HUMBOLDT STATE UNIVERSITY

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Building Community Resilience Workshop

Summary of Findings

March 7, 2019

Resilience is the capacity of our institutions and communities to anticipate risk and to prepare for changing conditions, to retain essential functions during and after a hazard strikes, and to rapidly recover from severe disruptions. We build resilience through the implementation of adaptation pathways that reduce our carbon footprint.

2019 Building Community Resilience Workshop Facilitation

Morgan King, Climate Action Analyst	Lead Facilitator, Summary of Findings Author
Dr. Kathryn Lancaster, School of Business	Workshop Co-Facilitator
Loretta Decker, Business Administration	Table Facilitator, Data Organizer
Tristin Wright, Business Administration	Table Facilitator, Data Organizer
Jordan Holt, Business/Accounting	Table Facilitator, Data Organizer
Jayvin Arechiga, Business Administration	Table Facilitator, Data Organizer

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How do I use this Summary of Findings?

In March 2019 the Humboldt State University (HSU) Office of Sustainability hosted the Building Community Resilience Workshop. The summary of findings from this workshop informs the work ahead to mitigate campus and community exposure to climate change-driven hazards.

*__Read__ this summary of findings to familiarize yourself with our community's current vulnerabilities and strengths to climate change impacts, as well as proposed actions to strengthen community resilience.

*__Understand__ the interrelated social, environmental and infrastructural dimensions of community resilience.

__*Know__ the most critical climate change-driven hazards in our region, and that we must begin planning for a campus and community that can sustain, if not strengthen, its core functions in a climate-constrained world.

__*Integrate__ climate projections and resiliency into the policy development and planning efforts of your community and campus.

1.0 Overview

In Northern California, like elsewhere in the state and across the world, climate change-related impacts are increasing in frequency and severity. Wildfire, sea level rise, intense storm events and other hazards have the potential of – or are already – disrupting nearly all aspects of community function, from public health to economic continuity, agricultural productivity, ecosystem services and infrastructure. Many communities and institutions are now engaged in identifying vulnerabilities to local and regional climate change impacts, and in developing strategies and actions to build greater resilience.

Building resilience means anticipating risks and preparing for changing conditions, so that when a severe hazard strikes, the campus and community will not suffer irreparable harm. Humboldt State University is committed to understanding and managing the impacts of climate change to our campus and within our community, and to preparing our students to be leaders in building resilient communities. On March 7, 2019, the Office of Sustainability hosted the *Building Community Resilience Workshop* as one in a series of forums to engage the campus and community in resilience planning.[i] HSU faculty, staff and students joined community stakeholders from across the Humboldt Bay region for this one day workshop, representing the following agencies and organizations:

- City of Arcata
- Redwood Coast Energy Authority
- Humboldt Co. Board of Supervisors
- Blue Lake Rancheria
- Humboldt Co. Association of Governments
- CSU Chancellor's Office
- Humboldt State University
- Civic Spark Climate Fellow
- Cooperation Humboldt
- Redwood Community Action Agency

Objectives of the workshop were to

a) Define local climate-related hazards of greatest concern;
b) Identify existing and future vulnerabilities to these hazards, as well as any strengths that may buffer the worst impacts of those hazards;
c) Develop prioritized actions to strengthen campus and community resilience, and
d) Advance opportunities to collaborate on planning and strategy implementation into the future.

The lead facilitator began the workshop with a presentation on projected climate variables[ii] for our region, after which three expert panelists[iii] discussed their work and perspectives on preparedness, capacity building and planning. For the remainder of the workshop, facilitators utilized the *Community Resilience Building (CRB) Workshop* model, an established, community-driven process, to facilitate dialogue, collaboration and group decision-making.[iv] The CRB model is built upon the *Risk Matrix*, a means for small groups to organize hazards, vulnerabilities/strengths, and actions into a single grid for deeper review and discussion by the larger group.

Clearly defining our vulnerabilities, as well as our strengths that may support resilience to climate change-driven natural disasters and related impacts, requires an intersectional approach that integrates infrastructural, societal, and environmental dimensions. This comprehensive methodology ensures that planning does not become an issue of emergency preparedness

alone, but rather provides a framework for incorporation into aspects of community development, education, facilities planning and design, and natural resources management.

For this workshop, vulnerabilities to climate change related hazards, as well as shared strengths to mitigate such hazards, were assessed according to three intersectional dimensions of resilience:

- **Societal** – the social dynamics of the campus and community, including access to basic needs, systems of governance, access to education, community and civic engagement, vulnerable populations, social justice priorities and other dynamics affecting equity;
- **Environmental** – the ecosystem services associated with local ecosystems, and the impacts climate change disturbances will have on their services. This dimension includes such natural assets as forests, creeks, wetlands, and agricultural productivity, as well as management practices to protect these assets, and
- **Infrastructural** – the built environment owned, managed and/or used by the campus and community, including existing buildings, transportation and telecommunications networks, energy and water utilities, bridges and dams.

Climate change resiliency planning is a core component of the *Second Nature Climate Commitment*, to which Humboldt State is signatory[v]. This summary of findings will be used as a framework for developing a Campus Resilience Plan, to be integrated into HSU's updated Climate Action Plan (starting in 2021).

2.0 Hazards of Greatest Concern

Prior to the workshop, the lead facilitator polled participants on what they understood to be the most critical natural and climate-related hazards and vulnerabilities facing the Humboldt region, along with initial actions the campus and local communities should take to strengthen resilience. Workshop participants then reviewed climate change projections published by the State of California and discussed the polling results. An estimated three feet of sea level rise by 2050 may cause Humboldt Bay to increase in size by more than 60%. Less frequent, but more intense storm events are anticipated to cause larger and longer-lasting floods and landslides. The number of days above average temperatures will rise, and the average number of hectares burned by wildfire is anticipated to increase by over 30% by 2050. Additional natural and climate-related hazards affecting our area include a statewide decline in snowpack, earthquakes and tsunamis. And, as populations shift as a result of extreme wildfire and other disasters elsewhere, the potential influx of climate refugees into our communities must also be considered. Workshop participants discussed the direct and cumulative effects of these impacts on campus and community populations, agricultural productivity, ecosystems, roads, telecommunication systems, drinking and wastewater systems, neighborhoods and other critical infrastructure. Following discussion, workshop participants came to an agreement on the four hazards anticipated to most impact the campus and local communities:

Hazards of Greatest Concern for the Campus and Communities
i. Sea Level Rise (SLR) Effects (coastal erosion, inundation)
ii. Flooding (rivers, creeks, surface runoff, as well as tidal)
iii. Extreme Weather Events (storm surge, wind, heavy rain)
iv. Wildfire

Although these hazards may have far-reaching impacts, specific areas of concern include but are not limited to:

- Transportation and roads (e.g., Highway 101, SR 255 and municipal roads in SLR inundation zones)
- Agricultural productivity (e.g., impacts on oyster farming from degradation of water quality; Arcata Bottoms and other ag lands inundated by salt water or freshwater flooding)
- Infrastructure (e.g., Arcata wastewater treatment facility in SLR inundation zone, storm-water systems overwhelmed by extreme weather events, telecommunications and power grid knocked out by extreme weather or wildfires, Matthews Dam failure from major storms or earthquake)
- Buildings and Neighborhoods (e.g., Industrial parks and Arcata's Windsong subdivision located in SLR inundation zones, City of Blue Lake impacted by wildfire)
- Ecosystems (e.g., loss of salt and freshwater marsh around Humboldt Bay, forests at risk of wildfire and mudslides)

In February 2019, heavy rains brought flooding to the Eel River Valley, closing Highway 211, isolating the town of Ferndale and causing the death of one person. Source: California Department of Transportation.

3.0 Vulnerabilities to Hazards of Greatest Concern

Humboldt State University and the communities near Humboldt Bay are impacted, either directly or indirectly, by the same climate change hazards, and therefore share many of the same vulnerabilities. Already, during winter storm events, one or more of the primary routes into Humboldt County (i.e., US Routes 101 and 199, State Routes 299 and 36) are regularly closed, due to landslides, flooding or snow conditions. High surf conditions frequently close the entrance to Humboldt Bay. Our communities feel the impacts of these closures in the loss of economic activity, the movement of goods and services, and the ability of residents to reach their homes, work, or emergency services. Similarly, Humboldt State University students and staff may find themselves unable to get to campus or leave the county during winter break highway closures. Food shipments to the university's dining services may not reach the campus, affecting on-campus residents. The interrelationship between HSU and local communities provided a framework through which participants evaluated common vulnerabilities to the top hazards. In small groups, participants discussed and then agreed upon vulnerabilities of greatest concern before sharing out with the group. Below are the most critical vulnerabilities and the hazards to which they correspond:

Dimension	Vulnerabilities
Infrastructural	Telecommunications – E, W Power Grid – E, W Water Supply/Treatment – S, E Roads/Transportation Networks (includes port) – S, F, E, W Buildings – S, F, E, W
Societal	Housing Security – S, W Outreach & Education – S, F, E, W Vulnerable Populations – S, F, E, W Medical Services (hospitals, clinics, first responder services) – S, F, E, W
Environmental	Ag lands and Food Production (aquaculture, agriculture, ranching) – S, F, E, W Coastal Ecosystems (includes marsh, wetland, dune) – S, F, E, W Terrestrial Ecosystems (includes forests, riparian corridors) – E, W Air Quality – E
S = Sea Level Rise; F = Flooding; E = Extreme Weather; W = Wildfire	

4.0 Primary Strengths

Local governments, tribes, NGO's and the university are engaged in climate change adaptation, resilience planning and capacity building – a common strength that is building cohesive, self-sufficient communities with engaged citizens. HSU seeks to integrate sustainability and climate resilience into academics and works to prepare the next generation to be active agents of resilience in whichever community they land upon graduation. During the workshop, participants were asked to reflect on these and other strengths and assets that can be leveraged to buffer our campus and communities from the worst climate change impacts. In small groups, participants then discussed and listed agreed upon strengths before sharing out with the group. Below are the primary strengths and the dimensions to which they correspond:

Dimension	Primary Strengths
Infrastructural	• Emergency Power (micro-grids at the Blue Lake Rancheria and the Humboldt County Airport); • HSU campus (gymnasiums can be utilized for emergency shelter); • Stable domestic water system with existing emergency water storage; • Coast Guard air station at local airport and a sector station on Humboldt Bay.
Societal	• High concentration of educated, actively engaged members of the community and campus (technological expertise); • Local expertise in traditional ecological knowledge and self-sufficiency; • Proactive local governments building capacity and planning for disruptions.
Environmental	• Temperate climate; • Water supplies are stable; • Communities protect and restore wetlands, forests, parks and trails; • Local agricultural land can be used to raise food for local consumption; • Local forests provide wildlife habitat, carbon sequestration, nutrient cycling, air and water purification, and other services.

Jana Ganion, workshop participant and the Director of Sustainability for the Blue Lake Rancheria, in front of the Rancheria's microgrid solar array. Along with solar, the microgrid includes battery storage and back-up generator systems to power critical infrastructure in the event of a power outage. Source: the Sierra Club, https://www.sierraclub.org/sierra/2019-2-march-april/faces-clean-energy/california-tribes-diy-electric-grid

5.0 Prioritized Actions to Strengthen Resilience

Facilitators next guided participants in identifying and then prioritizing actions to help reduce vulnerabilities and/or reinforce strengths for each or all of the top four hazards. In small groups, participants considered actions within the infrastructural, societal and environmental dimensions, and then assigned a level of priority (high, medium, low) to each action based on its urgency. Each small group completed poster-sized Risk Matrices, which were then posted around the conference room. Through a process of sticky-dot voting and report-outs, the large group reached agreement on a shorter, "highest priority" action list. High, medium and low priority actions were also identified based on participants' discussion and voting.

5.1 Highest Priority Actions to Strengthen Resilience

Power Grid

- Work with PG&E, RCEA, municipalities and tribes to assess vulnerabilities of critical infrastructure to severe weather events. Develop proactive measures to fortify existing infrastructure, build in redundancies, or otherwise improve resilience of the power grid;
- Build micro-grids (solar + battery storage) at HSU and other communities to power critical loads when the grid goes down.

Roads/Transportation Networks

- Assess primary land and sea-based routes into/out of Humboldt County, and develop proactive measures to protect critical roadways and harbor entrance, such as raising roads above grade, integrating permeable pavement, and increasing dredging operations.

Telecommunications

- Work with telecommunications companies, municipalities and other entities to assess vulnerabilities in existing infrastructure. Develop measures to protect existing systems while creating redundancies (e.g., running additional fiber optic lines, installing solar + storage on critical infrastructure, redundant backbones).

Housing Security

- Evaluate current stock of affordable housing, as well as zoning, permitting and other restrictions. Develop and implement creative strategies to increase affordable housing.

Water Supply/Treatment

- Protect Arcata wastewater treatment plant from sea level rise by installing hard and soft protection/living shorelines.

Outreach & Education

- Develop and integrate preparedness, climate resilience, and traditional ecological knowledge (TEK) education modules on campus and in the communities' schools.

Medical Services

- Collaborate to develop and implement strategies to improve recruitment and retention of doctors and medical professionals.

Vulnerable Populations

- Designate and equip emergency shelters on campus and in those communities without designated shelters.

Ag Land and Food Production

- Protect and enhance existing barriers that prevent saltwater intrusion and provide flood protection to agricultural land.

5.1 Highest Priority Actions to Strengthen Resilience Cont.

Coastal Ecosystems

- Build living shoreline to protect coastal wetlands and agricultural lands from sea level rise, while also restoring and expanding wetlands.

Terrestrial Ecosystems

- Assess wildfire danger surrounding affected communities and collaboratively seek additional funding to enhance wildfire mitigation and response operations.

5.2 High Priority Actions to Strengthen Resilience

Power Grid

- Support local Community Choice Aggregation (CCA) and development of locally controlled renewable energy generation.

Roads/Transportation Networks

- Reduce transportation-related risks by enhancing and electrifying public transit, improving bike and pedestrian connectivity between the campus and communities, and better aligning bus scheduling and capacity to service the campus.

Communications

- Install solar powered wireless mesh networks for emergency communications on campus and in communities.

Housing Security

- Municipalities incentivize/permit affordable, mixed-use transit-oriented development that reduces greenhouse gas emissions and the costs of transportation for residents.

Outreach and Education

- Strengthen dialogue with tribal, cultural and faith-based leaders to build trust and coordinated responses to climate related hazards.

Vulnerable Populations

- Improve coordination between emergency response, public agencies and advocacy organizations to increase response times, better utilize resources, and advocate for vulnerable/underserved populations.

5.2 High Priority Actions to Strengthen Resilience Cont.

Water Systems/Treatment

- Assess vulnerability of community and campus water infrastructure. Identify and implement measures to strengthen resilience, such as building additional water storage or water microgrids.

Ag Land and Food Production

- Build local food self-sufficiency by supporting efforts to connect local farmers with local markets, including the development of a local food storage and distribution hub.
- Promote ecological methods of production to sequester carbon and reduce greenhouse gas emissions, pollution, chemical use and runoff into waterways.

Terrestrial Ecosystems

- Restore riparian corridors along critical waterways to protect from flooding.

Air Quality

- Designate and equip indoor "clean air" facilities to provide protection to the most vulnerable when the Air Quality Index reaches unhealthy to hazardous conditions.

5.3 Medium Priority Actions to Strengthen Resilience

Power Grid

- Retrofit existing buildings to maximize energy efficiency.

Roads/Transportation Networks

- Assess and strengthen local bridges over/near waterways prone to flooding.

Ecosystems

- Enhance sustainable forest practices and fuels management of forests surrounding affected communities.

Outreach and Education

- Partner with Blue Lake Rancheria to enhance and expand their resilience and community emergency response training programs, thus increasing the number of CERT members and instructors in the area.

5.3 Medium Priority Actions to Strengthen Resilience Cont.

Vulnerable Populations

- Develop an on-call fleet program (e.g., shuttles or volunteers with their own vehicles) to help remove seniors and the disabled to safety when hazards strike;
- Assess social media and other communications to determine best approach for reaching all students and community members with emergency communications.

Buildings

- Review building codes and update, as appropriate, to strengthen construction requirements for fire resistance and protection from other hazards.

5.4 Low Priority Actions to Strengthen Resilience

Buildings

- Develop and implement electrification measures, requiring new construction to be all-electric while phasing in fuel-switching retrofits in existing buildings, with the goal of reducing local dependence on fossil fuel imports.

Communications

- Build maker's space and train community members on building/operating ham radios.

Roads/Transportation Networks

- Campus shuttle system to serve off-campus housing areas where student populations are most dense.

Vulnerable Populations

- Enhance emergency communications, in multiple languages, to ensure important messages, directions and resources reach critical populations.

Medical Services

- Designate and equip secondary locations to remove patients should hospitals be evacuated when a hazard strikes.

Air Quality

- Work with local retailers to carry/stockpile face masks.

In 2017 a vegetation fire broke out near the town of Blue Lake, forcing evacuations. Fire crews, including aircraft dropping fire retardant, were able to contain the fire before any structures were destroyed. However, the fire jumped the freeway and embers started spot fires near homes. Screen grab from video shot by Jason Miller, https://www.youtube.com/watch?v=kCXHv3hU2Q8

6.0 Conclusion

The Building Community Resilience Workshop was an important step towards institutionalizing resilience as a strategic priority for HSU and local communities. Workshop participants recognized that, moving forward, major planning efforts must consider the impacts of climate change related hazards on the infrastructural, societal and environmental dimensions of our campus and communities. Participants also understood that there are certain actions that can be taken now to build community resilience. In the coming years, HSU will continue to engage campus and community stakeholders, to participate in climate adaptation planning efforts sponsored by local and regional stakeholders, and to engage campus units on integrating resilience education and planning into academics, campus business continuity, emergency preparedness and hazard mitigation planning. Furthermore, this summary of findings provides the basis for a Campus Resilience Plan, to be integrated into HSU's updated Climate Action Plan starting in 2021. There is still much work ahead, and we look forward to continuing on the path to integrate climate change resilience into campus and community planning.

7.0 Appendix

7.1 List of Workshop Participants

Humboldt State University and CSU Chancellors Office	
Andrea Alstone	Energy Planner
Josh Callahan	Director and CTO of Information Technology Services
Kimberly Comet	Director of Risk Management & Safety
TallChief Comet	Director of Sustainability, Recycling & Grounds
Douglas Dawes	Vice President of Administration & Finance
Michael Fisher	Director of Planning & Design
Kiara Cuerpo-Hadsall	Environmental Science & Management
Aaron Klemm	CSU Chief of Energy & Sustainability
Christina Koczera	Emergency Coordinator
Tod Larsen	Associate Director of Housing
Jenessa Lund	Executive Director of Associated Students
Fernando Paz	Coordinator for Latinx Center for Academic Excellence
Jeanne Rynne	Associate Vice President of Facilities
Rosemary Sherriff	Professor of Geography
Emma Zierer	Economics Major

Local Governments	
Jana Ganion	Director of Sustainability, Blue Lake Rancheria
David Loya	Community Development Director, City of Arcata
Connor McGuigan	CivicSpark Climate Fellow
David Narum	Resilience Initiatives Director, Blue Lake Rancheria
Mike Wilson	Humboldt County Supervisor, District 3

Non-Governmental Organizations and Joint Powers Authorities	
Dana Boudreau	Redwood Coast Energy Authority Director of Operations
David Cobb	Cooperation Humboldt Director
Emily Sinkhorn	Deputy Director, Redwood Community Action Agency
Oona Smith	Senior Planner, Humboldt County Association of Governments

7.2 Non-Prioritized Vulnerabilities, Strengths and Actions

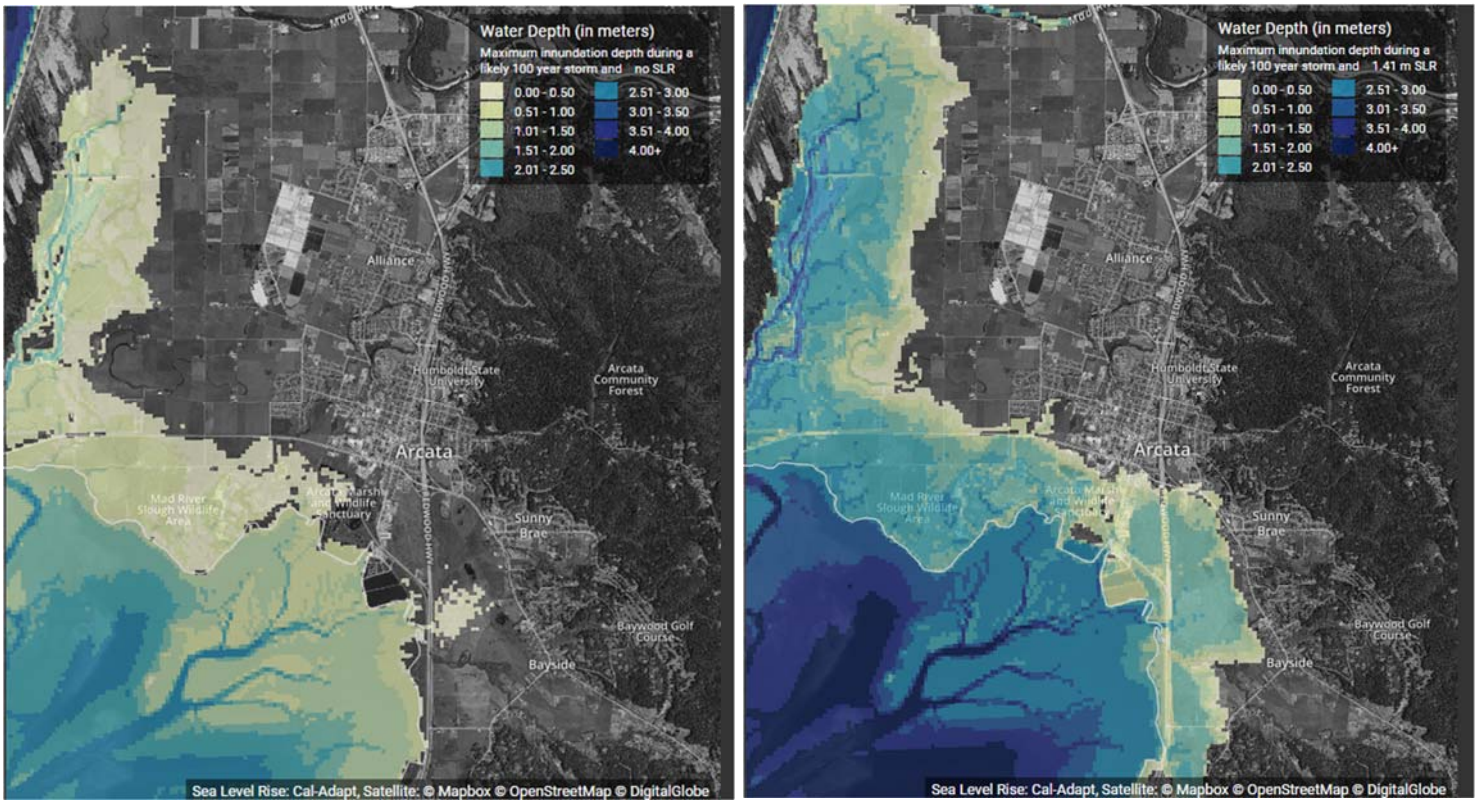
Workshop participants offered a number of vulnerabilities, strengths and actions that ultimately did not receive a high, medium, or low prioritization over the course of the workshop:

Dimension	Non-Prioritized Vulnerability
Environmental	Algal blooms in freshwater systems; Storm impacts to dunes on north spit of Humboldt Bay.
Societal	Economic impacts to business community and loss of jobs; Impacts to services provided by faith-based networks; Vulnerability of rural, disbursed communities, and Loss of tourism.

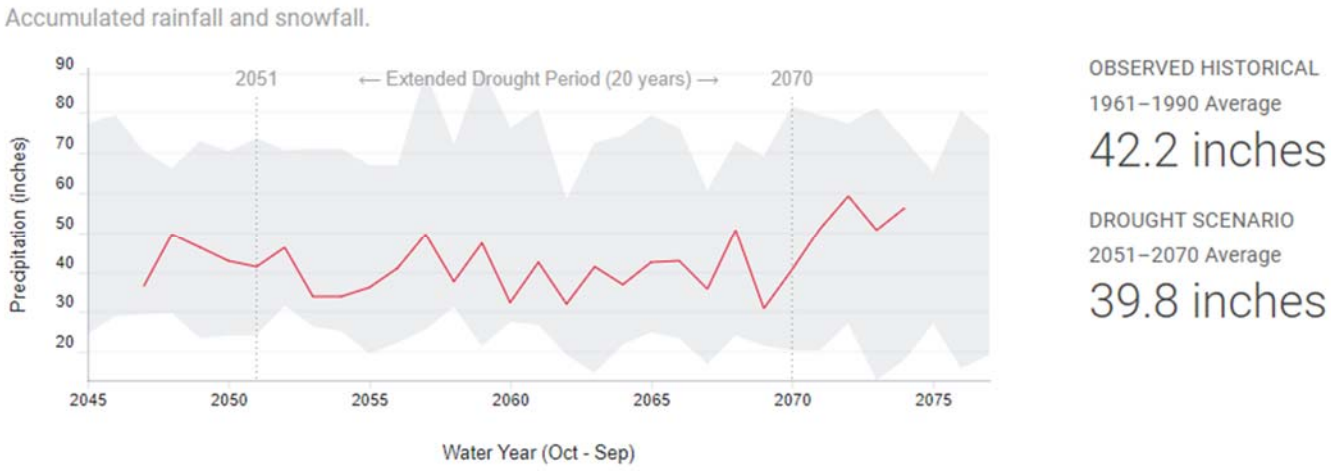
Dimension	Non-Prioritized Strengths
Environmental	Multiple rivers provide ecosystems services and emergency water; Dune systems provide protection from storm surges, and
Societal	Laws and policies already in place requiring hazard mitigation planning.

Dimension	Non-Prioritized Actions
Environmental	Permit and incentivize rainwater catchment; Encourage more community gardens & edible landscapes.
Societal	Get hazard mitigation plans up to code to qualify for funding; Local employers provide incentive to employees to participate in resilience training; Training programs for community members to build emergency kits; Promote and provide additional assistance to local businesses; Promote local, plant-based diets, and Streamline planning process for eco tiny homes.
Infrastructural	Invest in higher efficiency pumps for domestic water distribution; Move critical roadways inland to retreat from sea level rise; Support local radio stations; Transition to 5G networks, more energy efficient, more reliable, and Improve disaster preparedness for the local airport.

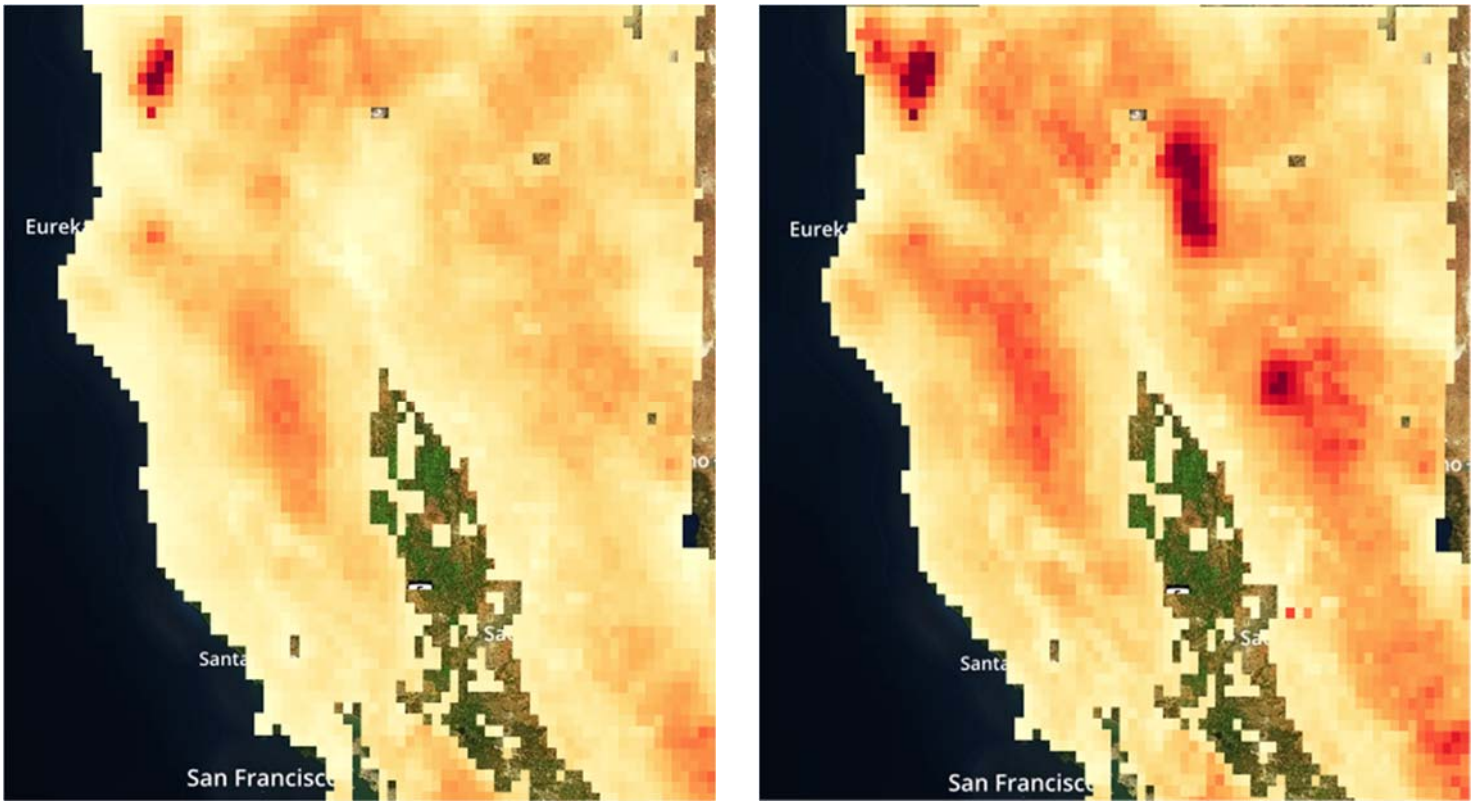
7.3 Climate Change Hazards Facing the Humboldt Bay Region



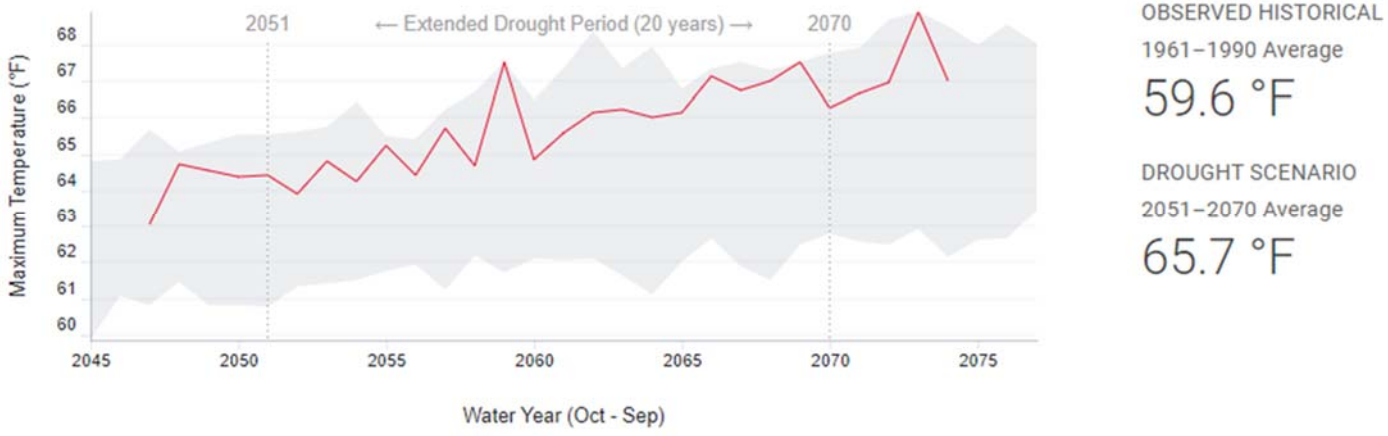
Sea Level Rise. *Above: Image on left shows maximum inundation depth (in meters) during a likely 100 year storm. Image on right shows maximum inundation depth during a likely 100 year storm* ***and*** *a sea level rise of 1.41 meters, or about 4.5 feet. If we were to have three feet of sea level rise by 2050, this could cause Humboldt Bay to expand by 13,000 acres — an increase of more than 60 percent. Source: www.cal-adapt.org*



Precipitation*. Above: Annual precipitation will vary by location, with general decline throughout the century. Areas of heavy rainfall (80 inches or more) are expected to lose 5 to 7 inches by 2050. Source: www.cal-adapt.org*



Wildfire. *Above: The images show annual area burned between 2010-2019 (on the left) and 2050-2055 (on the right). For Humboldt County, this means the average wildfire will increase from an average of 46.5 acres to 68 acres in size. Source: www.cal-adapt.org*



Temperature. *Above: Maximum daily temperatures are projected to rise substantially throughout the century. By 2050 one to three more heat waves per year are anticipated for the region. Source: www.cal-adapt.org*

[i] Go to https://facilitymgmt.humboldt.edu/sustainability-climate-change-resilience-initiatives to learn about HSU's climate change resilience initiatives, which are built upon three interrelated areas of focus: Planning, Curriculum & Research, and Student Leadership & Engagement.

[ii] Vulnerabilities are assessed based on modeled climate projections. Cal-Adapt synthesizes downscaled climate change projections and impacts at local, regional and State levels, https://cal-adapt.org/tools. Also see the *Humboldt Bay Area Sea Level Rise Vulnerability Assessment*, by Aldaron Laird and Trinity Associates, https://www.humboldtbaykeeper.org/climate-change-impacts-sea-level-rise/69-in-the-news/1218-humboldt-bay-area-sea-level-rise-vulnerability-assessment, and *Climate Change and Health Profile Report Humboldt County*, California Department of Public Health, 2017, https://www.cdph.ca.gov/Programs/OHE/Pages/ClimateHealthProfileReports.aspx.

[iii] David Loya, Community Development Director for the City of Arcata; David Narum, Pathmakers Program Director for the Blue Lake Rancheria; and Christina Koczera, HSU Emergency Coordinator.

[iv] For more information on the Community Resilience Building model, a program of the Nature Conservancy, go to https://www.communityresiliencebuilding.com/

[v] HSU joined the Second Nature Climate Commitment in 2016. To learn more go to https://secondnature.org/