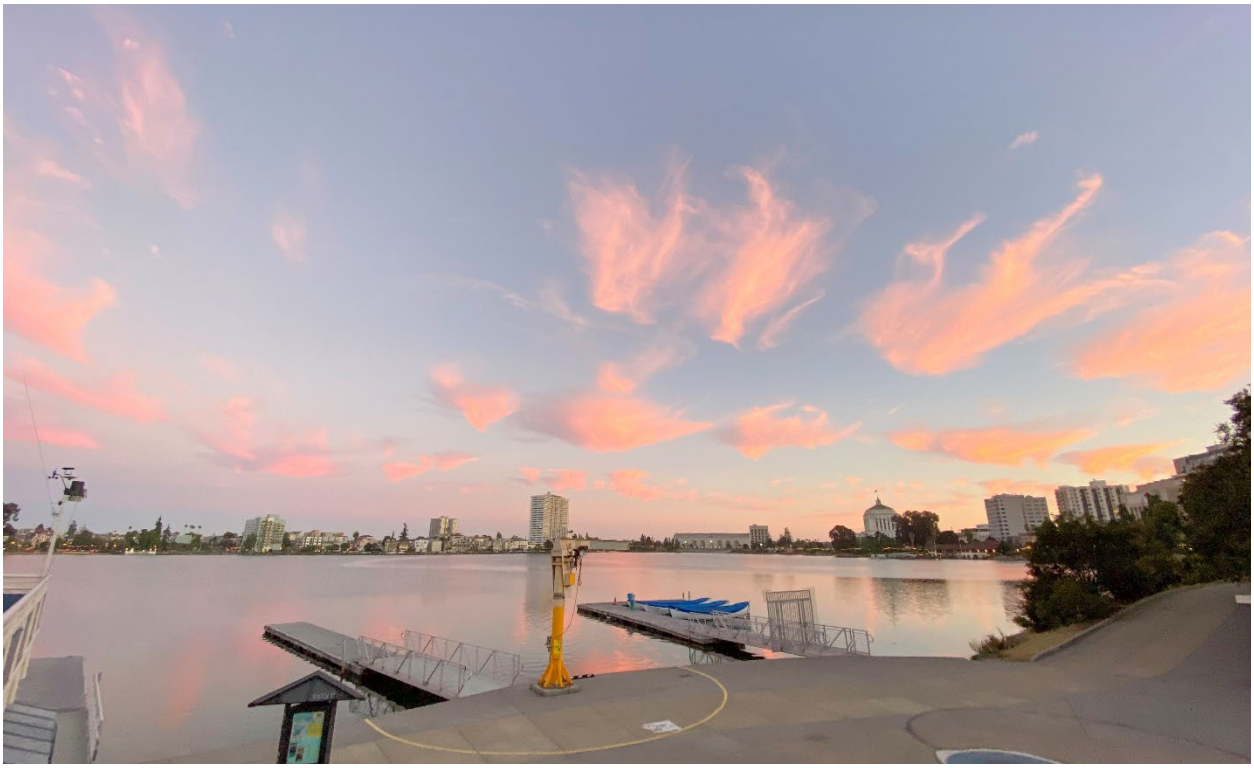
# Creating a More Effective and Actionable Estuary Blueprint Through Integration of Human Dimensions

A report from the Social Science Advisory Team to the San Francisco Estuary Partnership

November 2024



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## Executive Summary

The San Francisco Estuary is inextricably connected to the communities that inhabit and interact with its watershed. In recent decades, there has been a growing emphasis on including human dimensions in environmental management, and the Estuary Blueprint has made substantial progress in incorporating more actions and tasks focused on the social side of environmental management. However, there remain significant opportunities to improve and expand the ways the Estuary Blueprint considers the human dimensions of environmental management and stewardship. Integrating the human dimensions of management further into the Estuary Blueprint will result in more successful protection, restoration, and enhancement of the Estuary.

This report offers recommendations for the Estuary Blueprint developed by the San Francisco Estuary Partnership's Social Science Advisory Team ("Advisory Team"). The recommendations are informed by the Advisory Team's framing of key cross-cutting human dimensions themes. The human dimension themes the Blueprint should address and expand, as defined by the Advisory Team, include:

- Equity and environmental justice
- Climate adaptation and resilience
- Identity and sense of place
- Governance and representation
- Human health and wellbeing

This report includes recommendations for

1. **Identifying the human dimensions for each of the Actions and Tasks in the Estuary Blueprint,** and
2. **Improving the planning and development processes for the future Blueprint updates.**

<u>Overall recommendations for improving human dimensions in the Estuary Blueprint:</u>

1. **Maintain a focus on the human dimensions of estuarine management and protection through all stages of Blueprint development**. Developing people-centered strategies in estuarine management is a different process than setting targets for biophysical goals. Revisions of the Blueprint should incorporate social science and human dimensions from the outset of the planning process.
2. **Be specific with language.** To avoid turning critical concepts like "environmental justice" and "resilience" into empty buzzwords, it is important for the Blueprint to thoughtfully define its use of these terms.

3. **Be explicit about how collaboration should look.** When calling for more engagement with communities, the Blueprint should be as clear as possible about what this process can look like to discourage potentially harmful "box-checking" and provide transparency about expectations of resource allocation, time commitments, and ownership structures.
4. **Clarify what (and whose) problems a given solution will solve.** When invoking a need for nature-based or resilience solutions, the Blueprint should state what specific problems these initiatives will solve. Additionally, the Blueprint should recognize how these problems are not equally distributed across or experienced by the same social groups.
5. **Set objectives for avoiding green gentrification and displacement.** The Blueprint should acknowledge the expensive and exclusionary social reality of the Bay Area. It should also commit to a vision of estuarine management that does not exacerbate displacement through green gentrification.
6. **Invest in a long-term vision for integrating social science into management.** The Blueprint's actions and tasks have been shaped by a robust biophysical science field of practice. The San Francisco Estuary Partnership should support the development of a social science research agenda that can fill knowledge gaps to support evidence-based human dimensions actions in the Blueprint.

<u>Recommendations for promoting human dimensions in the next Blueprint update:</u>

1. **Hold a series of participatory planning workshops around the region.** To ensure that human dimensions of management are centered in future revisions of the Blueprint, the San Francisco Estuary Partnership should offer workshops that educate communities about regional issues, ensure compensation for participants' time, and make concerted efforts to include demographic groups that were not previously invited to the table in past iterations of Blueprint planning.
2. **Develop a long-term vision that includes both biophysical and social goals for Estuary stewardship.** By setting a long-term vision, the San Francisco Estuary Partnership can establish the scaffolding for building a social science research agenda and community of practice. This infrastructure can then facilitate work that can be leveraged for the benefit of the Estuary and inform future Blueprint development.
3. **Establish a permanent Social Science Advisory Team to support Blueprint work.** This team may include external researchers, environmental justice experts, and community leaders and should be constructed to intentionally make space for voices that are not often included in environmental management or planning.
4. **Seek broader perspectives and input to re-evaluate the human dimensions themes presented in this report.** The San Francisco Estuary Partnership should conduct a broad outreach effort to solicit input from the people the Blueprint serves to identify the most important and relevant human dimensions.

## Introduction

The San Francisco Bay-Delta is one of twenty-eight "Estuaries of National Significance" named in the federal Clean Water Act. The San Francisco Estuary Partnership ("Estuary Partnership") collaborates with state and federal agencies, Tribes, and local communities to facilitate estuary restoration, protection, and enhancement actions. With that purpose in mind, the San Francisco Estuary Blueprint ("Estuary Blueprint"), formerly known as the Comprehensive Conservation Management Plan and meeting the U.S Environmental Protection Agency's National Estuary Program requirements, provides a comprehensive action plan for ecosystem work across the Bay-Delta.

In 2022, the Estuary Partnership updated the Estuary Blueprint through a process that was guided by the work of a Steering Committee of volunteers from the Estuary Partnership Implementation Committee and supplemented with the expert input of subject matter expert working groups. The Steering Committee organized additional public listening sessions, social media alerts, and an online survey to solicit additional engagement from the local community. The updated Estuary Blueprint advanced the human dimensions of ecosystem management through the addition of a Blueprint Action focused on improving equity. However, the updated Estuary Blueprint maintained a predominant focus on biophysical actions, with less inclusion of the social aspects of effective ecosystem management, the human dimensions of water quality improvement, and human health and wellbeing.

To remedy this gap in the Estuary Blueprint, the Estuary Partnership convened a Social Science Advisory Team ("Advisory Team") in 2023 comprised of seven social science and human dimensions academic experts and practitioners in the field (see Appendix 2 for Advisory Team member biographies). The Advisory Team's goal was to assess the Estuary Blueprint for areas where it should further address the human dimensions of ecosystem protection, recovery, and enhancement. Expertise within the Advisory Team included geography, conflict studies, environmental justice, political ecology, science and technology studies, natural resource management, and coastal climate change adaptation. The Advisory Team drafted this report to highlight recommendations for integrating human dimensions and the social sciences into the Estuary Blueprint to create a more effective and actionable Blueprint in the future.

Many types of social science research are continuously happening in the Bay-Delta region. The social sciences encompass many theoretical and applied scientific disciplines, including sociology, psychology, anthropology, geography, economics, and political science. However, there is not a clear plan for how social science fits into the long-term plans for a healthy, resilient, diverse, and sustainable Estuary. In 2018, the Delta Stewardship Council and the Delta Science Program began a concerted effort to integrate the social sciences into their work to better inform environmental decision-making. The Delta Science Program tasked a six-member

independent Social Science Task Force to develop a strategy for integrating the social sciences in the work of the Delta. This effort resulted in April 2020 with the production of *A Social Science Strategy for the Sacramento-San Joaquin Delta*, or Delta Social Science Strategy.[1] The Estuary Partnership now seeks to expand that work to include integrating social sciences in the work of restoring, protecting, and enhancing the entire Estuary within the actions of the Estuary Blueprint.

The Delta Social Science Strategy identifies that "fundamentally, the integration of social and natural science recognizes that humans are a central part of the system, as is the case in the Delta—and that overlooking this human component often leads to unintended consequences and management ineffectiveness." The social sciences can help answer important questions about how human and natural systems interact, how environmental policy can produce undesirable social effects such as environmental inequality, and why natural resource management can result in unintended consequences and ineffective management. It is in this spirit that the Advisory Team approached the task of integrating human dimensions into future iterations of the Estuary Blueprint.

## Methods

The Advisory Team reviewed various strategic ecosystem management plans, including from the San Francisco Estuary Partnership, the Puget Sound Partnership National Estuary Program, and the Delta Stewardship Council. The Advisory Team found the Social Science Strategy for the Sacramento-San Joaquin Delta particularly insightful, as it demonstrated how to integrate social science into the science, management, and policy aspects of the Sacramento-San Joaquin Delta (Delta). The challenges faced by the Delta Social Science Task Force closely mirrored many of the issues the Advisory Team grappled with.

Over the course of eight months, the Advisory Team held four meetings to foster discussions on systematically integrating human dimensions and social science needs into the Estuary Blueprint. Additionally, the Advisory Team's planning team, which included two Estuary Partnership staff members and the Advisory Team chair, convened remotely over half a dozen times between July 2023 and August 2024 to plan and debrief the meetings of the larger Advisory Team group. The Advisory Team analyzed each Action in the Estuary Blueprint, as well as the overall document, to identify the human dimensions and social science information missing from it and create recommendations for improved inclusion of human dimensions into the Estuary Blueprint.

[1]https://deltacouncil.ca.gov/pdf/science-program/delta-social-science-task-force/2020-04-07-task-force-final-report-executive-summary.pdf

Additionally, the Advisory Team members created a list of five cross-cutting social themes that are not adequately addressed in the Estuary Blueprint relating to the human dimensions of protecting, restoring, and enhancing the San Francisco Estuary. They defined the goal related to each theme, the problems that arise from inadequate attention to it, and how this theme was important to support the goals of the Estuary Blueprint. The Advisory Team assessed the inclusion of these five themes across all the Actions in the Blueprint, understanding that when implemented adequately, the five cross-cutting themes would help develop, strengthen, and support the human dimensions of the Blueprint Actions. These cross-cutting themes also identify what kinds of social science expertise, analysis, and societal interventions will help to protect and restore the water quality and ecological integrity of the San Francisco Estuary and create a more environmentally just Estuary that benefits everyone.

## Cross-Cutting Themes of Human Dimensions in the Blueprint

Below is a summary of human dimensions themes the Advisory Team suggests for inclusion in the Estuary Blueprint. While most of these themes are already included to some extent in the Blueprint, their presence in the Blueprint should be expanded through systematic consideration of each theme under each Action.

Each subsection below also includes the goals related to the theme, problems related to the theme, justification for the Advisory Team's suggestions and analysis, and considerations regarding the theme during their analysis of the Estuary Blueprint.

### *Equity and Environmental Justice*

Equity involves giving everyone a fair shot at participation in decision-making and in sharing of environmental risks and benefits, while environmental justice involves removing the structural barriers that result in inequality. Cultivating equity and pursuing environmental justice through increasing inclusion, fairness, and diversity considerations should be fundamental to the Estuary Blueprint.

Environmental benefits related to the Estuary (including good water quality, access to open space, and protection from flooding, among others) should be provided equally to all people in the region, irrespective of race, gender, ethnicity, age, ability, and other demographic markers. Yet in reality, environmental problems in the Estuary region, including environmental pollution, lack of access to open space, and vulnerability to flooding, are unjust, unevenly experienced social problems that disproportionately impact people of color and low-income communities. Working towards improvement of benefits and reduction in risks for those most affected in the Estuary means prioritizing the most vulnerable, marginalized, and underserved communities, thereby focusing on improving and restoring the most degraded and impacted aspects of the Estuary's ecosystem.

The Advisory Team assessed the degree to which the Estuary Blueprint and each Action therein centers equity and environmental justice considerations. This includes ways in which the Estuary Blueprint and its Actions address:

- Identifying, mitigating and eliminating disproportionate exposures to the negative impacts of environmental harms in the Estuary (including climate change, pollution, and habitat degradation, among others) by prioritizing the most vulnerable populations and underserved communities.
- Developing processes that will result in equitable distribution of environmental benefits (including flood risk protection, access to wild foods, good water quality, and access to recreational spaces, among others) in the SF Estuary.
- Confronting and grappling with the history of government agencies' treatment of Tribes and elevating the imperative for government agencies to honor all tribal treaty rights and the rights of sovereign nations.

*What's generally missing in the Estuary Blueprint in this thematic area:*

- The Blueprint conflates equity and justice, and does not sufficiently address environmental justice (see glossary for definitions of these terms).

*What's generally needed for the Estuary Blueprint to fill the gaps in this thematic area:*

- When discussing resilience, the Estuary Blueprint should consider the problems with how "resilience" could involve continued investment in unjust infrastructures and systems, such as highways or oil refineries that disproportionally harm people of color and low-income communities.
- For actions and tasks focused on ecosystem restoration, the Estuary Blueprint should clarify the social benefits of ecosystem restoration, and include Tasks about progress monitoring and communication of those social benefits.
- The Estuary Blueprint should ensure equity in siting prospective projects for stormwater management or shoreline restoration/adaptation projects by including Tasks specifically focused on enabling members of underserved communities to have greater access to decision-making processes, technical support, and funding.

### *Climate Change Resilience and Adaptation*

San Francisco Estuary communities must effectively prepare for and adapt to climate change to maximize positive outcomes for ecosystems and people over time, and the Estuary Blueprint should reflect this. Doing so requires special attention to the most impacted ecosystems and to vulnerable, marginalized, and underserved communities. We know that climate change will bring sea level rise, groundwater rise, changing precipitation patterns, increased heat, and other environmental stressors to Bay Area communities and ecosystems. Without targeted preparation and adaptation in land management, these environmental stressors threaten ecosystem

degradation and harm to communities, with underserved communities expected to suffer the worst impacts.

The Advisory Team assessed each Estuary Blueprint Action for the degree to which climate change planning, resilience and adaptation are adequately included. This includes ways in which the Estuary Blueprint and its Actions address:

- Identifying the effects and risks of climate change on human communities and ecosystems, including identifying the disproportionate impacts on vulnerable populations.
- Facilitating empowerment and self-determination of communities in adaptation planning, including for vulnerable populations.
- Identifying the institutional, cultural, regulatory, economic, and social strategies for adapting to climate change in ways that maximize positive outcomes over time for ecosystems and communities.

*What's generally missing in the Estuary Blueprint in this thematic area:*

- The Estuary Blueprint should include a clear description of what climate resilience or vulnerability reduction entails, as well as a clear description of the specific climate change threats that we need to build resilience to.
- The Estuary Blueprint should seek to build understanding of how different communities across the Estuary understand their exposure/vulnerability to climate impacts or downstream economic/social impacts that may be exacerbated by climate change.
- The Estuary Blueprint should elevate communities' definitions of resilience to climate impacts and goals for climate adaptation and recognize how these may differ from government definitions of resilience and goals.

*What's generally needed for the Estuary Blueprint to fill the gaps in this thematic area:*

- The Estuary Blueprint needs to provide more information or reference relevant resources about where communities will suffer most from climate impacts, where those impact which are currently a problem, and which areas are "under-planned" or have not received sufficient levels of planning/investment for climate impacts.
- The Estuary Blueprint should include information on how different populations in the estuary could be affected differently by the effects of climate change, as well as the downstream, long-term impacts of adaptation projects.
- The Estuary Blueprint should highlight the need for research that articulates the economic and social outcomes of climate change adaptation planning/projects.

### *Identity and Sense of Place*

Bay Area residents should ideally see themselves as integrally connected, benefitting from, and important to the overall health of the San Francisco Estuary, as well as recognize the role of the Estuary on their identity and sense of place. Yet regional environmental planning efforts have historically been conducted by technical experts and people from dominant social groups without regard to the full range of cultural identities and senses of place present in the Bay Area,

including those of Native Americans. This limited historical perspective inhibits the possibilities and strategies for protecting, restoring, and enhancing the Estuary and risks marginalizing or alienating community members who otherwise might contribute valuably to the betterment of the Estuary. Stewardship of land and water is a cultural value for a diverse range of communities across the Bay Area, and these perspectives should be reflected in regional planning documents to have the greatest success and ensure the broadest set of leaders and champions for protecting, restoring, and enhancing the Estuary.

The Advisory Team assessed each Action for the degree to which identity and a sense of place were adequately included. This includes:

- Acknowledging and fostering a sense of connection to the San Francisco Estuary for residents from diverse cultural identities.
- Identifying cultural beliefs and practices critical to people's sense of place and identity.
- Understanding how different cultural groups react to policy and biophysical changes in ecosystem services and management.

*What's generally missing from the Estuary Blueprint in this thematic area:*

- Actions generally do not discuss how identity/sense of place can be meaningfully included in planning processes or project implementation.
- There is generally no recognition of how the Action can affect diverse cultural identities and senses of place in the Bay Area.

*What's generally needed for the Estuary Blueprint to fill the gaps in this thematic area:*

- The Estuary Blueprint should include baseline information about what "belonging" in the estuary and identifying with this place looks like for different social groups (or call for this research if it is not known).
- The Estuary Blueprint should identify the places/landmarks/areas of the estuary that are culturally significant and high priority for protection that may be absent from planners' priority lists.
- The Estuary Blueprint should highlight the need for more research on maintaining place relationships with the compounding impacts of climate-driven displacement and ongoing gentrification, as well as on the efficacy of anti-displacement strategies.
- Sea-level rise, droughts, and other climate-related hazards threaten communities' sense of place values. However, efforts such as wetland restoration may also threaten these values. The Estuary Blueprint should consider an array of scenarios about the Estuary to educate the public on existing trends and their longer-term implications.
- The Estuary Blueprint should include description of peoples' cultural relationships to the San Francisco Estuary and surrounding areas and incorporation of these concepts into decision-making around ecosystem management. The Estuary Blueprint should keep in mind that "culture" can mean many things, and it is best to ask community members directly what cultural aspects of life in the Bay Area they value.
- Research such as in this article may be a helpful starting point: The ecosystem service of sense of place: benefits for human well-being and biodiversity conservation | Environmental Conservation | Cambridge Core.

### *Governance and Representation*

Democratic representation, accountability, and transparency should be hallmarks of regional planning and implementation efforts. Yet technical experts and people from dominant social groups have historically conducted regional environmental planning efforts. Whether or not they have good intentions, this lack of representation in decision-making has resulted in skewed governance systems in which people from more societally privileged groups tend to disproportionately hold decision-making power and have often neglected the needs of less privileged groups. Representation on decision-making bodies that reflect the demographics of the Bay Area will result in more complete inclusion of the wide range of considerations and actions for protecting, restoring, and enhancing the Estuary.

The Advisory Team assessed each Action for how transparency and inclusivity in governance and decision-making are critical to its success. This includes:

- Identifying the degree to which each Action engages a broad set of committed interested parties and diverse forms of knowledge, with a focus on expanding trust and inclusion of vulnerable populations and underserved communities.
- Characterizing the scope of authorities and the timing of engagement.
- Ensuring Blueprint Actions adhere to the environmental justice principle of "nothing about us without us" and emphasize frontline communities' rights to self-determination.
- Identifying opportunities for increasing representation and voice in the Estuary's environmental and natural resource management decision-making structures.
- Identifying non-traditional interested parties and diverse forms of knowledge in the governance of ecosystem services.

*What's generally missing from the Estuary Blueprint in this thematic area:*

- Addressing or ensuring transparency of decision-making.
- Robust mapping of interested parties to reveal a more representative network of potential participants.

*What's generally needed for the Estuary Blueprint to fill the gaps in this thematic area:*

- The Estuary Blueprint should include more analysis of the institutions and capacity needs for improving governance and representation in decision-making around the different Actions.
- The Estuary Blueprint should mention engagement and financial support for inclusion of a more diverse network of participants in decision-making. Additionally, the Estuary Partnership should commit resources for ensuring a more diverse network of participants in the development of the Estuary Blueprint.
- Estuary Partnership staff should conduct a community needs assessment to inform the development of Estuary Blueprint Actions.

### *Human Health and Wellbeing*

The Estuary contributes to the health and wellbeing of every Bay Area resident. In a similar vein, environmental risks related to the Estuary, including pollution, flooding, and disease vectors, among others, contribute to human health burdens in the Bay Area, particularly for the most vulnerable populations. Social factors such as race, age, neighborhood of residence, disability, and socio-economic status may be predictive of inequitable health outcomes. Ensuring that Estuary Blueprint Actions to protect, restore, and enhance the San Francisco Estuary also contribute to the health and wellbeing of all Bay Area residents will help build public support for these activities as well as improve quality of life.

The Advisory Team assessed each Action for the degree to which it promotes health and wellbeing for Bay Area residents. This includes:

- Using language that builds a greater understanding that healthy communities and healthy ecosystems are intertwined and making one without the other is not effective.
- Identifying conditions and/or Actions that may result in disproportionate impacts on vulnerable populations and underserved communities from environmental health hazards and exposure.
- Identifying positive human health and wellbeing outcomes from ecosystem remediation and protection.

*What's generally missing from the Estuary Blueprint in this thematic area:*

- The Estuary Blueprint should feature the human health and wellbeing benefits that people derive from the estuary.
- The Estuary Blueprint should recognize that community activity to protect the Estuary, such as engagement in restoration work, should be seen as having the double benefit of nurturing collective actions that improve social cohesion while bringing near and long-term community benefits.

*What's generally needed for the Estuary Blueprint to fill the gaps in this thematic area:*

- Data about hazards and exposure that impact health within the community should inform the priority issues for each Action.
- There should be more focus on human health and wellbeing throughout the Blueprint.
- There should be more information in the Estuary Blueprint about the public health exposures/risks related to the Estuary that disproportionately impact frontline communities, with a commitment in the Estuary Blueprint to making these areas "healthy and resilient."
- The Estuary Blueprint should recognize ways overall human wellbeing is connected to environmental outcomes (e.g. psychological, cultural, economic, etc.).

## Social Sciences in the Estuary Blueprint

The social sciences encompass dozens of theoretical and applied disciplines and sub-disciplines, such as anthropology, geography, economics, public administration, psychology, and sociology. The disciplines vary in their methods, data types, and analyses. Many social sciences have

organized sub-disciplines focused on environmental and natural resource management, such as natural resource economics and environmental psychology. Particularly in contexts where humans deeply impact and are impacted by the state of the natural system, the social sciences can help answer a myriad of questions related to ways in which human and natural systems interact to influence the outcomes (and side effects) of environmental policy and natural resource management.

A primary task of the Estuary Blueprint should be to highlight the human dimensions of management efforts and regulatory measures in the Estuary, including understanding the unintended consequences of management on access and enjoyment and mitigating environmental justice implications, among many other priorities. The social sciences are essential for understanding the Estuary by leveraging data, methods, and analyses that can shed light on these dimensions. For example, sociology as a discipline can provide valuable information about how institutions and systems of governance impact different social groups. By contrast, economics assesses how people value, use, and benefit from resource distributions and decision-making incentives. When social science is not central to natural resources management and planning, it not only indicates a disregard but also a lack of knowledge about management effectiveness, efficiency, equity, and social impact.

## Overall Estuary Blueprint recommendations

These overarching recommendations emerged from the Advisory Team's meetings, discussions, and debates about integrating human dimensions into the Estuary Blueprint.

1. When revising the Estuary Blueprint, involve human dimensions and social science at the outset of Blueprint development rather than trying to shoehorn it in at the end.
2. Be thoughtful about the definitions of the key terms in the report, like "equity", "environmental justice", and "resilience," and provide a glossary. For equity, the definition should account for different dimensions of equity, such as procedural, distributive, and recognition. See the Glossary for the definitions recommended by the Advisory Team.
3. When the Estuary Blueprint calls out the need for collaboration, be explicit about *how* this process should take place. Collaboration with communities exists on a spectrum from community consultation to ownership, which holds vastly different expectations for resource allocation, time commitments, and governance structures.
4. When the Estuary Blueprint talks about solutions, including nature-based solutions, it should be explicit about the problem the solution is intended to address. Is the problem one of economic loss, human suffering, or ecological pollution, for example, and which groups will be most affected by this problem? Additionally, the Estuary Blueprint should be clear about how environmental and climate challenges are not equally distributed across communities and that solutions need to consider the distribution of benefits and burdens across different social groups and categories. The motto "Nothing About Us

Without Us," which relies on this principle of full and complete participation of all users, must be central to the revised Estuary Blueprint.

5. Explicitly set an objective in the Estuary Blueprint to avoid green gentrification or displacement resulting from solutions such as restoration or nature-based adaptation. Given the high costs of living and ongoing gentrification in the Bay, land-use planning in the estuary must be sensitive to communities' concerns about displacement and set goals to ensure that all communities can reap the long-term benefits of project work.
6. Findings from the Delta Social Science Task Force's Report are also relevant in the Bay Area. Echoing the findings from that report, the Bay Area also lacks a long-term vision for social science integration into the Bay's management and requires more social science to be integrated into the adaptive management process. Many of the recommendations from the Delta Social Science's Task Force are applicable in the Bay Area as well: the Estuary Partnership could do a better job of investing in a broad array of social science activities, integrating social and biophysical science to improve decision-making and reducing barriers to integrating new knowledge in management decisions.

## Specific Blueprint Action-level recommendations

The Advisory Team recommends the following key steps to fill social information gaps for each of the Estuary Blueprint tasks. These key steps reveal the need for additional Tasks to adequately support progress for each Action.

| **Blueprint Action** | **Key steps to fill social information gaps** |
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| 1. Climate Resilience | • Define what climate resilience or vulnerability reduction entails, who this is for, the target benefits/risks, and long-term expectations.<br>• Discuss how identity/sense of place can be included in planning processes or project implementation for climate resilience.<br>• Address health/public safety more broadly, including characterization of costs and public health impacts of climate adaptation for resilience compared to costs and public health impacts of inaction.<br>• Identify barriers to coordinated city and county-level adaptation planning. |
| 2. Equity | • Acknowledge how frontline communities are vulnerable to displacement from the estuary, both from climate-driven displacement as well as ongoing gentrification<br>• Address the importance of place identity and identity of frontline communities.<br>• Identify the barriers to broader participation by frontline communities and Tribes in planning processes, restoration projects, and stewarding estuarine ecological health.<br>• Understand the influences that play a role in the decision of a CBO or Tribe to get involved with estuary stewardship or government planning processes. |
| 3. Adaptation Planning | • Develop equity-centered guidelines about prioritizing what to protect, including neighborhoods and cultural resources threatened by sea level rise and climate change, and when to retreat.<br>• Broaden discussion of governance and representation beyond just technical assistance.<br>• Broaden discussion of human health and wellbeing to include Tribal Nations and Indigenous cultural uses. Wellbeing should |

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| | consider mental health effects from storms or other extreme weather events.<br>● Broaden the discussion of human health and wellbeing to account for climate change-related public health risks, such as increased disease vector populations.<br>● Identify effective communication strategies about climate adaptation for different interested parties.<br>● Engage to listen and document the ways in which different communities perceive the effectiveness of various adaptation actions to address the question of who and what adaptation planning serves.<br>● Engage to listen and document communities' various pathways to adaptation successes.<br>● Identify the probability of chronic and acute environmental disasters due to climate change and the disparities in the effects of these events. |
| 4. Adaptation Implementation | ● Engage to listen and identify vulnerable populations about climate change adaptation and resilience.<br>● Use historical ecological and anthropological data to identify native species and habitats that can be incorporated into shoreline adaptation projects.<br>● Pursue community-led design approaches and empower communities in decision-making processes.<br>● Understand the ways in which social and institutional networks can support adaptation implementation, particularly for innovative nature-based solutions. |
| 5. Watershed Connections | ● Increase considerations of equitable use of local watersheds and watershed connections (e.g., outdoor uses, fishing, bird watching, recreation, etc.).<br>● Include language on the benefits of healthy watersheds for human health (i.e., nature-health nexus).<br>● Include information on how different human populations in the estuary could be affected differently by the effects of climate change.<br>● Identify and seek to dismantle institutional barriers to a watershed approach to water management and climate adaptation, including at the scale of operational landscape units (OLUs). |

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| 6. Sediment | • Evaluate the public and environmental health risks and impacts of reusing dredged sediment for different purposes.<br>• Assess who sediment reuse projects are benefitting and whether these benefits are resilient over time. |
| 7. Carbon Management | • Consider the effects of carbon management via wetland restoration and other land use changes on the people who live, work, and play near and within them.<br>• Improve understanding of the factors that influence people who live, work, play, or otherwise steward land in the Delta to participate in carbon management practices.<br>• Evaluate the impacts of carbon markets on other (non-carbon) management goals and practices in the Estuary. |
| 8. Wetland Monitoring | • Identify and partner with local organizations to co-design monitoring strategies and build structures for community-based participation.<br>• Define the relationship between wetlands and flood risk reduction.<br>• Identify and honor cultural beliefs and practices that interact with the ecosystem services provided by the natural environment.<br>• Invest in relationship-building with Tribal and Indigenous communities.<br>• Evaluate the costs and benefits of the WRMP compared with project-based monitoring.<br>• Identify effective communication strategies of WRMP data for different audiences, including decision-makers.<br>• Identify and uplift the values and goals of different interested parties and Tribes for the WRMP. |
| 9. Intertidal/ Subtidal Habitats | • Engage Tribes and frontline communities in habitat planning and implementation.<br>• Understand the social/institutional barriers to expanding eelgrass and oyster beds.<br>• Understand the barriers to removing artificial structures.<br>• Create a monitoring and evaluation framework to identify the effectiveness of management interventions and their outcomes for people and the services provided by ecosystems |
| 10. Tidal Marsh | • Identify and center local community members' goals and objectives for marshes and marsh restoration. |

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| | • Use demographic data to identify where overburdened communities are in relation to these habitats - who benefits and to what degree? Recreational use data for habitats, if available, could also be important to identify heavily used sites that may be acutely sensitive to climate change and other non-climate stressors.<br>• Create a monitoring and evaluation framework to identify the effectiveness of management interventions and their outcomes for people and the services provided by ecosystems.<br>• Develop more specificity around habitat migration with rising seas - who will be affected first (homeowners, livelihoods, cultures, etc.)? Who will pay for people or infrastructure to move? What natural infrastructure solutions are effective, feasible, and accepted by the public? How will people respond to these potential changes? This evaluation would require a combination of economic, legal, and psychological/sociological sciences. |
| 11. Transition Zones | • Identify where marsh migration can or should be facilitated so as not to displace communities.<br>• Characterize the social/institutional / regulatory barriers to enhancing, restoring, or creating upland transition zones.<br>• Use demographic data to identify overburdened communities in relation to these habitats—who benefits from them, and to what degree? If available, recreational use data for habitats could also be important to identify heavily used sites that may be acutely sensitive to climate change and other non-climate stressors.<br>• Create a monitoring and evaluation framework to identify the effectiveness of management interventions and their outcomes for people and the services provided by ecosystems.<br>• Need more specificity around habitat migration with rising seas - who will be affected first (homeowners, livelihoods, cultures, etc.)? Who will pay for people or infrastructure to move? What natural infrastructure solutions are effective, feasible, and accepted by the public? How will people respond to these potential changes? Likely would require a combination of economic, legal, and psychological/sociological sciences. |
| 12. Managed Wetlands | • Identify the recreation, and therefore health, benefits of the facilities being monitored.<br>• Include workforce development opportunities for communities who might not otherwise work in these spheres. |

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| 13. Seasonal Wetlands | • Describe the threats to seasonal wetlands.<br>• Ensure that protecting landscapes is not unjustly experienced in communities that lack economic opportunity and open space access.<br>• Ensure that cultural practices of rangeland users, including ranchers and Indigenous groups, are considered in management actions.<br>• Engage with agricultural practitioners, ranchers, and community members to evaluate how new protected space will be selected.<br>• Understand landowner goals for seasonal wetlands.<br>• Evaluate barriers to the protection/ restoration of seasonal wetlands. |
| 14. Creeks | • Acknowledge how unhoused and underhoused populations or people living in low-lying areas are more vulnerable to rising sea levels and flooding brought on by climate change.<br>• Add additional milestones related to public access, climate adaptation, public engagement, and community partnerships for creek restoration.<br>• Identify barriers to creek restoration.<br>• Characterize local community members' goals for creek restoration. |
| 15. Invasive Species | • Provide specificity about the impacts of invasive species on cultural subsistence species, economics, and other impacts on frontline and underserved communities.<br>• Characterize the social impacts of invasive species, including impacts on public utilities, tourism and recreation, and property values.<br>• Add reflection on what is "natural" in a changing world and what is desired as a state of "naturalness," which are all linked to social and cultural perceptions.<br>• Add reflection on what constitutes an "invasive" with climate change-driven range shifts? Can non-native, non-invasive species serve important ecological and other roles if native species are driven out of current ranges and/or extirpated?<br>• Given that early detection and rapid response requires high public awareness and strong collective action, consider adding clearer identification of steps needed to raise awareness and build capacity among and between all players in the larger |

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| | system. This may include interviews, surveys, focus groups, workshops, and general community outreach techniques to generate action. |
| 16. Freshwater Flows | ● Evaluate how the histories of settler colonialism and water management in California affect today's freshwater flows in the Estuary. |
| 17. Water Conservation | ● Clarify the equity implications of rebate and refund programs for water conservation.<br>● Highlight ways in which water conservation can reduce energy usage and decrease greenhouse gas emissions from water and wastewater treatment plants.<br>● Highlight connections to natural uses of the waterways that make California special (fish, wildlife, recreation, etc.).<br>● Highlight the human wellbeing benefits of water conservation actions (e.g., lower customer costs, increased jobs, clean drinking water, etc.).<br>● Understand social perceptions of and barriers to smart meter installation.<br>● Evaluate cost savings to low-income households, to cities, and to the region associated with water conservation.<br>● Evaluate where more regulation is needed to promote water conservation.<br>● Evaluate the factors that contribute to effective voluntary water conservation. |
| 18. Recycled Water | ● Evaluate who benefits from proposed recycled water projects.<br>● Evaluate health risks from proposed recycled water projects. |

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| 19. Stormwater Management | • Evaluate the demographic characteristics of green stormwater infrastructure (GSI) project beneficiaries.<br>• Examine traditional stormwater management's flooding and public health risks, including from combined sewer system overflows.<br>• Encourage social and transportation co-benefits of GSI installation, including installing traffic calming features, bike lanes, and pedestrian safety features.<br>• Understand local community goals for GSI and incorporate these into planning and prioritization.<br>• Identify drivers and barriers to widespread GSI implementation in the Bay Area.<br>• Ensure equity in siting stormwater projects that reduce flood risk by not basing priority sites on high property value.<br>• Include a focus on community input in GSI from planning to implementation.<br>• Identify GSI's role in contributing to gentrification and take action to prevent it. |
| 20. Nutrients | • Include information on the links between climate change, nutrient loading, and public health.<br>• Identify the biggest human issues for nutrient loading in the Bay Area.<br>• Identify how the ecosystem changes due to excess nutrients would lead to decreased opportunities for humans in the local area to connect to what's important to them.<br>• Provide outreach materials in multiple languages.<br>• Evaluate the institutional barriers to regional cooperation on nutrient management. |

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| 21. Emerging Contaminants | • Recognize the combined impacts of climate change, ecosystem degradation, and emerging contaminants to underserved communities.<br>• Identify how contaminants can affect peoples' cultural identities and senses of place in the Bay Area.<br>• Provide more detailed information about how to conduct education, communication, outreach, and other pollution prevention efforts with an equity focus.<br>• Connect emerging contaminants to the health and wellbeing of Bay Area residents.<br>• Evaluate the feasibility of strategies to reduce pesticides in the estuary.<br>• Evaluate the ways in which current policies fail to protect the estuary from contaminants of emerging concern (CECs) and identify the necessary policy changes.<br>• Assess the feasibility of source control for various CECs. |
| 22. Health Risks of Contaminants | • Include contaminant effects and engagement of interested parties for commercial fishing, recreational fishing, swimming beaches, boating, and other water recreation.<br>• Consider the human health risks of contaminants outside of groundwater, including from agricultural practices.<br>• Identify the policies and practices that allowed the contamination of fish with mercury to happen and to continue. |
| 23. Trash | • Identify how uneven distributions of trash impact the health and wellbeing of different populations.<br>• Evaluate the impact of plastic bag bans and other trash-reduction policies on marine debris. |

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| 24. Public Access | • Account for rising sea levels and the loss of access area extent/substrate in public access planning.<br>• Identify how shoreline access points have different cultural uses.<br>• Track visitation to different shoreline sites and identify how public access points contribute to people's sense of place.<br>• Ensure transparency in planning for new or improved public access and evaluate any geographic disparities.<br>• Emphasize the importance of public access to physical and mental health.<br>• Ensure equitable access by identifying the factors that promote a sense of belonging for people from different demographic groups.<br>• Recognize that public access may, in some cases, preclude certain cultural uses. Consider "choreographing" access (temporally and spatially) to avoid conflicting uses.<br>• Consider unsanctioned public use of shoreline spaces, including by unhoused populations.<br>• Identify local communities' goals and priorities for public access to the shoreline, including amenities available, and plan projects accordingly.<br>• Identify the ways in which public access can promote tourism and the regional economy. |
| 25. Champion the Estuary | • Acknowledge that equity and environmental justice considerations should be central in championing the estuary.<br>• Mention how the Estuary Blueprint can help ensure the protection, restoration, and enhancement of the most impacted ecosystems and vulnerable communities.<br>• Identify how to champion cultural values in the estuary.<br>• Recognize that championing the estuary offers an opportunity to contribute to the health and well-being of Bay Area residents. |

## How to improve the Estuary Blueprint creation process so that human dimensions are better included in future iterations

The Advisory Team developed several suggestions about how the Estuary Partnership could modify the process of creating the Blueprint for human dimensions and social aspects of the tasks to be better incorporated from the outset.

1. **To make the Blueprint planning process more inclusive, Estuary Partnership staff could hold workshops or meetings around different geographic locations in the Bay to discuss various place-relevant topics.** These workshops could also be a way to educate people about larger regional efforts around the Estuary and would help to make the planning process more collaborative. These workshops should be held early in the Blueprint development process before deciding solutions and priorities. Estuary Partnership staff could ask for input and direction about the local aspects of the various Blueprint actions and even potentially conduct a community needs assessment in different geographic locations to inform Blueprint development. The Estuary Partnership must ensure compensation for participants' time in these public meetings. Additionally, the Estuary Partnership should regular stipends for people reviewing or working through a document like the Estuary Blueprint. In setting up these sub-regional meetings, Estuary Partnership staff should pay attention to who has been involved in the past - who has been at the table and who has not in the Blueprint creation process, and make a concerted effort to center the perspectives of those who have been excluded or neglected in past Blueprint creation efforts (whether related to geographic location, age, gender, race, profession).
2. **The Estuary Partnership could articulate a long-term vision for centering the biophysical and social aspects of protecting, restoring, and enhancing the Estuary.** To advance this vision, Estuary Partnership staff could construct a social science research agenda for the San Francisco Estuary, which could inform the creation of new Blueprint actions and tasks. Part of this could entail Estuary Partnership staff figuring out the networks of social science efforts happening around the Bay Area already and evaluating how to leverage them for the benefit of the Estuary.
3. **The Estuary Partnership could constitute a permanent Social Science Advisory Team with external researchers or an environmental justice advisory committee** (like BCDC). The Estuary Partnership should create criteria for advisory team group makeup to intentionally make space for people who haven't been involved in the past iterations of Blueprint creation (i.e. geographic location, age, gender, profession).
4. The Social Science Advisory Team took a first cut at establishing the five cross-cutting themes that should permeate the Blueprint. However, **the Estuary Partnership could do a broader outreach effort to get more buy-in and perspectives about what those**

**themes should be, and what are the most important human dimensions aspects that should be included in the Blueprint.** Once these human dimensions themes are established with broader buy-in from local interested groups, the groups of people that formulate the Estuary Blueprint tasks under each action could contain people with expertise in each of these themes.

## Conclusions

The human dimensions of estuary planning and management are fundamental and necessary pillars of the Estuary Blueprint. The Advisory Team made great strides in integrating social science aspects into an Estuary Blueprint that has historically focused on the non-human biophysical and ecological aspects of the Estuary. In conversation with those biophysical aspects, this report introduces a wide range of new considerations for the Estuary Blueprint and acknowledges the Advisory Team's limitations in addressing the vastness and complexity of social science fields. While outside the scope of this report, the authors suggest future work may include a circular economy, economic opportunity, and transformative justice considerations. Confronting climate change will require more holistic approaches that integrate technical considerations with values-based participatory decision-making to ensure fair distributions of the benefits and burdens of adaptation. The Estuary Blueprint provides guidance for stewardship in the face of rapid socio-environmental change punctuated by deep uncertainties. To promote effective stewardship of the San Francisco Estuary, the Estuary Partnership's work must effectively encompass the environmental landscape and the diverse human communities that reside there, as they are deeply intertwined.

# Appendices

## Appendix 1 - Glossary

Though the report used the following definitions for specific terms, the Social Science Advisory Team recognizes that some terms may have different definitions across policy and community contexts. We acknowledge that some definitions have been critiqued for minimizing agency and failing to fully recognize the historic and contemporary conditions that have yielded unjust, inequitable conditions. We suggest that normative definitions that are commonly used across planning documents and policies should be reconsidered and grappled with.

Adaptation: The process of preparing ecological, social, economic, or infrastructural systems for present-day and future climate change impacts that includes simultaneous aims to lessen the harms of climate impacts and improve conditions in a given system.

Climate resilience: Climate resilience is defined as the capacity of ecological, social, economic, or infrastructural systems to successfully cope with, manage, and adapt to the impacts of climate change.

Disadvantaged communities: Policies such as Justice40 and SB535 designate disadvantaged communities as those that suffer from a combination of economic, health, and environmental burdens as determined by census block group data. A second definition exists in the California Public Resources Code that defines a disadvantaged community as one where the median household income is below 80% of the statewide median household income.

Environmental justice: The State of California defines environmental justice as "the fair treatment of people of all races, cultures, and incomes with respect to the development, adoption, implementation, and enforcement of environmental laws, regulations, and policies." (California Government Code §65040.12(e))." Environmental justice may be considered an outcome of equity that is contingent upon systemic change.

Equity: Equity is concerned with fairness and justice in how people are treated, how public policies are formulated and implemented, and how benefits and burdens are distributed. It can also be considered a process that leads to the intended outcome of justice. Specific dimensions of equity include distributive (the fairness of how benefits and burdens are distributed), procedural (representation and participation in governance processes), and recognition (the acknowledgement of rights, tenures, and identities of groups in land management).

Frontline communities: Frontline communities experience the "first and worst" impacts of climate change because they are the most physically vulnerable (e.g. located in low-lying areas) and will be the most adversely affected by climate change due to systemic and historical socioeconomic disparities and other injustices.

Green gentrification: Green gentrification is a process in which the creation of green space, such as bike lanes, livable streets, and parks can lead to the exclusion and displacement of marginalized groups.

Human dimensions: Human dimensions is defined as a field of research and application that addresses the relationship and interactions between the environment and human activities. Human dimensions consider the ways people affect the environment, both positively and negatively, as well as the many ways humans depend on and benefit from the environment.

Human health and well-being: An overall state of physical, mental, psychological, cultural, and social wellbeing, not just the absence of sickness. Wellbeing may be defined as a state characterized by minimal levels of distress, good quality of life, or thriving rather than just surviving.

Marginalized communities: Marginalized communities experience social, political, and economic exclusion and discrimination due to characteristics such as race, gender, ethnicity, socioeconomic status, colonialism, and religion.

Nature-based solutions: Nature-based solutions are strategies or techniques that leverage ecosystems to reduce impacts from natural hazards, climate change, and other environmental challenges. These strategies aim to protect, restore, and sustainably manage natural and modified ecosystems, such as wetlands, beaches, and urban forests, with the goal of creating, maintaining, or improving ecosystem services. However, these services, such as habitat provisioning, air and water quality regulation, and aesthetic and cultural values, are not distributed equally across communities and may not be accessible to all. The implementation of nature-based solutions can also lead to green gentrification and displacement of individuals and households, forcing the most vulnerable people into areas or living conditions that are even less prepared to respond to and recover from natural hazards and climate change impacts. Equitable and just nature-based solutions should seek to address environmental risk reduction while providing social, economic, and cultural benefits, such as improved access to green spaces, new economic opportunities, enhanced cultural connections to nature, and improved community health and well-being. Creating an inclusive process for community input into the planning, design, implementation, and evaluation of nature-based solutions can enable more equitable and just outcomes.

Privilege: Privilege is access or advantages granted to members of specific social groups that follow patterns of historical power relations and comes at the expense of marginalized social groups.

Representation: Representation amongst different stakeholders is defined as meaningful participation, inclusion, and agency in decision-making processes and forums.

Underserved communities: Underserved communities experience, or have historically experienced, systemic disinvestment or institutional neglect.

Vulnerable communities: Vulnerable communities are defined as communities that have lower capacities to anticipate or recover from destabilizing events like disasters or other climate change impacts. Vulnerability is often determined using social indicators including but not limited to race, socioeconomic status, age, vehicle access, and linguistic isolation. Vulnerability may also be considered a consequence of unjust policies (e.g. redlining, disinvestment) that have influenced communities living and working in places with more environmental burdens, instead of a state inherent to a group of people.

## Appendix 2 - Social Science Advisory Team Biographies

**Mike Antos** is a Principal Watershed Social Scientist at Stantec who focuses on helping people and institutions navigate place, time, and culture to achieve equitable and sustainable outcomes. He is an established thought leader on how water policy and planning can be opened to members of overburdened and marginalized communities yielding empowerment and justice. Mike has a proven track record of coordinating complex multi-jurisdictional and publicly engaged water resources efforts. He is a fellow of the Switzer Foundation and holds a Ph.D. in Geography from the University of California, Los Angeles.

**Leah A. Kintner** is an Independent Consultant with expertise in applied environmental social science. Leah's work history includes notable assignments as a Social Scientist for the EPA Office of Inspector General, an Ecosystem Recovery Manager for the Puget Sound Partnership in Washington State, and work on the Humanitarian Partnerships Team with the World Wildlife Fund. In her role with the Puget Sound Partnership, Leah led the Puget Sound Social Sciences Advisory Committee, facilitated agency actions related to the social sciences and human dimensions, and co-developed a process for prioritizing a comprehensive social science research agenda for the Puget Sound estuary. She holds an M.A. in International Peace and Conflict Resolution, with an emphasis in Global Environmental Policy, from American University's School of International Service and a B.S. in Biology from the University of Puget Sound. Leah's composite areas of focus include environmental policy, conflict studies and conflict transformation, transboundary water management, and good governance.

**Michael Mascarenhas** is a first-generation college graduate and scholar of color. Mascarenhas is a Professor in the Department of Environmental Science, Policy and Management at the University of California, Berkeley. His scholarship examines questions regarding access to water for communities of color in an era of deeply racialized neoliberalism. His disciplinary fields include environmental justice, political ecology, and science and technology studies. Mascarenhas is the author of *Where the Waters Divide: Neoliberalism, White Privilege, and Environmental Racism in Canada (*Lexington Books*, 2012)*, *New Humanitarianism and the Crisis of Charity: Good Intentions on the Road to Help* (Indiana University Press, 2017), and *Toxic Water, Toxic System. Environmental Racism and Michigan's Water War* (University of California Press, 2024). He is also the editor of *Lesson in Environmental Justice. From Civil Rights to Black Lives Matter & Idle No More* (Sage Publishing 2020). Mascarenhas was an expert witness at the Michigan Civil Rights Commission on the Flint Water Crisis, and an invited speaker to the National Academies of Sciences, Engineering, and Medicine's Committee on Designing Citizen Science to Support Science Learning. He lives in Berkeley, California with his partner, twin sons, and rescued dog.

**Olivia Won** is an interdisciplinary scientist with expertise in coastal climate change adaptation, restoration ecology, and applied social sciences in natural resource management. She was the 2022-2024 NOAA Margaret A. Davidson Graduate Fellow at the San Francisco Bay National Estuarine Research Reserve where her research focused on how social equity goals are operationalized in nature-based coastal adaptation projects and planning work. She holds an M.S. from the Coastal Science and Policy Program at the University of California, Santa Cruz as well as a B.A. in Science in Society and Environmental Studies at Wesleyan University.

**Rachel M. Gregg** is a climate planner with experience in conservation, coastal ecology, and natural resource management. She has a background in natural and social science and the use of quantitative and qualitative methods to identify and evaluate risks and integrate community feedback in the development of climate-informed plans and projects. She is a trained facilitator and collaborates with federal, Tribal, state, and local decision makers to develop, implement, and evaluate climate adaptation strategies. Rachel holds a Bachelor's degree from Smith College in Marine Ecology and Government and a Master's in Marine Science and Policy from the University of Washington.

**Alejo Kraus-Polk** is an environmental geographer with 11 years of experience working with human dimensions of multi-benefit restoration projects in the Sacramento-San Joaquin Delta of California. Alejo has experience with structured decision-making, co-design, and participatory mapping as complementary parts of large-scale planning and adaptation efforts in the Delta. Alejo's Ph.D. dissertation explored the human dimensions of current and prospective landscape change in the Delta.

**Pamela Rittelmeye**r has a Ph.D. in Environmental Studies from the University of California, Santa Cruz, a M.A. in Geography from California State University Fullerton, and a B.A. in History from Barnard College, Columbia University. She has 15 years of experience in energy and water policy analysis and management. She has focused her research on the role of perceptions, sense of place, and local knowledge in anticipatory adaptation to water-related hazards. She was a contributing author to the Water chapter of the IPCC report *Climate Change 2022: Impacts, Adaptation and Vulnerability*.