
- Lack of or Disparities in Access to Open Space
- Loss of Biodiversity
- Structural Racism / Inequality

### SCALE

- San Diego Region

### STATUS

- Proposed

### TIMEFRAME

- Long: 5+ years

### PROJECT OWNER

- Not Yet Identified





### SHOCKS & STRESSES

- Aging or Inadequate Infrastructure (including transportation)
- Climate Change
- Coastal or Tidal Flooding
- Extreme Heat
- Lack of or Disparities in Access to Open Space
- Loss of Biodiversity
- Rainfall Flooding / Stormwater
- Sea Level Rise & Coastal Erosion
- Severe Storms



### SCALE

- San Diego Region



### STATUS

- Proposed



### TIMEFRAME

- Medium: 1 - 5 years



### PROJECT OWNER

- Scripps Institution of Oceanography

## 4.2 UNDERSTAND THE OPPORTUNITY FOR NATURE-BASED SOLUTIONS

**Research and understand the potential impact and benefits of nature-based solutions across the region.**

Scripps Institution of Oceanography will lead efforts to conduct research to understand the feasibility of nature-based solutions across the San Diego region. This effort will help communities identify the most strategic sites for pilot projects and facilitate early conversations with key stakeholders that are grounded in evidence-based science. In addition, conducting this analysis at the landscape scale of the whole regional coastline will lay the groundwork for a common baseline for monitoring, evaluation, and learning that will benefit not just regional project owners, but practitioners and policy makers across the state of California and beyond.

The opportunity is great: funding for nature-based solutions has never been so readily available. But because the region has yet to fully explore the full potential for these solutions, this research is required to understand where and how various types of these solutions might be piloted to maximize resilience benefits.

In addition, while our beaches and coastal typologies protect built infrastructure along these systems, we have yet to fully understand—and communicate—the opportunity for scaling nature-based solutions as an adaptation pathway in a way that will attract additional funding for pilots and for the regionally valuable learning that will follow. This new work will unlock a variety of new implementation pathways for nature-based solutions.



# Goal 5. Restore estuarine, coastal, and inland ecosystems

## 5.1 WETLAND AND LAGOON RESTORATION

**Continue supporting lagoon and wetland restoration through collaborative action.**

Since the 1900s, 90% of California’s native wetlands have been lost to urban development. While only a fraction of these original systems remain, in the San Diego region about 40% of the remaining wetlands are currently protected. Wetlands and lagoons provide refuge to endangered species, such as the Ridgeway Rail and other migratory birds that overwinter in San Diego’s warmer climate. Wetlands and lagoons also provide a natural buffer from extreme flood events and protect adjacent coastal and low-lying properties and communities. Initiatives like ReWild Mission Bay prioritize restoring and rebuilding lost wetlands and maintaining our existing wetlands to promote biodiversity and conscious recreation in estuarine systems. The National Oceanic and Atmospheric Administration, in collaboration with the Department of Fish and Wildlife, TRNERR, and multiple partnering local jurisdictions, is conducting restoration activities along the San Diego coast, including in the Tijuana River Estuary, Los Penasquitos Lagoon, and Mission Bay’s Kendall Frost Marsh. Maintaining and expanding initiatives that support our wetlands and critical coastal ecosystems will increase biodiversity while providing communities with an additional buffer from sea level rise impacts.

### SHOCKS & STRESSES

- Coastal or Tidal Flooding
- Loss of Biodiversity
- Sea Level Rise & Coastal Erosion
- Severe Storms

### SCALE

- Ecosystem

### STATUS

- Underway

### TIMEFRAME

- Long: 5+ years

### PROJECT OWNER

- TRNERR
- Los Penasquitos
- ReWild



## 5.2 BEACH RESTORATION

**Develop an integrated and multifaceted approach to beach restoration that reflects the dynamics of natural systems.**



### SHOCKS & STRESSES

- Coastal or Tidal Flooding
- Extreme Heat
- Lack of or Disparities in Access to Open Space
- Loss of Biodiversity
- Sea Level Rise & Coastal Erosion
- Severe Storms



### SCALE

- Ecosystem



### STATUS

- Piloted and ready to scale



### TIMEFRAME

- Long: 5+ years



### PROJECT OWNER

- Multiple

Beaches are dynamic ecosystems that provide multiple community and ecological benefits. These multipurpose recreational spaces can serve as natural cooling centers during times of extreme heat. Beaches also offer a natural buffer, mitigating impacts from flooding and storm surge events. Because sea level rise causes a lateral loss in the accessible space and width along our beaches, restoration of these systems has become integral for the health of our coasts. Coastal armoring, sand replenishment, and living coastlines are all examples of coastal adaptation strategies that might be used to enhance, protect, or restore beach systems. Municipalities and coastal land managers must navigate challenges in approaching how best to restore and sustain these beaches in order to ensure continued use, public access, and natural benefits. Finding pathways to work with nature-forward design principles, and implementing innovative and cross-cutting solutions that align with coastal typology, to help restore the natural dynamics and habitats along our beach systems will increase biodiversity and resilience of our beaches.

The City of Encinitas worked with a coalition of innovative partners to build the Cardiff State Beach Living Shoreline, restoring a historic dune system on top of buried rock revetment, a project that is intended to provide multiple engineering, environmental, and community benefits. Other municipalities and coastal land owners in our region have been working with engineers, scientists, and designers to identify additional priority nature-based strategies that will build resilience and ecological benefits.



### SHOCKS & STRESSES

- Climate Change
- Lack of or Disparities in Access to Open Space
- Loss of Biodiversity
- Structural Racism / Inequality



### SCALE

- Ecosystem



### STATUS

- Underway



### TIMEFRAME

- Long: 5+ years



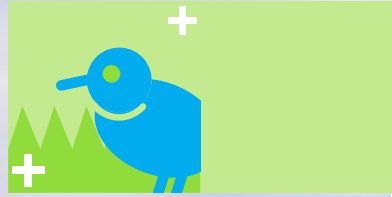
### PROJECT OWNER

- Multiple

## 5.3 MARINE PROTECTED AREA MANAGEMENT AND ENHANCEMENT

**Protect and conserve our ocean ecosystems to retain their natural value for generations to come.**

In addition to protecting onshore ecosystems, protecting wetland and coastal areas through Federal and State action will conserve and support the health of existing populations of fish, birds, and plants. Existing Marine Protected Areas (MPAs), however, lack enforcement due to staffing constraints, both in capacity and proximity. Oftentimes, MPA wardens are unable to reach individuals in violation of a no-take policy due to workload, distance, or lack of boats or equipment. Creating and nurturing a stronger culture of care for existing MPAs, while educating residents about the importance and ecological and cultural value that MPAs provide, would help increase the effectiveness of marine conservation in these areas. For instance, tribal leaders through the Yaqui Divers program take trips to local MPAs to teach participants about traditional indigenous connections and practices along the coast. However, local MPAs are small and oftentimes difficult to access without expensive equipment or training. Partners across the region should strive for enhanced capacity for enforcement, increased accessibility for community groups, and strengthened inclusion for tribes and valuing of cultural practices in these conservation areas.



**Biodiversity**





PRINCIPLE 3

## **Design and Build Infrastructure to Strengthen Coastal Resilience across the San Diego Region, including in both Coastal and Inland Communities**

The San Diego region is supported by a wide array of interdependent systems, from our bio-diverse habitats and ecosystems to our critical transportation, water, and energy infrastructure, and more. These natural and built systems serve as lifelines for our region’s residents, commuters, and visitors, both daily and during times of emergencies.

However, most of the infrastructure we currently rely upon to live, work, and play were neither designed to meet our present needs nor properly maintained to serve their intended purpose. Climate change is further exacerbating deficiencies in infrastructure along the coastline that are at risk of coastal flooding and sea level rise, including transportation routes and beach access points, as well as water and energy systems that are not equipped to serve our region’s needs reliably under a changing climate.

Infrastructure plays a fundamental role in shaping our physical environment in ways that promote (or hinder) accessibility, affordability, safety, and overall wellbeing. Designing and building infrastructure to meet our communities’ evolving needs equitably, withstand the worsening impacts of climate change, and provide essential services that enhance our region’s overall resilience will require new levels of leadership and collaboration. Actions within this Principle call for various forms of investments to create mutually supportive, future-proof systems that foster regional resilience and connectivity. While the level of investments needed to improve and maintain our region’s critical infrastructure can seem daunting, we know that the San Diego region is already rising to the challenge. We highlight Actions at different stages of planning, design, and implementation, many of which are already underway and demonstrate great potential for expansion and replication.

### **Goals**

**1**

**Increase equitable access to coastal open spaces including strategies to enhance multi-modal and public transportation**

**2**

**Accelerate implementation of multi-benefit infrastructure projects such as cooling, flood protection, and increased access to open space**

**3**

**Support integrated water management strategies that serve all communities across the region and are sustainable over the long term**

**4**

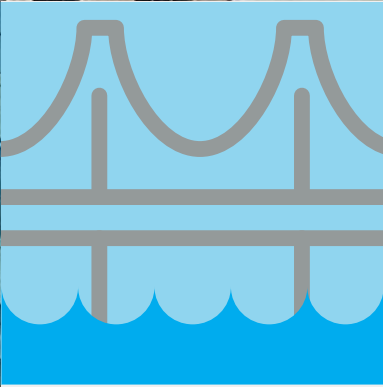
**Support increased coordination that leads to investments in coastal flood protection, adaptation, and managed retreat**

**5**

**Increase energy redundancy and reliability through grid resilience**

**6**

**Advance policies and projects that reduce exposure of critical infrastructure, including housing, in vulnerable coastal zones**



PRINCIPLE 3

# INFRASTRUCTURE

# Goal 1. Increase equitable access to coastal open spaces including strategies to enhance multi-modal and public transportation

## SHOCKS & STRESSES

- Climate Change
- Extreme Heat
- Homelessness
- Structural Racism / Inequality

## SCALE

- Local / Regional Jurisdiction

## STATUS

- Underway

## TIMEFRAME

- Medium: 1 - 5 years

## PROJECT OWNER

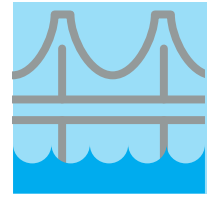
- City of San Diego

## 1.1 RESILIENCE HUBS

**Establish a network of resilience hubs to protect communities from climate events, including extreme heat.**

Resilience hubs are trusted community-serving facilities that provide year-round services before, during, and after disruptive events, particularly around extreme heat events and other climate-induced disasters, while building social cohesion and supporting communities every day. Also referred to as community resilience centers, resilience hubs have been piloted in many communities across the country and have been elevated as a priority solution in the face of increasing risks related to extreme heat. Extreme heat has been called the “silent killer” driven by climate change, with the most severe health impacts experienced by the elderly, youth, and those with underlying health conditions. Greater levels of funding are becoming available to support these spaces, such as through the Strategic Growth Council’s new Community Resilience Centers program. The City of San Diego is now looking to expand [Library Cool Zones](#) into more dynamic, multi-purpose resilience hubs to address extreme heat, as well as to provide additional services such as added grid redundancy and wildfire evacuation sites. This model is ripe for expansion and replication in jurisdictions across the region; partners can maximize the opportunities enabled by resilience hubs by coordinating with one another to create a regional network.



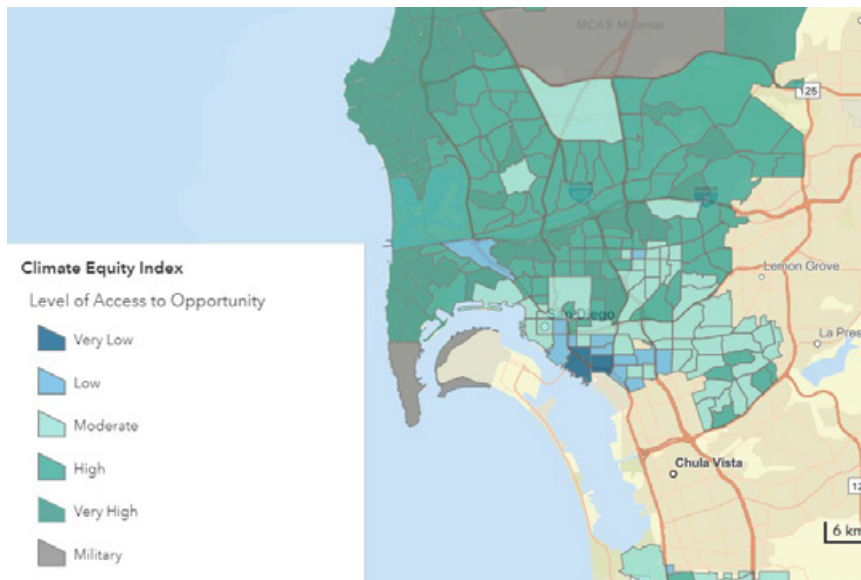


## Infrastructure

### 1.2 REGIONAL CLIMATE EQUITY INDEX

**Expand the City of San Diego’s Climate Equity Index (CEI) model region-wide.**

In 2019, the City of San Diego developed a [Climate Equity Index](#), with support of an equity working group, to measure access to opportunity and assess the degree of potential climate impacts within each census tract. This first-of-its-kind tool considers a range of environmental, mobility, health, housing, and socioeconomic indicators to better understand the cumulative effects of climate change, environmental pollution, and other vulnerabilities on communities. In 2021, inspired by the City of San Diego, the City of Chula Vista developed a [Draft Climate Equity Index](#). Expanding upon these efforts to create a region-wide Climate Equity Index will enable all jurisdictions in our region to make data-informed decisions to target climate and infrastructure investments where they are most needed. These localized indices provide improved data, supplementing statewide resources like CalEnviroScreen, that support local jurisdictions in making better informed decisions to support equitable investments in projects, programs, and infrastructure.



#### SHOCKS & STRESSES

- Climate Change
- Coastal or Tidal Flooding
- Drought
- Extreme Heat
- Food Insecurity & Agriculture
- Governance Challenges
- Housing Access & Affordability
- Poverty & Economic Inequality
- Sea Level Rise & Coastal Erosion
- Severe Storms
- Structural Racism / Inequality
- Water Insecurity



#### SCALE

- Local / Regional Jurisdiction



#### STATUS

- Piloted and ready to scale



#### TIMEFRAME

- Medium: 1 - 5 years



#### PROJECT OWNER

- City of San Diego
- City of Chula Vista

## Goal 2. Accelerate implementation of multi-benefit infrastructure projects such as cooling, flood protection, and increased access to open space

### SHOCKS & STRESSES

- Aging or Inadequate Infrastructure (including transportation)
- Climate Change
- Coastal or Tidal Flooding
- Loss of Biodiversity
- Rainfall Flooding / Stormwater
- Sea Level Rise & Coastal Erosion
- Severe Storms

### SCALE

- Local / Regional Jurisdiction

### STATUS

- Underway

### TIMEFRAME

- Medium: 1 - 5 years

### PROJECT OWNER

- Imperial Beach

## 2.1 BAYSHORE BIKEWAY RESILIENCY PROJECT

### Transform an existing segment of coastal access bikeway into a flagship resilience corridor.

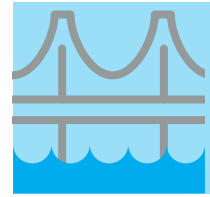
A regional asset, the Bayshore Bikeway is envisioned as a separated bike path that will extend 24 miles around San Diego Bay, passing through multiple cities including Chula Vista, San Diego, Coronado, and Imperial Beach. The City of Imperial Beach is developing plans and engineering designs to repurpose a 1.2-mile segment of the Bayshore Bikeway corridor. The project will enhance flood protection of the bikeway and adjacent neighborhood, improve access to and along the bikeway, preserve the natural habitat around the bikeway, and provide additional opportunities for future economic development and recreation.

The Bayside Neighborhood is one of the most vulnerable segments of Imperial Beach to coastal flooding impacts. The Bikeway and the residential community in this location are already prone to flooding during existing extreme tidal events near 7th Street and Basswood Avenue. Projected sea level rise will drastically increase the risk of tidal (non-storm) flooding at this location with a projected 3.5 feet of increased sea level impacting large portions of SR-75 and the neighborhood.

The project will incorporate a variety of nature-based features and sea level rise adaptation strategies. A living levee will elevate the Class 1 Bikeway using an earthen living levee concept and ecotone slope to increase sea level rise resilience. Multi-purpose detention basin/stormwater improvements will result in a flood control structure that will manage floodwater and control stormwater discharge to the Bay.

The project will also provide additional coastal access and environmental benefits. Coastal access trail improvements will add separated pedestrian and bicycle paths alongside the Bikeway to provide connectivity and reduce conflicts between bikes and pedestrians. Through habitat enhancements, existing tidal marsh will be enhanced and restored in alignment with implementation of the living levees and activities to increase tidal flushing in Pond 10A.

Proposed “Access Nodes” will allow visitors to come together in defined areas to view the scenery. The intent is to provide a safe area for pedestrians to cross the Bikeway and for those users on wheeled vehicles to slow and accommodate different users. While this project is currently being led by Imperial Beach, and offers a promising increase in coastal protection as well as important public access for the adjacent communities, the effort prioritizes collaboration—and Bikeway expansion with neighboring communities beyond the current proposed project site will extend and enhance the important resilience dividends this project provides. These multi-benefit adaptation improvements, including coastal access and the separated bikeway, serve as an example and important model for the region.



## Infrastructure

### 2.2 OCEANSIDE SAND NOURISHMENT AND RETENTION PILOT

**Accelerate implementation of an innovative multi-benefit sand retention pilot project through a design competition.**

The City of Oceanside has experienced rapid beach erosion for at least five decades. Despite annual dredging of Oceanside’s Harbor mouth as a supplemental supply, sediment loss has persisted and today there is no dry sand on Oceanside’s beaches for most of the year. Coupled with impacts from climate change, including sea level rise, severe storms, and tidal flooding, the need for an intervention has become critical.

In 2022, the City of Oceanside approved phase two of a sand nourishment and retention pilot project including a design competition process that will bring international design firms together to tackle Oceanside’s dwindling coast. Competing teams will develop innovative sand retention designs that seek to include multiple benefits, such as nature-based solutions. The selected design will move into final design and permitting, encouraging not just the generation of new ideas for the coast but a concept that can and will be built. Engineering firm GHD and Resilient Cities Catalyst are working alongside the City to execute the project and understand the process’s potential to strengthen the enabling environment across San Diego for pilot projects that bolster coastal resilience.



#### SHOCKS & STRESSES

- Climate Change
- Coastal or Tidal Flooding
- Lack of or Disparities in Access to Open Space
- Sea Level Rise & Coastal Erosion
- Severe Storms



#### SCALE

- Local / Regional Jurisdiction



#### STATUS

- Underway



#### TIMEFRAME

- Medium: 1 - 5 years



#### PROJECT OWNER

- City of Oceanside





### SHOCKS & STRESSES

- Aging or Inadequate Infrastructure (including transportation)
- Climate Change
- Coastal or Tidal Flooding
- Extreme Heat
- Sea Level Rise & Coastal Erosion
- Severe Storms



### SCALE

- San Diego Region



### STATUS

- Planned



### TIMEFRAME

- Medium: 1 - 5 years



### PROJECT OWNER

- City of San Diego

## 2.3 COASTAL RESILIENCE MASTER PLAN

### Prioritize multi-benefit nature-based solutions and green infrastructure.

The City of San Diego is leading the development of a Coastal Resilience Master Plan that prioritizes nature-based solutions and green infrastructure as a response to aging and inadequate infrastructure and to address multiple climate shocks and stresses, including extreme heat and sea level rise. Existing infrastructure practices have resulted in broader implementation of man-made, coastal hardening strategies. With the consideration and mainstreaming of nature-based solutions and green infrastructure, positive co-benefits such as ecosystem restoration and naturally cooling green spaces can be more readily realized. Making alternative forms of infrastructure solutions a priority pathway in planning documents is an important signal and can spur action beyond the public sector, including across the development industry, encouraging these types of resilience projects over more traditional gray infrastructure.



### SHOCKS & STRESSES

- Aging or Inadequate Infrastructure (including transportation)
- Climate Change
- Coastal or Tidal Flooding
- Loss of Biodiversity
- Sea Level Rise & Coastal Erosion
- Severe Storms



### SCALE

- San Diego Region



### STATUS

- Proposed



### TIMEFRAME

- Medium: 1 - 5 years



### PROJECT OWNER

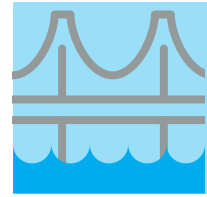
- StartBlue
- Scripps Institution of Oceanography
- Port of San Diego

## 2.4 ARTIFICIAL REEFS

### Explore opportunities to pilot artificial reefs and related emerging technologies and approaches across the region.

StartBlue is an accelerator affiliated with the Scripps Institution of Oceanography & Rady School of Management that supports the formation of advanced science and engineering startups tackling ocean-focused challenges and solutions integrated into science, industry, investment, and government networks. In its first cohort round, StartBlue supported *Reefpark*, which focuses on the engineering of living coral reef-mimicking structures for the sustainable use of coastal resources.

StartBlue and the Scripps Institute of Oceanography can explore partnerships with regional leaders like the Port of San Diego to pilot this artificial reef technology in San Diego Bay, creating new models for coastal protection with additional ecosystem benefits. By using the Port as a testing ground, the region, state, and world can learn about how to implement artificial reefs—which provide multiple benefits—and San Diego will help grow its regional blue economy. Increasing opportunity pathways to implement innovative resilience adaptation pilots will also provide much needed data and information about their multiple benefits and potential scale of impact.



## Infrastructure

### 2.5 ADAPT CRITICAL ROADWAYS

#### Realign South Carlsbad Boulevard east to account for sea level rise impacts.

In May 2020, the City of Carlsbad was awarded over \$500,000 in grant funding from the California State Coastal Conservancy to design a plan that would increase resilience to rising sea levels, including relocation of a vulnerable stretch of South Carlsbad Boulevard further away from the coastline. The overall long-term project scope involves a three-mile stretch along the coast from Palomar Airport Road down to La Costa Avenue. Planners and engineers have focused on an initial design phase for how the southbound lanes of Carlsbad Boulevard from Manzano Drive to Island Way could be moved further east, allowing for a repurposing and restoration of the coastal land.

The overall goal is to move critical transportation infrastructure inland. In the current phase of work, with the State Coastal Conservancy funding, the City of Carlsbad is working with GHD to explore moving the one-mile stretch of South Carlsbad Boulevard inland to address vulnerabilities to sea level rise. Findings from a recent SANDAG study on regional transportation infrastructure demonstrate that multi-jurisdictional coordination is required to realign critical transportation infrastructure effectively. Moving forward, a coordinated effort that includes collaboration among diverse partners from local, regional, statewide, and federal agencies will most effectively support improvements that foster more resilient transportation infrastructure.



#### SHOCKS & STRESSES

- Aging or Inadequate Infrastructure (including transportation)
- Climate Change
- Coastal or Tidal Flooding
- Loss of Biodiversity
- Rainfall Flooding / Stormwater
- Sea Level Rise & Coastal Erosion
- Severe Storms



#### SCALE

- Local / Regional Jurisdiction



#### STATUS

- Underway



#### TIMEFRAME

- Medium: 1 - 5 years



#### PROJECT OWNER

- City of Carlsbad



Photo credit: Port of San Diego



# Goal 3. Support integrated water management strategies that serve all communities across the region and are sustainable over the long term

## SHOCKS & STRESSES

- Aging or Inadequate Infrastructure (including transportation)
- Rainfall Flooding / Stormwater
- Water Insecurity

## SCALE

- Ecosystem

## STATUS

- Proposed

## TIMEFRAME

- Long: 5+ years

## PROJECT OWNER

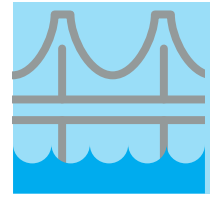
- Not Yet Identified

### 3.1 MULTINATIONAL CLEAN WATER INFRASTRUCTURE

#### Scale and implement solutions for improved watershed health and management at the multinational scale.

In 2022, the International Boundary and Water Commission, United States and Mexico (IBWC) announced [an agreement](#) to support sanitation projects addressing sewage problems along the Tijuana River, with \$330 million in funding from the U.S. government and \$144 million in funding from the Mexican government. Dynamic impacts from rainfall runoff as well as from sewage and wastewater treatment infrastructure failures can directly and negatively impact coastal health. Originating in Mexico, the Tijuana River runs along the border between the United States and Mexico and flows to the Pacific Ocean on the southern edge of San Diego County. Water treatment facilities along the River are unable to support demand and are often overrun with sewage and trash, which flow to the ocean and significantly impact the water quality in San Diego's southern beaches. South Bay beaches are routinely closed as a result of the cross-border pollution. Imperial Beach, for example, had sewage closure or warning signs posted on 249 days last year, according to data from the San Diego County Department of Environmental Health and Quality.

Projects supported by the IBWC agreement are expected to be completed and operational by the end of 2027 and to result in a 50% reduction in the number of days of transboundary wastewater flow in the Tijuana River and an 80% reduction in the volume of untreated wastewater discharged to the Pacific Ocean six miles south of the border. These projects and infrastructure improvements are an essential step forward and lay the groundwork for new and improved opportunities for additional projects and partnerships that offer increased multi-benefit solutions and improved multi-national coordination.



## Infrastructure

### 3.2 STORMWATER SYSTEM IMPROVEMENTS

**Assess storm drains and regional-scale pathways to promote effective stormwater capture projects.**

Stormwater capture projects and management systems are most effective when the storm drainage systems within a city and region are well understood and maintained. The City of Imperial Beach has been working to assess storm drains and to identify opportunities to elevate stormwater capture projects that can be integrated into a full stormwater management system for the City. Through this undertaking, a need emerged to assess storm drains across the San Diego region. One benefit of assessments that examine stormwater management at a larger scale, rather than jurisdiction by jurisdiction, is the ability to identify storm drains that outflow across jurisdictions and to plan comprehensively, resulting in opportunities to prioritize capture and reuse in severe storm events and strengthening the resilience of the water system.



#### SHOCKS & STRESSES

- Aging or Inadequate Infrastructure (including transportation)
- Climate Change
- Governance Challenges
- Rainfall Flooding / Stormwater
- Severe Storms



#### SCALE

- San Diego Region



#### STATUS

- Proposed



#### TIMEFRAME

- Medium: 1 - 5 years



#### PROJECT OWNER

- City of Imperial Beach



# Goal 4. Support increased coordination that leads to investments in coastal flood protection, adaptation, and managed retreat

## SHOCKS & STRESSES

- Aging or Inadequate Infrastructure (including transportation)
- Climate Change
- Coastal or Tidal Flooding
- Funding Challenges
- Governance Challenges
- Sea Level Rise & Coastal Erosion
- Severe Storms

## SCALE

- Beyond the Region

## STATUS

- Proposed

## TIMEFRAME

- Short: <1 year

## PROJECT OWNER

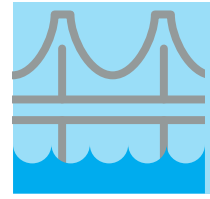
- SDRCC

## 4.1 CALIFORNIA COASTAL COMMISSION TRAININGS & OUTREACH

**Encourage regional coordination and dialogues around permitting and funding processes.**

With cities across the region confronting similar and related coastal infrastructure challenges that are further compounded by climate change and sea level rise, there is an opportunity to strengthen understanding of the role of permitting agencies like the California Coastal Commission in advancing projects that enable communities to respond more quickly to coastal infrastructure needs, as jurisdictions seek required approvals from the Commission for infrastructure projects that are within the Coastal Zone. The City of Oceanside, for example, has been working closely with the Coastal Commission on a number of projects. These efforts underscore the potential in leveraging more regular, regional convening efforts to streamline permitting and funding processes. With convening support from the San Diego Regional Climate Collaborative, this effort will open dialogue and can help spur action for cities across the region confronting similar challenges.





## Infrastructure

### 4.2 DUNE SCIENCE NETWORK

**Evaluate the potential of dune systems to insulate San Diego’s coast from climate impacts.**

Many of California’s coastal landscapes are defined or were historically defined by dune systems, which provided a natural barrier to wave impacts and critical ecosystems. The California Coastal Dune Science Network seeks to understand how existing and restored dune systems can strengthen resilience along California’s coast. In San Diego, the Cardiff Living Shoreline is an example of these highly transitional and adaptive landscapes that can buffer critical infrastructure and ecosystems from severe storms, flooding, and sea level rise. By fostering connections among practitioners, guiding best practices, sharing research and data, and engaging students and communities, the Network is helping to build a greater understanding of how a network of dune systems can build resilience. Learnings from the Dune Science Network can inform scaling of new pilot projects across the region.



#### SHOCKS & STRESSES

- Aging or Inadequate Infrastructure (including transportation)
- Climate Change
- Coastal or Tidal Flooding
- Sea Level Rise & Coastal Erosion
- Severe Storms



#### SCALE

- Beyond the Region



#### STATUS

- Piloted and ready to scale



#### TIMEFRAME

- Long: 5+ years



#### PROJECT OWNER

- Scripps Institution of Oceanography

# Goal 5. Increase energy redundancy and reliability through grid resilience

## SHOCKS & STRESSES

- Aging or Inadequate Infrastructure (including transportation)
- Climate Change
- Grid Reliability

## SCALE

- Local / Regional Jurisdiction

## STATUS

- Planned

## TIMEFRAME

- Medium: 1 - 5 years

## PROJECT OWNER

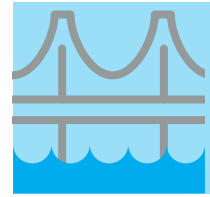
- City of Chula Vista

## 5.1 RESILIENT MICROGRIDS

### Expand building blocks for reliable, decarbonized energy infrastructure.

More frequent extreme weather events induced by climate change, as well as accelerated efforts to decarbonize and electrify our energy system, have created new and evolving challenges for grid reliability. Recognizing these challenges and simultaneously addressing the importance of supporting a clean energy transition, the City of Chula Vista is investing in critical infrastructure, such as combined solar and battery storage solutions, to transform clusters of City-owned and City-operated buildings into resilient microgrids. Some City facilities will soon be equipped with batteries; however, roughly 15 buildings equipped with solar infrastructure still currently lack storage capacity due to insufficient funding. The City of Chula Vista is planning to develop a Microgrid Feasibility Study to explore viable pathways for implementation, which can serve as an example for other buildings throughout the City and other jurisdictions in the San Diego region and beyond.





## Infrastructure

### 5.2 MODELING SUSTAINABILITY AND GRID RESILIENCE AT SAN DIEGO AIRPORT

**Expand resilience projects and zero net energy facilities at the San Diego International Airport.**

Our regional economy’s vibrancy and growth depend upon holistic resilience solutions, including those that advance energy redundancy and reliability through grid resilience. As a world-class tourist destination and the busiest single-runway commercial airport in the United States, the San Diego International Airport (SAN) plays a key role in economic activity and connectivity. The San Diego County Regional Airport Authority (Airport Authority) manages the day-to-day operations of SAN and addresses the region’s long-term air transportation needs. SAN is the busiest single-runway commercial airport in the United States.

The Airport Authority has integrated sustainability across social, environmental, and economic functions in order to reduce greenhouse gas emissions and address climate vulnerabilities (for example, minimizing energy usage). The Airport Authority is working to increase the volume of photovoltaic (PV) solar battery storage as the load demand grows and is also focused on ensuring enough battery storage is available for renewable energy generation. The Airport Authority’s Terminal 1 (T1) project, which is underway, will integrate sustainability into the modernization of the terminal’s operations and building functions. This effort will provide the region with a high-performing campus that is resilient in the face of climate-induced vulnerabilities. Additional energy resilience and redundancy will be integrated in the new T1 parking plaza as 10% of the future lot will be dedicated to electric vehicle (EV) charging. SAN is working to provide the EV infrastructure necessary to support this increased EV charging capacity.



#### SHOCKS & STRESSES

- Aging or Inadequate Infrastructure (including transportation)
- Climate Change
- Grid Reliability



#### SCALE

- Local / Regional Jurisdiction



#### STATUS

- Underway



#### TIMEFRAME

- Long: 5+ years



#### PROJECT OWNER

- San Diego County Regional Airport Authority



# Goal 6. Advance policies and projects that reduce exposure of critical infrastructure, including housing, in vulnerable coastal zones

## SHOCKS & STRESSES

- Climate Change
- Coastal or Tidal Flooding
- Sea Level Rise & Coastal Erosion

## SCALE

- Local / Regional Jurisdiction

## STATUS

- Underway

## TIMEFRAME

- Medium: 1 - 5 years

## PROJECT OWNER

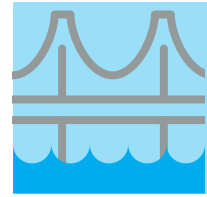
- Los Peñasquitos Lagoon Foundation
- GHD

## 6.1 TORREY PINES STATE RESERVE NORTH LOT MANAGED RETREAT

**Identify feasible alternatives for redesigning or relocating the parking lot while incorporating multiple benefits.**

The North Beach Parking Lot serves as a key access point for the northern portion of Torrey Pines State Natural Reserve, including for Los Peñasquitos Lagoon, Torrey Pines State Beach, and a network of regional trails. The Los Peñasquitos Lagoon Enhancement Plan identified managed retreat of the parking lot as a priority project due to its current vulnerability to sea level rise and other climate impacts. A feasibility study is being conducted to improve water flows under McGonigle Road through design elements, for example by replacing the damaged culvert or elevating the roadway to improve wildlife movement. The study will also address stormwater management needs, such as through bioswales and other green infrastructure methods, and assess alternatives to relocate the bathroom that is currently vulnerable to sea level rise and coastal flooding. This project aims to provide multiple benefits, from preserving beach access to maximizing ecological and community benefits.





## Infrastructure

### 6.2 SAN DIEGO REGIONAL RAIL ALTERNATIVE ALIGNMENT STUDY

Explore options to move the rail line off of coastal bluffs.

The San Diego Regional Rail Alignment Study analyzed potential realignment options that would move a portion of the rail line completely off of coastal bluffs in the City of Del Mar, increasing stability for this key rail corridor. A total of \$300 million was secured to move this study through the environmental and design phase. Two options for Del Mar Heights alignment were studied, crossing either above or below Carmel Valley Road. SANDAG is refining the two alignment alternatives based on engineering, construction, and operational considerations as well as stakeholder input to reduce impacts to the community. A feasibility study will determine which of the options will advance to environmental review. This study builds upon previous conceptual alignment studies completed by SANDAG in 2017, in which five conceptual rail realignments were identified.



#### SHOCKS & STRESSES

- Aging or Inadequate Infrastructure (including transportation)
- Climate Change



#### SCALE

- Local / Regional Jurisdiction



#### STATUS

- Underway



#### TIMEFRAME

- Long: 5+ years



#### PROJECT OWNER

- SANDAG
- GHD

### 6.3 LEVEE MAINTENANCE

Advance Army Corps of Engineers projects that promote restoration of ecologically significant sediment pathways.

The natural flow of sediment through the San Luis Rey River mouth and estuary in Oceanside has been restricted by the construction of the Oceanside Harbor and Boat Basin for decades. The Army Corps of Engineers recently progressed levee maintenance along the San Luis Rey River that will enhance ecological restoration with the potential to bring back some of the natural flow of sediment to Oceanside's coast. Projects like this are often not prioritized by local municipalities and the California Coastal Commission, but they are important for building long-term resilience. Annual dredging of the Harbor mouth currently costs the City millions of dollars. With a functioning River mouth and sediment flow connecting through the watershed, costly annual dredging may no longer be needed and the entire Oceanside Littoral Cell, extending down to La Jolla, would see an increase in sediment.



#### SHOCKS & STRESSES

- Aging or Inadequate Infrastructure (including transportation)
- Climate Change
- Coastal or Tidal Flooding
- Sea Level Rise & Coastal Erosion
- Severe Storms



#### SCALE

- Community



#### STATUS

- Proposed



#### TIMEFRAME

- Long: 5+ years



#### PROJECT OWNER

- Army Corps of Engineers



## Model Tools for Understanding Risk, and Test Solutions that Mitigate Vulnerability to Future Hazards while Increasing Community Preparedness

On one hand, San Diego’s leaders have every reason to feel overwhelmed by an uncertain future wrought by climate change, globalization, and a growing population. However, this moment in history affords us more insight and perspective on what possible futures may unfold than ever before, and San Diego has the right mix of partners, resources, capacity, and knowledge to leverage a more nuanced understanding of risk to support decision making and to help design and implement resilience projects.

Many of the barriers to coastal adaptation and resilience involve identifying funding sources for projects and overcoming the real and perceived risk of trying new things. Innovative finance is the development of new tools and mechanisms that allow organizations and individuals to move money through time and transfer risk in ways that make taking action possible for investors and project owners. But in order for innovative financial solutions to be developed, tested, and piloted, four key ingredients must be in place in the region.

- First, project owners and organizations that are willing to pilot these solutions.
- Second, a regulatory environment that will allow for the testing of these solutions.
- Third, financial sector actors willing to participate in the pilots.
- Fourth, adequate data and modeling to understand the potential impacts of various projects and actions.

One of San Diego’s strengths is its full set of knowledge institutions and researchers. This is evident in the presence of world-class institutions like Scripps Institution of Oceanography at the University of California San Diego, as well as the University of San Diego, San Diego State University, and other colleges and universities. In addition, San Diego has a history of birthing private sector ventures rooted in scientific discovery—most notably in biotech. There is growing momentum around cultivating a “Blue Economy.” Innovative finance and insurance should be a key component of this new sector.

### Goals

1

**Use policy tools, innovative funding strategies, and incentives to channel development towards areas less vulnerable to climate hazards**

2

**Support more regular and granular risk and scenario modeling**

3

**Develop models and communication tools to increase shared understanding of risks and opportunities**

4

**Pilot and test new financial mechanisms that transfer risk and more fully capture environmental, social, and other costs and benefits**

5

**Cultivate spaces for cross-sector dialogue and coordination**



PRINCIPLE 4

# RISK

# Goal 1. Use policy tools, innovative funding strategies, and incentives to channel development towards areas less vulnerable to climate hazards



## SHOCKS & STRESSES

- Aging or Inadequate Infrastructure (including transportation)
- Climate Change
- Coastal or Tidal Flooding
- Sea Level Rise & Coastal Erosion
- Severe Storms



## SCALE

- Local / Regional Jurisdiction



## STATUS

- Underway



## TIMEFRAME

- Medium: 1 - 5 years



## PROJECT OWNER

- Multiple

## 1.1 SEDIMENT MOVEMENT

### Support sediment matching programs and enhance regulatory processes to streamline transport.

Cities and communities across the region can increasingly use growing understanding of sediment and sand movement—and of littoral drifts, or ocean currents—to better manage their beaches. Beyond supporting recreational use, sandy beaches also act as natural buffers for critical coastal infrastructure, dampening wave attenuation from large storms and protecting from the impacts of flooding and sea level rise. Nature-based solutions that lower risk of climate impacts, like living shorelines and engineered dune systems, require large amounts of sediment to construct and implement. However, local municipalities face challenges in moving large amounts of sand because a lack of support and clarity from permitting agencies have made these projects arduous or sometimes impossible. Streamlining regulations, while supporting capacity needed to navigate permitting processes and regulatory frameworks that enable the movement of sand to beaches in need, would help cities manage their coastlines efficiently and reduce risk.





## Risk

### 1.2 CEQA ADJUSTMENTS

#### Adapt CEQA to assess future risk effectively.

Since 1979, the California Environmental Quality Act (CEQA) has required any new project led by a public agency to inform project stakeholders, decision makers, and the public about the project's proposed and potential impacts on the environment. These impacts are traditionally measured against existing ecosystem conditions and risk. However, with increasingly dynamic environmental shifts brought on by climate change, assessments in light of existing conditions are inadequate because they do not accurately account for future risks. Partners can advocate for several adjustments to CEQA that would incorporate and embed future environmental risk and impacts. These modifications would encourage public agencies to produce and focus on projects that more comprehensively address both existing and future conditions.

#### SHOCKS & STRESSES

- Aging or Inadequate Infrastructure (including transportation)
- Climate Change

#### SCALE

- Beyond the Region

#### STATUS

- Proposed

#### TIMEFRAME

- Medium: 1 - 5 years

#### PROJECT OWNER

- Not Yet Identified



# Goal 2. Support more regular and granular risk and scenario modeling

## ⚡ SHOCKS & STRESSES

- Climate Change
- Governance Challenges

## ↔ SCALE

- Local / Regional Jurisdiction

## 📊 STATUS

- Piloted and ready to scale

## 📅 TIMEFRAME

- Medium: 1 - 5 years

## 👤 PROJECT OWNER

- Scripps Institution of Oceanography

## 2.1 LOCALIZED CLIMATE PROJECTIONS

**Enhance localized climate projections and modeling to reduce risk.**

Projecting future climate conditions is essential to strengthen understanding of how our communities will be affected by climate change and the resulting consequences. However, data and research that address such changes do not always connect back directly to their impact on communities. Weather data in tandem with census tract data, including socio-economic attributes, should be utilized when calculating risk. For instance, as weather patterns become more unpredictable under a changing climate, extreme precipitation—such as atmospheric rivers—and extreme heat threaten properties and infrastructure that was built to withstand moderate rain and temperatures. Estimating hospitalizations due to heat-associated illnesses, including cardiovascular and respiratory illnesses, is important for identifying what kind of health risks communities face during extreme heat waves. Additionally, analyzing how terrain and proximity to the ocean affect these impacts—including by modeling green spaces, such as tree canopy and cover, park access, and impervious surface cover—contributes to a holistic understanding of health risks for communities. Furthermore, integrating spatial data with demographic and socioeconomic data strengthens understanding of how communities of different incomes and races are impacted by climate-driven health hazards.





## Risk



### SHOCKS & STRESSES

- Climate Change
- Severe Storms



### SCALE

- San Diego Region



### STATUS

- Proposed



### TIMEFRAME

- Medium: 1 - 5 years



### PROJECT OWNER

- Academic & Agency Research Partners

## 2.2 ADVANCED GEOSPATIAL MONITORING

**Increase collection and monitoring of advanced geospatial datasets for regional resilience planning.**

Storm intensity and accompanying conditions, including powerful wave swells, large atmospheric rivers, and higher tides, are anticipated to increase with climate change—prompting critical decisions for local governments, State agencies, and residents. Access to high quality, frequently updated datasets, including during post-storm recovery, enables informed decision-making, allowing communities to prepare, adapt, and implement successful projects now and into the future. One example of an opportunity to strengthen data collection and use includes sourcing and supporting the collection of high-resolution lidar and hyperspectral aircraft surveys that can map changes in beaches, cliffs, wetlands, estuaries, and built environments immediately following the cumulative impacts of intense storm events. Additionally, precision mapping of shorelines and site-specific assessment of exposure and water level tracking can enable more accurate flood forecasts. These datasets and models can be combined with satellite imagery and other spatial observations to provide land managers and planners with a longer-term context grounded in useful results. It is also critical to support frequent and repeated collection of data, which will be invaluable for assessing coastal resilience, advancing predictive modeling capabilities for climate risk assessment, and ultimately, leading to specific best practice recommendations.



# Goal 3. Develop models and communication tools to increase shared understanding of risks and opportunities

## SHOCKS & STRESSES

- Climate Change
- Coastal or Tidal Flooding
- Structural Racism / Inequality

## SCALE

- San Diego Region

## STATUS

- Proposed

## TIMEFRAME

- Medium: 1 - 5 years

## PROJECT OWNER

- Not Yet Identified

### 3.1 CLIMATE RISK COMMUNICATIONS CAMPAIGN

**Develop innovative and scalable communication campaigns to increase awareness of and preparedness for climate risks.**

Challenges in understanding complex concepts related to climate risk create additional barriers to strengthening community preparedness. Simple and accessible communications strategies can help to overcome these barriers by increasing awareness of climate threats alongside an accurate understanding of risk—including practical knowledge about potential impacts. Through creative community engagement, regional leaders can help educate local residents about these complex topics related to long-term climate risk, identify information gaps, and mobilize action to support communities. An innovative communications campaign would capitalize upon the region's natural assets, engage with communities creatively through formats and channels that meet them where they are, use simple language accessible to non-technical audiences from diverse backgrounds, and incorporate effective approaches in order to increase awareness and preparedness. These communications should support a clear understanding of the specific risks residents face as well as concrete steps they can take to mitigate risk and prepare for more likely scenarios. By launching and sustaining these kinds of creative communications efforts, partners can help more San Diegans reduce their risk and take steps to become more prepared in the face of future climate threats.



Photo credit: City of San Diego

# Goal 4. Pilot and test new financial mechanisms that transfer risk and more fully capture environmental, social, and other costs and benefits

## 4.1 COASTAL RESILIENCE DISTRICTS

**Deploy Coastal Resilience Districts as a strategy to manage risk and resources for resilience projects.**

Resilient Cities Catalyst (RCC) will work with local partners to identify the best possible opportunities for piloting Resilience Districts to advance coastal projects. This effort will include forming governance structures and revenue streams by aligning beneficiaries and project costs. Resilience Districts are a new policy tool in California, and an innovation that could change the way communities develop and operate resilience projects across the country and around the world. Through the development and testing of these pilots in the San Diego region, we will better understand this new policy’s potential for scaling, and RCC will leverage its national and international network of partners to explore opportunities for replication.

Resilience Districts were adopted as a new policy in October 2022, when California Senate Bill 852 established a new mechanism for managing and resourcing resilience projects. The Climate Resilience Districts Act authorizes local agencies to create Climate Resilience Districts to address climate change effects and impacts. The Districts must be formed for the purpose of raising and allocating funding for projects, and their operating expenses, that are designed and implemented to address climate change mitigation, adaptation, or resilience. The Climate Resilience Districts are limited to funding projects that address sea level rise, extreme heat, extreme cold, and the risk of wildfire, drought, and flooding.



### SHOCKS & STRESSES

- Aging or Inadequate Infrastructure (including transportation)
- Climate Change
- Coastal or Tidal Flooding
- Funding Challenges
- Governance Challenges
- Homelessness
- Housing Access & Affordability
- Loss of Biodiversity
- Poverty & Economic Inequality
- Rainfall Flooding / Stormwater
- Sea Level Rise & Coastal Erosion
- Severe Storms
- Structural Racism / Inequality

### SCALE

- San Diego Region

### STATUS

- Proposed

### TIMEFRAME

- Medium: 1 - 5 years

### PROJECT OWNER

- Resilient Cities Catalyst





### SHOCKS & STRESSES

- Aging or Inadequate Infrastructure (including transportation)
- Climate Change
- Coastal or Tidal Flooding
- Funding Challenges
- Poverty & Economic Inequality
- Sea Level Rise & Coastal Erosion



### SCALE

- Local / Regional Jurisdiction



### STATUS

- Piloted and ready to scale



### TIMEFRAME

- Medium: 1 - 5 years



### PROJECT OWNER

- Port of San Diego

## 4.2 UNDERSTANDING NATURE-BASED SOLUTIONS' IMPACT ON RISK

**Explore insurance or other innovative financial mechanisms to justify or support the costs of expanding the Port of San Diego's Nature-Based Solution pilots.**

The Port of San Diego will leverage its existing investments in innovative, natural and nature-based solutions to explore and understand their potential impact in risk reduction for both the Port's assets, and the region as a whole.

Over the last decade, the Port of San Diego has prioritized piloting innovative solutions to manage current and future climate impacts. Through partnerships to implement projects using innovative materials (such as ECoConcrete), the Port has deployed a number of small-scale, coastal resilience pilots that feature a variety of nature-based solutions.

While the pilots have been constructed and their direct impacts are being monitored, the Port has not yet conducted a full analysis of the potential impact of these pilot projects on the overall risk profile of the Port, including full social, economic, and environmental costs and savings. Undergoing this analysis, and determining the potential savings and risk reduction, could yield new financial mechanisms to fund scaling of the pilots and deployment of these solutions by other regional actors. Additionally, this effort will test ways to communicate these benefits more broadly to the public through briefings, online communication, and broader engagement activities.

Given the Port's role as a regional leader, these analyses can support research and address information gaps to catalyze stronger regional adoption and deployment of innovative models. Better understanding the full range of benefits is an important step toward establishing standards for natural and nature based solutions, which will facilitate further scaling and greater impact.



## Risk

### 4.3 PARAMETRIC INSURANCE FOR EMERGENCY DREDGING

Develop a new insurance product to provide emergency funding for dredging activities.

Major storm events or coastal forces can occasionally suddenly close a harbor mouth, erode a beach, or disrupt the natural flow of sediment in a coastal ecosystem. Many municipalities and agencies maintain “rainy day funds” to manage the costs associated with these disruptions, or at times simply have to allocate emergency funds. Parametric insurance offers a promising solution, as the product would set specific criteria (for example, harbor channel depth) that could be measured objectively to establish condition points. The moment the agreed upon condition is met, funds would be released to the agency or municipality holding the parametric insurance policy that could be deployed immediately to address the problem. Resilient Cities Catalyst will work with insurance companies, brokers, the California Department of Insurance, and local governments to explore the potential for this new product in the San Diego Region.



Photo credit: City of San Diego



#### SHOCKS & STRESSES

- Aging or Inadequate Infrastructure (including transportation)
- Climate Change
- Coastal or Tidal Flooding
- Funding Challenges
- Loss of Biodiversity
- Rainfall Flooding / Stormwater
- Sea Level Rise & Coastal Erosion
- Severe Storms



#### SCALE

- Local / Regional Jurisdiction



#### STATUS

- Proposed



#### TIMEFRAME

- Medium: 1 - 5 years



#### PROJECT OWNER

- Resilient Cities Catalyst

## Goal 5. Cultivate spaces for cross-sector dialogue and coordination

### SHOCKS & STRESSES

- Climate Change
- Coastal or Tidal Flooding
- Funding Challenges
- Sea Level Rise & Coastal Erosion

### SCALE

- San Diego Region

### STATUS

- Underway

### TIMEFRAME

- Medium: 1 - 5 years

### PROJECT OWNER

- Ocean Science Trust

## 5.1 STATEWIDE DIALOGUES ON NATURE & RISK

### Expand convenings to catalyze new collaborations and pilot approaches.

Multiple regional partners will bring experts, practitioners, and other partners together to support additional dialogues needed to catalyze new approaches to address risk. Through convenings such as learning symposia, webinars, working groups, and tactical workshops oriented around specific project opportunities, these sessions will intentionally engage partners across sectors to facilitate development of innovative tools and solutions.

Coastal communities statewide face growing, climate-driven threats that impact both coastal ecosystems and the people who depend on them, including rising seas and frequent flooding. The multi-trillion dollar insurance industry, which increasingly views these impacts as unchecked risk, can also be a tool for mitigating this risk if activated through climate adaptation and mitigation efforts. Building upon the innovative recommendations established by the California Department of Insurance's (CDI) 2021 California Climate Insurance Working Group, Ocean Science Trust (OST) signed a memorandum of agreement with CDI to provide science services and support on issues pertaining to resilient coasts and oceans. In early 2023, OST and CDI partnered with the UC Santa Cruz Center for Coastal Climate Resilience and the U.S. Army Corps of Engineers to host the Integrating Nature into Risk Science & Insurance Symposium. The symposium brought together local and national policymakers, insurance practitioners, and coastal resilience experts to explore opportunities to use insurance and nature-based solutions to build coastal resilience and reduce risk.

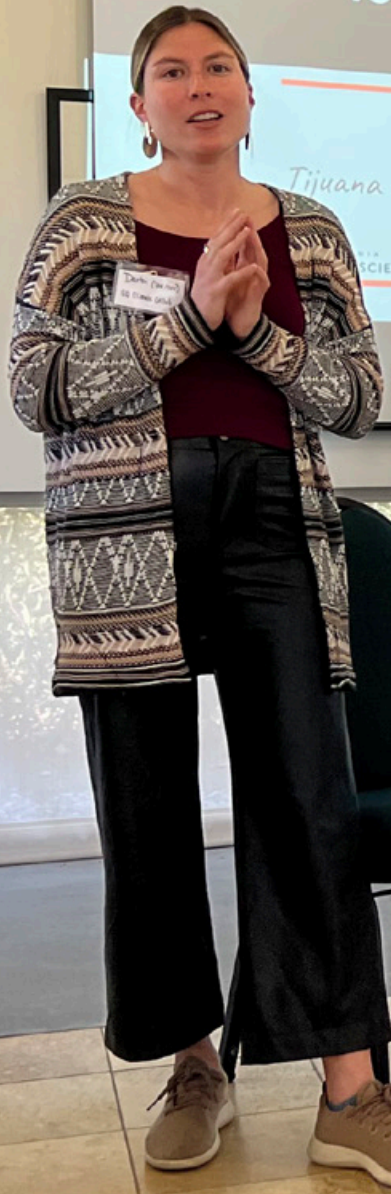
Building upon this collaboration will help to accelerate the integration of nature into insurance and risk management approaches, as well as the identification of potential pilot projects and solutions. Through these kinds of convenings and collaborations, partners across the region will continue to build upon this foundation to expand upon these dialogues and spur new partnerships and pilot projects.



Risk

# Unlocking Insurance to Leverage Nature, Finance, and Risk Science for Coastal Resilience

Monday, February 27th  
Tijuana River National Estuarine Visitor Center



PRINCIPLE 5

## Grow an Innovative, Equity-Driven Climate Economy through Workforce Development, Capacity Building, Policy, and Systems Change

We will harness our economic strengths to address both our climate challenges and underlying economic inequality.

Climate-driven risks threaten our economic prosperity, while exacerbating underlying economic pressures. Economic activity across our region is deeply tied to our coastal assets: our vital tourism and hospitality sector, for example, is linked to our coastline, and the Port of San Diego drives over \$9 billion in economic impact and supports tens of thousands of regional jobs. At the same time, the economic damage caused by climate change is projected to worsen, with small businesses and major infrastructure alike expected to face increasingly costly flooding events. Rising sea levels will only strain our acute affordability challenges, placing even greater pressure on housing prices in less risky areas in the context of an existing housing affordability crisis.

Notwithstanding climate change, the San Diego region is already contending with significant economic disparities. Entrenched economic inequality, deeply linked to racist practices and decades of underinvestment particularly in communities of color, has resulted in radical disparities between neighborhoods that are only miles apart. While well-paying jobs in growing sectors show promise to address these longstanding disparities, these jobs are out of reach for many San Diegans as the result of unequal access to high quality training and educational opportunities.

However, these growing sectors also show great potential to address our inter-related climate and economic challenges simultaneously. Our region is already at the vanguard of blue and green jobs, with this growing cluster presenting a critical opportunity to bring not only stable jobs and economic activity to our region—but also to innovate and grow businesses and organizations right here in San Diego that address our urgent climate challenges. The actions in this Roadmap aim to ensure that we continue growing these sectors, and that we do so in a way that addresses inequality, bringing jobs and economic growth to historically underinvested communities. We also draw upon the vibrancy of our binational region, the largest economic zone along the U.S.-Mexico border, contributing to our regional GDP of \$250 billion and an estimated \$70 billion in cross-border trade flows. Leveraging our binational assets to foster increased prosperity for all residents across the region will help us work towards our equity and climate goals.

### Goals

1

**Increase economic mobility and wealth-building opportunities for all to reduce long-standing disparities**

2

**Build upon the strengths of the growing binational region to promote investments that support thriving, equitable communities**

3

**Nurture and promote diverse career pathways to high paying jobs in traditional and emerging climate-supportive sectors**

4

**Continue growing blue and green economy clusters to foster quality jobs across diverse sectors and economic activity, as well as climate benefits**



PRINCIPLE 5

# ECONOMY

# Goal 1. Increase economic mobility and wealth-building opportunities for all to reduce long-standing disparities

## SHOCKS & STRESSES

- Climate Change
- Food Insecurity & Agriculture
- Poverty & Economic Inequality
- Structural Racism / Inequality

## SCALE

- Beyond the Region

## STATUS

- Underway

## TIMEFRAME

- Medium: 1 - 5 years

## PROJECT OWNER

- California Volunteers

### 1.1 CALIFORNIANS FOR ALL: COLLEGE CORPS

**Amplify the impact of the College Corps program in the San Diego region while nurturing similar training opportunities for the emerging workforce.**

The State’s Californians for All [College Corps](#) program, launched in 2022, provides meaningful, paid service and work experiences for college students as they simultaneously tackle urgent resilience challenges, including climate change. By providing our emerging workforce and students with the training, mentorship, and work experience necessary to secure jobs following graduation, College Corps prepares students for high quality jobs in fields such as public service and the nonprofit sector, while helping to reduce the financial burden of their education. For host partners, which currently include public agencies and nonprofit organizations, the program and Fellows provide additional staff and support their programs and project efforts at no cost—filling a critical capacity gap and expanding their programmatic impact in the communities they serve. Partners across the San Diego region can build upon the success of this model by increasing awareness and program access points for San Diegans, connecting additional local organizations to the program as hosts for Fellows, and expanding and funding similar training efforts for other critical workforce groups, such as youth, K-12, and transitional career adults.

The program places Fellows in community-based organizations addressing important community needs including climate action, food insecurity, and K-12 education. Two campuses across the San Diego region currently participate in the program, with students at the University of San Diego and University of California, San Diego (along with other campuses statewide) who demonstrate financial need eligible to participate. The program is also open to AB 540 CA Dream Act Students, providing an important pathway to economic opportunity for undocumented students who may not be eligible for other federal programs. Current College Corps Fellows in San Diego are gaining experience in organizations leading activities such as urban greening, energy conservation, environmental education, community gardens, food or nutrition support, and K-12 education. Beyond engaging in workforce training opportunities that can increase access to jobs following graduation, students participating in the program earn up to \$10,000 that can go towards educational or living expenses, receive ongoing training, earn academic credit, and become part of a statewide youth leadership cohort with access to professional development opportunities.



## Economy

### 1.2 MAJOR INVESTMENTS IN SAN DIEGO’S HISTORIC BARRIOS

**Pursue and secure major funding opportunities such as Transformative Climate Communities to coordinate catalytic community-driven projects in San Diego’s Historic Barrios.**

Over a dozen organizations, led by community-based nonprofits, philanthropy, and government, have come together to seek and coordinate historic levels of investment in San Diego’s underinvested Historic Barrios. Up to \$44 million total, including a potential \$29.5 million grant through the State’s Transformative Climate Communities (TCC) program alongside an additional \$14.75 million in matching funds, could fund transformative projects in these City of San Diego communities—Logan, Stockton, Grant Hill, Sherman, Southcrest and Sheltown—vibrant cultural centers that today face disproportionate environmental burdens, poverty, and displacement as the result of decades of racism and underinvestment. Community-driven projects are currently being identified that support increased affordable housing, urban greening, building upgrades, and transportation improvements alongside workforce development and anti-displacement programs. TCC, and other models that increase coordinated investment, can promote economic opportunity, alongside health and climate benefits, for communities most vulnerable to climate impacts.



#### SHOCKS & STRESSES

- Aging or Inadequate Infrastructure (including transportation)
- Climate Change
- Funding Challenges
- Housing Access & Affordability
- Lack of or Disparities in Access to Open Space
- Poverty & Economic Inequality
- Structural Racism / Inequality



#### SCALE

- Community



#### STATUS

- Planned



#### TIMEFRAME

- Long: 5+ years



#### PROJECT OWNER

- Environmental Health Coalition
- San Diego Foundation





### SHOCKS & STRESSES

- Food Insecurity & Agriculture
- Governance Challenges
- Poverty & Economic Inequality
- Structural Racism / Inequality



### SCALE

- Community



### STATUS

- Underway



### TIMEFRAME

- Medium: 1 - 5 years



### PROJECT OWNER

- City Heights CDC

## 1.3 NEIGHBORHOOD ORIENTED ECONOMIC DEVELOPMENT

**Support small business and entrepreneurial growth that brings economic activity, employment, and other benefits to neighborhoods, addressing historic disparities.**

City Heights Community Development Corporation (City Heights CDC) supports the growth of small businesses that connect more residents to economic opportunity and strengthen neighborhood vibrancy. The CDC's integrated economic development efforts can serve as a model for neighborhoods across the region, and include training for small business owners and street vendors, advocacy for investment and community priorities along key business corridors, and connections to resources, including those that support entrepreneurs in navigating City processes. These efforts have helped residents—many of whom are immigrants—launch and sustain local small businesses and keep economic activity within the neighborhood. Recently, the CDC's economic development team was awarded \$1 million in State funding in partnership with the Regional Entrepreneurship Center Innovation Lab at San Diego Miramar College, COOK Alliance, Business For Good, and the Jacobs Center for Neighborhood Innovation to lead the San Diego Food Justice Project, an effort to educate and support food-focused small business entrepreneurs. Now cultivating its fourth cohort of participants, including micro-enterprise home kitchen operations, sidewalk vendors, pop-ups and caterers, and immigrant owned restaurants, the program provides mentorship, training, and other resources.



### SHOCKS & STRESSES

- Aging or Inadequate Infrastructure (including transportation)
- Poverty & Economic Inequality
- Structural Racism / Inequality



### SCALE

- San Diego Region



### STATUS

- Piloted and ready to scale



### TIMEFRAME

- Short: <1 year



### PROJECT OWNER

- SANDAG

## 1.4 FREE PUBLIC TRANSIT FOR YOUTH

**Expand the Youth Opportunity Pass pilot program to make free transit access for youth permanent and connect young San Diegans to educational, recreation, and training opportunities.**

SANDAG's Youth Opportunity Pass pilot program provides young people under the age of 19 with unlimited free fares for transit on the bus, trolley, COASTER, and SPRINTER. The pilot increases equity and accessible mobility across the region, connecting and empowering young people to access education, recreation, training, and other community assets and opportunities regardless of family income. Currently funded through 2024, making this successful pilot program permanent would advance critical goals related to equity, mobility, and economic opportunity. Supported in partnership with the Metropolitan Transit System (MTS), North County Transit District (NCTD), and the County of San Diego, this pilot effort is a key piece of SANDAG's Transit Equity Pilot, which aims to increase accessibility of public transit. The pilot has helped to drive increased ridership in recent years. SANDAG is working to identify funding to sustain and expand the pilot program.


# Goal 2. Build upon the strengths of the growing binational region to promote investments that support thriving, equitable communities

## 2.1 WORLD DESIGN CAPITAL SAN DIEGO TIJUANA 2024


**Build upon World Design Capital programming to support a stronger and more connected binational region through design.**

San Diego and Tijuana collaboratively were awarded the first binational World Design Capital designation by the World Design Organization in 2020. Civic leaders and designers across the binational region are now preparing for a year of public events, conferences, and workshops in 2024 that will focus around utilizing human-centered design to deepen the connection between eco-systems and communities across the binational region while addressing critical challenges related to the environment, economy, and social justice. Complementary design-oriented projects will create opportunities for the binational region’s more than 7 million residents to get involved in topics ranging from green infrastructure, to restoration, to public-sector innovation, to education, and more. Partners across the region have the chance to capitalize upon this historic opportunity by both developing a robust year of programming that fully engages and unifies regional partners across both sides of the border, and by ensuring that approaches identified to transform the region through this effort are fully implemented beyond 2024.



-  **SHOCKS & STRESSES**
- Aging or Inadequate Infrastructure (including transportation)
  - Climate Change
  - Governance Challenges
  - Loss of Biodiversity
  - Poverty & Economic Inequality
  - Structural Racism / Inequality

-  **SCALE**
- Beyond the Region

-  **STATUS**
- Underway

-  **TIMEFRAME**
- Medium: 1 - 5 years

-  **PROJECT OWNER**
- UC San Diego Design Lab
  - Design Forward Alliance
  - Burnham Center for Community Advancement

## SHOCKS & STRESSES

- Poverty & Economic Inequality
- Structural Racism / Inequality

## SCALE

- Community

## STATUS

- Proposed

## TIMEFRAME

- Medium: 1 - 5 years

## PROJECT OWNER

- Not Yet Identified

## 2.2 INCREASE ECONOMIC MOBILITY

### Expand economic mobility pilots and best practices to tackle persistent inequality.

Significant inequality driven by the growing affordability crisis remains one of the most persistent, intractable challenges the region faces. Multiple multi-sector partners, initiatives, and collaborations are making progress in leveraging the region's considerable assets and data to reduce these gaps, ranging from the [Inclusive Growth](#) collaboration, to the many nonprofits advancing place-based efforts such as a comprehensive [Transformative Climate Communities](#) initiative, to numerous additional efforts in jurisdictions across the binational region. The San Diego Foundation is advancing comprehensive efforts in impact areas ranging from children and families to education to housing and more. The long-standing Equinox Project's [Quality of Life Dashboard](#) provides annual measures and benchmarks several environmental and economic trends throughout the region and informs and engages the public and decision-makers in crafting better solutions to regional challenges. By fostering a data-driven approach, increased knowledge sharing around best practices that support human-centered-design and strengthened coordination of antipoverty programs, and supporting regional scale coordination, our region can continue to amplify and grow these existing efforts. This effort will begin with lifting up the most effective efforts that take an integrated approach at the community scale for historically underinvested neighborhoods that disproportionately experience disparities. In addition, activities that consider the binational economy comprehensively, with a holistic approach that drives economic mobility while taking into account the connectivity of our communities and economy across the border region, will be prioritized.




# Goal 3. Nurture and promote diverse career pathways to high paying jobs in traditional and emerging climate-supportive sectors

## 3.1 INCREASED ACCESS TO GREEN JOBS


**Build upon efforts to connect more San Diegans, with a focus on youth, to promising green careers.**

Programs across the region are training San Diegans from a range of backgrounds and helping them access high quality, sustainable green jobs. Amplifying and scaling these efforts can simultaneously connect more residents to economic opportunity and mobility through well-paying jobs, while helping to tackle the region's urgent climate challenges. The San Diego Foundation, for example, has increased investments in local partners and programs that promote access to these career pathways for opportunity youth, young people who are not in school or working, and connect them to training and green job pathways in fields such as urban forestry, agriculture, solar installation, and climate advocacy. These efforts provide young people with career readiness programs, workforce development training, and mentorship. The University of San Diego's Nonprofit Institute hosts the Leaders 20/20 program, which cultivates a network of emerging professionals advancing green jobs and climate leadership for the region. Leaders 20/20 supports educational opportunities, connections to multi-sector leaders, civic engagement, and professional development for participants, helping to strengthen the region's talent pipeline in green jobs over the long term.

 **SHOCKS & STRESSES**  
- Climate Change  
- Poverty & Economic Inequality  
- Structural Racism / Inequality

 **SCALE**  
- San Diego Region

 **STATUS**  
- Underway


 **TIMEFRAME**  
- Short: <1 year

 **PROJECT OWNER**  
- San Diego Foundation  
- The Nonprofit Institute


## 3.2 GROW CAREERS ADVANCING SUSTAINABILITY AND FOOD ACCESS

**Connect young San Diegans to promising sustainable career pathways through expanded apprenticeships such as those in commercial fishing and aquaculture.**


The [California Commercial Fishing Apprenticeship Program](#) educates young people to prepare them for opportunities and careers in commercial fishing, covering topics such as fisheries science; conservation and practice; boat and fishing gear competency; business and marketing; and safety and seamanship. In addition, with funding awarded through the Sea Grant "Food from the Sea" Careers Program: Young Fishermen's Development Act & Aquaculture Planning Frameworks, California Sea Grant is enhancing the current program and expanding to include aquaculture training. The training program includes both workshop instruction as well as paid, on-the-job training. Growing promising apprenticeships and training programs in commercial fishing and aquaculture such as these can prepare San Diegans from a variety of educational backgrounds for stable careers while increasing food access and sustainability.

 **SHOCKS & STRESSES**  
- Food Insecurity & Agriculture  
- Poverty & Economic Inequality

 **SCALE**  
- San Diego Region

 **STATUS**  
- Underway

 **TIMEFRAME**  
- Short: <1 year

 **PROJECT OWNER**  
- California Sea Grant  
- UC San Diego

### SHOCKS & STRESSES

- Loss of Biodiversity
- Poverty & Economic Inequality

### SCALE

- San Diego Region

### STATUS

- Proposed

### TIMEFRAME

- Long: 5+ years

### PROJECT OWNER

- Not Yet Identified

## 3.3 CAREER PATHWAYS IN ECOSYSTEM MANAGEMENT

### Increase training in management of coastal landscapes to promote stable careers and ecosystem health.

Increased levels of maintenance necessary for parks, open space, and other natural assets has created the opportunity to nurture stable, entry-level jobs while simultaneously integrating approaches that promote ecosystem health. Occupations in clean-up and maintenance of dunes, for example, incorporate plant management, infrastructure upkeep, and other functions that have an impact on dune habitat health and on species across the broader ecosystem. Current training programs to build skills related to restoration and habitat management for those employed in landscaping, maintenance, and related fields are inadequate to support increased demand—especially with the increased need for these occupations given climate change. The National Oceanic and Atmospheric Administration’s Office for Coastal Management offers one online training model, the [Digital Coast Academy](#), that provides tools and training resources for those employed in occupations related to coastal management. By bringing partners together to share best practices, gaps, and workforce development approaches in adjacent fields, there is an opportunity to increase training opportunities for stable careers in adaptive management of coastal landscapes—with a particular focus on building skills that promote conservation and restoration of ecosystems.

### SHOCKS & STRESSES

- Aging or Inadequate Infrastructure (including transportation)
- Climate Change
- Grid Reliability
- Poverty & Economic Inequality

### SCALE

- Local / Regional Jurisdiction

### STATUS

- Planned

### TIMEFRAME

- Short: <1 year

### PROJECT OWNER

- San Diego Community Power

## 3.4 COMMUNITY CLEAN ENERGY INNOVATION GRANTS

### Support investment in community-led efforts for a clean and resilient grid while increasing access to quality jobs.

San Diego Community Power (SDCP)’s [Community Clean Energy Innovation Grants](#), launched in 2023, will fund projects of up to \$45,000 per project that provide multiple environmental, economic, and community benefits related to clean energy. Nonprofits serving SDCP customers are eligible to seek funding for projects that advance at least one of the following goals: increase energy literacy; education related to reducing consumption and/or costs; improvements in indoor or outdoor air quality; workforce development connecting residents to careers in clean energy; mitigating, preparing for, and recovering from energy disruptions; and increasing access to clean energy for historically underserved populations. Programs like these can help to increase community leadership in clean energy resources and support training and education of more residents for well-paying, stable jobs while supporting a more resilient clean energy grid.



## Economy

### 3.5 PRIORITIZING LOCAL HIRING PRACTICES

**Expand programs that prioritize local hiring among major employers, with a focus on climate careers and projects.**

Targeted, local hiring efforts are a key tool in driving local economic activity: by prioritizing hiring of residents and local companies, major employers in climate-supportive fields can increase employment and economic prosperity for our communities. San Diego Gas & Electric (SDG&E) and partners such as Jingoli Power and San Diego City College have supported efforts such as the Competitive Edge workforce development program. Competitive Edge provides paid training opportunities that lead to careers in the construction and utility trades—with an emphasis on ensuring that dollars supporting projects remain within local communities. Recruiting from local communities who are underrepresented in these fields is central to this goal—and has helped to train local workers to deliver important projects including infrastructure to strengthen wildfire safety, expand electric vehicle charging infrastructure, and more. Expanding upon these efforts to grow local hiring programs would increase access to quality employment for San Diego residents.

#### SHOCKS & STRESSES

- Aging or Inadequate Infrastructure (including transportation)
- Climate Change
- Grid Reliability
- Poverty & Economic Inequality
- Structural Racism / Inequality

#### SCALE

- San Diego Region

#### STATUS

- Proposed

#### TIMEFRAME

- Medium: 1 - 5 years

#### PROJECT OWNER

- San Diego Gas & Electric



# Goal 4. Continue growing blue and green economy clusters to foster quality jobs across diverse sectors and economic activity, as well as climate benefits



## SHOCKS & STRESSES

- Aging or Inadequate Infrastructure (including transportation)
- Climate Change
- Coastal or Tidal Flooding
- Funding Challenges
- Poverty & Economic Inequality
- Sea Level Rise & Coastal Erosion



## SCALE

- San Diego Region



## STATUS

- Piloted and ready to scale



## TIMEFRAME

- Medium: 1 - 5 years



## PROJECT OWNER

- Port of San Diego

## 4.1 BLUE ECONOMY INCUBATOR

**Expand the Port of San Diego’s Blue Economy Incubator Program to support innovative businesses, bringing economic growth while tackling climate challenges.**

Launched in 2016, the Port of San Diego’s [Blue Economy Incubator](#) accelerates the region’s global leadership as a hub for the blue economy, supporting growth of innovative technologies and businesses dependent upon or related to oceans and water systems that simultaneously advance sustainability. In the coming years, the Incubator will expand with additional investments in promising companies—as the Port actively explores broader Incubator growth strategies and pathways to scale the program for greater impact. Given San Diego’s deep-water harbor location, capacities in research and science, and strength in adjacent core industries including innovation, technology, and trade, the blue economy is already a major—and growing—sector, responsible for over 4,300 businesses in maritime, water, and blue technology that drive over \$16 billion in revenue for the region and support 114,000 jobs.<sup>28</sup> Incubator expansion and growth of the sector advances a critical opportunity to bring additional economic prosperity to the region, including through stable jobs accessible to those from diverse educational backgrounds, while simultaneously tackling urgent climate challenges.

The Port’s Blue Economy Incubator helps to launch and grow promising businesses, with a focus on segments of the sector most aligned with the Port’s expertise and mission: sustainable aquaculture and Port-related blue technologies. Nine companies advancing diverse pilot projects across resilient shoreline infrastructure, shellfish and seaweed aquaculture, and water and sediment remediation technologies have participated in the program thus far.<sup>29</sup> Early-stage companies that are a part of the Incubator program receive assets and services including subject matter expertise, permit-ready infrastructure, entitlement assistance, marine spatial planning tools, market access, and funding. The Port’s commitments have already totaled \$1.7 million in funding and use of Port-owned property, alongside additional services and assistance.

Beyond the direct growth of affiliated businesses themselves, the Incubator and pilot projects supported by the program—through the convening power of and global partnerships catalyzed by the Port—has cultivated further regional leadership in the blue economy ecosystem while informing broader regional approaches related to topics including sea-level rise adaptation, marine debris removal management, and shellfish and seaweed aquaculture as a tool for bioremediation and restoration.



## Economy

### 4.2 STARTBLUE ACCELERATOR AND BLUETECH INCUBATOR

Expand upon efforts to grow regional blue tech startup companies.

Numerous efforts across the region are supporting entrepreneurs in launching early stage blue tech companies. [StartBlue](#), affiliated with the University of California, San Diego's (UCSD's) StartR accelerator program and led by the Scripps Institution of Oceanography and Rady School of Management, supports new or emerging startups that seek to address ocean-related challenges through commercialization of solutions grounded in science or engineering. Participating teams receive training in ocean entrepreneurship, skills development through workshops, mentorship provided by industry leaders, technical support, and fundraising assistance. Similarly, TMA BlueTech's [BlueTech Incubator](#) aims to support the growth of science-based ocean, water, and wastewater tech startups by providing office space, a mentorship program, connections to their global network, and other resources. Expanding initiatives such as these would help nurture the growth of companies that show the potential to connect San Diegans from an array of training backgrounds to high quality jobs while fostering economic activity and tackling climate challenges. One promising area of expansion could include an investment fund directed at promising blue tech startups whose efforts prioritize local hiring and career pathways.

#### SHOCKS & STRESSES

- Climate Change
- Poverty & Economic Inequality

#### SCALE

- San Diego Region

#### STATUS

- Underway

#### TIMEFRAME

- Short: <1 year

#### PROJECT OWNER

- UCSD
- TMA BlueTech

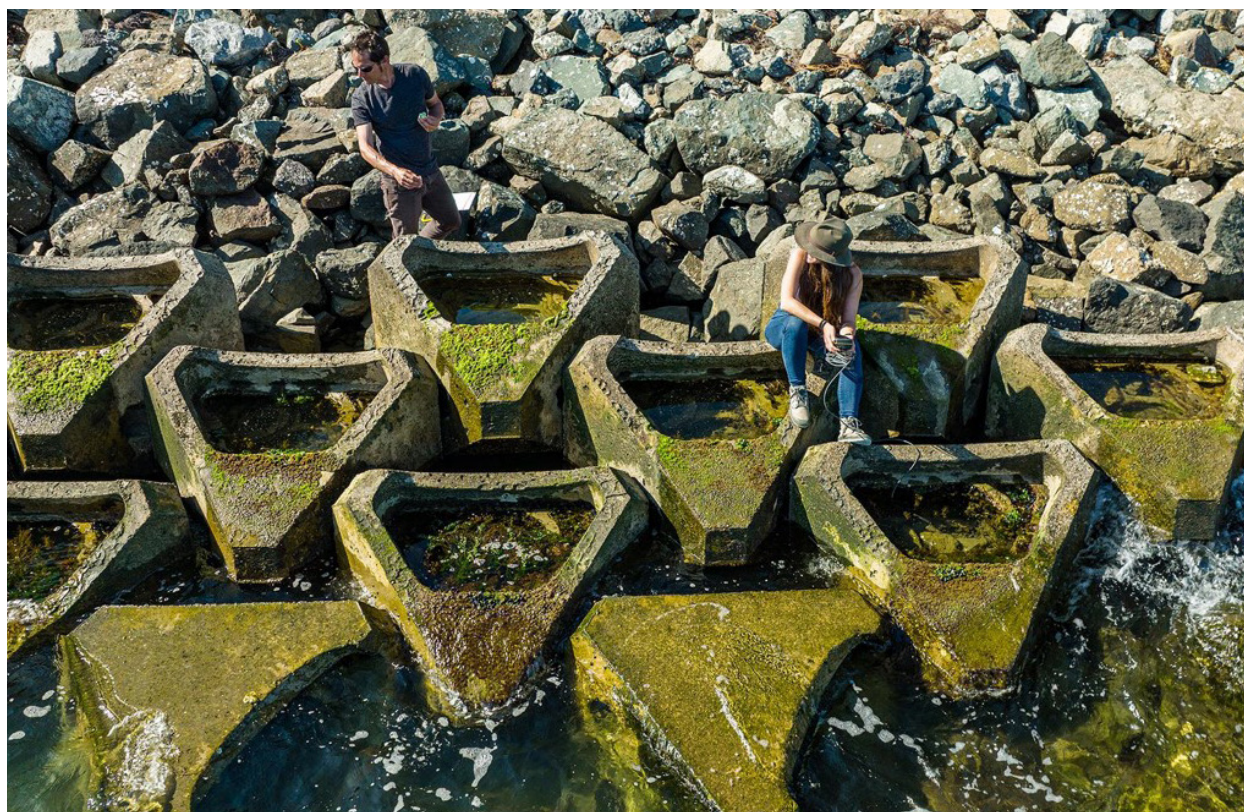


Photo credit: Port of San Diego



PRINCIPLE 6

## Center Approaches to Community Resilience around the Persistent Confrontation with Loss and Trauma in Living with Changing Coastal Landscapes

Ultimately, climate change impacts are felt through our experiences of living with and in a rapidly changing world. Along San Diego's coast, the changes are sometimes minimal, almost imperceptible, such as an increasingly higher tide that slowly renders a favorite beach more impassable. Other times, these changes are felt with great urgency and scale and make themselves known, like a large bluff collapse. These changes are felt by outdoor workers experiencing health impacts due to increasingly frequent heat waves, small business owners navigating frequent costly repairs due to flooding, and families priced out of neighborhoods due to rising housing costs. It is through all of these experiences along the coast, and many others, that individual and collective knowledge of change becomes a part of San Diego's narrative around coastal resilience. We define our futures through our understanding of the past and present.

At the core of these changes occurring along our coast is a collective sentiment of loss. A loss of beach width, a cliffside, or an accessible pathway—each instance exemplifying something removed, retreated and gone. The acute and compounding trauma associated with these experiences of loss goes largely unnoticed—that is, until it is unavoidable. This Principle illuminates Actions that San Diegans can prioritize to begin to shape how we live with our ever-changing landscape, and to instill new capacities in future generations. The shifts along our coastline are not new: they are part of a larger rhythm whose pace has quickened under the impacts of climate change. Relearning how to exist in a constantly shifting and liminal environment means taking into consideration how our communities may hinder our ability to retreat and adapt, or how our beaches themselves may need technical and mechanical support in order to survive the onslaught of climate-driven storms, flooding and inundation.

By bringing communities together around a shared experience, the Goals and Actions outlined in this Principle aim to cultivate wellbeing, knowledge, and capacities that offer both our coastal and inland communities an opportunity to thrive through this next phase of change.

### Goals

1

**Increase awareness of a pluralistic history of the region that re-centers the indigenous relationship to the coast**

2

**Foster a shared science-based understanding and recognition of both the threat of climate change and the range of alternatives for adaptation**

3

**Increase access to services, spaces for dialogue, and other resources that promote well being, including through an understanding of the role of the coast as a place for both healing and persistent confrontation with climate uncertainty**

4

**Mobilize San Diego's youth as continued future advocates and stewards for the coast**



PRINCIPLE 6

# LIVING WITH CHANGE



Photo credit: San Diego Coastkeeper

# Goal 1. Increase awareness of a pluralistic history of the region that re-centers the indigenous relationship to the coast

## SHOCKS & STRESSES

- Climate Change
- Governance Challenges
- Structural Racism / Inequality

## SCALE

- Beyond the Region

## STATUS

- Proposed

## TIMEFRAME

- Long: 5+ years

## PROJECT OWNER

- Not Yet Identified

## 1.1 TRIBAL JUSTICE

### Explore Land Back and reparations for tribal nations.

San Diego County is home to more tribes and Indian reservations than any other county in the United States. Our region includes 18 federally recognized tribal nation reservations and 17 tribal governments, with the Barona and Viejas Bands sharing joint-trust and responsibility for the Capitan Grande Reservation. The following distinct cultural groups govern these reservations in addition to two tribal governments that do not have federally recognized lands, the San Luis Rey Band of Luiseño Indians and the Mount Laguna Band of Luiseño Indians.

- Kumeyaay/Diegueño (Ipai/Tipai): Barona, Campo, Capitan Grande (unoccupied), 'Ewiiapaayp (Cuyapaibe), Inaja-Cosmit, Jamul Indian Village, La Posta, Manzanita, Mesa Grande, San Pasqual, Santa Ysabel, Sycuan, and Viejas Indian Reservations.
- Luiseño (Quechnajuichom): La Jolla, Pala, Pauma, and Rincon Indian Reservations.
- Cupeño (Kuupiaxchem): Pala Indian Reservation (originally from Kupa-Warner Hot Springs).
- Cahuilla: Los Coyotes Indian Reservation.
- Juaneño (Acjachemen): no reservation, ceremonial grounds at San Mateo State Park.

For millennia prior to colonization, indigenous peoples were the sovereign caretakers of the land and each tribal nation had its own sustaining practices for managing natural resources and maintaining reciprocal, harmonious relationships with the natural world. However, colonization forcibly removed these peoples from their land and racist policies prevented tribal nations from performing traditional practices and cultural ceremonies. We must all confront these historical injustices and systems of oppression in order to achieve our regional vision for equity and resilience.


After decades of restrictive policies that prevented tribal nations from expanding their reservations, in May 2021, the San Diego County Board of Supervisors lifted these restrictions to allow tribal nations to buy back their land. However, permissive policies alone will not create the accessible, viable, and enabling pathways needed to return indigenous land back to indigenous hands. We must leverage the momentum built through the ongoing Land Back movement to support tribal nations in our region to reclaim stolen lands, while also exploring reparations and other mechanisms to address these historic injustices.

## Goal 2. Foster a shared science-based understanding and recognition of both the threat of climate change and the range of alternatives for adaptation

### 2.1 INTEGRATED CLIMATE RESEARCH INITIATIVES


**Advance a more robust, integrated, and science-based understanding of coastal and extreme heat dynamics in Southern California while supporting teaching and learning.**


The SoCal Heat Hub (Hub) was launched in 2022 at the Scripps Institution of Oceanography at UCSD, and funded as part of the National Science Foundation's Coastlines and People (CoPe) research initiative. Over the next five years, the Hub will generate science-based, data-driven, and co-produced research and data products that will directly benefit heat adaptation planning efforts in Southern California, and will be transferable to other coastal regions worldwide. Additionally, the Hub's focus on teacher training and student learning is designed to broaden participation in STEM, and will empower students from communities most hard-hit by climate change and extreme heat to participate in building solutions. This effort will advance localized data on the atmosphere-land-ocean dynamics that drive and modulate patterns of extreme heat; the health impacts of extreme heat; regionally specific vegetation-temperature relationships; and the climate suitability and water needs of urban greening efforts. This research is being supported by a suite of partners, including the San Diego Regional Climate Collaborative and The Nonprofit Institute at the University of San Diego as well as the Birch Aquarium. Project efforts will be informed by local and regional government agencies, CBOs, and community groups that are already invested and engaged in climate change adaptation.

 **SHOCKS & STRESSES**  
- Coastal or Tidal Flooding  
- Extreme Heat  
- Sea Level Rise & Coastal Erosion


 **SCALE**  
- San Diego Region


 **STATUS**  
- Underway

 **TIMEFRAME**  
- Medium: 1 - 5 years

 **PROJECT OWNER**  
- Scripps Institution of Oceanography



 **SHOCKS & STRESSES**  
- Climate Change

 **SCALE**  
- Beyond the Region

 **STATUS**  
- Underway

 **TIMEFRAME**  
- Medium: 1 - 5 years

 **PROJECT OWNER**  
- University of California

## 2.2 BENDING THE CURVE: CLIMATE EDUCATION FOR ALL

Expand access to, and mainstream curriculum for, climate education.

The University of California's [Bending the Curve: Climate Education for All™](#) is a multi-disciplinary curriculum grounded in climate change solutions. Modules span more than 50 topics and are based upon cutting-edge research led by University of California researchers. Currently, this curriculum has been integrated into an undergraduate course and translated to online modules that are widely available for the public, the private sector, and other audiences. A version of the course is also offered to the public as a [free Massive Online Open Course](#) specialization through UC San Diego Online. Increasing awareness of and access to Bending the Curve, and similar educational opportunities focused on climate action, can help build understanding around the urgency for addressing climate change and the range of potential solutions among San Diegans of all backgrounds.



# Goal 3. Increase access to services, spaces for dialogue, and other resources that promote well being, including through an understanding of the role of the coast as a place for both healing and persistent confrontation with climate uncertainty

## 3.1 DISASTER PREPAREDNESS AND RESPONSE

### Improve coordinated communications to strengthen disaster preparedness.

As natural and climate-driven disasters become more frequent and severe, preparing communities in advance and mounting an effective coordinated response post-disaster is essential to ensure communities can rebound quickly. Regional partners can draw upon a wealth of resources—starting with, most importantly, the community-based organizations (CBOs) on the ground working in neighborhoods across the region everyday. Through their everyday activities, these trusted CBOs are the most important partner in communicating in advance with residents about risks and the steps every San Diegan should take to be prepared. Existing State efforts are another resource, and amplifying programs such as [Listos California](#) can ensure that we reach residents across our region in accessible ways while building a culture of preparedness. Finally, we can explore deploying new communications tools and activities, including models that build social resilience and can be activated post-disaster. These include, for example, programs that build volunteer networks of residents who check on their neighbors—particularly seniors, those with underlying health conditions, and others who are vulnerable—during climate driven events, such as extreme heat or severe storms. Building off existing efforts and programs and integrating additional best practices, we can coordinate a communications campaign to educate and raise awareness about climate impacts while equipping community members—particularly, those who are most vulnerable—with the information they need to prepare. This collaborative effort should engage multiple sectors, jurisdictions, and organizations to streamline information and ensure diverse audiences are engaged.

#### SHOCKS & STRESSES

- Coastal or Tidal Flooding
- Earthquake
- Extreme Heat
- Governance Challenges
- Grid Reliability
- Severe Storms
- Structural Racism / Inequality
- Wildfire

#### SCALE

- San Diego Region

#### STATUS

- Proposed

#### TIMEFRAME

- Medium: 1 - 5 years

#### PROJECT OWNER

- Not Yet Identified



### SHOCKS & STRESSES

- Aging or Inadequate Infrastructure (including transportation)
- Climate Change
- Drought
- Extreme Heat
- Food Insecurity & Agriculture
- Structural Racism / Inequality



### SCALE

- Beyond the Region



### STATUS

- Piloted and ready to scale



### TIMEFRAME

- Short: <1 year



### PROJECT OWNER

- EcoLife

## 3.2 AQUAPONICS

**Nurture the growth of aquaponics to increase access to nutritious produce while fostering more sustainable agricultural practices.**

Many communities across our region face barriers in accessing fresh produce—with food scarcity and food deserts perpetuating and exacerbating existing inequities. Aquaponics—the practice of raising plants and fish in a unified system—allows for more sustainable agricultural practices where fresh produce can be grown using less land and water and without causing pollution. This method shows potential for improving local access to produce, including in neighborhoods that have historically lacked access to nutritious foods. EcoLife is exploring how aquaponic systems can be installed on roofs, in mobile systems powered by solar panels, and on brownfield sites whose toxic soils are no longer productive for agriculture. Aquaponic systems create opportunities for cultivating and growing food that are resilient to ongoing climate shocks and stresses affecting traditional agriculture, such as persistence through drought cycles and severe storms, alongside co-benefits such as cooling through greening in urban centers.





## Living with Change

### 3.3 REGENERATIVE FARMING

**Foster community resilience through regenerative farming practices.**

A regenerative farm in Encinitas, Coastal Roots Farm incorporates growing practices that are designed to be resilient in the face of climate impacts like drought, extreme heat, and storms while building and strengthening community. During the COVID-19 pandemic, its “Farm Stand” responded to the crisis, adapting its program to provide food to families in need. Youth and volunteer activities bring people from both coastal and inland communities to the farm for hands-on learning experiences around growing practices. Connecting community members from across the region to nature helps to support a space for conversation and dialogue around the impacts of climate change, while demonstrating the potential of resilient farming practices in sustaining and feeding communities.



#### SHOCKS & STRESSES

- Climate Change
- Drought
- Extreme Heat
- Food Insecurity & Agriculture
- Lack of or Disparities in Access to Open Space
- Poverty & Economic Inequality
- Severe Storms
- Structural Racism / Inequality



#### SCALE

- Community



#### STATUS

- Underway



#### TIMEFRAME

- Medium: 1 - 5 years



#### PROJECT OWNER

- Coastal Roots Farms





# Goal 4. Mobilize San Diego's youth as continued future advocates and stewards for the coast



## SHOCKS & STRESSES

- Climate Change
- Lack of or Disparities in Access to Open Space
- Poverty & Economic Inequality
- Structural Racism / Inequality



## SCALE

- San Diego Region



## STATUS

- Underway



## TIMEFRAME

- Short: <1 year



## PROJECT OWNER

- Ocean Discovery Institute
- WILDCOAST
- Boy Scouts

## 4.1 YOUTH STEWARDSHIP

### Expand experiential learning programs that engage young people and connect them with nature.

Numerous innovative programs across the region educate youth while deepening their sense of connection to nature. These programs contribute to our region in many ways, addressing long standing inequities, building pathways for increased economic mobility, strengthening connectivity between inland communities and the coast, and expanding the cohort of young people who can be stewards and advocates for the environment, both now and well into the future. Studies suggest that young people who participate in these kinds of hands-on environmental learning activities are more likely to be involved in conservation efforts later in life. By building upon the region's already robust network of programs—fostering additional investment in effective approaches and launching additional efforts—partners can augment this solid foundation and continue laying the groundwork for the next generation of climate advocates.

The Ocean Discovery Institute (ODI) is one organization that offers tuition-free ocean science opportunities, mentoring programs, and other resources to young people in underserved communities, reaching 6,000 students per year. Participation in ODI's programs helps to provide leadership pathways and prepare young people for high quality science, technology, engineering, and math careers, with targeted programming in the City Heights neighborhood—a vibrant inland community where virtually all students are eligible for free or reduced lunch programs, but are underserved by rigorous science opportunities. In and out of school programs include hands-on learning, field trips to coastal environments, career-connected leadership programs, camps, community events, and more. WILDCOAST also offers numerous youth focused programs, including community science experiences and a tidepool ambassador program where students lead development of tidepooling etiquette recommendations based on labs exploring local tidepools within marine protected areas. Finally, the local Boy Scouts chapter, including through programming at the Youth Aquatic Center on Fiesta Island in Mission Bay Park, supports numerous service, recreation, and education-oriented activities that foster stewardship among young people, including for many who may otherwise be less exposed to the outdoors and to coastal environments.



Photo credit: San Diego Coastkeeper



### SHOCKS & STRESSES

- Lack of or Disparities in Access to Open Space
- Structural Racism / Inequality



### SCALE

- Local / Regional Jurisdiction



### STATUS

- Underway



### TIMEFRAME

- Medium: 1 - 5 years



### PROJECT OWNER

- San Diego Coastkeeper

## 4.2 ACCESSIBLE ENVIRONMENTAL EDUCATION

**Reach more San Diego youth—particularly those in underserved communities—through robust environment-focused educational opportunities.**

Partners across the region will amplify, support, and expand programs that engage youth in environmental education and help young people access viable career pathways in related fields. These programs increase access for our region’s future workforce to quality jobs while fostering connectivity to the environment that will benefit future generations. Programs should prioritize equity, with a focus on efforts that build economic mobility for historically underinvested communities.

San Diego Coastkeeper, in partnership with Groundwork San Diego-Chollas Creek and Outdoor Outreach, leads one such effort, launching the BIPOC Youth Science Program in 2021 to provide environmental education, leadership, more equitable access to the outdoors, and workforce training programs to high-school students of color. The program provides students aged 14-18 with the opportunity to participate in a paid experience to engage with and learn about the environmental impacts their communities are facing. Students gain hands-on experience with water quality testing and explore themes including environmental racism, equity, and accessibility. The curriculum integrates career development and networking opportunities as well as other activities to inspire students to pursue STEM careers. San Diego Coastkeeper continues to expand accessibility across the Chollas Creek community by providing stipends to participants.

The Summer Leadership Program led by Outdoor Outreach also provides a paid eight-week training experience for young adults across the region. Daily workshops and outdoor training experiences are focused on skills building, leadership, and workforce development—helping participants become more civically engaged and prepared for future careers. Efforts such as these are ripe for replication, amplification, and growth in order to reach more young people.

Since 2015, the San Diego Foundation’s Opening the Outdoors grant program has distributed over \$6 million to nonprofit organizations that preserve outdoor spaces, increase equitable access to the outdoors, and support the next generation of environmental stewards across the region. These investments have supported over 100 local nonprofit organizations in increasing access for 65,000 youth and families to the outdoors. Programs have engaged over 55,000 volunteers and residents in community outreach, education, and other activities; helped to protect or improve over 75,000 acres of green space; and created or restored over 70 miles of trails. With the Foundation leading the way in continued growth of this program, with the next round of grantmaking anticipated to launch in early 2024, efforts such as these are ripe for replication, amplification, and growth among additional regional partners in order to reach more young people.



## Living with Change

### 4.3 EXPANDING THE REACH OF MUSEUMS & AQUARIUMS

**Support museums and aquariums in their role as centers of wellbeing and community learning about coastal resilience.**

Museums, aquariums, and other cultural centers are essential community spaces for gathering and learning. As they amplify information about new and emerging discoveries in engaging ways, these facilities are also stewards of invaluable environmental and social histories. For children and adults alike, these spaces bring residents across our region closer together and create pathways to build knowledge while strengthening understanding of our relationship to the environment. These opportunities for learning and discovery create new spaces for reflection and healing through the often traumatic lived experiences of climate change—like rapid erosion, land loss, sea level rise, severe storms, flooding, and diminishing biodiversity. Partners will work to uplift and expand the work of museums, aquariums, and other essential community anchors—including through efforts to reach more residents across our region.

#### SHOCKS & STRESSES

- Climate Change
- Poverty & Economic Inequality

#### SCALE

- San Diego Region

#### STATUS

- Underway

#### TIMEFRAME

- Long: 5+ years

#### PROJECT OWNER

- San Diego Natural History Museum
- Birch Aquarium at Scripps Institution of Oceanography



Photo credit: Birch Aquarium at Scripps, UC San Diego

## ENDNOTES

- 1 Walker, B., Holling, C. S., Carpenter, S. R., & Kinzig, A. (2004). Resilience, adaptability and transformability in social–ecological systems. *Ecology and society*, 9(2).
- 2 San Diego Food System Alliance. (2022, September 14). *Uprooting segregation through our food system*. <https://storymaps.arcgis.com/stories/4139975eef744b5b9709e9196872ef4f>
- 3 Deitrick, L., Tinkler, T., Durnford, J., Abruzzo, T., Meschen, C., and Young, E. (2022). *2022 State of Nonprofits and Philanthropy Annual Report*. State of Nonprofits in San Diego. <https://digital.sandiego.edu/npi-stateofnp/19>
- 4 Jennings, M., Cayan, D., Kalansky, J., et al. (March, 2018). *San Diego County Ecosystems: The Ecological Impacts of Climate Change on a Biodiversity Hotspot*. Climate Science Alliance. <https://drive.google.com/file/d/1UMzSuB1FRfaHlaFkAWDXgwm0B8C5z1B/view>
- 5 Rouleau, T., Adkins, J., Boudrias, M., Croom, S. (2022). *The San Diego Maritime, Water, and BlueTech Economy in 2020*. TMA BlueTech. [https://uploads-ssl.webflow.com/5cfe4b2804ff07093bd09cdb/626c32091f009307150d578d\\_FINAL%20-%20SD%20Maritime%20Water%20and%20BlueTech%20Economy%202020.pdf](https://uploads-ssl.webflow.com/5cfe4b2804ff07093bd09cdb/626c32091f009307150d578d_FINAL%20-%20SD%20Maritime%20Water%20and%20BlueTech%20Economy%202020.pdf)
- 6 San Diego Foundation. (October 20, 2020). *Binational Resilience Initiative Launches with \$294K in Grants to Advance Cali-Baja Coastal Preservation*. <https://www.sdfoundation.org/news-events/sdf-news/binational-resilience-initiative-launches-with-294k-in-grants-to-advance-cali-baja-coastal-preservation/>
- 7 Kalansky, J., Cayan D., Barba, K., et al. (2018). *San Diego Summary Report*. California's Fourth Climate Change Assessment. University of California, San Diego. [https://www.energy.ca.gov/sites/default/files/2019-11/Reg\\_Report-SUM-CCCA4-2018-009\\_SanDiego\\_ADA.pdf](https://www.energy.ca.gov/sites/default/files/2019-11/Reg_Report-SUM-CCCA4-2018-009_SanDiego_ADA.pdf)
- The Nonprofit Institute. (2022). *Climate Change and Regional Planning*. University of San Diego. <https://www.sandiego.edu/soles/centers-and-institutes/nonprofit-institute/signature-programs/dashboard/climate-impacts.php>
- 8 Kalansky, J., Cayan D., Barba, K., Walsh, L., Brouwer, K., and Boudreau, D. (2018). *San Diego Summary Report*. California's Fourth Climate Change Assessment. University of California, San Diego. [https://www.energy.ca.gov/sites/default/files/2019-11/Reg\\_Report-SUM-CCCA4-2018-009\\_SanDiego\\_ADA.pdf](https://www.energy.ca.gov/sites/default/files/2019-11/Reg_Report-SUM-CCCA4-2018-009_SanDiego_ADA.pdf)
- 9 Hayley Smith. (2022, February 16). *Rising sea levels pose perilous threat to California coast as study raises new alarms*. Tribune. <https://www.sandiegouniontribune.com/news/california/story/2022-02-16/rising-sea-levels-pose-perilous-threat-to-california-coast-study-raises-new-alarms>
- 10 San Diego Regional Climate Collaborative and Center for the Blue Economy at the Middlebury Institute of International Studies. (2018). *Regional Economic Vulnerability to Sea Level Rise in San Diego County*. <https://digital.sandiego.edu/npi-sdclimate/9>
- 11 Kalansky, J., Cayan D., Barba, K., et al. (2018). *San Diego Summary Report*. California's Fourth Climate Change Assessment. University of California, San Diego. [https://www.energy.ca.gov/sites/default/files/2019-11/Reg\\_Report-SUM-CCCA4-2018-009\\_SanDiego\\_ADA.pdf](https://www.energy.ca.gov/sites/default/files/2019-11/Reg_Report-SUM-CCCA4-2018-009_SanDiego_ADA.pdf)
- 12 The County of San Diego. (2018, February). *Climate Change Vulnerability, Resiliency, and Adaptation*. *Climate Action Plan*. <https://www.sandiegocounty.gov/content/dam/sdc/pds/advance/cap/publicreviewdocuments/CAPfilespublicreview/Chapter%204%20Climate%20Change%20Vulnerability%2C%20Resiliency%2C%20and%20Adaptation.pdf>
- 13 Kalansky, J., Cayan D., Barba, K., Walsh, L., Brouwer, K., and Boudreau, D. (2018). *San Diego Summary Report*. California's Fourth Climate Change Assessment. University of California, San Diego. [https://www.energy.ca.gov/sites/default/files/2019-11/Reg\\_Report-SUM-CCCA4-2018-009\\_SanDiego\\_ADA.pdf](https://www.energy.ca.gov/sites/default/files/2019-11/Reg_Report-SUM-CCCA4-2018-009_SanDiego_ADA.pdf)
- 14 Bland, A. (2023, March 10). California storms create paradox: Too much water in reservoirs, too soon. CalMatters. <https://calmatters.org/environment/2023/03/california-storm-reservoirs-flooding/>
- 15 Kalansky, J., Cayan D., Barba, K., Walsh, L., Brouwer, K., and Boudreau, D. (2018). *San Diego Summary Report*. California's Fourth Climate Change Assessment. University of California, San Diego. [https://www.energy.ca.gov/sites/default/files/2019-11/Reg\\_Report-SUM-CCCA4-2018-009\\_SanDiego\\_ADA.pdf](https://www.energy.ca.gov/sites/default/files/2019-11/Reg_Report-SUM-CCCA4-2018-009_SanDiego_ADA.pdf)
- 16 Ibid.
- 17 Ibid.
- 18 California Department of Fish and Wildlife. (1999). *Marine Life Protection Act*. <https://wildlife.ca.gov/Conservation/Marine/MPAs/MLPA>
- 19 SANDAG. (2021, December). *2021 Regional Plan*. <https://www.sandag.org/regional-plan/2021-regional-plan/-/media/8D0F181A086844E3A84C3D44576BED6B.ashx>
- 20 Earthquake Country Alliance, California Earthquake Authority, and California Governor's Office of Emergency Services. (n.d.). *Staying Safe Where the Earth Shakes*. <https://www.earthquakecountry.org/library/StayingSafeWhereTheEarthShakes.pdf>
- 21 San Diego Regional Climate Collaborative, San Diego Association of Governments, Tijuana River National Estuarine Research Reserve, and The San Diego Foundation. (2020). *Regional Adaptation Needs Assessment*. *San Diego Regional Climate Collaborative*. <https://digital.sandiego.edu/npi-sdclimate/13>

- 22 San Diego County. (2023). *State of the Food System*. <https://www.sandiegocounty.gov/content/sdc/lueg/food-system-initiative/state-of-the-food-system/>
- 23 The Nonprofit Institute. (2022). *Housing*. University of San Diego. <https://www.sandiego.edu/soles/centers-and-institutes/nonprofit-institute/signature-programs/dashboard/housing.php>
- 24 San Diego Regional EDC. (n.d.). *Addressing San Diego's Affordability Crisis*. <https://affordability.inclusivesd.org/>
- 25 The Nonprofit Institute. (2022). *Outdoor Access*. University of San Diego. <https://www.sandiego.edu/soles/centers-and-institutes/nonprofit-institute/signature-programs/dashboard/park-access.php>
- 26 Groundwork USA. (n.d.). *Climate Safe Neighborhoods*. <https://gwm-ke.maps.arcgis.com/apps/Cascade/index.html?appid=55e6a62e-73094543a5122e894126c775>
- 27 Rise San Diego and The Nonprofit Institute. (2021, October 4). *State of Equity and Engagement in Neighborhoods: Elevating the Voices of San Diego's Urban Communities*. <https://storymaps.arcgis.com/stories/9c4fb63b6e15442a998a5a7b93a19d4e>
- 28 Rouleau, T., Adkins, J., Boudrias, M., Croom, S. (2022). *The San Diego Maritime, Water, and BlueTech Economy in 2020*. TMA BlueTech. [https://uploads-ssl.webflow.com/5cfe4b2804ff07093bd-09cdb/626c32091f009307150d578d\\_FINAL%20-%20SD%20Maritime%20Water%20and%20BlueTech%20Economy%202020.pdf](https://uploads-ssl.webflow.com/5cfe4b2804ff07093bd-09cdb/626c32091f009307150d578d_FINAL%20-%20SD%20Maritime%20Water%20and%20BlueTech%20Economy%202020.pdf)
- 29 Port of San Diego. (2022, July). *Blue Economy Incubator Highlights*. <https://pantheonstorage.blob.core.windows.net/waterfront-development/Blue-Economy-Highlights-2022-FINAL.pdf>



