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An Equity-First Approach to Climate Adaptation

San Diego Regional Climate Collaborative

San Diego Association of Governments

An Equity-First Approach to Climate Adaptation

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| AIMS AND SCOPE

In 2020, the San Diego Association of Governments (SANDAG), together with the San Diego Regional Climate Collaborative (SDRCC), prepared the Regional Adaptation Needs Assessment (Regional NA)[1] which provided a deeper understanding of the gaps and challenges that exist for climate adaptation planning, specific to the San Diego region. This Regional NA revealed that "local and regional practitioners [still] need consistent and accessible guidance, best practices for adaptation planning, and local and regional case studies that highlight the application of these best practices." Consistent with the Regional NA's findings, a review of the San Diego region's climate change adaptation-focused planning documents, to the extent available, revealed that many agencies' identified adaptation measures still lack detail, including on how to approach an economic assessment and how to integrate equity.

With funding from a Caltrans Senate Bill 1 Adaptation Planning Grant, SANDAG initiated the Holistic Implementation of Adaptation and Transportation Resilience Strategies (HIATRS) project in to comprehensively assess the existing status of equity, economic, and other environmental considerations in local adaptation planning, and provide consistent and accessible guidance for adaptation strategy selection. As part of this effort, two guidance documents, including this Equity-First Approach to Adaptation Planning, an equity curriculum, a prioritization tool, and an implementation toolkit have been developed for planning professionals in the San Diego region.

The Equity-First Approach to Climate Adaptation guidance document (Equity Guidance; document) serves as a general framework for local agency planners and transportation planning professionals. The Equity Guidance's overall goal is to provide best practices for designing, planning, and implementing a climate adaptation process that supports equitable outcomes. This document identifies trends, assumptions, emerging practices, indicators, metrics, and implementation opportunities, that support and operationalize an equitable climate adaptation planning process.

This Equity Guidance synthesizes the latest academic literature, equity-focused climate reports, and regional and national adaptation reports to provide high-level guidance for adaptation practitioners to engage communities, identify inequities related to climate impacts, and advance equitable adaptation initiatives. Resources such as the Greenlining Institute's Making Equity Real in Climate Adaptation and Community Resilience Policies and Programs: A Guidebook and the California Office of Emergency Service's California Adaptation Planning Guide 2.0 (APG) were foundational in the development of this Equity Guidance. All supplemental resources and case studies detailed throughout this document can be found in the respective Appendices. It is important to note that best practices to integrate equity in climate adaptation are continuously evolving. Although there are advancements in frameworks and guidance, there are considerable long-term challenges to implementation, assessing the efficacy of

[1] SANDAG (2020). *Regional Adaptation Needs Assessment*. PDF

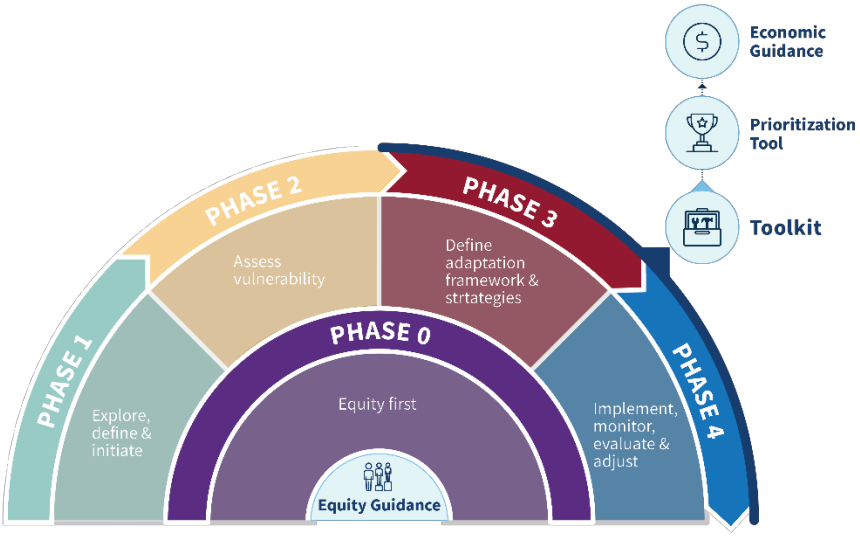
projects, and the development of equity analyses, all of which may not be fully captured in this Equity Guidance [9] [10].

An equity-first approach to adaptation forefronts the disproportionate impacts of climate change due to factors such as disparities in income and wealth, access to resources, representation in government, health status, age, neighborhood conditions, indigeneity, citizenship, structural racism, and gender [10]. The assumption is that equity is not an add on, but a fundamental part of building a climate adapted future.

This Equity Guidance connects to the phases of adaptation planning outlined in the APG: (Phase 1) Exploring, defining, and initiating adaptation; (Phase 2) Assessing vulnerabilities; (Phase 3) Defining adaptation frameworks and strategies; and (Phase 4) Implementation monitoring and evaluation; outreach and engagement occurs across each of these phases. Furthermore, the equity-first approach proposed in this document includes the addition of an Equity-First stage (Phase 0) that helps practitioners develop the foundational knowledge and outlines the tools necessary to create an equitable adaptation planning process.

SANDAG recognizes that climate change affects everyone, with low-income and communities of color disproportionately feeling those effects. Regional resilience is only possible if all communities and populations are prepared. The 2021 Regional Plan seeks to equitably prioritize climate resilience projects and increase public awareness of climate change across San Diego County. SANDAG will promote climate resilience projects through the Resilient Capital Grants and Innovative Solutions program, prioritizing communities most vulnerable to the impacts of climate change.

Figure A Equity-First Climate Change Preparation Planning and Implementation Process



"While all Californians are impacted by climate change, climate change does not affect all people in the same way. These frontline communities are particularly vulnerable to the impact of climate and environmental changes because of decades long, pervasive socio-economic conditions that are perpetuated by systems of inequitable power and resource distribution. Those systems, in turn, are the result of intentional decisions by people in positions of power and deeply institutionalized racism and class bias. These conditions and systems have left California's frontline communities with unsafe, unhealthy neighborhoods and limited access to quality education, public services, and economic opportunities."

— Advancing Climate Justice in California, Climate Justice Working Group

1 | Introduction

The San Diego region is already experiencing the impacts of climate change and will continue to experience increases in temperature, drought, sea-level rise, wildfire risk, and changes in the frequency and intensity of storms. Many jurisdictions in the San Diego region are beginning to develop proactive responses to respond to the impacts of future climate conditions through adaptation planning. Current regional efforts include development and/or implementation of climate action plans, climate adaptation plans, sustainability reports, vulnerability assessments, resilience plans and adaptation strategies.

Climate change will not impact all communities equally. *Climate equity* recognizes the disproportionate burden of climate impacts on marginalized communities and foregrounds inequity at the root causes [11]. This approach centers the disproportionate climate burdens due to many existing factors. These factors include, but are not limited to: structural racism, income and wealth, access to resources, representation in government, renter status, health status, age, neighborhood conditions, geographic isolation, occupation, health conditions and disabilities, language barriers, indigeneity, citizenship, and gender in climate adaptation processes [5, 10, 12, 13].

Social Equity Communities, or historically marginalize, underserved, and underrepresented communities are more vulnerable to the impacts of climate change.

Climate Adaptation: *"Climate change adaptation describes actions that address the projected impacts on all aspects of community function that may result from climate change. This can include impacts related to hazard events (flood, wildfire, drought, severe storms), as well as slow changes that affect agricultural, forestry, and fisheries productivity, ecosystem structure, and public health."*

- Cal OES, California State Hazard Mitigation Plan, 2018

Climate Equity: *"The central equity challenges for climate change policy involve several core issues: addressing the impacts of climate change, which are felt unequally; identifying who is responsible for causing climate change and for actions to limit its effects; and understanding the ways in which climate policy intersects with other dimensions of human development, both globally and domestically."*

- California Climate Adaptation Planning Guide, 2020

Social equity communities may already be experiencing the cumulative burden of climate change, environmental pollution, and historical socioeconomic disparities [14, 15]. For instance, the expanding wildfire season due to climate change directly impacts outdoor workers (e.g., agriculture, landscapers, fire cleanup) with extreme heat and smoke exposure, outdoor air pollution, toxic materials, and dangerous working conditions during wildfire cleanup. These conditions increase the risk of heat-related illness, death, long-term health outcomes, and may impact livelihoods [15].

At the same time, social equity communities have developed mechanisms that will be assets in climate adaptation processes, including community networks, community cohesion, a deep understanding of community needs, and coping mechanisms [16]. It is likely that Community Based Organizations (CBOs) and other critical social equity community groups, such as Nonprofits and Non-Governmental Organizations, are already working to address foundational issues, such as housing and food security, to build an equitable climate future. This document will refer to CBOs to capture the work of frontline organizations supporting social equity communities.

Practitioners engaged in the adaptation planning process should work with communities to strengthen their current adaptation efforts. In many cases, communities may have identified pathways from which local and regional agencies can learn. Collaborating with social equity communities, underserved and underrepresented populations, and CBOs throughout the planning process can help build the adaptive capacity (the ability to cope, adapt, and recover from climate impacts) of communities and equitable climate adaptation. See Spotlights throughout this document for examples of best practices implementing an equity-first adaption planning approach.

SPOTLIGHT

Climate Action Plan in Portland, Oregon: Adapting with Communities

"Equity played an integral role in all phases of the 2015 Climate Action Plan, including an intentional community engagement process that included the creation of an Equity Working Group made up of representatives from six community-based organizations representing the interests of low-income populations and communities of color. The insights and local knowledge that these groups provided was invaluable. This work resulted in a plan that is inclusive and recognizes the unique strengths that exist in communities. Equity is featured from the guiding vision for the plan through the implementation stage. This intentional integration throughout the plan seeks to ensure that the Climate Action Plan is more than just words on paper, but a plan for inclusive accountable implementation" [4].

Developing an equity-first adaptation plan can help achieve transformative climate adaptation and advance social, environmental, and climate justice. Structural and historical drivers of inequality, such as chronic disinvestment, redlining, and resource deprivation, can be addressed in ways that strengthen communities and increase their *resilience* or the ability to rebound and recover from shocks and stressors

[11]. The implementation of well-planned adaptation strategies can improve and advance public health and safety, economic stability, housing, ecology, and reduce uneven vulnerabilities to climate risk [10, 11, 17]. This document provides foundational steps to develop an equity-first approach to inform the climate adaptation planning process.

1.2 This Document: Equity Guidance

Equity Guidance Fulfills an Adaptation Gap

The Regional Adaptation Needs Assessment (Regional NA) concluded that adaptation planning efforts in the San Diego region have been mostly reactive in their response to climate change. Consistent with the Regional NA is that "local and regional practitioners [still] need consistent and accessible guidance, best practices for adaptation planning, and local and regional case studies that highlight the application of these best practices." The Regional NA also noted that building community resilience requires prioritizing equity in adaptation planning goals to: "holistically advance adaptation planning, local and regional agencies must integrate equitable solutions for historically underserved and underrepresented communities, or communities of concern, throughout the planning process" [16].

What this Equity-Guidance Provides

This document features emerging best practices and identifies and develops equity-first adaptation approaches. This document defines connections between mitigation, adaptation, and dimensions of social equity and justice and provides case studies, resources, and guiding principles for practitioners supporting the adaptation planning process. It also provides users with critical questions that may be considered throughout the adaptation planning phases. Overall, the document is high-level and should serve as guidance to tailor adaptation efforts to the unique needs of each jurisdiction and community.

The Equity Guidance builds from the State of California's climate adaptation efforts. California has prioritized the interconnected issues of equitable climate adaptation and the necessity of mitigation. As one of the most ambitious in the United States, California's Executive Order (EO) B-30-15 (2015) directs that "State agencies' planning and investment...should protect the state's most vulnerable populations" [18]. Notably, the EO recognizes that the most vulnerable communities will be disproportionately affected by climate change. Additionally, California legislation, SB 379 and SB 1000, require local jurisdictions to adopt a climate and justice policy. Throughout this document, users will find connections to the climate adaptation phases detailed in the APG. Figure 1 California Adaptation Planning Guide Adaptation Phasesdetails the four phases of climate adaptation planning included in the APG.

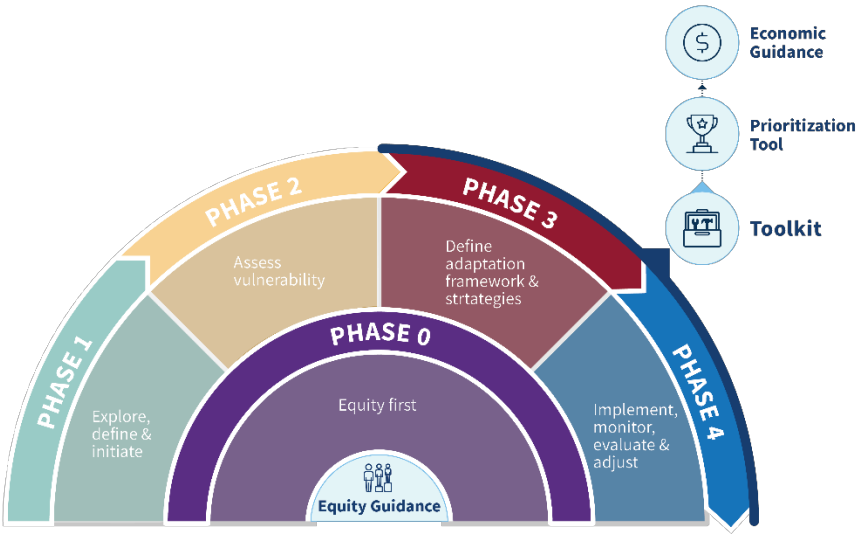
Research demonstrates the importance of regionally scaled climate adaptation planning as a mechanism that can help overcome obstacles in fragmented local adaptation planning [9]. The complexity of equity-first adaptation at the local level requires flexible, scalable, and multi-level frameworks that can be guided by regional adaptation planning initiatives. This document provides foundational guidance to continuously and consistently build an equitable and just climate adaptation approach across the San Diego region.

Figure 1 California Adaptation Planning Guide Adaptation Phases

1.3 Adaptation Planning Process: Phases 0-4

This document provides guidance connected to the four phases of climate adaptation outlined in the APG. Outreach and Engagement are also critical elements that should be prioritized throughout all adaptation phases. This document adds an additional phase for Equity-First, known as "Phase 0", that incorporates pre-planning questions and foundational knowledge about equity in climate adaptation. This document also highlights the necessary cycle of continuous learning that should be inherent to an equity-first adaptation process. As users move through the phases, they should acknowledge opportunities for learning and project improvements. Figure 2 Equity-First Climate Change Preparation Planning and Implementation Process illustrates the process outlined in this document as well as how users can utilize the additional guidance and tools developed as part of this holistic effort.

Figure 2 Equity-First Climate Change Preparation Planning and Implementation Process



Phase 0, Equity-First: This phase involves recognizing the disparities in how benefits and burdens are distributed in society. An equity-first approach to adaptation begins with identifying the root cause of

injustices, historical harms, and structural and institutional systems that perpetuate social inequality and how climate impacts and adaptations influence existing conditions [3]. Phase 0 includes three important components:

1. *Pre-planning* involves assessing climate impacts and inequities that exist within the community. For example, practitioners can ask: How are communities being impacted by climate change? Next, they can ask: What do equity, justice, and adaptation mean for the community and its members? During this stage, users can also identify how to work with communities and community-based organizations to further plan and implement climate adaptation strategies [5, 19].

2. *Capacity Building* is defined as "the practice of enhancing the strengths and attributes of, and resources available to, an individual, community, society, or organization to respond to change" [20]. Building internal capacity within an organization can support increased coordination across local, regional, and state agencies. This can work to incorporate climate and racial equity into policies, design processes, plans, and programs more robustly. It is also essential to recognize that leadership, staff, and local agencies have the power to influence equitable outcomes [21]. Likewise, supporting and building the capacity of communities and CBOs to plan and implement adaptation strategies can help develop resilience. Capacity building is critical for social equity communities that will experience higher levels of sensitivities and vulnerabilities to climate risks.

3. *Learning* is the process of setting up evaluation, monitoring, accountability, and community feedback mechanisms to help agencies improve their overall ability to develop and implement equitable adaptation projects.

Outreach and Engagement[2] is essential to adopting equitable adaptation policies and strategies and ensuring that they can be implemented efficiently. Stakeholder engagement offers the opportunity to educate and build commitment and consensus among local decision-makers and community members. Each phase of the adaptation planning process should include intentional and comprehensive community and stakeholder outreach and engagement [11].

Phase 1, Explore, Define, and Initiate: This phase includes scoping the process and project, such as identifying the potential climate change effects and important physical, social, and natural assets in the community [11].

[2] Outreach and Engagement and Phases 1-4 were extracted verbatim from California Adaptation Planning Guide. (2020).

Phase 2, Assess Vulnerability: This phase includes analysis of potential impacts and adaptive capacity to determine the vulnerability for populations, natural resources, and community assets. A vulnerability assessment identifies how climate change could affect the community [11].

Phase 3, Define Adaptation Framework and Strategies: This phase focuses on creating an adaptation framework and developing adaptation strategies based on the results of the vulnerability assessment. The adaptation strategies are the community's response to the vulnerability assessment—that is, how the community will address the potential for harm identified in the vulnerability assessment, given the community's resources, goals, values, needs, and regional context [11].

Phase 4, Implement, Monitor, Evaluate, and Adjust: In this phase, the adaptation framework is consistently implemented, monitored and evaluated, and adjusted based on continual learning, feedback, and/or thresholds [11].

2 | Phase 0: Equity-First Approach to Adaptation

SPOTLIGHT

Oakland 2030: Equitable Climate Adaptation Plan (ECAP), July 2020

Best practices to develop robust climate adaptation planning involve community and cross-sector engagement. This strategy can help planners understand the complex and interconnected climate impacts, vulnerabilities, and, at the same time, identify opportunities. The City of Oakland has worked with communities within city agencies to integrate equity throughout their Climate Action Plan. "This Equitable Climate Action Plan is our strategy to create a future built on justice, equal opportunity, and environmental protection. This Plan is more than just policies to reduce greenhouse gas emissions. Equity drives every aspect of this approach, and each Action is designed to maximize benefits to frontline residents. These benefits come in many forms: reduced asthma and respiratory illnesses, more housing security, lower utility bills, more access to nature, greater economic opportunity, improved access to fresh food, and so much more" [7].

Social equity communities will experience a greater vulnerability to climate change impacts due to persistence of structural inequities that result in environmental, health, and socioeconomic inequities [15]. Communities that experience greater structural inequities are less likely to have resources to combat climate change impacts, such as air conditioning or access to cooling centers during an extreme heat event [15]. As another example, social equity communities experience asthma and cardiovascular diseases at higher rates and have less access to health insurance and affordable emergency health care [15]. Climate change impacts, such as increases in wildfire, air pollution, and more extreme hot days will exacerbate many existing inequities [13].

An equity-first approach to climate adaptation recognizes the disproportionate impacts of climate change due to existing factors, including but not limited to structural racism, income and wealth, access to resources, representation in government, renter status, health status, age, neighborhood conditions, and gender [10]. Disproportionate impacts include both climate-related shocks and stressors that will affect social equity communities the most [22]. Shocks include the short-term deviations from long-term trends such as a wildfire or singular extreme weather event. Stressors include long-term pressures that undermine the stability of a system; examples include diminished social capital and an increased number of annual extreme heat days.

The goal of the equity-first approach to adaptation is to "enhance marginalized communities' access to the services, infrastructure, and livelihoods required to sustain their well-being and potential for improvement, rather than exacerbating their vulnerability" [10]. At the same time, it is essential to recognize that communities more vulnerable to climate impacts have social capital and are likely already

engaged in climate adaptation activities. Supporting the work communities are already involved in can enhance their overall resilience.

The Connection Between Climate Mitigation, Adaptation, Justice, and Social Equity

The complex and interconnected dimensions of equity and climate change present significant challenges for regional, rural, suburban, and urban climate adaptation planning. To develop equitable climate adaptation, it is important for practitioners to identify both the underlying mechanisms of persistent inequality and opportunities to enhance their communities' adaptive capacity.

Figure 3 High-Level Considerations for Equitable Adaptation

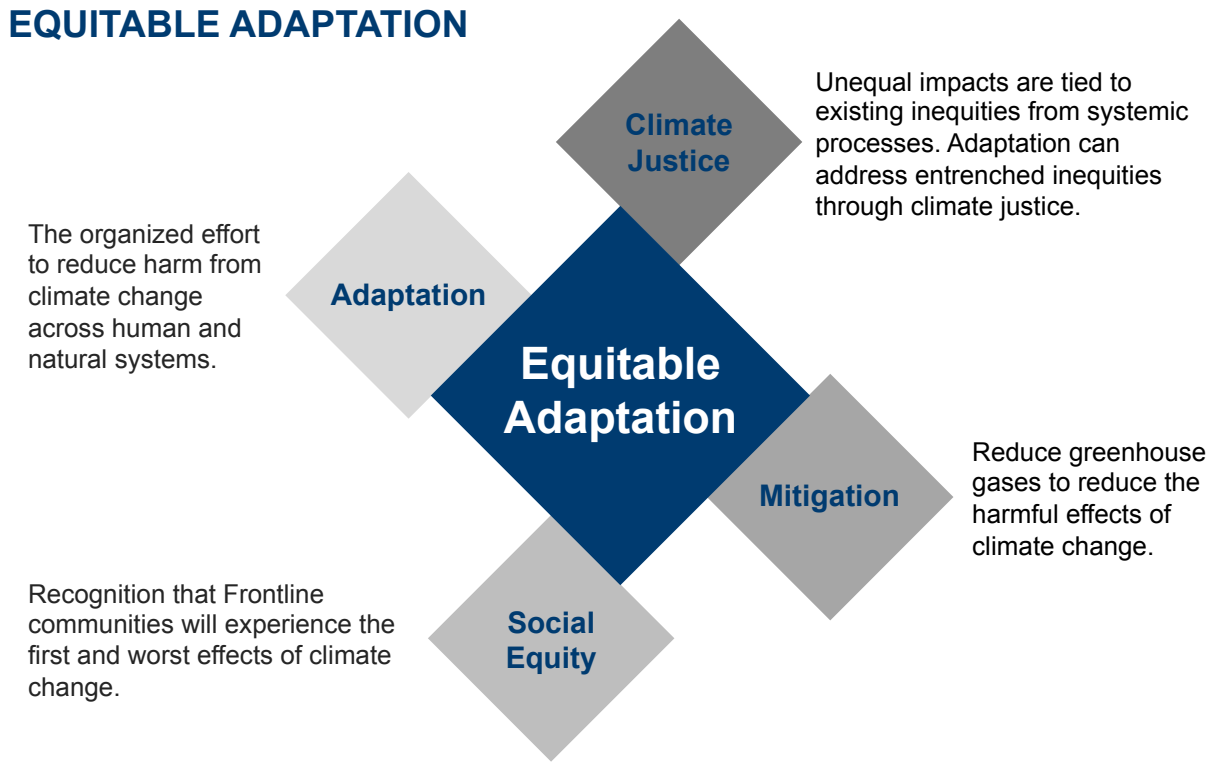


Figure 3 High-Level Considerations for Equitable Adaptation details the interconnected dimensions of developing equitable climate adaptation. The mitigation quadrant represents the relationship between greenhouse gas (GHG) reductions and climate impacts. Any reduction in GHG emissions reduces the potential for overall climate impact, especially for those most vulnerable to effects. The adaptation quadrant represents the process that reduces the overall effect of climate change across human and natural systems. The social equity quadrant recognizes that persistent inequities are sustained through structural exclusion, including chronic disinvestment and resource deprivation. The climate justice quadrant displays how climate impacts connect to existing social inequities and the potential for transformative adaptation through equity-first approaches.

Connecting Climate Adaptation to Climate Justice and Social Equity

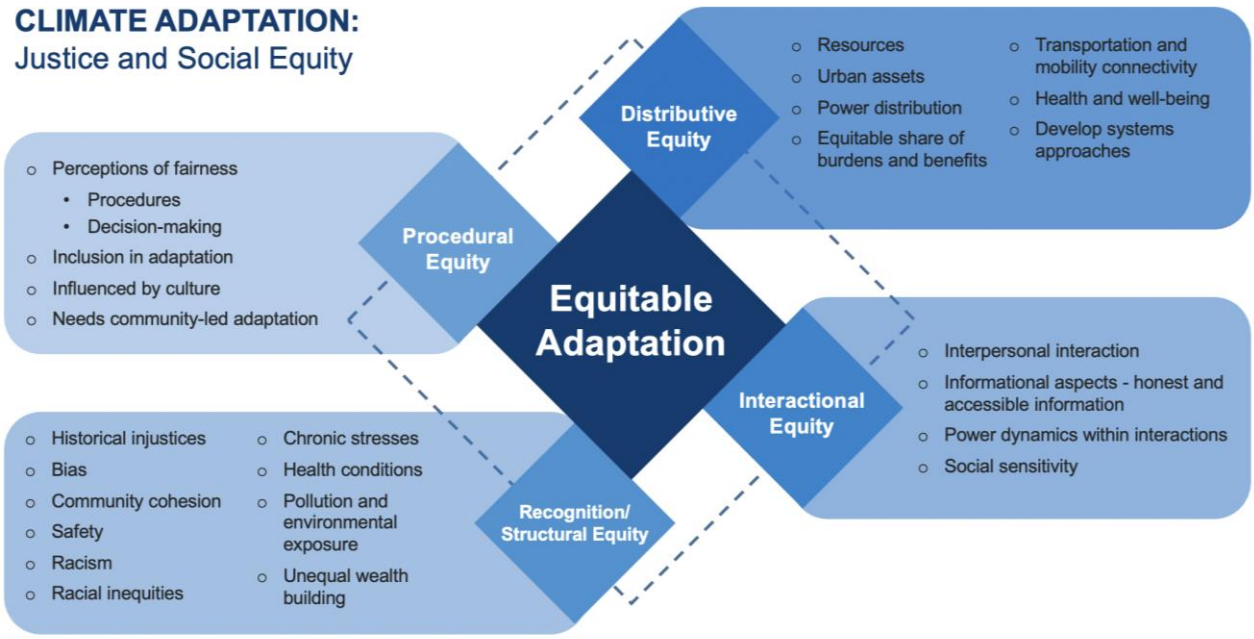
Equity: *"A resilient community is one in which all members of a community are able to effectively prepare for and recover from acute and chronic climate impacts. Ideally, all community members are equally resilient regardless of income, health, identity, education, and other socioeconomic factors. Removing all disparities is an aspirational goal and may be beyond what an individual community can achieve, but a resilient community should strive for confidence that all members of the community are prepared for and able to recover from climate change impacts."*

- Climate Adaptation Planning Guide 2.0

Climate change is an intergenerational inequity where current and past generations have benefited from a stable climate and its resources. At the same time, there are other intergenerational social, economic and environmental inequities that create greater vulnerabilities to climate impacts. With intensifying impacts from climate change, building an equitable climate future requires current generations to immediately make the needed changes to lessen climate impacts for future generations [23].

An equity-first approach to adaptation involves "deliberately and fundamentally changing systems to achieve more just and equitable adaptation outcomes" [24, 25]. This involves looking beyond 'end-point vulnerabilities' or the most visible symptoms of past development patterns, societal relations and human-environment interactions [24]. Instead, transformative, equity-first adaptation responds to 'starting-point vulnerabilities' or the deep roots and conditions that produce vulnerability in the first place, which are embedded in unequal processes, institutions, and systems [24].

Figure 4 Justice and Social Equity in Adaptation



Adapted from:
a) Whiteman, G. (2009). All my relations: understanding perceptions of justice and conflict between companies and indigenous peoples. Organization studies, 30(1), 101-120.
b) Schlosberg, D. (2012). Climate justice and capabilities: A framework for adaptation policy. Ethics & International Affairs, 26(4), 445-461.
c) NAACP (2017). "Equity in Resilience Building in the Context of Climate Change: Community Organizing Toolkit "
d) Ramboll (2019). "Co-benefits And Climate Justice"

Recognition is the acknowledgement of historical injustices that have led to structural inequalities, including those related to climate and the environment [26, 27]. Recognition is connected to structural equity which involves acknowledging the structural and institutional systems that support and produce social, economic, environmental, and racial inequities. Adaptation planning that recognizes structural inequities "seeks to correct past harms and to anticipate and prevent future unintended consequences for disadvantaged social and racial groups…[and] examines whether planning decisions to achieve climate resilience also eliminate poverty, create workforce development opportunities, address racism, increase civic participation and social cohesion, protect housing availability and affordability, increase educational outcomes, and improve public health outcomes" [28].

While inequities exist, so does privilege. The concept of environmental privilege recognizes "how political, economic, and cultural power engender and maintain disparities in the upkeep of and access to urban spaces and how privilege safeguards against the knowledge of and experiences with environmental risks" [29]. Populations or individuals in privileged positions may not experience the same environmental burdens as social equity communities and may not have deep knowledge of these disparities.

Since climate adaptation strategies tend to involve decision-making about land-use and the built environment, it is important to recognize disproportionate benefits and burdens in the way land has been developed. Climate impacts will contend with a historical context that has shaped the distribution of benefits and environmental burdens across space.

Identifying the mechanisms that produce persistent inequities can enable transformative climate adaptation. For example, work by Climate Safe Neighborhoods and Groundworks connects disparities of green space to historical practices of redlining, community infrastructure, and exposure to heat and flood risk. Lack of access to green space is an existing structural inequity, as green space provides climate adaptation benefits (e.g., reduces heat island effects, absorbs GHGs, absorbs stormwater runoff) [30]. An equity-first strategy would include partnering with low-income communities to develop green space adaptation strategies, such as creating parks, urban gardens, and nature-based solutions.

Distributional equity includes the fair distribution of resources, benefits, and burdens that can result from climate adaptations [28]. Distributional equity also recognizes that who is "at the table" influences the distribution. Therefore, it is important to create opportunities for engagement and ownership in decision-making, in all aspects of climate resilience planning, specifically by the communities that are most disproportionately impacted and vulnerable to the effects of climate change (see procedural equity) [15].

The fair distribution of resources may also be perceived differently depending on the community. Addressing distributive equity focuses on an individual or group's perception of the equity involved in an outcome, settlement or decision-making process [31, 32]. There are different perceptions and connections specific to planning outcomes. For instance, compensation for expertise may be important to Indigenous Peoples, but this does not offset the historical, ecological, social, or spiritual costs [31]. Thus, in analyzing costs, benefits, and the efficacy of projects, it is important to gather and incorporate community knowledge and information about the ecological costs, social costs and benefits, spiritual costs (e.g., losses from wildfires, land-use changes, and historical injustices), and effects on social cohesion [31].

SPOTLIGHT

Groundworks Climate Safe Neighborhoods: Making Connections between a History of Redlining and Climate Impacts

Groundwork San Diego works with residents and stakeholders to, "understand the relationship between the city's history of race-based housing segregation and the current and predicted impacts of climate change" [1].

They ask: "What does race have to do with climate change? Which neighborhoods in San Diego are most at risk from extreme heat and flooding? What can residents and local government do to make sure their neighborhoods are safe and resilient to climate change?" [1]

By analyzing historic redlining maps with modern satellite imagery, Groundworks notes "a relationship between government-led housing segregation of the past century and vulnerability to extreme heat and flooding in San Diego today." Groundworks San Diego intends to "work closely with residents of the Encanto and Southcrest neighborhoods to prioritize climate mitigation measures and push for equitable municipal funding for flood and heat mitigation projects" [1].

Procedural equity recognizes that inequities are embedded directly in decision-making procedures. Addressing procedural equity involves creating outreach and engagement that is fair and inclusive and considers community needs and barriers to participation [28]. It is essential to recognize that creating equity in procedure requires making space for marginalized populations to participate meaningfully [31]. Procedural equity requires training and building the capacity of staff and leadership on inequality and creating space for participation fairly and inclusively in ways that share decision-making power with communities.

Interactional equity includes interpersonal and informational justice and interpersonal power imbalances or perceived imbalances among stakeholders and planners. For instance, technical experts or professional planners may be perceived as having more power in engagement activities. Often, technical and expert knowledge may be elevated over community knowledge, culture, and lived experience. Acknowledging and remediating imbalances in adaptation processes and outreach and engagement creates fairness in the "interpersonal and informational aspects of encounters between parties" through honest information sharing, respect, and accountability *[31]*.

It is crucial for practitioners engaged in adaptation planning to consider the four dimensions of equity through the adaptation process. To pursue equity-first adaptation, planners must understand and respond to starting point vulnerabilities embedded in unequal processes, institutions, and systems. Developing adaptations that integrate equity dimensions can support a more profound understanding that leads to comprehensive and transformative equity-first adaptation planning.

3 | Challenges for the Region of San Diego

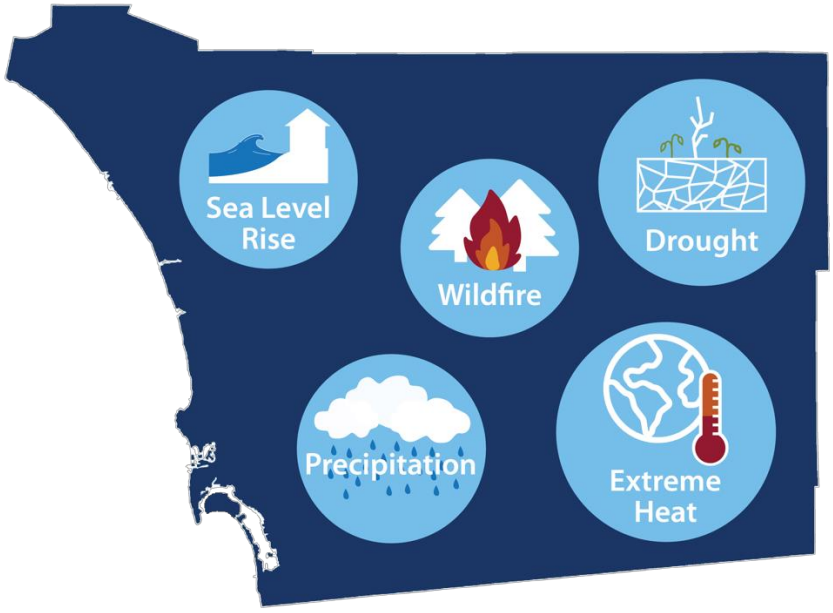
Climate change is being driven by the release of GHG emissions to the atmosphere and will continue to impact social and ecological systems. The San Diego region will experience increases in temperature, drought, sea-level rise, wildfire risk, and the frequency and intensity of storms; each of these impacts will intersect with socioeconomic conditions [14].

Climate Impacts

California's Fourth Climate Change Assessment, San Diego Report (San Diego Report) cites the following major challenges and climate impacts:

- Average temperature is expected to increase, estimated from 5˚F to 10 ˚F by the end of the 21st century. This will increase heatwave frequency with more intensity over longer durations, this projected increase in frequency is estimated between 20-50% under a 6˚F temperature increase scenario.
- Precipitation is expected to remain highly variable and include more frequent and severe droughts and intense individual precipitation events. This variability is predicted to impact seasonal changes including wetter winters and drier springs.
- Wildfire risk will likely increase. The potential for catastrophic wildfire risk will be driven by Santa Ana wind events and drier autumns leading before the Santa Ana wind season.
- Sea level rise along the coast is expected to be approximately one foot by the mid-21st century to three feet or higher by 2100. There is also an increased potential for high tides combined with elevated shoreline water levels will drive additional inundation and flooding events.

Figure 5 Major Climate Impacts for the San Diego Region



Intersecting Climate Change Impacts and Equity

Regional climate impacts will intersect with existing inequities and disproportionately impact vulnerable communities. Communities that are already disproportionately burdened with environmental degradation, such as pollution exposure, and social factors, such as housing and food insecurity, will see these burdens exacerbated by climate change impacts [14, 15]. Table 1 outlines examples of climate impacts and the special considerations across natural and human dimensions in the San Diego region.

Table 1 Crosswalk: Climate Impacts and Equity Implications

Climate Impact	Projection	Impact	Equity Implications
Temperature	Temperature projected to increase substantially (~5-10°F by the end of the 21st century); Marine Layer Clouds (MLC), which act as a natural air conditioner that moderates daytime heat and dryness, fluctuate throughout the years and their impacts resulting from climate change remain uncertain	Heat wave frequency will increase; more hot days; increased humidity	Lack of access to air conditioning; heating and cooling costs; public transportation commute impacts Occupations (e.g., farm workers, construction, day laborers); homeless populations, elderly, very young, and those with health conditions will be affected.
Precipitation	Precipitation will stay highly variable, but with greater intensity (e.g., wetter winters, more severe droughts, etc.)	Research is evolving around expected impacts to water demand and supply, water quality, flooding emergencies, and drought.	Storm water runoff; flash floods; water quality; food system impacts including drought; vector borne disease; homeless especially vulnerable
Wildfires	Risk will likely increase as climate warms	Large catastrophic wildfires from Santa Ana events will likely increase; potential major disruptions to the operation of the transportation systems; property impacts and losses.	Evacuation ability during disaster; air pollution impacts; impacts on occupation (e.g., construction, farm workers, essential workers); the ability of communities to rebound and recover after disaster; distribution of recovery aid
Coastal Erosion and Sea Level Rise	SLR expected to rise significantly faster than modest historical rates of about 0.6 ft over the last century; late-21st century sea levels likely to rise 3ft or higher	Sea-levels will impact communities, property, infrastructure, and ecosystems.	The potential impact is migration or displacement (coastal communities move inland) [33]; who pays and who benefits from coastal adaptations is also a concern [34]; storm water, wastewater, shoreline parks, transportation facilities, commercial buildings, and ecosystems will also be affected [11]

Climate Impact	Projection	Impact	Equity Implications
Landscapes	Climate change impacts on people and the environment vary by different types of development; San Diego County's population of 3.3 million people projected to increase to 4 million or more by 2050.	Future development in San Diego will affect climate vulnerability in the region; a comprehensive review of climate impacts on ecosystems in San Diego was conducted for the Fourth California Climate Change Assessment.	Urbanization and the heat island effect disproportionately affects vulnerable populations due to lack of green spaces and cooling options; development can spur gentrification; cost benefit analyses can direct funding to the most valuable areas.

This table was directly developed from the following resources: Kalansky, Julie, Dan Cayan, Kate Barba, Laura Walsh, Kimberly Brouwer, Dani Boudreau. (University of California, San Diego). 2018. San Diego Summary Report.
California's Fourth Climate Change Assessment. Publication number: SUM-CCCA4-2018-009; Roos, Michelle. (E4 Strategic Solutions). 2018. Climate Justice Summary Report. California's Fourth Climate Change Assessment. Publication number: SUM-CCCA4-2018-012.

Specific Challenges to the Region of San Diego and Its Inhabitants

Communities with high rates of existing chronic health conditions, pollution exposure, and limited resources are especially vulnerable to impacts of climate change including heat and increased pollution. The San Diego Report notes that specific communities and jurisdictions in the San Diego region, which include: Barrio Logan, Logan Heights, and National City have high rates of child asthma and hospitalization, experience high rates of air pollution, lack affordable energy, and lack access to safe, affordable, and convenient transit to jobs, health care, parks, and cooling centers. These communities remain among the top 5-10% of the state most impacted by pollution, as identified by CalEnviroScreen.

There are an estimated 156,000 undocumented immigrants in San Diego County that contribute economically and socially to the region [35]. Immigrants, migrant workers, and refugees are essential contributors to the San Diego region but are particularly vulnerable to climate change and may experience barriers to accessing adaptation resources and information. These groups may experience geographic, linguistic, social and political isolation, and may live transient lifestyles; all of which increases vulnerability to climate impacts and natural disasters. Further, there are significant barriers for migrant workers to access aid, legal assistance, and health programs [36]. Special considerations will need to be implemented throughout the adaptation planning process to reach these populations.

Outdoor workers are significantly more vulnerable to climate impacts from heat and wildfire. The worsening wildfire season due to climate change directly impacts outdoor workers (e.g., agriculture, landscapers, fire cleanup) with smoke exposure, outdoor air pollution, toxic materials, dangerous working conditions during wildfire cleanup, and exposure to extreme heat. For example, Arizona, California, and Texas "accounted for 94.5% of non-citizen heat deaths, and the risk was most significant among Hispanic immigrants" [14]. In California, heat-related illness and death is especially high among agricultural workers who tend to be Hispanic, earning incomes below the poverty line [15]. These conditions increase the risk of heat-related illness, death, and long-term health outcomes. These communities may not have

access to resources for protection such as air-conditioning, transportation, evacuation funding, and healthcare.

Rural communities play an important role in the San Diego region and face a suite of unique challenges in the face of climate impacts. Due to the region's geography, there are significant disparities that exist within the urban-rural divide – this may take the form of resource access such as reliable water, power, and internet. Existing inequities pose a unique challenge for local and regional agencies in the face of climate adaptation planning.

Climate will significantly impact tribal communities, especially in water-stressed areas. San Diego County has 18 federally-recognized Tribal Nation Reservations and approximately 130,000 acres of tribal land [37, 38]. California's Fourth Climate Change Assessment notes that tribes are "utilizing and blending traditional ecological knowledge science and methodologies with other science and management techniques to mitigate and adapt to climate impacts" [37]. Tribal knowledge and practices such as the use of ecological based initiatives are important components of developing climate resilience and should be consulted as potential adaptation strategies in an equity-first approach.

California has the largest population of people experiencing homelessness. The number of people experiencing homelessness for the first time in San Diego increased 79 percent from 2019 to 2020 (compared to a 6 percent increase from 2018 to 2019) [39]. Climate change will significantly impact these populations, including exposure to extreme weather events and wildfire smoke. Yet, people experiencing homelessness are an underemphasized population in current climate reports and the impact of exogenous shocks (e.g., the pandemic, wildfires) on homelessness is just emerging. At the same time, California's housing shortage increases housing insecurity and higher housing cost burdens for low-income renters, people with disabilities, and communities of color, increasing susceptibility to the dual impacts of homelessness and climate change.

Climate adaptation strategies that intersect with land and resources can help create change and remediate inequities. These strategies often take the form of either infrastructure or institutional responses. Infrastructure strategies that build, expand, or modify infrastructure (e.g., shoreline modification and maintenance, beach nourishment) must robustly consider the cost and benefits of these strategies to the impacted communities [40]. Institutional responses include strategies such as providing public awareness, coordination with community groups, building capacity of staff (e.g., training), and using data to understand climate risks [40]. Examples of equity first approach to housing in the San Diego region include:

The San Diego Black Homebuyers Program (SDBHP)	The San Diego Foundation, LISC San Diego, and the Urban League of San Diego County have partnered together to invest $1.25 million towards generational wealth building opportunities through Black homeownership. To help reduce the racial wealth gap in San Diego, this program provides down payment assistance and Housing and Urban Development (HUD)-certified homeownership counseling services for eligible Black/African-American first-time homebuyers.
Mapping Inequality: Redlining in New Deal America - San Diego	To visually display inequality in America, a four-university collaborative mapped redlining, a federally endorsed practice that denied home mortgage financing to people of color. LISC San Diego uses this work to analyze the impacts redlining has had on the San Diego region and discusses how this affects our thoughts on zoning, affordable housing, and the character of our communities today.
San Diego County Food Vision 2030	This initiative aims to better the San Diego region's food system through addressing its highest concerns: justice, climate change, and resilience. Their work, guided by ten objectives and several strategies, informs planning, policy, program, and investment opportunities across all sectors to grow the movement towards a more sustainable and just food system.

Developing a deep understanding of existing vulnerable populations and community makeup can aid in identifying potential intersecting climate sensitivities and illuminate more accessible pathways and strategies for climate adaptation. Additional examples of vulnerable populations include, but are not limited to: individuals with disabilities, seniors, youth, women, and gender non-binary individuals. Each of these community groups presents unique needs and vulnerabilities that should be addressed in an equity-first adaptation approach. Table 2 provides users with examples of climate projections, projected and existing climate impacts, and opportunities for practitioners leading an equity-first adaptation approach on communities and infrastructure specific to the San Diego region.

Table 2 Snapshot of Community and Infrastructure Impacts

Community and Infrastructure	Climate Projection	Projected and Existing Impacts	Opportunities
Food systems, regeneration, and conservation	Food systems and ecosystems are at risk from climate impacts heat, drought, and variable rainfall.	Agricultural workers at risk; increased vulnerability of food systems; lack of access to nutritious food; food insecurity; food waste as a source of greenhouse gas emissions.	• Focus on food systems as a source of mitigation and adaptation, including carbon sequestration and food access. • Increase emphasis on overall resilience including food security, access to green space, and greenhouse gas emission reduction through nature-based solutions. • Develop a food recovery system and work with community organizations already doing so. Examples: Regenerative Agriculture and carbon farming Wild Willow Farm & Education Center San Diego Food System Alliance Resource Conservation District of Greater San Diego County
Landscapes	Climate change impacts vary by different types of development and infrastructure. San Diego County's population of 3.3 million people is projected to increase to 4 million or more by 2050 which will impact land-use, development, and housing.	The heat island effect can disproportionately affect vulnerable populations due to lack of green spaces; development can spur gentrification.	• Focusing on green space in neighborhoods socially and economically vulnerable to climate impacts can reduce disproportionate heat island effects and increase stormwater absorption. • Develop neighborhood scale solutions that develop co-benefits with communities Examples: Community supported tree planting initiative Tree Eastie Multi-benefit neighborhood solutions: Groundwork San Diego Chollas Creek and the Chollas Ecovillage in Encanto

Community and Infrastructure	Climate Projection	Projected and Existing Impacts	Opportunities
Infrastructure and Services	Climate-related hazards projected to increase and will strain infrastructure and services	Disparities in education; lack of social capital, political involvement, civic representation, and isolation; lack of transportation; housing prices and affordability; potential displacement with adaptations.	• Target adaptations toward identified infrastructure and service disparities such as affordable housing and transportation access. • Enhance interagency coordination and develop strong partnerships to develop multi-benefit solutions. • Ensure renter and low-income renters are not displaced with adaptations Examples: The San Diego Black Homebuyers Program (SDBHP) The combined transportation and cooling center initiatives: *The Use of Cooling Centers to Prevent Heat-Related Illness: Summary of Evidence and Strategies for Implementation.* Sector by sector solutions: *2030 Equitable Climate Action Plan (ECAP)* and *Racial Equity Impact Assessment + Implementation Guide*
Health and Climate Justice	Human health impacts of climate change exacerbate existing health impacts (e.g., heat waves, wildfire) and introduce new ecological challenges (e.g., invasive species)	Existing disproportionate impacts from other pollutants; pollutants impact outdoor workers disproportionately; existing high rates of health issues and lack of access to good health care; vector-borne diseases; increases in heat-related illness and cardiovascular failure	• Develop engagement between adaptations, environmental issues (e.g., water quality or air pollution), and human health to develop robust multi-benefit adaptations. • Focus on grassroots community-based solutions • Develop preemptive strategies to assist occupations subject to extreme heat and pollution. Examples: Reports that identify broad solutions at the intersection of health and climate justice issues: *Safeguarding California: Implementation Action Plans, Public Health Sector Plan* American Public Health Association Climate Changes Health: Climate Justice resources

Community and Infrastructure	Climate Projection	Projected and Existing Impacts	Opportunities
Cross Border	Climate changes felt in San Diego will also affect northern Baja, Mexico	Cross-border flows of water, pollutants, sediment, and solid waste; refugees and migrant workers experience multiple risks; distressed border region and "Colonias".	• Binational coordination can open opportunities to benefit border communities. • Focus on improving shared estuary systems. Examples: The Tijuana River National Estuarine Research Reserve

This table was directly developed from the following sources: Kalansky, Julie, Dan Cayan, Kate Barba, Laura Walsh, Kimberly Brouwer, Dani Boudreau. (University of California, San Diego). 2018. San Diego Summary Report.
California's Fourth Climate Change Assessment. Publication number: SUM-CCCA4-2018-009; Roos, Michelle. (E4 Strategic Solutions). 2018. Climate Justice Summary Report. California's Fourth Climate Change Assessment. Publication number: SUM-CCCA4-2018-012.
Hess, D. J., & McKane, R. G. (2021). Making sustainability plans more equitable: an analysis of 50 US Cities. Local Environment, 26(4), 461-476.

4 | Pre-Planning Guidance: Laying the Groundwork

Pre-planning is an early step practitioners can take to identify who will be impacted in adaptation, who to engage, and opportunities to enhance resilience through adaptation. An equity-first approach to adaptation begins with connecting the Dimensions of Equity (see Table 3) to climate adaptation processes. This step will help practitioners understand the underlying systemic issues that contribute to persistent inequities and identify community needs using pre-planning questions.

Community may include:

- *Community residents*
- *CBOs*
- *Local non-profits and advocacy groups*
- *Community organizing groups*
- *Local businesses and merchants*
- *Other community stakeholders [3]*

Consider the current conditions in your community across the dimensions of equity: Table 3 details these dimensions as well as opportunities and pitfalls within climate adaptation.

Table 3 Addressing Community Conditions, Opportunities and Common Pitfalls Across the Dimensions of Justice

Dimension of Equity	Examples of Major Questions	Opportunity	Common Pitfalls
Procedural	What is the history of inclusion in decision-making processes? Are there opportunities to develop community leadership in adaptation processes?	Establish trusted and ongoing relationships with the community, community groups, and CBOs in a way that is mutually beneficial and will enhance resilience to climate impacts.	• Assuming trust • Assuming an inclusive process • Tokenism • Lack of continued engagement
Structural	What are the histories of cultural difference, injustices, racism, and chronic community stresses (environmental, social, economic)? What is the history of redlining and displacement? What is the history of place? Are groups such as tribal communities, migrants, refugees, and asylum seekers (documented and undocumented), and other less visible populations recognized in your efforts?	Recognize systemic injustice and persistent inequities embedded in systems including policies, procedures, and the distribution of resources.	• Omit the history of redlining • Omit history of place and Indigenous lands • Don't acknowledge existing environmental justice issues (e.g., pollution, toxic sites) • Development and property focused adaptations

Dimension of Equity	Examples of Major Questions	Opportunity	Common Pitfalls
Distributive	Where are resources concentrated currently? What groups and communities may be left out of this access? Do communities have access to parks, transportation, community resources? What have communities and community-based organizations identified as necessary resources? How might these connect to adaptation?	Equity-first adaptation can help direct resources to communities that have experienced racism, chronic disinvestment, carry pollution burden, high unemployment, etc.	• Property/development focused adaptation • Failure to recognize the breadth of community assets (e.g., social cohesion, community groups, culture) • Not accounting for short and long-term outcomes
Interactional	Have you begun to establish lines of communication with communities in accessible non-technical language, or in the language spoken within the community? Have you considered power dynamics in engagement?	Outreach and engagement that considers power dynamics within interactions and involvement, including accessible language, non-native English speakers, and power dynamics between the community and perceived authority, are more impactful for practitioners and the community. Engagement that is centered on trust can build ongoing mutually beneficial relationships that enhance community adaptative capacity.	• Use technical language • Don't consider the digital divide • Focus on survey and data • Power dynamics- or perceived power not considered. • Don't honoring commitments • Develop one-way engagement

This table was directly developed from the following resources: Shi, L., Chu, E., Anguelovski, I., Aylett, A., Debats, J., Goh, K., ... & VanDeveer, S. D. (2016). Roadmap towards justice in urban climate adaptation research. Nature Climate Change*, 6(2), 131-137.*

Mohnot, S., J. Bishop, and A. Sanchez, Making Equity Real Framework: Evaluation Sheet. *2019: Oakland, CA.*

Groundworks USA, Best Practices for Community Engagement: Tips for Engaging Historically Underrepresented Populations in Visioning and Planning (https://groundworkusa.org/wp-content/uploads/2018/03/GWUSA_Best-Practices-for-Meaningful-Community-Engagement-Tip-Sheet.pdf).

When initiating the pre-planning process, it is helpful for practitioners to establish a strong foundation and understanding of the unique climate equity impacts on their communities. The pre-planning assessment in Table 4 will help practitioners identify the equity and climate impacts specific to their community and begin to address the critical question of who may benefit from any particular adaptation strategy. The questions include considerations for identifying current community group engagement, detailing current climate and equity impacts, and gauging opportunities to alleviate disproportionate climate impacts (see Section 6 | Developing Outreach, Engagement, & Educationand Appendix B for detailed guidance on community engagement).

Table 4 Preplanning Assessment: Climate Equity Impacts, Community Engagement and Opportunities.

Pre-Planning Questions
Climate Equity and Impacts:
1. What are the major social concerns in your district? Where are marginalized/disadvantaged communities and vulnerable populations located? a. Use CEI or SB1000 (see Appendix B for resources) 2. How is climate change already evolving in your jurisdiction? 3. Who is already being impacted from climate change? How are they being impacted? 4. Who will be impacted by climate change? And how might climate change impact them? 5. Who will benefit from a climate adaptation investment or project? Now and in the long-term?
Community engagement:
1. Can you identify groups, community members, or community-based organizations working on adaptation or resilience measures? 2. What groups, community members, or community-based organizations are engaging in activities related to adaptation (e.g., community solar, urban farming, affordable housing)? 3. What barriers to accessing participation might exist (e.g., childcare, transportation, trust of government agencies)? 4. Can you engage with community experts to identify barriers to participation (e.g., trust, citizenship status, childcare, travel time, language including technical jargon)? 5. How can you ease these barriers as you move into climate adaptation outreach and engagement (e.g., develop a trusted community partner, providing childcare, siting the event in an easily accessible location)?
Opportunities:
1. How can investments enhance communities, alleviate disproportionate environmental burdens, and protect against climate change? 2. How can local planners build trust and relationships with these communities and work with them to alleviate impacts? 3. How can local planners help communities enhance social capital and ensure resilience in the face of climate change?
This table was directly developed from the following resources: OPR, Resiliency Guidebook Equity Checklist. *2018.* *Cal-OES,* California Adaptation Planning Guide. *2020; and* *Mohnot, S., J. Bishop, and A. Sanchez,* Making Equity Real Framework: Evaluation Sheet. *2019: Oakland, CA.*

5 | Capacity Building

The Regional NA identified the need to: (1) enhance collaboration and cross-jurisdictional coordination to advance local and regional adaptation planning and improve the capacity to re-evaluate current planning documents for each local jurisdiction. This section outlines capacity building, or the practice of enhancing the strengths and resources available to an individual, community, society, or organization. Research has identified capacity deficits such as a lack of information, staff capacity, political leadership, and funding as barriers to climate adaptation [29, 31].

Organizational capacity building *involves training staff to recognize that unequal distribution climate impacts and starting-point vulnerabilities, or factors that produce inequities, to develop social and cultural competencies.*

Community capacity building *focuses on deepening connections with and empowering frontline communities by providing technical assistance, enhancing local coordination, enriching and empower community leadership, assisting with knowledge, skills, expertise development, and improving access to resources. This work will improve the adaptive capacity within social equity communities and frontline communities to move toward independent adaptation implementation and grant seeking. [5]*

There are multiple benefits to organizational capacity building. First, it is essential to recognize that leadership, staff, and local agencies have the power to influence equitable outcomes. Second, developing capacity can help increase coordination among internal staff as well as across other local, regional, and state agencies to incorporate climate equity and racial equity into their mission, policies, design processes, plans, and programs. Third, building organizational capacity equips individuals with the ability to identify opportunities for cross-sector synergies, co-benefits, and to coordinate cross-sector and interagency resources within adaptation practices and plans [20, 21]. Finally, once established, equity and adaptation can be integrated consistently throughout the work of the organization and could help reprioritize adaptation processes across current resources and staff. The City of Seattle Racial Equity Toolkit is an example of best practice integrating equity into decision-making activities (see Spotlight).

SPOTLIGHT

City of Seattle: Racial Equity Toolkit

"All City departments are required to follow the Toolkit to inform decision-making impact on equity. The Toolkit is applied to policies, programs, and budgets through stakeholder engagement and raising awareness of racial inequities" [9, 10].

Organizational capacity building starts with developing foundational knowledge of inequality at the root cause. Supporting and building organizational capacity increases the agencies' overall ability to develop equity-first adaptations. This can also include coalition building and collaborative regional guidance. Historically, adaptation planning has lacked engagement across sectors such as health, housing, and transportation which are vital to increasing a communities' adaptive capacity and tackling root inequities [10]. Table 5

outlines foundational questions for practitioners to begin the process of considering opportunities to enable organizational capacity building.

Table 5 Foundational considerations for practitioners to address opportunities for Organizational Capacity Building

Considerations for Staff and Organizational Capacity Building
1. Do staff members have access to intercultural competency workshops and trainings to stay informed and to be able to make the best possible decisions on equity? 2. How does our agency provide opportunities for staff to build and share their intercultural competency skills, facilitate continued learning within the agency, and develop recommendations for agency consideration? 3. How do staff and leadership set goals to improve intercultural competency and how are they held accountable to those goals? 4. Has the program and/or agency developed a measurement for DEI workforce competency? 5. Are staff trained on the history of inequitable policies and exclusionary decision-making practices that have led to current inequities in Oregon? 6. Does our agency have a designated Environmental Justice Coordinator or Equity Specialist who can act as a liaison with agency program and other State agencies to advance equity related work? 7. Has our agency requested or set aside funding for internal capacity-building for staff? 8. Is our program or process adequately funded to engage in ongoing learning and capacity building? a. If not, what are other available resources or next steps? What are new or existing opportunities for different agencies/departments to pool resources? 9. Are there opportunities for cross-sector collaboration or coordination with other agencies on equity in adaptation? a. Can you establish ongoing relationships and pathways to ensure coordination and resources?
This table is a modified version of the State of Oregon Climate Equity Blueprint. *2021. Oregon.*

Community capacity building connects frontline communities to adaptation by providing technical assistance, enhancing local coordination, enriching and empowering community leadership, assisting with knowledge, skills, expertise development, and improving access to resources [5]. Doing so can improve the adaptive capacity within social equity communities to move toward independent adaptation implementation and grant seeking [5]. As an example, the Empowered Communities Program's Neighborhood HUB initiative supports neighborhoods by building community networks for continued engagement to increase community preparedness and resilience (see Spotlight).

SPOTLIGHT

The HUB Program, A Community Resilience Solution

This initiative, "supports neighborhoods as they create a local network, a HUB, of organizations that advances the community's overall preparedness on a daily basis, as well as provides essential support to residents as they recover from a stressful event of any size" [1].

Communities have strengths, assets, social cohesion, and resilience and may already work directly or indirectly on climate adaptation activities. Working with CBOs and communities through partnerships and continued engagement deepens adaptive collaboration and enables adaptation planning practitioners to be able to accurately identify community needs, increase agency accountability, and ensure the adaptation strategies identified meet community needs [5]. Table 6 provides initial questions for practitioners to engage in an equity-first approach to community capacity building.

Table 6 Foundational considerations for practitioners to address opportunities for Community Capacity Building

Considerations to Support Community Capacity Building
1. Does the adaptation plan develop meaningful partnerships between communities and other entities where community strengths and expertise are leveraged (e.g., having community representatives design the community engagement process, so that community capacity is built during the collaboration process)? 2. Does the proposed adaptation strategy help build community capacity through funding, an expanded knowledge base or other resources? 3. How will the adaptation strategy provide for local capacity building? (e.g., through funding, expanded knowledge base or other resources?) 4. Does the proposed adaptation strategy or pathway address disaster recovery? (e.g., resources, preparedness, evacuation, recovery)
Directly extracted from: Cal-OES, California Adaptation Planning Guide. *2020; and Mohnot, S., J. Bishop, and A. Sanchez,* Making Equity Real Framework: Evaluation Sheet. *2019: Oakland, CA.*

6 | Developing Outreach, Engagement, & Education

This section discusses opportunities and recommendations to enable equity-first adaptation approaches to outreach, engagement, and education. This section fulfills the need identified in the NA for adequate and effective communication materials to assist with training and outreach for diverse audiences [41]. Appendix B provides resources, tools, and frameworks for further guidance on developing equitable and inclusive outreach, engagement, and education.

> **The California Adaptation Planning Guide 2.0** *recommends developing "community outreach and engagement into all phases of the adaptation planning process. This will build trust between the core planning team and community stakeholders and develop a plan that has collective support. Outreach and engagement should be considered carefully and budgeted appropriately. The approach should include stakeholders within the organization or agency leading the adaptation planning process, and those external to the organization or agency."*

Outreach and engagement are crucial, yet often challenging, elements of the climate adaptation planning process. Existing challenges between government and the communities they serve may be rooted in historical actions such as redlining, disinvestment, and structural racism [42]. To alleviate tensions and build ongoing relationships that better support the climate adaptation planning process, practitioners first need to lay the groundwork for an equity-first approach by engaging with communities before beginning the formal adaptation planning process [3]. The information gathered through initial outreach and engagement activities should directly inform the development of the adaptation plan through all phases of the process moving forward (Figure 2) [5].

Outreach and engagement can enable multiple critical elements for effective adaptation. Practitioners can learn about community priorities, needs, and challenges. Furthermore, communities can also establish where support and resources are needed immediately to enhance their adaptive capacity. Robust participatory processes help build stronger community representation, leadership, work to cultivate co-developed equity indicators. This approach develops accountability mechanisms and may lead to greater efficacy in the implementation phase of the adaptation planning process (Figure 2). It is important to note that best practices are evolving around developing indicators through participatory processes.

Collaboration and Coordination

Practitioners engaged in the adaptation planning process should strive to develop and implement inclusive outreach, engagement, and education through all phases of the process (Figure 2). Engaging stakeholders is essential to adopting equitable adaptation policies and strategies and ensuring that they can be implemented efficiently and effectively. Stakeholder engagement offers the opportunity to educate and build commitment and consensus among local decision-makers and community members.

To support this work, Table 7 provides practitioners core questions and considerations that should be utilized to guide the process of establishing and fostering long-term, equitable outreach, and engagement. Practitioners should consider these questions throughout each phase. Appendix B provides additional resources to support practitioners through stakeholder mapping, stakeholder identification, and best practices for meaningful engagement.

Table 7 Questions for Practitioners to Establish Equitable Outreach & Engagement

Questions for Practitioners to Establish Equitable Outreach & Engagement
1. Does the adaptation strategy help foster the building of effective, long-term relationships and trust between diverse communities and government? [1] 2. Is there a process to engage and collaborate with vulnerable populations in a meaningful, authentic and culturally appropriate manner? [1] 3. Which best practices for meaningful engagement are being implementing? (Included in Appendix B)? [2] a. Are communication materials culturally relevant and accessible in multiple languages? b. Do the communication products remove jargon and technical language? 4. Do engagement strategies identify and engage with isolated communities (e.g., undocumented immigrant communities)? 5. Is there a pathway identified to engage sovereign tribal groups? 6. Does the proposed action engage and empower communities of color and low-income populations in a meaningful and culturally appropriate manner? [4] 7. Does the proposed action create opportunities to leverage resources and build collaborative partnerships with community priorities at the forefront? [4] 8. Is there a need for formal agreements to define the collaboration, and if so, how will they be developed (see Appendix B)? [1]
Developed directly from: (1) California Adaptation Planning Guide*. (2020); Kaswan, A. (2012); (2) Resiliency Guidebook Equity Checklist OPR; (3) Seven principles for equitable adaptation.* Sustainable Dev. L. & Pol'y*, 13, 41; (4) Climate Action Plan, Portland*

Stakeholder Identification

It is important to identify all potential stakeholders and support ongoing efforts to maintain trust, iterate on solutions, and to share information. Stakeholders can include but are not limited to: community members, including local people and organizations, small businesses or CBOs; local agency representatives and planners; national, State, and regional government agencies such as tribal governments, academic and research institutions; and nonprofit organizations [11]. Practitioners can identify stakeholders through conducting a robust stakeholder mapping exercise. To ensure that all stakeholders are identified during this process, practitioners should include community groups and leaders to help identify additional groups that may not be accounted for. Figure 6 provides examples of key community stakeholders that should be considered for adaptation outreach and engagement efforts. Additional information on these processes and exercises are included in Appendix B.

Figure 6 A Regional Resilience Toolkit to Identify Key Stakeholders

Interactional and Procedural Equity in Outreach & Engagement

Not all participatory processes are created equal. Historically, marginalized populations (e.g., people of color, women, indigenous communities, the disabled, other socioeconomically disadvantaged groups) have been excluded from decision-making processes and tasked to mitigate unequal environmental exposures [43].

Identification and removal of barriers to participation is critical for practitioners to do early on during the equity-first phase of the adaptation planning process. Barriers to participation include but are not limited to: access to stable high-speed internet (i.e., digital divide); use of technical language; access to translated materials for non-English speakers; location of meetings; transportation needs to and from meetings; and access to childcare. There may also be broken trust between community groups and government agencies which can lead to either real or perceived power dynamics that may inhibit community member engagement. The questions and considerations in Table 8 serve as foundational guidance for developing outreach and engagement. This guidance works to support practitioners as they consider elements necessary for engaging historically marginalized groups. Examples of interactional and procedural equity (e.g., language barriers, technical jargon, power dynamics, and leadership) are an especially critical consideration for practitioners during this phase. The Groundworks USA report "Best Practices for Community Engagement: Tips for Engaging Historically Underrepresented Populations in Visioning and Planning" [44], is an additional best-practice resource that provides tips for engaging marginalized and underrepresented groups.

Co-Producing Climate Adaptation Insights

The co-production of knowledge emphasizes the necessity of practitioners working effectively with stakeholders to co-create an understanding of how climate will impact their community. This process can be transformative and help reach the community's goals to understand climate vulnerabilities from their perspectives. In this approach, practitioners should work to apply the following principles [17]:

1. Provide clear opportunities for social equity community members to speak
2. Support community member innovation and ideation of proposed adaptation strategies and pathways
3. Measure success by impact for the most vulnerable community members

Social equity communities may not prioritize climate impacts directly in discussions; their most immediate concerns may include issues of day-to-day stressors such as electricity or transportation expenses, food, and housing. However, these issues are connected to climate impacts. Practitioners must support and identify possible intersections and find pathways that enable short-term and long-term impact strategies that have multiple benefits.

6.5 Learning

An equity-first adaptation approach emphasizes the critical importance of learning that should occur throughout each of the planning phases. The APG recommends that practitioners: (1) develop materials allowing for pop-up events to solicit feedback and ideas for strategy adjustment when needed and (2) collaborate with the community to update strategies and program implementation based on lessons learned from monitoring.

It is imperative for practitioners to intentionally set up feedback loops to ensure learning is integrated throughout all phases of the adaptation planning process. Successful implementation must include plans for monitoring and evaluation of strategy efficacy. Opportunities that elevate the resilience and adaptive capacity of social equity communities should be prioritized and consistently evaluated to mitigate for potential negative impacts (see Section 7: Monitoring, Accountability).

Learning can be developed through accountability, monitoring, and evaluation, and community feedback measures. Establishing organizational processes, such as debriefs after a project or community surveys, can enable practitioners to gather the necessary information for continued learning and success. Some specific considerations for establishing and developing organizational learning processes can be found in Sections 7.4 and 7.5.

7 | Approaches, Actions, & Strategies to Integrate Equity into Phase 1-4 of the Adaptation Planning Process

This section identifies opportunities, approaches, and strategies for practitioners to integrate equity into Phases 1-4 of the adaptation planning process. It works to provide questions for practitioners to work through to integrate equity considerations effectively and holistically. This section is not intended to be comprehensive, but instead provides resources and questions that planners can use to integrate equity in each phase.

This section can support practitioners in integrating their adaptation planning efforts utilizing the additional Economic Guidance Document, Prioritization Tool, and Implementation Toolkit that have been developed as part of the larger project effort. Additionally, the APG and Appendix D serve as more comprehensive guidance.

7.1 Connections to Phase 1: Explore, Define, Initiate

Phase 1 includes scoping the process and project and identifying the potential climate change effects and essential physical, social, and natural assets in the community. Planners will initiate the adaptation planning process for different reasons. It is helpful early in the process to identify the motives guiding the process and what concerns, challenges, and vulnerabilities the strategy will address. Throughout this phase of the planning process, it is critical to identify how these motivations may impact vulnerable populations. This section offers questions and considerations that will aid in identifying motivators and equity impacts.

Similar to Phase 0 (equity-first), it is critical to ensure that practitioners have clearly identified the social equity communities that may be impacted by any suite of adaptation strategies. These social equity communities may be different across districts or neighborhoods and may be impacted differently in the face of multiple climate impacts. Table 8 supports practitioners in ensuring they have identified appropriate social equity communities in scoping Phase 1 of the adaptation planning process.

Table 8 Identification of Social Equity Communities

Identification of Social Equity Communities
• Which social equity communities would benefit from the proposed policy, initiative, program, and/or budget? [1] • What qualities have been used to identify social equity communities (e.g., population characteristics, location)? [2] • Is there opportunity to engage with social equity communities from the onset of the adaptation planning process to identify their intersecting vulnerabilities? [2] • Are occupations and economic sectors at risk identified (e.g., agricultural, construction, sanitation workers, public transportation commuters)?[1]
Extracted from: (1) Resiliency Guidebook Equity Checklist OPR; and (2) Kaswan, A. (2012). Seven principles for equitable adaptation. Sustainable Dev. L. & Pol'y, 13, 41.

7.2 Connection to Phase 2: Assess Vulnerabilities

In Phase 2, practitioners conduct a vulnerability assessment that identifies and characterizes the climate hazards and other climate impacts their community will face across multiple time horizons. In California, local jurisdictions are required to conduct a vulnerability assessment compliant with the Safety Element requirements as outlined in California Government Code[3]. The APG recommends that a vulnerability assessment be more in-depth than in other planning processes to create a more comprehensive assessment of vulnerability to climate change effects. Phase 2 has four steps for completing the vulnerability assessment, which includes exposure, sensitivity and potential impacts, adaptive capacity, and outreach and engagement (see Section 6 | Developing Outreach, Engagement, & Education). However, the equity-first adaptation approach discussed in this document encourages practitioners to conduct outreach and engagement throughout all steps of the adaptation planning process.

The vulnerability assessment serves to understand the exposure and sensitivity of systems or assets already in place to define the potential climate impact. The exposure includes measuring and describing historical hazards and the magnitude at which they occurred. It is critical to assess the physical, historical impacts of a climate hazard (e.g., depth and frequency of water from rainfall or flooding events) and consider how the historical and systematic inequities a community faces are related to these exposures. Outreach and engagement with community groups in Phase 2 can provide information about historical and lived experience with the vulnerability assessment that may otherwise be missed. Additionally, the questions and considerations in Table 9 aid practitioners to more strongly evaluate exposure as it relates to historical inequities in communities.

[3] California Government Code § 65302(g)(4), as updated by SB 379 and SB 1035

Table 9 Addressing Historical Inequities

Addressing Historical Inequities
• What are the current and historical racial disparities related to the climate impact? • Does the climate impact proposed involve land or space? If yes, what are the historical connections to the land? How are the populations who hold these connections being considered or included in the decision-making process? • What specific communities or populations will primarily benefit from the proposed adaptation strategy or pathway? • Are vulnerable populations, (e.g., Black, indigenous, people of color (BiPOC), low-income, seniors or disabled people) more negatively affected by the climate impact? • Would mitigated exposure to the climate impact reduce existing historical disparities among the social equity communities addressed?
Extracted from: Portland climate adaptation strategy vulnerability assessment: https://www.portland.gov/sites/default/files/2019-07/risk-vulnerabilities-assessment-press.pdf

When preparing the vulnerability assessment, practitioners will also lead the development of sensitivity ratings to various climate impacts and hazards. Practitioners should engage and consult stakeholders to define and finalize the information that indicates which community populations and assets are sensitive to each identified climate change impact. Practitioners may find that community groups may already be working towards some of these goals and have already robustly identified these assets [11].

7.3 Connection to Phase 3: Define Adaptation Framework and Strategies

Phase 3 focuses on creating an adaptation framework as well as developing potential and viable adaptation strategies based on the results of the vulnerability assessment. The adaptation strategies are the community's response to the vulnerability assessment—that is, how the community will address the potential for harm identified in the vulnerability assessment, given the community's resources, goals, values, needs, and regional context.

A critical component of Phase 3 as outlined in the APG is to confirm the community's vision and establish shared goals for adaptation and resilience. This step should work to build transparency directly into the adaptation planning process at the outset and should consistently include input from the community. Early stakeholder engagement improves the identification of shared goals, fosters the cooperation needed to identify adaptation pathways or strategies effectively, and ensures that the chosen adaptations are impactful and implementable in Phase 4.

When defining and choosing adaptation strategies and pathways to develop the overall planning framework, practitioners must identify potential equity impacts of each strategy selected (see Table 10).

Table 10 Assessing Proposed Adaptation Pathways

Assessing Proposed Adaptation Pathways
• How does the proposed adaptation strategy or pathway prioritize multi-sector approaches?[1] • What synergies already exist within sectors impacted by the proposed adaptation strategy or pathway that may work to advance climate preparedness and social equity? • Will potential investments of the proposed adaptation strategy or pathway enhance communities, alleviate disproportionate environmental burdens, and protect against climate change? • How is the proposed adaptation strategy or pathway community-driven?[1] • How does the proposed adaptation strategy or pathway establish paths toward wealth-building in vulnerable communities?[1]
Extracted from: (1) Mohnot, S., J. Bishop, and A. Sanchez, Making Equity Real in Climate Adaptation and Community Resilience Policies and Programs: A Guidebook. *2019, The Greenlining Institute: Oakland, CA.*

Once practitioners have begun developing strategies, it is essential to identify opportunities to integrate adaptation planning into multiple community programs and plans. Mainstreaming and locating key synergies is critical in elevating co-benefits and increasing the impact of adaptation pathways and strategies. Integrating climate impacts and hazard risks and exposure into the management of existing workflows, in contrast to adding novel decision processes for climate adaptation alone, can provide many more adaptation benefits. Key considerations for practitioners to identify and enable assured benefits associated with the selected adaption strategy or pathway can be found in Table 11.

Table 11 Identifying Assured & Shared Benefits of Adaptation Pathways

Identifying Assured & Shared Benefits of Adaptation Pathways
• What mechanisms will be used to assure benefits are provided to vulnerable populations (e.g., provide technical assistance or capacity building, provide jobs, provide extra financial resources or investments)? • How may the proposed adaptation strategy or pathway decrease inequality in income or wealth? • How does the proposed adaptation strategy or pathway increase adaptive capacity and/or reduce exposure to climate change effects in frontline communities? • How may the proposed adaptation strategy or pathway ensure safety and improve health outcomes for vulnerable populations?
Extracted from: California Adaptation Planning Guide. 2020: Mather, CA.

The Economic Guidance Document, Prioritization Tool, and Implementation Toolkit developed as part of this project should be consulted during Phase 3. When assessing the economic implications, it is essential to consider the equity impacts on the accessibility of resources and how to allocate them when executing potential adaptation pathways. This opportunity to enhance co-benefits is vital to consider. Practitioners

should consider how adaptation strategies will impact the distribution of benefits and burdens such as wealth building, impact on renters, or property value changes. Key considerations of resource allocation in adaptation processes can be found in Table 12.

Table 12 Analyzing Accessibility and Allocating Resources

Analyzing Accessibility and Allocating Resources
• Are the benefits of the proposed adaptation strategy or pathway broadly accessible to households and businesses throughout the community (e.g., BiPOC, low-income populations, women and gender non-binary individuals)? [2] • Does the proposed adaptation strategy or pathway have dedicated funding allocated specifically for implementation in vulnerable communities?[1] • How can the lead planning agency help communities enhance their social capital and ensure resilience in the face of climate change? • How might the proposed adaptation strategy or pathway ensure safety and improve health outcomes for vulnerable populations (e.g., people with disabilities, unhomed populations, and immigrant communities)? [1] • Are public health objectives included in the proposed adaptation strategy or pathway?
Extracted from: (1) Resiliency Guidebook Equity Checklist, OPR; (2) Climate Adaptation Plan Portland

Authentic outreach and engagement with communities can increase buy-in of the adopted adaptation strategies and pathways. Early support for the adaptation framework can directly ensure the successful implementation of the selected adaptation strategies, discussed next.

7.4 Connections to Phase 4: Implement, Monitor, Evaluate, Adapt,

To ensure that implementation of each strategy is and continues to be effective, agencies should monitor, evaluate, and modify as needed based on their observed effectiveness, local changes, community feedback, and newly available science and data. Phase 4 of the adaptation planning process outlines how practitioners can take the established adaptation frameworks and move into action. Implementation is the most critical phase in assessing the measurable impact of adaptation strategies. This is particularly important for vulnerable communities; the equity-first adaptation approach ensures that community members are partners in monitoring and evaluating implementation effectiveness.

Once an adaptation strategy and community are identified, there must be accountability to deliver direct and meaningful benefits. For a strategy to achieve this, the benefits must directly reach the community, not in the form of trickle-down benefits but in ways that move toward addressing starting point vulnerabilities. Additionally, for adaptation to be meaningful, the benefits must be relevant and valuable for the community and should be informed by community-identified needs [5].

There are many examples of the implementation of successful, equitable adaptation pathways. These ultimately depend on the communities' immediate needs and the historical backdrop of the strategies.

One such example is the implementation of resilience hubs (see also section 8). These are multi-use buildings designed to meet numerous community goals while providing adaptation benefits (e.g., bridging the digital divide by providing free high-speed internet, serving as cooling centers during extreme heat events, mobilizing networks during disaster events). Resilience hubs present an opportunity for communities to efficiently improve emergency management, reduce climate pollution, and enhance community resilience. These spaces also serve as resources for communities to become more self-determining, socially connected, and successful in the long term. Key considerations for practitioners to address and identify equity in adaptation strategies and pathways are outlined in Table 13.

Table 13 Assessing Equity in Proposed Adaptations

Assessing Equity in Proposed Adaptations
• Does the proposed action generate burdens either directly or indirectly, to social equity communities, low-income populations, or other marginalized groups? • Are there unintended consequences or negative impacts of this action for racial, ethnic, low-income communities, older adults or disabled people, or other marginalized groups? If so, what are the strategies to mitigate negative impacts?[3] • How will the adaptation strategy increase the quality, efficiency, and effectiveness of existing operations?[1] • Can the benefits of the proposed action be targeted in progressive ways to reduce historical or current disparities? [2]
Extracted from: (1) Resiliency Guidebook Equity Checklist, OPR; (2) Climate Adaptation Plan Portland; (3) Portland climate adaptation strategy vulnerability assessment

7.5 Addressing Outcomes and Accountability

Research demonstrates that adaptation is "only effective if you identify the responsible parties and monitor- develop accountability measures" [20]. In this phase, the adaptation framework is implemented, monitored, evaluated, and adjusted based on continual feedback. During this phase, it's critical to address how proposed adaptation pathways may create opportunities for long-term learning and improved project performance. Throughout the adaptation planning process, building and maintaining trust and accountability are critical, and this section addresses some key considerations to ensure success.

To ensure equitable outcomes, practitioners must meet community needs, reduce climate vulnerabilities, and increase overall community resilience [5]. There are many social factors that intersect with climate impacts, such as public health and safety, workforce and economic development, mobility, wealth inequality, social cohesion, green space access, infrastructure, and also trust between local agencies and communities *[5, 32, 45]*. With an equity-first approach, ensuring accountability through the implementation of an adaptation strategy or pathway is critical to long-term success. Often, this critical component is often under-resourced or not executed entirely, which can lead to deteriorated efficacy in the long-term adaptive capacity of a solution. Table 14 presents opportunities for practitioners to consider in order to ensure and enable long-term accountability, monitoring and evaluation for strategy implementation.

Table 14 Ensuring Accountability in Implementation

Ensuring Accountability in Implementation
• How will the long-term equity impact of adaptation strategies or pathways being implemented be evaluated? [1] • Does the proposed adaptation strategy or pathway have appropriate accountability mechanisms to ensure that vulnerable communities will equitably benefit and not be disproportionately harmed?[2] • Is there a plan to adjust, adapt, or correct course if data shows that the strategy is not on track to meet equitable outcomes? [3] • Is there a reporting framework in place that generates publicly available data on key metrics and benchmarks in a timely manner? [4] • Is there a plan to communicate progress to stakeholders regularly? • Are benchmarks identified to measure progress on important outcomes to all stakeholders and impacted communities?
Extracted from: (1) Resiliency Guidebook Equity Checklist, OPR; (2) Climate Adaptation Plan Portland; (3) California Climate Adaptation Planning Guide 2020; (4) Oregon, Climate Equity Blueprint 2021

8 | TRANSPORTATION

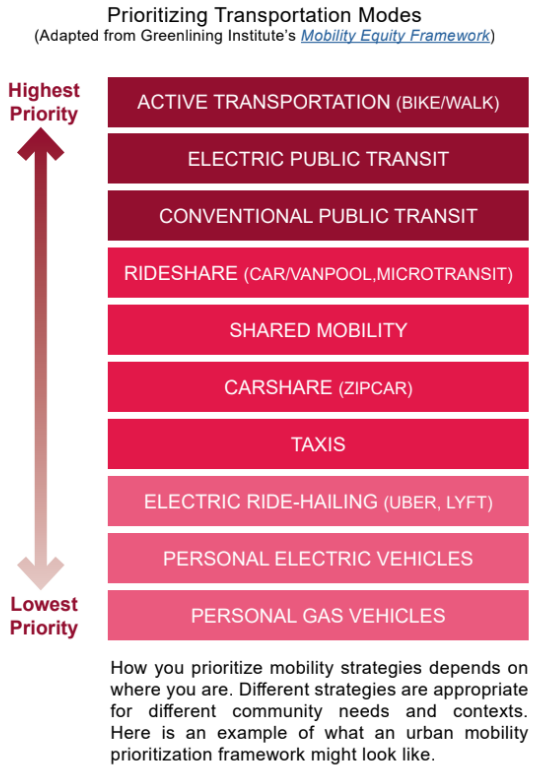
Previous sections of this document provide high-level guidance that can apply across many sectors critical to the adaptation planning process, including transportation. Transportation is a critical climate adaptation pathway that can reduce GHG emissions and pollution while increasing economic opportunity and access to necessary public facilities, schools, parks, and food establishments [46, 47]. Transportation access is also vital in times of crisis, such as the need to evacuate during a sudden climate shock. This section outlines essential considerations specific to transportation and mobility, including barriers, opportunities, innovations, and resources to develop equitable, clean, and climate-ready transportation planning.

In California, SB 350 directs the California Air Resources Board (CARB or Board) to identify barriers for low-income residents to access zero-emissions mobility options and develop pathways and recommendations to address identified barriers. The Low-Income Barriers Study, Part B: Overcoming Barriers to Clean Transportation Access for Low-Income Residents identifies accessibility barriers and opportunities to increase zero-emission and near zero-emission transportation options [48]. The end of this section lists several additional resources that develop equitable transportation recommendations for social equity communities.

8.1 Transportation Equity and Climate Change

Climate impacts in the San Diego region will include changes in precipitation frequency and intensity, coastal flooding, and extreme heat that will impact all modes of transportation. These changes will impact "environmental sustainability, economic vitality and mobility, congestion, and system reliability, particularly for vulnerable populations and urban infrastructure" [46]. Without sufficient adaptations, climate impacts will increase transportation challenges [42]. The Fourth Climate Assessment provides analysis of potential climate impacts on mobility and transportation and indicates these impacts will increase system vulnerabilities and have broad rider impacts [46]. Climate change impacts can induce significant challenges to transportation networks, such as service disruptions due to extreme flooding or have potential health impacts with increased wait times during heat waves. Professionals will need to ensure access, reliability, consistency, and safety of mobility options with the effects of climate change.

Figure 7 Prioritizing Transportation Modes [6, 7]



Transportation planners will need to identify vulnerabilities in transportation systems from climate impacts, how these changes will impact riders, and equity implications. For instance, planners need to consider intersecting climate impacts and ridership characteristics such as populations reliant on transportation that are highly susceptible to the effects, such as the elderly, who may be more sensitive to extreme heat. Transportation professionals will also need to ensure frequent access to buses and trains and active mobility pathways (e.g., biking, walking) to safeguard access to goods, critical services, and other essential needs amid changing climate conditions. Ensuring reliability is especially important for riders that rely on public transit for commuting. Figure 7, Prioritizing Transportation Modes [7], is an example of mobility prioritization. Note that prioritization of mobility modes will vary across contexts and in relation to community needs.

Transportation accessibility and reliability are critical for evacuation during a climate shock, especially for low-income, historically marginalized, and rural communities. There is a need to identify communities with low mobility and understand how transportation trends may shift. Assessments can include ongoing evaluation of public transportation ridership changes, identifying low-mobility and low-vehicle ownership communities, and education and outreach to ensure access to transportation and programs. Such assessments should be coupled with climate risk projections such as high-risk wildfire areas, more hot days, and increased precipitation.

Transportation and mobility intersect with multiple sectors which provides opportunities for coordinated interagency equity-first adaptations. For instance, clean transportation reduces greenhouse gas emissions and pollution and can improve health outcomes and economic opportunity. Developing interagency coordination can maximize “clean mobility investments and to target them to the people with the most barriers” [49]. Coordinated approaches may include collaborations and partnerships with health agencies and organizations, workforce development centers, affordable and transitional housing sites and organizations, substance abuse and domestic violence programs, among others [49] [48]. Importantly, there is substantial opportunity for collaboration to pursue transformative equity-first clean adaptations in transportation.

Community Engagement at Every Stage

Transportation requirements vary significantly across communities, including differences in rural and urban needs and community and population characteristics. For instance, historically marginalized and low-income communities may have significant barriers, such as monetary, language, immigration status, or geography, to accessing reliable transportation or clean transportation programs (see Section 6 | Developing Outreach, Engagement, & Education). Other mobility barriers include unreliable transportation, low vehicle ownership, and lack of capital or credit history to purchase a vehicle [48]. Such barriers can inhibit access to economic and educational opportunities, participation in clean vehicle programs, or increase susceptibility to extreme weather events. In short, deep community engagement is needed to understand mobility barriers and prioritize mobility program developments.

SPOTLIGHT

Co-Designing Equitable Transportation in Southeast San Francisco with the Reflex Design Collective

Deep community engagement through co-designing mobility solutions with communities provides opportunities to develop clean transportation options that meet community needs. The Reflex Design Collective worked with communities to identify synergies across equity, mobility, and clean transportation. The co-designed goals for more equitable transportation included [6]:

- *Increase transportation options for residents without a car*
- *Increase connectivity between the target district and the rest of San Francisco*
- *Improve air quality to address Environmental Justice within the community*
- *Support workforce and economic development*
- *Improve public safety and security while noting that safety varies for communities*
- *Build community power*

Developing needs assessments are one way toward deep community engagement to identify community mobility needs and barriers to access reliable and resilient transportation. The Spotlight "Co-Designing Equitable Transportation in Southeast San Francisco with the Reflex Design Collective" is an example of community-based needs identification. The program identified that barriers to participation in large workshops included historical distrust and safety concerns. This finding led to developing small group engagement to build community trust and identify mobility needs. From here, workshops were co-designed with communities and included "re-designing the table" to build community power and increase accessibility to engagement [50].

Access, Reliability, and Safety

Access involves recognizing mobility challenges such as the digital divide, the urban/rural divide, and language barriers in accessing programs. For instance, the lack of credit cards and bank accounts required to access carsharing and re-loadable public transit cards present significant barriers for communities with underserved mobility needs [44]. There may also be language barriers for non-English speakers that prevent access to clean mobility services such as ride-sharing [49].

Identifying the cost burden of transportation is imperative to improving mobility. Cost burden, as defined by the Climate Equity Index[4], is the median household transportation cost as a percentage of median household income. Such indicators can identify areas households are significantly burdened with transportation costs. Considerations may also include cost and time burdens for first and last-mile travel for low-income residents [48].

Safety considerations include crime, injury, personal health, and weather changes that span active transportation (biking/walking), and public transportation (buses/trains). Structurally sound sidewalks and bike lanes, safe crossing zones, shade, and streetlights improve active transportation safety and reliability. Safety will extend to climate impacts such as very hot days that can strain transportation systems, decrease reliability, and impact health. Public transportation will need to consider reliability, frequency, and ridership health and well-being during weather events.

Convenience can improve and incentivize participation in clean transportation programs. Convenience factors include proximity to transportation, travel and wait times, travel availability such as extended hours that meet the needs of occupations outside of 9-5 pm, and travel information accessibility (e.g., routes, schedules, fares, connections, digital access, language) [48].

Accountability and Awareness

It is vital to ensure the program meets the intention and is sustainable over the long term. At the same time, it is crucial to ensure selected adaptation strategies and pathways prevent unintended impacts to communities such as gentrification. For instance, research shows the possibility of climate or green gentrification with the development of green infrastructure [51]. Accountability mechanisms can track community changes through ongoing assessment "to avoid and minimize the displacement of low-income residents through neighborhood gentrification" [48]. With ambitious plans such as disincentivizing driving through increased taxes and no cost public transportation as proposed by SANDAG, the effects of gentrification and low-income communities will need to be assessed [52].

SPOTLIGHT

Transit and Gentrification in California

The San Diego Union-Tribune looked at transportation changes in urban areas statewide including San Diego, Los Angeles, Sacramento, and the San Francisco Bay Area. The assessment found that "over the past five years, nearly 400 new multifamily buildings had either gone up or were under construction within half a mile of a transit stop. Median family income in these neighborhoods averaged less than $64,000. The average monthly rent for a two-bedroom apartment, meanwhile, was more than $3,500. And in nearly 20 percent of these neighborhoods, the median household income was less than $30,000—but the average rent on a two-bedroom apartment was still more than $3,300. That, suffice it to say, is an untenable situation for the average renter and a recipe for displacement." [14, 15]

[4] City of San Diego. (2019). Climate Equity Index Report. https://www.sandiego.gov/sites/default/files/2019_climate_equity_index_report.pdf

The Greenlining Institute also highlights the importance of intentional benefits. Benefits cannot trickle down to communities; they need to go directly to the people most in need in the most impactful ways, while not increasing or creating new burdens [46]. That is, equitable plans must provide direct action for targeted populations. For instance, clean vehicle programs have public benefits such as reducing carbon emissions and air pollution. Yet, they are most accessible to higher income households because the upfront costs and needed credit are barriers to participation for low-income households [53].

8.2 Innovations and Opportunities

As municipalities pursue climate adaptation strategies and pathways, there is an opportunity to develop transportation solutions that meet multiple equity, mobility, and adaptation needs.

One opportunity is interagency coordination and partnership development that combines workforce development and training targeted for marginalized, low-income, and youth groups to develop clean transportation programs. Combined transportation and workforce development solutions include targeted hiring, vocational training, apprenticeships, and prioritization of projects that demonstrate local economic benefits for low-income populations [44]. CARB further outlines opportunities to maximize economic benefits for low-income residents while pursuing investments in clean transportation and mobility specifically focused on expanding workforce training and development [48].

Mobility solutions can increase overall resilience for communities. One innovation is mobility hubs that serve as community anchors that provide multiple modes of transportation and supportive amenities [47]. Mobility hubs can build frequent, resilient, reliable, and high-capacity transit that is safe, comfortable, convenient, and accessible (see Spotlight). SANDAG has proposed The Central Mobility Hub and Connections Comprehensive Multimodal Corridor Plan (CMH and Connections CMCP) that provides transportation solutions near the San Diego International Airport and surrounding communities [54]. The Bay Area Regional Mobility Hubs: Mobility Hub Implementation Playbook provides step-by-step guidance and examples of developing equitable mobility hubs [47].

SPOTLIGHT

Car Sharing and Mobility Hubs in Affordable Housing Pilot Project - Community Transportation Needs Assessment

The Metropolitan Transportation Commission (MTC) partnered with TransForm, a nonprofit addressing climate change, and social inequity through transportation and housing solutions [5]. The partnership received $2.25 million grant from CARB to design and implement the Car Sharing and Mobility Hubs in the Affordable Housing pilot project. The project included mobility hubs in disadvantaged communities in Oakland, Richmond, and San Jose. The associated report is an important resource that details the development of a needs assessment, key findings, and lessons learned [5].

Climate change will increase annual extreme heat days. During a heat event, there is an increased need to protect public transportation riders. Cooling stations are one solution that can ensure residents avoid adverse and dangerous health impacts during a heat event. “The Use of Cooling Centers to Prevent Heat-

Related Illness: Summary of Evidence and Strategies for Implementation" identifies transportation as a barrier to accessing cooling stations, recognizes the opportunity to pair cooling centers with transportation hubs, and provides tools and frameworks to develop cooling centers [55].

The Greenlining Institute's "Mobility Playbook" defines community-owned mobility programs as opportunities for communities to develop and implement programs. Community-ownership models promote and focus on social, economic, and environmental benefits experienced by the community rather than profits. In this model, wealth, capacity, and assets are all retained within the community [49].

8.3 Tools for Equitable Transportation

The following tools and resources are helpful resources to developing equity-first climate ready transportation.

Low-Income Barriers Study, Part B: Overcoming Barriers to Clean Transportation Access for Low-Income Residents	This study by the California Air Resources Board (2018) engaged low-income residents to understand barriers to accessing clean transportation and mobility options and provides guidance and recommendations on mobility and transportation.
Social Equity Analysis Tool (SEAT) and Social Equity Analysis Methodology (SEAM)	The Social Equity Analysis Tool is a set of geospatial processing tools that generate GIS layers and tables for use in evaluating regional planning scenarios. The social equity performance measures, definitions, and calculation methodologies are detailed in the Social Equity Analysis Methodology document. The SEAT and SEAM are intended to be used to fulfill the requirement that agencies receiving federal or state funds are ensuring they do not create disparate impacts or disproportionate burdens as a result of their planning or policy decisions. Performance measures include mobility (proximity to transit, travel time), accessibility and benefits (distribution of investments, access to resources such as parks and medical facilities), health and environment burdens (air and noise pollution), affordability, and health benefits (minutes of physical activity).
Climate Equity Index (CEI)	The index measures thirty-five indicators for each of the city's 297 census tracts. The indicators cover transportation metrics including flood risk, pedestrian access, commute burden, transportation cost burden, traffic density, electric vehicle charging infrastructure, bike-ability, access to public transportation, and related metrics like health indicators such as asthma.

Clean Mobility Equity: A Playbook Lessons from California's Clean Transportation Programs The Greenlining Institute (2021)	It is critical for local and regional agencies to better understand how clean transportation programs can be implemented to truly address equity in a comprehensive and effective way. For success, practitioners need to find ways to effectively make use of knowledge gained in recent years. This report reviews California's clean mobility equity programs, noting successes, pitfalls and opportunity areas for improvement.
Mobility Equity Framework The Greenlining Institute (2018)	This framework was designed by experts to elevate and prioritize the mobility needs of low-income individuals of color and to address structural inequities. To do this, the framework assess existing inequities through an adaptable, customizable process for community, advocates, and transportation decision-makers.

9 | Specific Considerations for Equity Indicators

This section outlines basic trends in the use and development of equity indicators and metrics. For more information, see Appendix C. Climate impacts are typically measured in terms of vulnerability which is "the degree to which natural, built, and human systems are at risk of exposure to climate change impacts" [56]. An equitable approach includes identifying major vulnerability factors, such as communities with fewer resources and coping mechanisms to adapt to climate impacts [56].

Equity will need to be considered across dimensions of climate impact include but are not limited to: (1) anticipation of shocks (e.g., planning for increases in wildfire or storm events); (2) slower-moving stressors (e.g., heat, energy usage, pollution); (3) during a disaster (e.g., evacuation, resources); (4) after a disaster (e.g., return, rehabilitate, rehome, rebound); and (5) mitigation and adaptation linkages (e.g., any increase in GHG emissions exacerbates overall impacts). Adaptation has tended to focus on infrastructure and climate shocks (e.g., storm events) [57]. However, the slow-moving and cumulative effects, such as hotter days and pollution, will significantly impact the most vulnerable populations.

An equitable approach to climate adaptation identifies the interconnected social vulnerabilities that disproportionately impact populations based on major vulnerability factors. It is important to note that "complex issues, such as increased social vulnerabilities to climate hazards, rarely have a singular solution that can be implemented by one sector or government agency alone" [3]. For example, research notes the difficulty in developing adequate indicators for social vulnerabilities [58]. Social equity issues are not always easily identifiable or measurable. Equity factors may be omitted from adaptation considerations because of the difficulties isolating equity concerns and the many sectors equity issues span (e.g., housing, healthcare, transportation) or adaptations prioritize buildings and high-value infrastructure [58]. Employing the dimensions of equity outlined in Section 2 | Phase 0: Equity-First Approach to Adaptation can help identify starting point vulnerabilities to climate impacts.

Qualitative knowledge of community needs and climate impacts may also be undervalued [58]. Social elements may not lend well to quantitative measurement and may not be considered if they are difficult to model. For example, social cohesion can help alleviate suffering during and after disaster, but measuring social cohesion proves difficult. In another way, social benefits may be slow-moving, interconnected, intrinsically qualitative, or spatial. Therefore, the use of adaptation-related data should be carefully approached. High-level considerations for the development of equity measurements, indicators, and outcomes are outlined below.

Indicators and metrics are used across Phases 0-4 of the adaptation planning process. This involves quantitative and qualitative identification of community experiences and intersecting historical, social, and economic factors, evaluating climate risk, evaluating adaptive capacity, and monitoring and evaluation.

How to Use Equity Indicators and Metrics

This section pulls heavily from The Urban Institute: Equity Measures and Their State of Analysis and the Integrated Climate Adaptation and Resiliency Program (ICARP), Defining Vulnerable Communities in the Context of Climate Adaptation. Both resources provide a robust review of developing equity indicators, metrics, and outcomes. This section also includes the resources in Table 16, as well as academic research.

Identifying Intersecting Historical, Social, and Economic Factors

Historical legacies

Identification of historical legacies through data is connected to recognition and structural inequity. This area of measure recognizes that inequities are a result of past actions that are connected to institutions, systems, and sectors [59]. When identifying historical legacies that contribute to persistent inequality, data may be quantitative, spatial, or include historical accounts from communities, social equity communities, and CBOs. For example, Groundworks Climate Safe Neighborhoods has completed a spatial cataloging of historical redlining that correlates with today's greenspace and climate risks. Additionally, LISC San Diego's report, "Mapping Inequality: Redlining in New Deal America - San Diego," demonstrates how property was graded and black and brown communities were left deprived of "once-in-a-generation wealth building opportunities afforded to white Americans that undergird the many societal inequities we see today." Identifying specific institutions or sectors can target existing inequities, or starting point vulnerabilities, to increase adaptive capacity and transformative adaptation. Sectors connected either indirectly or directly to climate impacts, such as housing or high-polluting industries, may be target areas that can help accelerate adaptation efforts.

Intersecting Risks with Populations and Vulnerabilities

Spatial Data

There is a trend toward qualitative and spatial data in adaptation. Climate impacts are distributed across space, time, populations, infrastructure, resources, and access to services. Spatial equity (connected to distributional equity) recognizes that "socially valued resources, such as jobs, income, political voice and power, cultural acceptance, social services, and environmental goods, as well as the opportunities to make use of these resources, should be equitably allocated across space" [10]. Vulnerabilities to climate extremes are spatially variable [56]. For instance, inland communities may be more vulnerable to poor air quality, smoke exposure from wildfires, and may not be able to readily access resources such as cooling centers (see Appendix C | Equity Indicators and Sources).

> *There are lasting unequal economic impacts after disasters due to resource distribution: "local hazard damages increase, so does wealth inequality, especially along lines of race, education, and homeownership." In counties with more than 10 billion in damage, white families and homeowners tend to gain wealth, black, Latino, and Asian households tend to gain less and lose wealth [2]. Disparities in aid may be connected to systemic inequities including access to information [8].*

Developing Awareness of Important Populations

Awareness of populations involves the identification of groups based on several criteria, such demographics and behaviors. Here, information can be used to "analyze disparities in an intervention's inputs, activities, outputs, and outcomes" [59]. An example is the City of San Diego's Climate Equity Index data (see Table 16) that details vulnerabilities to flooding, tree coverage, urban heat island index, access to food, and mobility such as transportation cost and commute burdens. Data comparisons can be made across the general population in a specific area. Indicators, such as income, have criteria set by the State of California.

Further, populations can also be distinguished by rent versus home ownership, or specific considerations, such as food insecurity or healthy food access, transportation access, housing insecurity (including housing cost burden and overcrowdings), or occupation (including outdoor labor jobs).

Procedure and Representation Metrics and Measures

Procedure and representation measures involve gauging community perspectives and developing accountability to procedure, process, representation, access, and interactions. Here, planners may want to conduct surveys asking for input regarding representation, community participation, and engagement quality. Through workshops and interviews, community input on procedure can help assess equitable access to materials, outreach activities, and if and how bias emerges. Given the breadth of diversity and wide disparities in resource access in the San Diego region, this is important to consider.

Assessing Benefits through Co-Benefits and Costs Avoided

Deciding where to invest in equitable climate adaptation is not a simple linear trend or causal relationship. The dynamics are complex and often spatial, involve synergies, and the co-benefits are distributed over time [60, 61]. Co-benefits can enhance community well-being and alleviate potential harm from climate impacts. Co-benefits span natural (e.g., air, water quality, ecosystem services), social (e.g., social cohesion, health, well-being, ease of commute, food security), economic (e.g., green jobs and training, transit affordability, housing security, biodiversity) factors, and there are synergies between each factor [61]. One such example is green space. It can reduce heat island effects, enhance public spaces, absorb stormwater, and enhance biodiversity.

Often, co-benefits can decrease costs in "municipal budgets due to financial savings from delivering municipal services to more compact communities (as opposed to sprawling communities)" [60]. Figure 8 describes the relationship between investments, benefits (including costs avoided from risk reduction), and co-benefits.

Figure 8 Co-Benefit Relationship [62]

Measuring Accountability and Monitoring

It is important to measure whether an adaptation strategy or policy has been successful. Conditions should be monitored over time [63], and monitoring can be done qualitatively or quantitatively. Policies and grant programs should include mechanisms to evaluate whether and how the effort meets its stated equity goals [5]. Data can be gathered via reviews, check-ups, surveys, and/or comparing target groups and the general population across multiple time points.

Accountability and monitoring can be established by utilizing community oversight or a steering committee to evaluate program implementation and evaluation criteria. This can also be established by developing a framework or equity lens that can direct climate adaptation projects across a shared set of equity criteria (see Spotlight: City of Seattle, Racial Equity Toolkit, Page 29). Another option is to develop a regional "one-stop-shop" that can serve as a consulting center for local jurisdictions. This one-stop-shop would help embed, monitor, and evaluate climate adaptation plans by increasing overall adaptive capacity in the region.

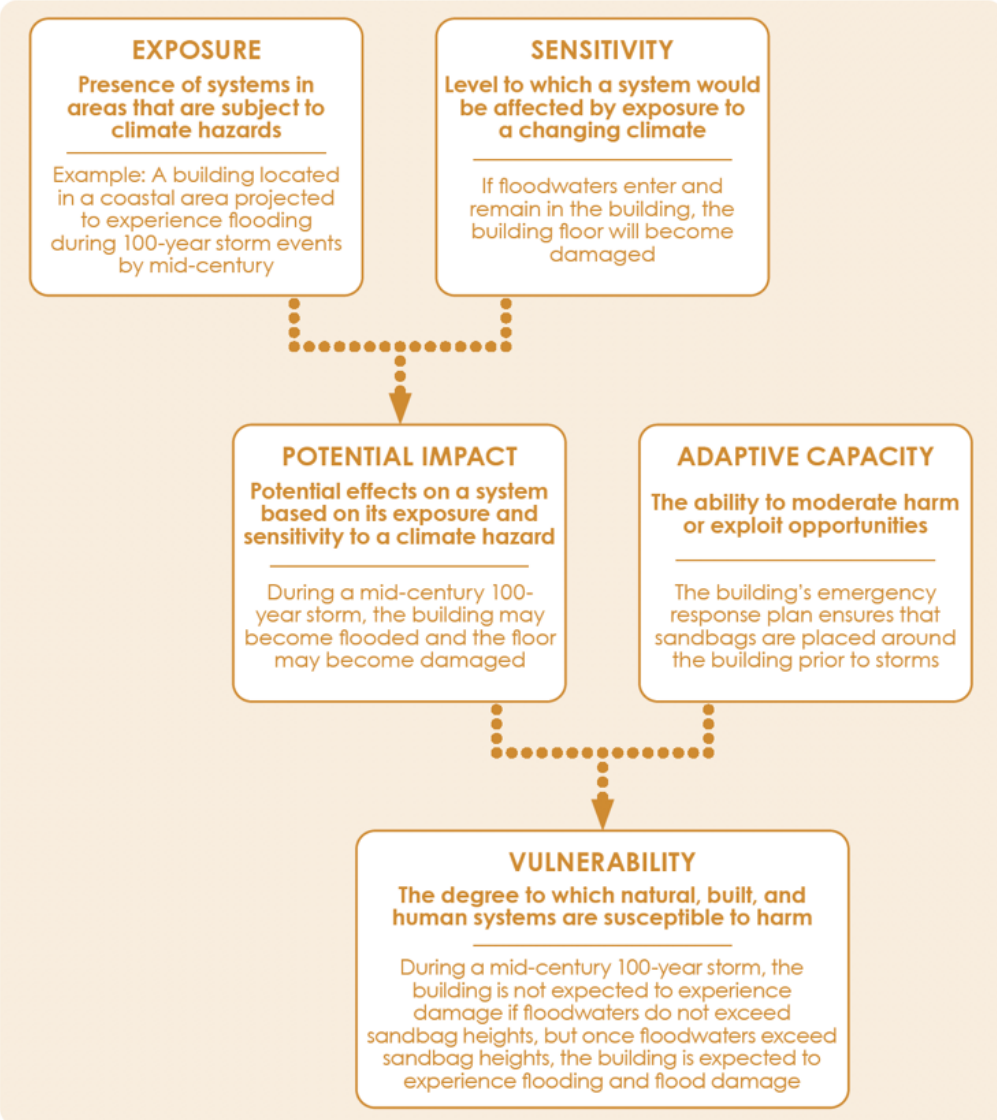
Accountability and monitoring also involves asking: *what are the unintended impacts?* The adaptation program or policy may produce "desirable or unintended disparate impacts between groups despite purported equal access and treatment" [63]. Unintended impacts or maladaptations can be identified early on and developed as a monitoring point.

Vulnerability Assessments

Evaluating climate risk and adaptive capacity are major components of vulnerability assessments and include communities most at risk and assessing intersecting social, environmental, and climate hazards. The APG provides detailed information and resources to develop vulnerability assessments that meet the State's Safety Element requirements, as well as those to integrate into a local hazard mitigation plan (LHMP). Figure 9 details the steps in the vulnerability assessment process.

The APG and ICARP provide a robust synthesis of best practices regarding vulnerability assessments that are beyond the scope of this report. However, it is important to consider that the demographic and socio-economic factors and measures identified throughout this report influence a community's sensitivity to climate change.

Figure 9 APG Vulnerability Assessment Steps



APPENDIX A | LIST OF TERMS

Climate adaptation
The adjustment in natural or human systems in response to actual or expected climatic stimuli or their effects, which moderates harm or exploits beneficial opportunities.[3]

Climate justice
Climate justice is defined as "securing the ability to thrive and survive in a climate-changed future"[5] and "the concept that no group of people should disproportionately bear the burden of climate impacts or the costs of mitigation and adaptation.[3]

Climate vulnerability
The degree to which natural, built, and human systems are at risk of exposure to climate change impacts.

Community-based organization
A group of individuals organized by and for a particular community of people based on shared interests and/or attributes. The community could be defined geographically (e.g., a neighborhood), could contain members from diverse backgrounds, and/or could be defined on the basis of something like religious beliefs or a shared condition. Members may include various stakeholders, such as the public, elected officials, advocacy groups, and business leaders. [14, 15]

Climate equity
Involves addressing historical inequities suffered by people of color, allowing everyone to fairly share the same benefits and burdens from climate solutions and attain full and equal access to opportunities regardless of one's background and identity.[6]

Climate gentrification & green gentrification
The displacement of existing urban populations because of climate change impacts, attributed to both the geographic exposure of one's home (e.g., whether a building is in a floodplain) or its degree of resilience to those impacts (e.g., whether a building is elevated).[7]

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[5] Dunlap, Riley E and Robert J Brulle. (2015). Climate change and society: Sociological perspectives: Oxford University Press.

[6] City of San Diego. (2019). Climate Equity Index Report. https://www.sandiego.gov/sites/default/files/2019_climate_equity_index_report.pdf

[7] Equitable Adaptation Legal & Policy Toolkit. (2020). https://www.georgetownclimate.org/adaptation/toolkits/equitable-adaptation-toolkit/resilient-affordable-housing-anti-displacement-gentrification.html

Community resilience

Community resilience is the ability of communities to withstand, recover, and to learn from past disasters to strengthen future response and recovery efforts. This can include, but is not limited to, physical and psychological health of the population, social and economic equity and well-being of the community, effective risk communication, integration of organizations (governmental and nongovernmental) in planning, response, and recovery, and social connectedness for resource exchange, cohesion, response, and recovery.[3]

Co-benefits

An additional beneficial result of an action to increase resiliency, such as greenhouse gas reduction or increased open green space.[3]

Costs avoided

Avoiding the cost of adaptation. The cost of any additional investment needed to adapt to or exploit future climate change[8]. This can include increases in "costs for electricity and food, contaminated drinking, worsened air pollution and increased asthma rates."[9]

Environmental privilege

The concept of environmental privilege captures how political, economic, and cultural power engender and maintain disparities in the upkeep of and access to urban spaces and how privilege safeguards against knowledge of and experiences with environmental risks.[10]

Equality

The right of different groups of people to have a similar social position and receive the same treatment: equality between the sexes, racial equality, the equalities and inequalities in health care.

Equity

Prioritize actions that promote equity, foster community resilience, and protect the most vulnerable.

Justice

Climate justice is defined as the concept that no group of people should disproportionately bear the burden of climate impacts or the costs of mitigation and adaptation.[3]

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[8] Economics of Adaptation. In: Climate Change 2014: Impacts, Adaptation, and Vulnerability. 2014. Page 952. https://www.ipcc.ch/site/assets/uploads/2018/02/WGIIAR5-Chap17_FINAL.pdf

[9] Making Equity Real in Climate Adaptation and Community Resilience Policies and Programs. August 2019. Page 81. https://greenlining.org/wp-content/uploads/2019/08/Making-Equity-Real-in-Climate-Adaption-and-Community-Resilience-Policies-and-Programs-A-Guidebook-1.pdf

[10] Park, Lisa Sun-Hee and David N Pellow (2013). The slums of Aspen: immigrants vs. the environment in America's Eden: NYU Press.

Maladaptation
Adaptation efforts that worsen a situation, or transfer the challenge from one area, sector, or social group to another.[3]

Marginalized communities
Communities that have historically been denied rights and resources by societal institutions, which has led to a cumulative history of institutionalized oppression.[11]

Mitigation
Strategies, policies, programs, actions, and activities that, over time, will serve to avoid, minimize, or compensate for the impacts to or disruption of elements of the human and natural environment.[12]

Regeneration
A regenerative economy is a sustainable, earth-focused economy that is able to adapt and learn from shocks to the system.[3]

Resilience
The ability to prepare for changing conditions and withstand, respond to, and recover rapidly from disruptions and hazardous events.[12]

Procedural equity
This is about creating outreach, engagement, and involvement processes that are transparent, fair, and inclusive. It focuses on increasing opportunities for engagement and ownership in decision-making, in all aspects of climate resilience planning, by the communities that are disproportionately impacted by and most vulnerable to climate change.[13]

Distributional equity
This is about the fair distribution of resources, benefits, and burdens that result from climate resilience planning decisions. Distributional equity means prioritizing the allocation of finite resources and designing planning strategies to benefit communities that experience the greatest climate and environmental inequities and have the most unmet environmental health needs, while also ensuring that these communities do not disproportionately experience economic, social, or environmental burdens as a result of such planning decisions.[9]

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[11] Roadmap towards justice in urban climate adaptation research. January 2016. Page 132. https://www.researchgate.net/profile/Isabelle-Anguelovski/publication/292178387_Roadmap_towards_justice_in_urban_climate_adaptation_research/links/57055dc108ae44d70ee34238/Roadmap-towards-justice-in-urban-climate-adaptation-research.pdf

12 *San Diego Forward 2021 Regional Plan*. (2021). San Diego Association of Governments. (SANDAG). https://sdforward.com/mobility-planning/2021-regional-plan

[13] Climate Change Solutions II Appendix D – Incorporating Equity into Climate Resilience Activities.

Structural equity

This involves making planning decisions that recognize and address the underlying structural and institutional systems that are at the root of economic, social, and racial inequities. It is an approach to decision making that overtly seeks to correct past harms and to anticipate and prevent future unintended consequences for underrepresented social and racial groups. An approach based on structural equity examines whether planning decisions to achieve climate resilience also eliminate poverty, create workforce development opportunities, address racism, increase civic participation and social cohesion, protect housing availability and affordability, increase educational outcomes, and improve public health outcomes.[9]

Frontline communities

Examples include low-income communities, communities of color, and tribal nations, which are especially vulnerable to climate change impacts because of long-standing structural and institutional inequities. Decades of underinvestment by the public and private sectors have left frontline communities with outdated critical infrastructure, disproportionately high costs for energy and transportation, and limited access to public services. Moreover, these communities have disproportionately higher levels of pollution and often lack quality jobs and educational opportunities to lift families out of poverty. These unjust conditions have resulted in frontline communities having a low adaptive capacity to cope with the effects of climate change. Therefore, climate resilience cannot be achieved without ensuring that frontline communities are prioritized in all climate mitigation and adaptation planning.[9]

Social equity communities

Areas disproportionately affected by environmental pollution and other hazards that can lead to negative public health effects, exposure, or environmental degradation, or with concentrations of people that are of low income, high unemployment, low levels of homeownership, high rent burden, sensitive populations, or low levels of educational attainment.[9]

Vulnerable communities

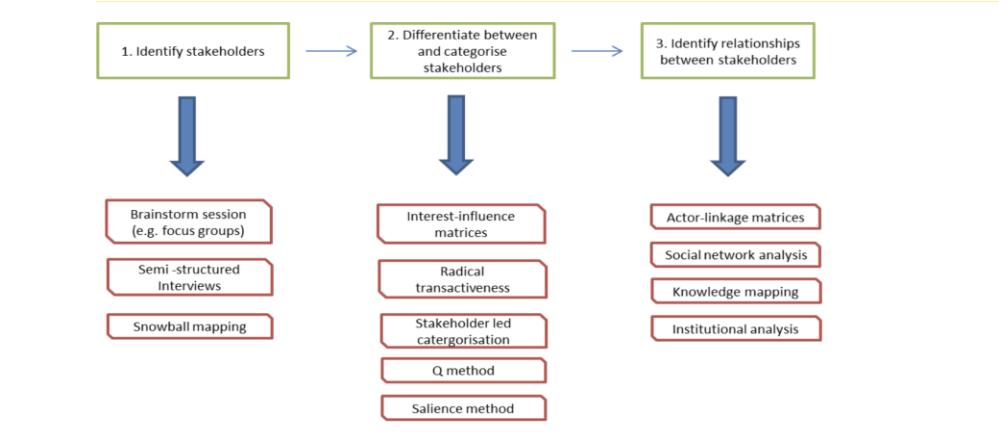
Climate vulnerability describes the degree to which natural, built, and human systems are at risk of exposure to climate change impacts. Vulnerable communities experience heightened risk and increased sensitivity to climate change and have less capacity and fewer resources to cope with, adapt to, or recover from climate impacts. These disproportionate effects are caused by physical (built and environmental), social, political, and/or economic factor(s), which are exacerbated by climate impacts. These factors include, but are not limited to, race, class, sexual orientation and identification, national origin, and income inequality.[9]

Vulnerable populations

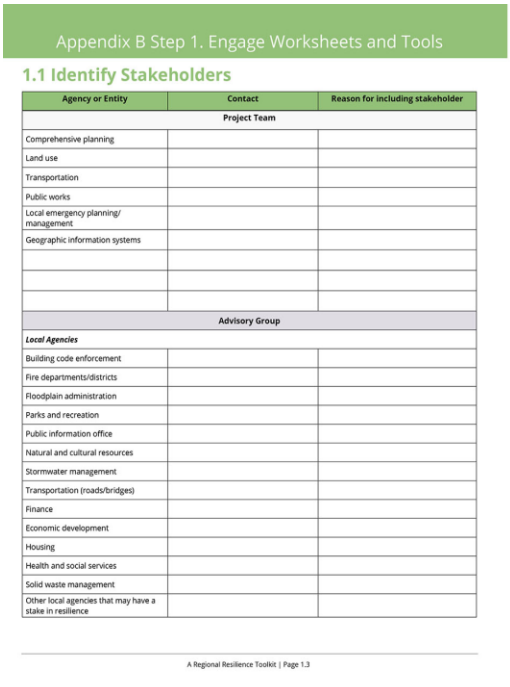
Vulnerable populations include, but are not limited to women; racial or ethnic groups; low-income individuals and families; individuals who are incarcerated or have been incarcerated; individuals with disabilities; individuals with mental health conditions; children; youth and young adults; seniors; immigrants and refugees; individuals who are limited English proficient (LEP); and Lesbian, Gay, Bisexual, Transgender, Queer, and Questioning (LGBTQQ) communities, or combinations of these populations.[3]

APPENDIX B | STAKEHOLDER ENGAGEMENT RESOURCES

1. RESIN Project: Supporting Decision-Making for Resilient Cities has resources for involving stakeholders that detail multiple methods and practices for developing stakeholder identification and engagement, and the pitfalls and benefits of each.



2. A Regional Resilience Toolkit, Stakeholder Mapping. Also see the California Climate Adaptation Planning Guide 2.0.

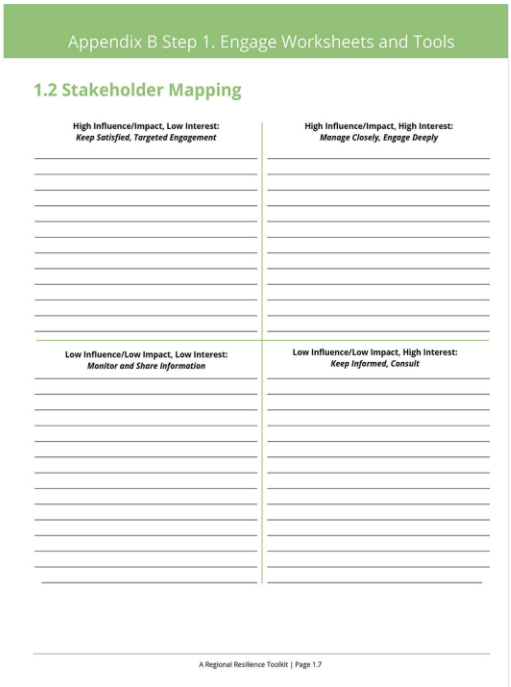


Appendix B Step 1. Engage Worksheets and Tools

1.1 Identify Stakeholders

Agency or Entity	Contact	Reason for including stakeholder
Project Team		
Comprehensive planning		
Land use		
Transportation		
Public works		
Local emergency planning/ management		
Geographic information systems		
Advisory Group		
Local Agencies		
Building code enforcement		
Fire departments/districts		
Floodplain administration		
Parks and recreation		
Public information office		
Natural and cultural resources		
Stormwater management		
Transportation (roads/bridges)		
Finance		
Economic development		
Housing		
Health and social services		
Solid waste management		
Other local agencies that may have a stake in resilience		

A Regional Resilience Toolkit | Page 1.3



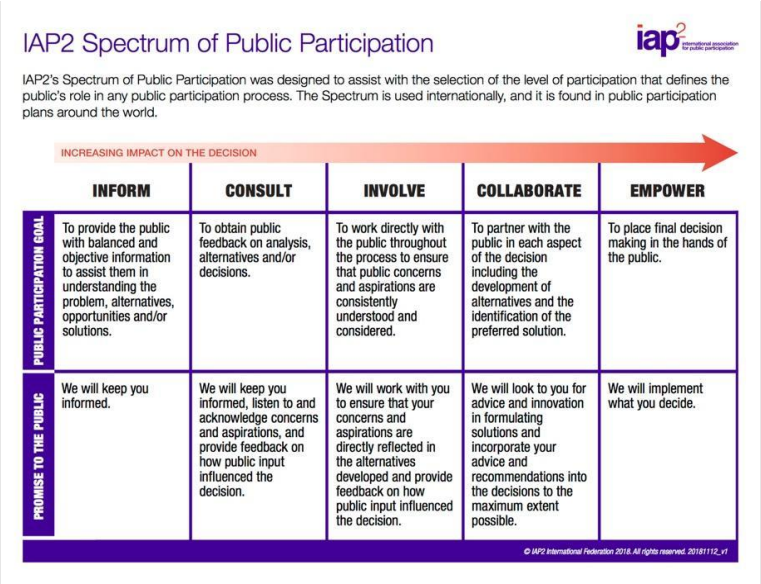
Appendix B Step 1. Engage Worksheets and Tools

1.2 Stakeholder Mapping

High Influence/Impact, Low Interest: *Keep Satisfied, Targeted Engagement*	High Influence/Impact, High Interest: *Manage Closely, Engage Deeply*
Low Influence/Low Impact, Low Interest: *Monitor and Share Information*	Low Influence/Low Impact, High Interest: *Keep Informed, Consult*

A Regional Resilience Toolkit | Page 1.7

3. IAP2 Spectrum of Public Participation (https://cdn.ymaws.com/www.iap2.org/resource/resmgr/pillars/Spectrum_8.5x11_Print.pdf)



IAP2 Spectrum of Public Participation

IAP2's Spectrum of Public Participation was designed to assist with the selection of the level of participation that defines the public's role in any public participation process. The Spectrum is used internationally, and it is found in public participation plans around the world.

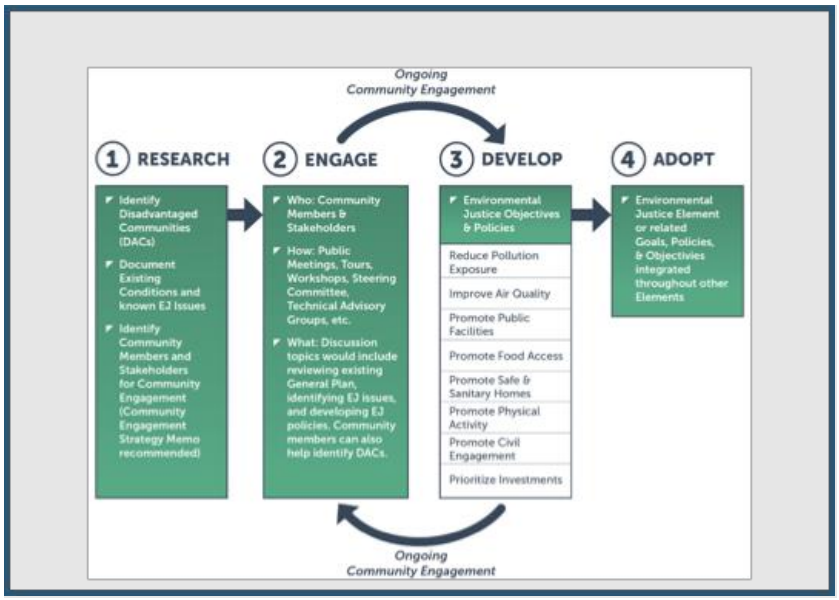
INCREASING IMPACT ON THE DECISION

	INFORM	CONSULT	INVOLVE	COLLABORATE	EMPOWER
PUBLIC PARTICIPATION GOAL	To provide the public with balanced and objective information to assist them in understanding the problem, alternatives, opportunities and/or solutions.	To obtain public feedback on analysis, alternatives and/or decisions.	To work directly with the public throughout the process to ensure that public concerns and aspirations are consistently understood and considered.	To partner with the public in each aspect of the decision including the development of alternatives and the identification of the preferred solution.	To place final decision making in the hands of the public.
PROMISE TO THE PUBLIC	We will keep you informed.	We will keep you informed, listen to and acknowledge concerns and aspirations, and provide feedback on how public input influenced the decision.	We will work with you to ensure that your concerns and aspirations are directly reflected in the alternatives developed and provide feedback on how public input influenced the decision.	We will look to you for advice and innovation in formulating solutions and incorporate your advice and recommendations into the decisions to the maximum extent possible.	We will implement what you decide.

4. Groundworks USA, Best Practices for Community Engagement: Tips for Engaging Historically Underrepresented Populations in Visioning and Planning (https://groundworkusa.org/wp-content/uploads/2018/03/GWUSA_Best-Practices-for-Meaningful-Community-Engagement-Tip-Sheet.pdf). This table has been adapted specifically for this Equity Guidance, please see reference directly for the complete table and resource.

Best Practices for Community Engagement: Tips for Engaging Historically Underrepresented Populations in Visioning and Planning	
Action	**Questions to Ask**
Identify who is underrepresented at your meeting or event.	• Why do you define this particular population this way? How can this information guide your planning and outreach efforts?
Listen more than you speak.	• Seek the perspective, expertise and lived experience of each person you meet.
Gather input and buy-in on your project, its aims, and its marketing materials.	• Seek input from the groups you are actively trying to engage. • Invest time in building relationships with grassroots community leaders who may serve as information conduits. Acknowledge their time and efforts explicitly.

5. The Environmental Justice Planning Process: SB 1000 https://calgreenzones.org/wp-content/uploads/2020/06/Toolkit-fact-sheets-Ch-2.pdf



APPENDIX C | EQUITY INDICATORS AND SOURCES

Table 15 Equity Indicators and Sources

Category	Indicator Type	Examples of How Indicators Can Be Measured	# Indicators in 15 Select Indices/Tools
Community Resources and Characteristics	Community Safety	- Violent crime rates per 1,000 - Percentage of individuals afraid to walk through the neighborhood during the day/night per 1,000	8
	Community Resources (e.g., parks and open space)	- Percentage of the population living within ½ -mile of a park, beach, or open space greater than 1 acre - Proportion of neighborhood made up of park space. - Density of community resource facilities - Travel time to community resource facilities	11
	Financial Services Access	- Proportion of unbanked and underbanked households in the neighborhood - Dollars invested in each geographic analysis unit	2
	Neighborhood Cohesion	- Percent of population who trust their neighbors - Scores on perceptions of trust, commonality, and sharing with neighbors	2
	Philanthropy	- Number of foundations per 10,000 residents - Percentage of individuals giving between $1-$500 and $500+ per year - Employment rate in arts and nonprofit organizations	4
	Retail Density	- Combined employment density for retail, entertainment, and educational uses (jobs/acre)	1
	Voter Participation	- Percent of registered voters voting in last election - Percent of eligible voters registered to vote	5
Demographic	Age	- Percent of population by age class	5
	Disability (physical and/or mental)	- Percent of population with a physical and/or mental disability	7
	Elderly	- Percent of population over the age of 65 years - Percent of the population over the age of 65 years and living alone	8
	Foreign Born	- Percent of the population born outside the US or US territory	2
	Income	- Mean/median household income - Mean/median wage/hour - Share of workers earning at least $15/hour	13
	Limited English Proficiency	- Percent of households with no one aged >=14 years speaking English	9
	Low Income / Poverty Rate	- Percent of households under 80% of the median household income - Percent of population living at or under the federal poverty line - Percent of population living at or under 200% of the federal poverty line	17
	Parents per Household	- Percent of households that are single-parent - Percentage of children with two married or partnered parents/caregivers	2
	Population Growth	- Percent change in population by race/ethnicity - Projected growth in population	3
	Race & Ethnicity	- Percent of population by major race/ethnicity group - Precent of population a person of color	16

Category	Indicator Type	Examples of How Indicators Can Be Measured	# Indicators in 15 Select Indices/Tools
	Youth	- Percent of households with children - Percent of population under the age of 5 years - Number of 16- to 24-year-olds not working or in school	6
Education	Educational Attainment	- Percent of population aged >=25 years with less than a four-year college educational attainment - Percentage of 15–17-year-olds enrolled in school - Percent of high schoolers graduating - Percent of population over age 25 with a bachelor's education or higher	14
	Free & Reduced-Price Lunch Program Participation	- Number of students eligible for free and reduced-price meal programs	2
	Preschool Enrollment	- Percent of 3- and 4-year-olds enrolled in preschool	2
	Reading Proficiency	- Proportion of third or fourth grade students meeting or exceeding "proficient" reading levels on standardized assessments in neighborhood schools	1
	School Attendance	- Proportion of students chronically absent from neighborhood schools (i.e., missing more than 5% school days).	1
	School Readiness	- Proportion of neighborhood kindergarteners prepared for first grade.	1
Employment	Employment Rate	- Percent of population aged 16+ and employed - Percent of population aged 16+ and employed for more than 12 months - Unemployment rate measured by number of unemployed individuals to the total population	11
	Employment Resources	- Perception of the availability for quality education, professional development or training for jobs	1
	Employment Type	- Percent of population employed and aged > 16 working outdoors - Percent of population in non-salaried positions - Percent of workforce considered non-essential - Percent of households reporting self-employment income	6
	Local Businesses	- Proportion of small (0-4 employees), locally owned businesses within a neighborhood - Percent change in number of neighborhood businesses from the previous year	5
Environmental	Air Quality	- Three-year annual mean concentration of particulate matter (PM2.5) - Spatial distribution of gridded diesel PM emissions from on-road and non-road sources for a 2012 summer day in July (kg/day) - Three-year average daily maximum ozone concentration - Number of days above regulatory standards for select pollutants (Ozone, PM 2.5)	24
	Drought	- Palmer drought severity index - Number of months of mild or worse drought per year and the maximum number of consecutive months of mild or worse drought	3
	Environmental Hazard Sites (e.g., Waste, Brownfields)	- Proportion of the neighborhood located near a Brownfield site - Proportion of neighborhood located near an active Superfund site - Number of permitted hazardous waste facilities and hazardous waste generators in each census tract weighted by proximity to populated areas	27
	Extreme Heat	- Projected number of extreme heat days - Projected increase in warm nights	8

Category	Indicator Type	Examples of How Indicators Can Be Measured	# Indicators in 15 Select Indices/Tools
	Flood Risk (inc. Sea-Level Rise)	- Percent of population living in sea level rise inundation areas - Percent of population living within the 100-yr flood plain	6
	Land Cover (inc. tree cover)	- Percent of area cover by tree canopy - Percent of area covered by impervious surfaces	10
	Pesticide Use	- Amount of pesticides applied (lb/sq.mi.) in production-agriculture	7
	Traffic Density and Proximity	- Proportion of a residential neighborhood located near roads with heavy traffic - Traffic volumes by the total road length	9
	Urban Heat Island	- Urban Heat Island Index	2
	Water Consumption	- Water demand per capita	3
	Water Quality	- Cal EnviroScreen 3.0 drinking water contaminant index for selected contaminants - Number of polluted water bodies	27
	Wildfire Risk	- Percent of population currently living in very high wildfire risk areas	4
Health	Alcohol Access	- Number of stores selling alcohol for "off-site" consumption per 10,000 people - Percentage of the population residing within ¼ mile of an off-site sales alcohol outlet	4
	Alcoholism	- Crude prevalence of binge drinking, adults aged 18+ years	1
	Arthritis	- Crude prevalence of arthritis, adults aged 18+ years	1
	Asthma Rate	- Age-adjusted rate of emergency department (ED) visits for asthma per 10,000 - Crude prevalence of current asthma, adults aged 18+ years	6
	Blood Lead Levels	- Proportion of 1- and 2-year-olds tested for lead with a blood lead level over 5 micrograms per deciliter	1
	Cancer Rate	- Crude prevalence of cancer (excl .skin cancer), adults aged 18+ years	2
	Chronic Disease	- Age-adjusted mean body mass index	1
	COVID-19 Rates	- COVID-19 death rate - COVID-19 positivity rate - COVID-19 hospitalizations	3
	Diabetes / Obesity	- Crude prevalence of obesity, adults aged 18+ years	2
	Food Access	- Percentage of the urban and small-town population residing less than 1/2 mile from a supermarket/large grocery store, and the percent of the rural population living less than 1 miles from a supermarket/large grocery store - Proportion of a neighborhood that is low income and has no access to affordable, healthy food	4
	General Health (physical and/or mental)	- Crude prevalence of mental health not good for 14+ days, adults aged 18+ years - Crude prevalence of no leisure-time physical activity, adults aged 18+ years	6
	Healthcare Access	- Percent of population without health insurance - Percentage of adults aged 18 to 64 years currently insured - Number of hospital beds per capita - Number of hospitals	11
	Heart Related Conditions (inc. heart attacks, coronary disease, high blood pressure, etc.)	- Age-adjusted rate of emergency department visits for AMI per 10,000 - Crude prevalence of coronary heart disease, adults aged 18+ years - Crude prevalence of high blood pressure, adults aged 18+ years	6
	Kidney Disease	- Crude prevalence of chronic kidney disease, adults aged 18+ years	1

Category	Indicator Type	Examples of How Indicators Can Be Measured	# Indicators in 15 Select Indices/Tools
	Life Expectancy	- Life expectancy at birth	3
	Low Infant Birthweight	- Proportion of infants born with low birth weight (< 2500 grams)	6
	Preventable Hospitalizations	- Age and sex adjusted hospitalization rate for conditions where appropriate outpatient care prevents or reduces the need for a patient to be admitted to the hospital	1
	Pulmonary Disease	- Crude prevalence of chronic obstructive pulmonary disease, adults aged 18+ years	1
	Smoker Rate	- Crude prevalence of current smoking, adults aged 18+ years	1
	Stroke	- Crude prevalence of stroke, adults aged 18+ years	1
Housing	Crowdedness	- Percent of households with more people than rooms - Percentage of households with more than 1.5 occupants per room	4
	Digital Access	- Percent of households with internet access	2
	Energy Cost Burden	- Proportion of household income spent on energy bills	1
	Homeownership	- Percent of occupied housing units occupied by property owners	2
	Housing Condition(s)	- Proportion of neighborhood housing built before 1980 - Percent of households without air conditioning - Percent of households with a complete kitchen	6
	Housing Cost Burden	- Proportion of household income spent on housing - Percentage of low-income homeowners paying more than 50% of income on housing costs - Proportion of neighborhood households whose housing costs are 35% or more of their gross income	13
	Housing Type	- Percent housing units with 10 or more units in structure - Percent housing units that are mobile homes - Percent of persons who are in institutionalized group quarters (e.g., correctional institutions, nursing homes) and non-institutionalized group quarters (e.g., college dormitories, military quarters)	6
	Housing Vacancy Rates	- Proportion of vacant residential properties	1
	Renewable Energy	- Number of solar PV systems per capita	2
	Renters	- Percent of population living in a rented household	2
	Residential Mobility	- Proportion of neighborhood residents, age one year and older, living in the same house as the previous year	1
Mobility	Bicycle Access	- Bike-ability scores	1
	Commute Mode	- Proportion of neighborhood residents commuting to work by transit, bicycle, foot, or carpool	4
	Commute Time	- Average amount of time (in minutes) it takes a neighborhood resident to commute to work - Percent of population with a commute time greater than the regional average	6
	Pedestrian Access	- Walkability scores - Density of pedestrian-oriented intersections within a neighborhood - 5-year annual average rate of severe and fatal pedestrian injuries per 100,000 population	4
	Public EV Charging Infrastructure	- Number of public EV chargers per capita	1
	Street Conditions	- Jurisdiction assigned street condition scores	1

Category	Indicator Type	Examples of How Indicators Can Be Measured	# Indicators in 15 Select Indices/Tools
	Transit Access	- Percent of population residing within ½ mile of a major transit stop - Frequency of transit service within a .25-mile during peak evening hours - Percent of population not residing within 0.5 mile of bus/ferry/ferry stop with <15 minutes waiting time during peak commute hours	7
	Transportation Cost Burden	- Proportion of household income spent on transportation	3
	Vehicle Access	- Percent of occupied households with no vehicle ownership	6
	Vehicle Collisions	- Annual incidence of motor vehicle collision injuries and fatalities per 1,000 residents for all modes of transportation on public roadways and right of ways.	2
Other	Other Index or Defined Zone(s)	Refers to another index/tool and includes them as an additional layer	7

Table 16 Indices and Tools

Indices/Tools	Source	Full Name
City of SD CEI	City of San Diego, EPIC	Climate Equity Index
CDC SVI	Center for Disease Control	Social Vulnerability Index
Berkeley COVID-19	Othering & Belonging Institute (UC Berkeley)	COVID-19 Mapping
HPI	Public Health Alliance of Southern California	Healthy Places Index
CalBRACE	CA Dept. of Public Health (CDPH)	CA Building Resilience Against Climate Effects
CalEnviroScreen 3.0	CA Office of Environmental Health Hazard Assessment	CalEnviroScreen
HCAT	US HUD, Office of Policy Development and Research	Healthy Communities Assessment Tool
NEA	National Equity Atlas	PolicyLink and USC Equity Research Institute
OR CHVA	Oregon Climate and Health Program	Climate & Health Vulnerability Assessment
CDC NEPHT	Center for Disease Control	National Environmental Public Health Tracking
ASI	University of Texas at Austin, RGK Center for Philanthropy and Community Service	Austin Area Sustainability Indicators
EJSM	Equity Research Institute (ERI), USC Dornsife	Environmental Justice Screening Method
CEVA	Huang and London	Cumulative Environmental Vulnerabilities Assessment
SEAM	SANDAG	Social Equity Analysis Methodology
Spatial Equity Data	Urban Institute	Spatial Equity Data Tool – Measure Disparities in Your Data

APPENDIX D | EQUITY AND TRANSPORTATION RESOURCES

An equity analysis of clean vehicle rebate programs in California - Ju, Y., Cushing, L.J. & Morello-Frosch, R. (2020)

These findings indicate that design elements such as an income cap, income-tiered rebate amounts, expanded vehicle eligibility, and increased benefit eligibility in social equity communities, can facilitate distribution of rebates to more socioeconomically diverse populations with higher air pollution burdens.

California Adaptation Planning Guide - CA Governor's Office of Emergency Services (2020)

The APG provides guidance to local governments on local adaptation and resiliency planning. This includes specifics on the transportation sector.

Clean Mobility Equity: A Playbook Lessons from California's Clean Transportation Programs - The Greenlining Institute (2021)

We need to better understand whether and how clean transportation programs truly address equity in a comprehensive and effective way and make use of knowledge gained in recent years. This report reviews California's clean mobility equity programs, noting successes, pitfalls and areas for improvement.

Clean Mobility Options for Disadvantaged Communities, San Joaquin Valley - program funded by California Climate Investments (CCI)

The San Joaquin Valley Air Pollution Control District was awarded $2.25 million to launch a pilot project, Ecosystem of Shared Mobility, which will provide San Joaquin Valley residents with new modes of travel, while also reducing air pollution and GHGs emissions. The pilot project consists of multiple components: an electric vehicle car sharing program called Míocar, a volunteer ride program, and a smartphone application called Vamos that brings together planning, reservation, and payment for travel across cars and buses.

Co-Designing Equitable Transportation in Southeast San Francisco - Reflex Design Collective

This news article discusses how the Equity Design process is used to improve transportation options in a historically underinvested neighborhood facing an imminent wave of gentrification.

Car Sharing and Mobility Hubs in Affordable Housing Pilot Project - Community Transportation Needs Assessment - TransForm (2020)

The Metropolitan Transportation Commission (MTC), the Bay Area's transportation planning, financing and coordinating agency, in partnership with TransForm, a nonprofit addressing climate change and social inequity through transportation and housing solutions, received a $2.25 million grant from CARB to design and implement the Car Sharing and Mobility Hubs in Affordable Housing pilot project, which includes three mobility hubs in social equity communities in Oakland, Richmond, and San Jose. This report was prepared to detail the steps taken by the project team to complete the needs assessment, summarize key findings, and share lessons learned. We intend for this report to serve as a helpful resource for other

organizations considering conducting a transportation needs assessment in their own communities.

Low-Income Barriers Study, Part B: Overcoming Barriers to Clean Transportation Access for Low-Income Residents - California Air Resources Board (2018)

Pursuant to the Clean Energy and Pollution Reduction Act of 2015, Senate Bill (SB) 350 (De León, Chapter 547, Statutes of 2015), the California Air Resources Board (CARB or Board) presents its findings on the barriers low-income residents, including those in social equity communities, face to access zero-emission and near zero-emission transportation and mobility options, and recommendations to increase access. Recommendations establish a pathway to overcome these barriers statewide. This document supplements the California Energy Commission's "Low-Income Barriers Study, Part A: Overcoming Barriers to Energy Efficiency and Renewables for Low-Income Customers and Small Business Contracting Opportunities in Disadvantaged Communities" that presents the barriers and opportunities to expand low-income residents' access to energy efficiency, weatherization, and renewable energy investments, and for small businesses contracting opportunities in disadvantaged communities.

Mobility Equity Framework - The Greenlining Institute (2018)

To establish a transportation system that benefits all people, California must embrace an equitable deployment of investments and policy interventions to prioritize the mobility needs of low-income individuals of color and address the historical neglect they have experienced. This type of reform must center social equity and community power as primary values in all transportation planning and decision-making. To get there, this paper proposes a framework designed to elevate these values and address structural inequities through an adaptable, customizable process for community, advocates, and transportation decision-makers.

Racial Equity Impact Assessment & Implementation Guide - Environmental / Justice Solutions (2020)

This Assessment and Guide is the work of the Equity Facilitator team, led by Environmental / Justice Solutions, and provides a comprehensive set of recommendations and best practices to help City of Oakland staff maximize equity throughout the 2030 Equitable Climate Action Plan's 10-year implementation period. Pages 26-27 has specific guidance for maximizing equitable outcomes in transportation and land-use.

Sustaining Clean Mobility Equity Programs - The Greenlining Institute (2021)

Establishing long-term financial sustainability for clean mobility equity programs represents one of the largest challenges that these programs face. In Clean Mobility Equity: A Playbook, The Greenlining Institute conducted an equity evaluation of a selection of California's clean mobility equity programs. We used Greenlining's Six Standards for Equitable Investment and the Making Equity Real Framework, to explore several ways that these programs may be able to generate and sustain the funding needed to continue the operation of clean mobility equity programs.

Transformative Climate Communities Program - California Strategic Growth Council (2019)

The Transformative Climate Communities (TCC) Program is part of the California Climate Investments, a statewide initiative that puts billions of Cap-and-Trade dollars to work reducing greenhouse gas emissions, strengthening the economy, and improving public health

and the environment — particularly in social equity communities. This includes investments in the transportation sector.

Travel Behavior - Shared Mobility and Transportation Equity - U.S. Department of Transportation, Federal Highway Administration (2017)

In an effort to categorize the myriad of transportation equity barriers facing transportation system users, this primer proposes a STEPS to Transportation Equity framework including: Spatial, Temporal, Economic, Physiological, and Social barriers. For each barrier category, shared mobility opportunities and challenges are explored along with policy recommendations. The supporting content for this primer reflects a literature review and discussions with 11 experts from the public, private, and non-profit sectors that were conducted by researchers at the Transportation Sustainability Research Center (TSRC) between January and February 2017.

APPENDIX E | REFERENCES

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