Making Hawai'i Climate Ready:

Developing a Playbook for Adaptation and Resilience to Sea Level Rise Impacts

Rising Seas Means Rising Vulnerabilities

As Hawai'i begins to implement adaptation to sea level rise and its impacts–water from the ocean (sea level rise and coastal erosion), water from the sky (severe downpours or "rain bombs"), and water from the land (floods from overflowing storm drains even on dry days)—it will need to look at a suite of planning and policy tools to chart its adaptation path over the next decade. While studies and reports are an essential foundation for the work that needs to be done, the full gamut of activities that need to be planned for and set in place are not yet clearly charted in Hawai'i.

At the State's first annual climate change conference held on January 14, 2019, an expert panel reiterated the state's role, and expanded on the recommendations of the Hawai'i Climate Change Mitigation and Adaptation Commission's 2018 statement to counter the impacts of sea level rise.[1] The panel recommended that the state "consider adopting a community resilience-building planning process to help Hawaii's communities, counties and institutions of any scale to identify their top priorities based on climate change hazards cross-referenced to strengths and vulnerabilities relative to infrastructure, social and environmental characteristics."[2] This brief attempts to outline the various steps for coordination, planning, and implementation for adaptation to climate change in Hawai'i, especially to the impacts of sea level rise.

Hawai'i is part of a 25-Governor network, the US Climate Alliance, which collectively addresses climate change issues at the state level. Hawai'i looks to the trajectories of 3 Alliance states-- California, Massachusetts and Delaware – all of which have been grappling with similar sea level rise issues. Their experiences are used here as examples of potential pathways for Hawai'i. While climate equity is a major focus for Hawaii's Climate Change Commission, it is not the focus of this brief, and will be discussed in detail elsewhere.

Panel Briefing Disclaimer: This is a draft document produced for discussion purposes for the 2020 Climate Conference of the State's Climate Commission. This is not a peer reviewed paper. Since this is an emerging document with gaps that need to be filled, if you have any information that would further its intent, please contact the Hawai'i Climate Change Mitigation and Adaptation Coordinator, Anukriti Hittle at the following email: Anukriti.s.Hittle@Hawai'i.gov. Date of document: January 10, 2020. Acknowledgement is due to Casey Ambrose, DOFAW Kupu member, for research, graphics and formatting assistance.

[1] "Paddling together to Accelerate Actions for Adaptation to Sea Level Rise", Panel Discussion, Hawai'i Climate Change Conference (2019)

[2] "State Climate Adopts Recommendations for Countering Impacts of Sea Level Rise", Press Release, Department of Land and Natural Resources (2018)

Climate Ready Hawai'i: A Coordinated Approach to Sea Level Rise Adaptation and Resilience

The rationale for the panel's recommendations lies in the fact that the foreseeable impacts of rising sea levels are deeply concerning to Hawai'i due to its geographic isolation, coastal-focused society, and present-day impacts from coastal erosion and flooding. Hawaii's vulnerability to climate change and sea level rise is clearly described in the Climate Commission's *2017 Hawai'i Sea Level Rise and Vulnerability and Adaptation Report* (*Hawai'i Sea Level Rise Report*)[3], the 2018 National Climate Assessment, Sea Level Rise Guidance from the City and County of Honolulu Climate Change Commission, and elsewhere.

In 2018, the mayors of Maui and Honolulu Counties issued directives accepting the findings of the *Hawai'i Sea Level Rise Report*[3] and instructing their county agencies to begin considering climate change and sea level rise risks in their plans, programs, and capital improvement decisions. Maui County Council later passed a resolution reinforcing the mayor's proclamation. The state and counties are beginning to make significant strides in considering sea level rise in planning and decision-making, such as in the 2018 updated *State Hazard Mitigation Plan*, 2018 updated Kaua'i General Plan, and ongoing work on community plan updates for West Kaua'i, West Maui, and the Honolulu Primary Urban Center, as well as the *Oahu Resilience Strategy*[4]. However, ongoing technical and financial support is urgently needed for state and county agencies in assessing and preparing for increasing impacts from sea level rise. To be maximally effective, agencies, communities, Counties and the state need to approach sea level rise adaptation through a coordinated and collaborative initiative that also addresses the varying challenges and needs among the islands and our urban/rural communities.

The state is proposing an initiative--Climate Ready Hawai'i -- to support communities, and state and county government agencies in maintaining best available science-based information and planning tools and practices for sea level rise adaptation building on the *Hawai'i Sea Level Rise Report* and related efforts. The proposed initiative would implement the Hawai'i Climate Change Mitigation and Adaptation Commission's (Climate Commission) September 4, 2018 statement to "…bring resources to assist in planning and implementation for sea level rise and other climate related impacts."

Build on Hawaii's Progress and Learn from Alliance States

Many questions arise when thinking through what it means for Hawai'i to adapt to sea level rise, and how Hawai'i can prepare for it, such as: What is meant by climate resilience? How do communities and State agencies prepare for climate impacts, and what gets them started? How to plan for such impacts, and involve and inform communities so they can contribute meaningfully in the process and shape it to their priorities and needs? What criteria should state and local government consider in their response to impacts of sea level rise in a way which prioritizes and decides on a course of action for addressing risks to public and private development, while improving community vitality, conserving natural and cultural resources, and more? How to fund this response? How to change and affect development in at-risk/vulnerable areas, and who is making

[3] *Hawai'i Sea Level Rise Report Vulnerability and Adaptation Report*. Hawaii Climate Change Mitigation and Adaptation Commission (2017)

[4] *Ola: Oahu Resilience Strategy*. City and County of Honolulu Office of Climate Change, Sustainability, and Resiliency (2018)

progress in this space? How to consider the impacts on vulnerable communities and formulate policies that will address issues of climate equity?

Answering these questions will help provide an outline of the options for Hawai'i, and its path forward. An analysis of the trajectories of the three states mentioned above, California, Massachusetts, and Delaware, revealed the following common components:

1. Strengthen Policy Framework to Send Clear Signals

A. Define Resilience: Set the Stage for Metrics and Progress

A definition of resilience helps define what success would look like. It helps provide the consistency needed to achieve common goals. Following Webster's Dictionary, The US Climate Alliance's *New Governors' Resilience Playbook* reminds us that resilience is defined as: "the capacity to recover quickly from difficulties; toughness." [5] The Playbook adds that according to Rockefeller Foundation's President Judith Rodin, "Resilience is the ability of people, communities and institutions to prepare for, withstand, and bounce back more rapidly from acute shocks and chronic stresses." The Alliance further defines resilience as the ability for our states and communities to prepare for, endure, and overcome environmental and economic stressors and disturbances induced by climate change.

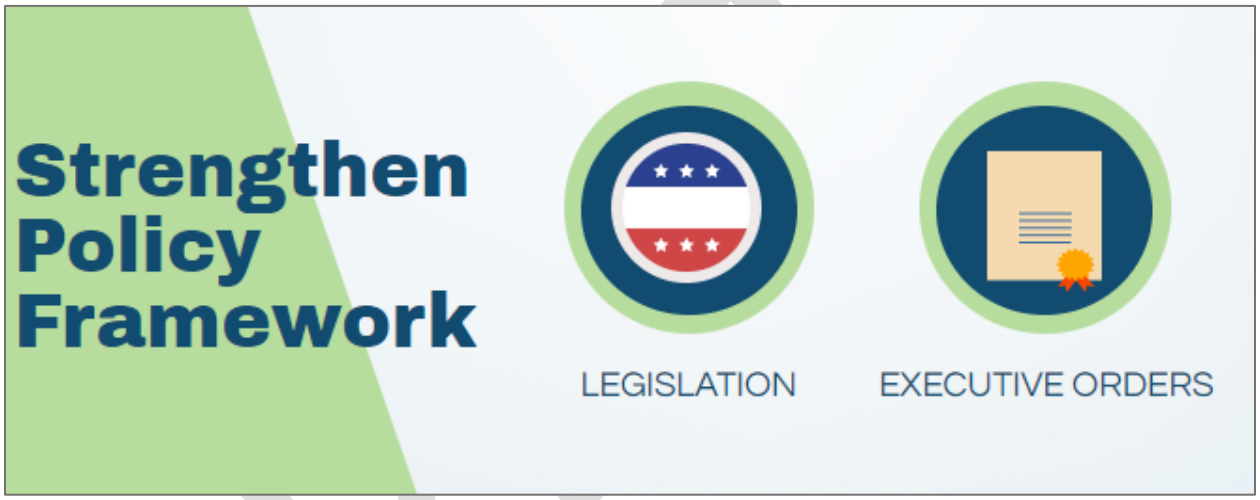
At the state level, California defines it as "strong infrastructure, communities and natural systems that can withstand increasingly volatile conditions."[6] Delaware defines resilience as "the ability to adapt to changing conditions and rapidly recover from disruptions due to emergencies." Massachusetts, in its *State Hazard Mitigation and Climate Action Plan* characterizes resilience as the ability to "position the Commonwealth to effectively reduce the risks associated with natural hazards and the effects of climate change." [7]

[5] *New Governors' Resilience Playbook*, US Climate Alliance (2018)

[6] *Planning and Investing for a Resilient California*: A Guidebook for State Agencies, CA Governor's Office of Planning and Research (2015)

[7] *Massachusetts State Hazard Mitigation and Climate Action Plan* (SHMCAP), Office of the Governor, 2018

Recommendation for Climate Ready Hawai'i. Hawai'i, like California, Delaware and Massachusetts, is experiencing increasingly frequent and far-reaching impacts of climate change and must adapt as quickly as possible, starting with a clearly defined understanding of the meaning of resilience statewide. At the county level, the *O'ahu Resilience Strategy* develops a comprehensive framework for action, but a statewide definition is still needed. Not only will a statewide definition be a useful starting point for developing metrics, it will allow the State to start generating more detailed planning materials that will aid communities and stakeholders in protecting themselves from and planning for future climate change impacts.



B. Strong Executive and Legislative Action Reinforce Each Other

Generally, a combination of laws and administrative directives such as executive orders help to frame the goals for the state and actions for its executive branch. For example, in Massachusetts, EXECUTIVE ORDER NO. 569 issued in 2016, set such a stage for the executive branch, stating "within one year of this Order, we aim to establish a framework for each Executive Office to assess its and its agencies' vulnerability to climate change and extreme weather events, and to identify adaptation options for its and its agencies' assets."[8] This was further strengthened by a law that provided funds for climate change adaptation, among other environmental protection.

Delaware used executive action to clarify the role of state and helped to expand capacity for local jurisdictions. As far back as 2010, Delaware established a sea level rise advisory committee, convened by Department of Natural Resources and Environmental Control Secretary O'Mara, to deal with sea level rise and other climate change issues, and to provide recommendations about how to best prepare for

[8] *Establishing an Integrated Climate Change Strategy for the Commonwealth.* EXECUTIVE ORDER NO. 569. Governor Charlie Baker. Massachusetts (2018)

higher sea levels. Hawaii's own *Sea Level Rise Report* issued in 2017 and accepted by its Climate Change commission produced a similar baseline effort that characterized the situation in Hawai'i .

Directing state agencies, Delaware's Governor Markell issued EXECUTIVE ORDER NO. 41 in 2013 to form a Committee on Climate and Resiliency to:

> "develop agency-specific actionable recommendations for improving Delaware' s preparedness and resiliency to climate impacts on public health and safety, public infrastructure and facilities, water resources, natural ecosystems, agriculture, tourism, and other industries. The recommendations shall prioritize the use of natural systems or green infrastructure as the preferred means to improve resiliency."[9]

Also included in Delaware's EO 41 was the directive that "[a]ll state agencies shall consider and incorporate the sea level rise scenarios set forth by the Delaware Department of Natural Resources and Environmental Control (DNREC) Sea Level Rise Technical Committee into appropriate long-range plans for infrastructure, facilities, land management, land-use, and capital spending. DNREC shall periodically update the scenarios with the best scientific data available and distribute new guidance to state agencies." Since then, climate change/sea level rise issues have been incorporated into many critical planning documents including: the State Hazard Mitigation Plan, the Policies for State Spending and Policy, and state wildlife action plan, and the DOT Strategic Implementation Plan. For Hawai'i , the Climate Commission serves a similar purpose, and is codified in law.[10] However, since the Commission does not have a directive role and can only make recommendations, stronger executive action would be advantageous.

While EO 41 helped clarify the directive for state agencies to work with local governments and support local communities, it did not provide any additional direction. In Delaware, where capacity is limited at the local level, the State operates and maintains much of the public infrastructure. A motivated core group of agencies under DNREC's leadership moved to break down silos through its resource-providing program, Resilient and Sustainable Communities League (RASCL), which is comprised of resiliency practitioners from state government, academia and non-governmental organizations.[11] Much like Massachusetts' Municipal Vulnerabilities Preparedness (MVP) program, RASCL partners collaborate to provide tools and training to local entities to identify vulnerabilities and make plans to implement them. Hawai'i would benefit from such cross-agency collaboration which could potentially be led by the Climate Commission's staff and member departments.

Similarly, in 2015, California's EXECUTIVE ORDER B-30-15 "Planning and Investing for a Resilient California"[6] directed State agencies to integrate climate change into all planning and investment, including accounting for current and future climate conditions in infrastructure investment. From this, emerged an update to the State's climate adaptation strategy, Safeguarding California, to:

- Identify vulnerabilities to climate change by sector and regions, including, at a minimum, the following sectors: water, energy, transportation, public health, agriculture,

[9] AN ACT PROMOTING CLIMATE CHANGE ADAPTION, ENVIRONMENTAL AND NATURAL RESOURCE PROTECTION, AND INVESTMENT IN RECREATIONAL ASSETS AND OPPORTUNITY. 191st General Court. S 209. Massachusetts (2018)

[10] ACT 32. S.B. No. 559. 29th Legislature. State of Hawai'i (2017)

[11] See Delaware Resilient and Sustainable Communities League (RASCL), https://www.derascl.org/

emergency services, forestry, biodiversity and habitat, and ocean and coastal resources;

- Outline primary risks to residents, property, communities and natural systems from these vulnerabilities, and identify priority actions needed to reduce these risks; and

- Identify a lead agency or group of agencies to lead adaptation efforts in each sector.

Building off EXECUTIVE ORDER B-30-15, California passed legislation Senate Bill no. 246 which established the Integrated Climate and Resiliency Program (ICARP) that provided high-level vision and principles and incorporated public input.[12] Together, the executive and legislative tools worked to support action for climate adaptation in California.

Recommendation for Climate Ready Hawai'i. Hawaii's legislature has recognized the risks posed by climate change as early as 1984 by Senate Resolution no. 137. On the executive side, among other efforts, Hawaii's first sustainability plan, published in 2008, addressed these issues, and established goals and recommendations. Though Act 83 (SLH 2014) and Act 32 (SLH 2017), initiatives to deal with sea level rise formed the interagency Climate Adaptation Committee, and the Hawai'i Climate Change Mitigation and Adaptation Commission. However, sea level rise projections are now more dire than before, and Hawai'i must step up its response. Coordinated action is urgently needed in Hawai'i, and now, it is time to instate a combination of legislative and executive action which would provide specific directives for each department to plan for and begin to implement adaptation action.

3. Planning for Resilience: Resources for Communities & Governments

There are two distinct places where action needs to take place: At the county level, where private homes, businesses and local roads and structures are affected; and at the state level where highways, airports, roads, hospitals, schools and other public facilities are affected. To support these actions, a Climate Ready Hawai'i would provide up to date information on sea level rise impacts, produce further guidance for state and local actions, help develop vulnerability assessments including building on work for the *Hawai'i Sea Level Rise Report*, such as was done in Delaware "to assess current and future inundation problems that may be exacerbated by sea level rise and develop a set of recommendations for state agencies, local government, businesses, and citizens;"[13] identify options for adaptation planning; develop a grants program to help communities with their planning and prioritization processes, and help to fund the implementation of these priorities. Each of these aspects of becoming Climate Ready are discussed below.

[12] *Oil and Gas Severance Tax*. S.B. no. 246. California State Legislature (2020)

[13] "From the First State to the Fiftieth State: Strategies for Adapting to Climate Change". 2020 Climate Conference Panel Discussion, Susan E. Love, Delaware Climate and Sustainability Program (2019)

A. Information: Key to Decision Making

Once the policy framework is in place, the next step is to begin soliciting feedback and input as to community and local government priorities. To support such prioritization, an information hub and outreach and training programs have proved useful in other states. Massachusetts' Climate Clearinghouse helps to provide information on the latest climate science, what to expect, community resiliency and links to grants programs and technical assistance. Alongside university partners, they provide specific-to-Massachusetts climate projections and vulnerabilities.

The State of Delaware, with the help of its university and other partners, provides data and latest sea level rise and climate information to its communities. As with the *Hawai'i Sea Level Rise Viewer Tool*, sea level rise maps at 1-foot increments give communities an idea of vulnerable areas and the latest information. California, similarly, provides a clearing house for adaptation through its Fourth Climate Assessment report. [14] [15] [16]

Recommendation for Climate Ready Hawai'i: Develop an information hub to maintain understanding and applicability of the latest and best available information on climate and sea level rise risks. Science and planning approaches for climate change and sea level rise continue to evolve. Coordinating with partners such as Hawai'i Sea Grant, Climate Ready Hawai'i aims to provide the latest information and science to keep agencies and communities informed of the latest observations

[14] See Resilient MA: Climate Change Clearinghouse for Commonwealth, https://www.resilientma.org/

[15] See *Hawaii Sea Level Rise Viewer Tool*, available at: https://www.pacioos.hawaii.edu/shoreline/slr-hawaii/ (2020)

[16] *California's Fourth Climate Change Assessment*: CA Governor's Office of Planning and Research (2018)

and projections for climate change and sea level rise, and so, update and build on previous work such as the *Sea Level Rise Report*[3] and *Viewer.* The Climate Commission and its partners would convene experts in climate science and sea level rise adaption planning from federal, state, and county agencies, the University of Hawai'i and other institutions, non-governmental organizations, and the private sector to provide the latest climate and sea level rise information through various means, such as its annual climate conference, outreach and meetings on each of the islands and written summary materials. Key elements of this component might include:

- Developing briefs, white papers and other relevant documents to capture the latest and best-available information on climate change and sea level rise observations and projections as they relate to Hawai'i; and
- Developing a searchable database containing relevant resources, and an online interface for these.

B. Tools & Outreach: How to Use Available Information

For information to be used effectively, all three states provide outreach opportunities to their local governments and communities--Massachusetts, through its Municipal Vulnerability Preparedness (MVP) program, and Delaware through its Resilient and Sustainable Communities League.

Recommendation for Climate Ready Hawai'i. To get Hawai'i climate ready, and since the issuance and adoption of the State's *Sea Level Rise Report*, it has become increasingly clear that ongoing guidance is needed to implement the recommendations of the report, especially at the local and county levels. As Hawaii's four Counties are forging their own necessary and innovative paths while simultaneously delving into this issue, the State is working in partnership with them to characterize the issues and provide statewide guidance. Eventually, as the need for more tools arises, Hawai'i might consider its own version of RASCL, one that bridges information sources statewide, and provides a coherent interpretation of what is expected. However, there are several such efforts already well underway, and these need to be identified and weighed as to benefits and focus, before any new effort is established.

C. Support Localized and Sector-specific Vulnerability Assessments

In Massachusetts, EXECUTIVE ORDER NO. 569 set the stage for technical assistance for communities through the MVP program and an agency process for short-, medium-, and long-term vulnerability assessments that directed agencies to "Establish an Integrated Climate Change Strategy for the Commonwealth, provide technical assistance to Cities and Towns to complete vulnerability assessments, identify adaptation strategies, and begin implementation of these strategies."[17]

States such as Delaware have provided resources to state and local governments to allow them to develop resiliency plans and vulnerability assessments (VAs). "Delaware's municipal and county governments make land use decisions and administer codes, but often are not large enough to have paid professionals on staff. The state government is largely responsible for the maintenance of roads,

[17] *Establishing an Integrated Climate Change Strategy for the Commonwealth*. EXECUTIVE ORDER NO. 569. Governor Charlie Baker. Massachusetts (2018)

drainage infrastructure, and beaches. Because of the close interactions and interdependence of Delaware's state and local governments, the State's strategy for responding to climate change has focused on providing tools, resources, and technical assistance for these two primary audiences, as well as building partnerships between them."

Recommendation for Climate Ready Hawai'i. Recognizing the urgent need to begin preparing for sea level rise now, institutions need to conduct exposure and vulnerability assessments for critical infrastructure --such as roads, utilities, drainage systems, public lands and facilities. At the county level, directives from Honolulu and Maui County mayors have spurred more localized vulnerability assessments to support required updates to general and community plans, and other government plans. Counties have begun using maps and data from the *Hawai'i Sea Level Rise Vulnerability and Adaptation Report* and companion *Hawai'i Sea Level Rise Viewer Tool*, which provide a basis for assessing sea level rise exposure and vulnerability. This initiative would provide technical guidance in utilizing and interpreting the information, allowing government departments and communities to downscale the data contained in these tools for use in required updates to existing plans (e.g., infrastructure plans, community development plans, hazard mitigation plans, vulnerability assessments), as stand-alone climate adaptation strategies, and/or through updates to state and county policies and regulations. Key elements might include:

- Supporting identification of vulnerable assets, and assessment of sensitivity to sea level rise, through a better understanding of general risks and vulnerabilities from sea level rise for specific agencies, sectors, and communities;
- Identifying short-, medium- and long-term options and preferred strategies to reduce vulnerability and build resilience to sea level rise, along with benefit-cost and pathways analyses to inform decision making; and
- Supporting prioritization of projects by using the results of the vulnerability assessments, while ensuring necessary flexibility to meet localized needs and priorities among the islands through community engagement.

D. Funds for Planning: Community and Agency Grants Programs

For communities to plan for climate change, and because they generally do not have the capacity or resources, states such as Massachusetts and Delaware have stepped in to provide planning funds in the form of grants programs. With these funds, communities (and agencies) identify and prioritize vulnerabilities, and position themselves for implementation. Additionally, in Delaware, funding and technical assistance is available to Municipal governments and State agencies through various programs such as the Resilient Communities Partnership Program, Sustainable Communities planning grants, and the Strategic Opportunity fund for adaptation.

Recommendation for Climate Ready Hawai'i. For Hawai'i, such planning funds need to be identified, and then solicited. Funding is discussed in some more detail in the next section.

4. Funding Adaptation Implementation

States such as Massachusetts and Delaware have access to the Regional Greenhouse Gas Initiative (RGGI) funds.[18] RGGI represents an innovative collaboration among a selection of Eastern states with the goal of reducing power sector CO^2 emissions. It is the first mandatory, market-based CO^2 reduction program in the United States. The program works by providing CO^2 Budget Trading Programs for participating states, limiting allowances and generating revenue through auction allowances.

Massachusetts is taking steps to defend against the significant impacts that climate change has on its communities by increasing the funding available for projects centered around increasing resiliency. In addition to RGGI's funds, Massachusetts's legislature authorized a Green Bond in 2014 and 2018, which provides grants to communities to help prepare for and protect against climate change impacts.[19]

Massachusetts EXECUTIVE ORDER NO. 569 authorized $501 million dollars to respond and prepare for extreme weather, sea level rise, inland flooding and other climate impacts. Since the passing of this legislation in 2018, an additional $11 million dollars in planning and MVP action grants has been made available for state and local efforts. In keeping with EXECUTIVE ORDER NO. 569 and AN ACT PROMOTING CLIMATE CHANGE ADAPATATION, ENVIRONMENTAL AND NATURAL RESOURCE PROTECTION, AND INVESTMENT IN RECREATIONAL ASSET AND OPPORTUNITY (H.4385), in August 2018 Governor Charlie Baker authorized a grand total of $2.4 billion dollars in capital allocations for investments in safeguarding residents, municipalities, and businesses from the impacts of climate change.[20] This legislation codifies the commitments under the EXECUTIVE ORDER NO. 569, which recommends the implementation of a state-wide hazard mitigation and adaptation plan, continuation of the MVP program, and support for ongoing state agency climate change vulnerability assessments. Through these funding mechanisms, both states have helped communities create plans for adaptation, as well as begun implementing these plans.

Recommendation for Climate Ready Hawai'i. Hawai'i does not have the same funding mechanism that is embodied in RGGI. It can, however, investigate the options that exist for a Green Bond issue. Another mechanism for raising revenue for adaptation that is under active discussion and study is that of a carbon

[18] See Regional Greenhouse Gas Initiative, https://www.rggi.org/

[19] "Baker-Polito Administration Awards $5 Million in Grants to Address Climate Change Impacts." Press Release, Massachusetts Executive Office of Energy and Environmental Affairs (2018)

[20] "Ahead of Climate Week, Governor Newsom Announces Executive Action to Leverage State's $700 Billion Pension Investments, Transportation Systems and Purchasing Power to Strengthen Climate Resiliency." Press Release, Office of Governor Gavin Newsome (2019)

tax.[21] What is undeniable, though, that Hawai'i needs to work through the benefits and costs of these mechanisms. In addition, a strong policy framework can help it plan for and align to its ambitious goals for climate change action. As Hawai'i prepares to get climate-ready, it also needs to look at the issues of climate risk to infrastructure. California is already ahead in preparing to do so, and Hawai'i is looking to lessons learned from its larger neighbor.[22]

Moving Forward: Equity in Resilience Planning and Implementation

As Hawai'i grapples with the tough issues of climate change impacts and response, it must also keep in mind the conversation it needs to have with all stakeholders, especially its vulnerable communities. This engagement is crucial in determining priorities for public spending. Using the Climate Commission's equity lens framework that is under development, and in consultation with community leaders, local groups, neighborhood boards, and county governments, a Climate Ready Hawai'i must solicit input across the state to determine what matters to communities with respect to sea level rise adaptation.

This year, Hawaii's Climate Change Commission should look to lessons learned from the paths discussed here and recommendations from the 2020 Climate Conference and adapt them appropriately and swiftly to Hawai'i's context.

[21] Some Thoughts on a Carbon Tax". Yoram Bauman, Hawaii Climate Conference Panel Discussion, Panel 3, Appendix B (2019)

[22] *California's Fourth Climate Change Assessment*: CA Governor's Office of Planning and Research (2018)