HUMBOLDT STATE UNIVERSITY

# Report on the Initial Assessment of Campus-Community Resilience

HSU Office of Sustainability

June 14, 2018

**Climate change resiliency** can be defined as the capacity of institutions, cities or other entities to prepare for changing conditions, to endure and recover rapidly from disruptions, and to adapt to climate change events, especially when those adaptation strategies substantially reduce the institution's carbon footprint.


## Acknowledgements

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**Redwood Coast Energy Authority**
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## How do I use this Report?

This initial assessment serves as a starting point for the work ahead to integrate climate change resiliency into campus and community planning.

*__Read__ this report to familiarize yourself with current vulnerabilities to climate change impacts, as well as the interrelated social, economic, environmental and infrastructural dimensions of campus and community resiliency.

*__Understand__ that components of this initial assessment may be updated as climate change impact models change, new laws or policies are enacted, or other social, environmental or economic shifts occur.

***Know** that climate change is happening, 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 campus unit.

# 1.0 Overview

This Campus-Community Resilience Assessment, completed in April 2018, provides an initial baseline of current climate change resilience strengths, assets and activities on the Humboldt State University campus, its satellite buildings, and within the City of Arcata. Through a multi-stakeholder process, the assessment also identifies vulnerabilities to climate change impacts, initial opportunities to strengthen resilience, and indicators the campus and surrounding community can use to track progress towards greater resiliency. Furthermore, this assessment deepens understanding of the social and economic dimensions of climate change and identifies how these dimensions can be included in the dialog and policies influencing hazard mitigation and climate action planning.

The City of Arcata (i.e., the community) and all of HSU's campus and satellite buildings (i.e., the campus) fall within the boundaries of this assessment, although it is acknowledged that climate change hazards and impacts may be experienced on a more regional scale. For the purposes of this assessment, however, the clear interrelationship between the City of Arcata and HSU provides a framework through which to evaluate common vulnerabilities, strengths and assets. This interrelationship includes, but is not limited to:

- HSU is a customer of the City's municipal water and waste water treatment systems;
- Students, faculty and staff live within city limits, including within sea level rise hazard areas;
- HSU depends on the City's public transit system and other transportation infrastucture;
- HSU offers expertise and research capacity to the City in the areas of climate change resiliency and sustainability, and
- The City is already engaged in climate change resiliency planning, much of which will directly or indirectly improve the resiliency of the campus.

The HSU Office of Sustainability (OS) facilitated the development of this initial campus-community resilience assessment. The process included multiple planning meetings with Engineering, Community Development and Environmental Services staff members at the City of Arcata, and with staff members in the HSU Risk Management & Safety department. The OS then developed and deployed a survey to poll campus and community stakeholders on shared vulnerabilities, strengths/assets, indicators and initial opportunities to move towards greater resiliency. Finally, the OS convened stakeholders from the campus, from the City of Arcata, and from a regional partner (the Redwood Coast Energy Authority, which is engaged in climate action planning and resiliency work on behalf of its member municipalities) to workshop the contents of the initial assessment and to discuss next steps for deepening a collaborative effort to pursue greater resiliency in the face of anticipated climate change disruptions. Through this effort, the OS accomplished its primary goals of a) establishing a collaborative relationship with the City of Arcata to increase communication and joint planning opportunities; b) gaining acknowledgment from campus stakeholders that climate change and attendant hazards should be included in hazard mitigation, facilities planning, continuity of operations, emergency preparedness and other planning efforts; and c) developing consensus to continue down the path of resiliency planning.

Climate change resiliency planning is a core component of the Second Nature Climate Commitment, to which Humboldt State is a signatory. This initial assessment was therefore developed in accordance with Second Nature's guidelines and reporting requirements. For more information on the Second Nature Climate Commitment, go to www.secondnature.org.

## 2.0 Assessment Elements

Clearly defining our vulnerabilities, as well as our strengths and assets that may support resilience to climate change-driven natural disasters and related impacts, requires an intersectional approach that integrates economic, social, and environmental dimensions. This comprehensive methodology ensures that climate change resiliency planning does not become an issue of emergency preparedness alone, but rather provides a framework for incorporation into aspects of community and economic development, facilities planning and design, and natural resources management.

For this report, vulnerabilities to climate change related disruptions, as well as shared strengths and assets to mitigate such disruptions, are assessed according to these five intersectional dimensions of resiliency:

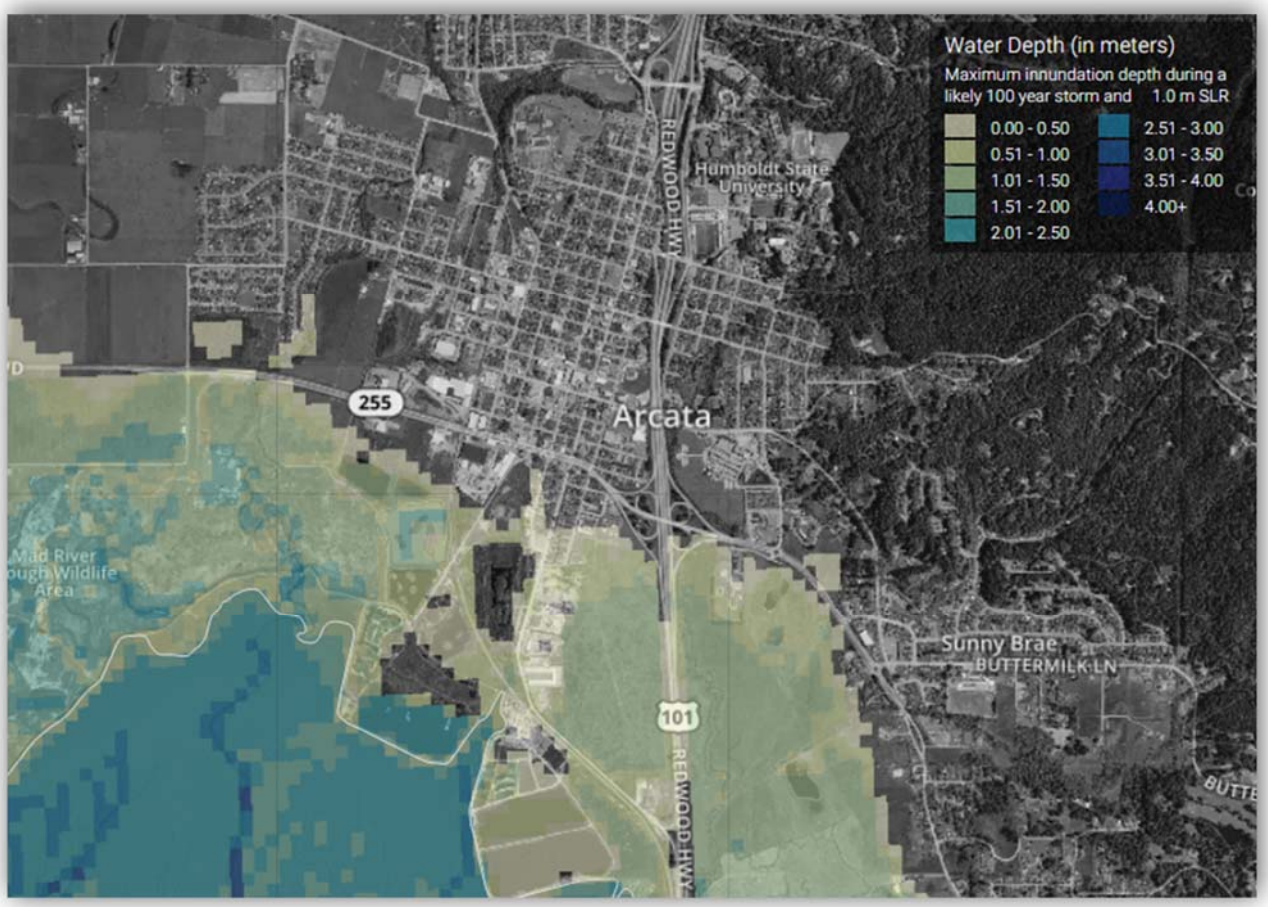
- **Social Equity & Governance** – the social dynamics of the campus and community, including systems of governance, access to education, community and civic engagement, vulnerable populations, social justice priorities and other dynamics affecting equity;
- **Health & Wellness** – campus and community access to basic needs and their susceptibility to adverse health impacts associated with climate change;
- **Ecosystem Services** – "natural capital" 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 recreation parks, as well as management practices to protect these assets;
- **Infrastructure** – the built environment owned, managed and/or used by the campus and community, including existing buildings, transportation and telecommunications networks, backup energy and self-generation systems, bridges and dams, and
- **Economic Systems** – the capacity of the campus and community to invest in resiliency measures and to financially rebound from climate change impacts.

*The Five Dimensions of Climate Change Resilience*


Note that this is an initial assessment, and that components of it may be updated as climate change impact models change, new laws or policies are enacted, or other social, environmental or economic shifts occur. Additionally, the five dimensions of resilience are not mutually exclusive, but offer a framework for visualizing unique yet interrelated aspects of climate change resilience.

## 3.0 Vulnerabilities to Climate Change

Vulnerabilities include direct hazards from the changing climate, impacts resulting from those hazards, and any existing challenges further exacerbated by the effects of climate change (such as homelessness and environmental degradation). For the purposes of this assessment, the OS and stakeholders utilized climate change projections published by the State of California, the County of Humboldt, and other entities to understand anticipated hazards within the campus-community boundary.[i]




*Map depicting Humboldt Bay inundation into the City of Arcata with a seal level rise scenario of 1.0 meters. Source: Cal-Adapt, [http://cal-adapt.org/tools/slr-calflod-3d/](http://cal-adapt.org/tools/slr-calflod-3d/).*

Listed below are the vulnerabilities anticipated to most impact the campus and community:

**Climate Change Hazards**

i. Coastal/Tidal Flooding
ii. Sea Level Rise/Costal Erosion
iii. Severe Storms

**Impacts from Climate Change Events**

i. Power Outage
ii. Infrastructure Failure
iii. Storm Surge

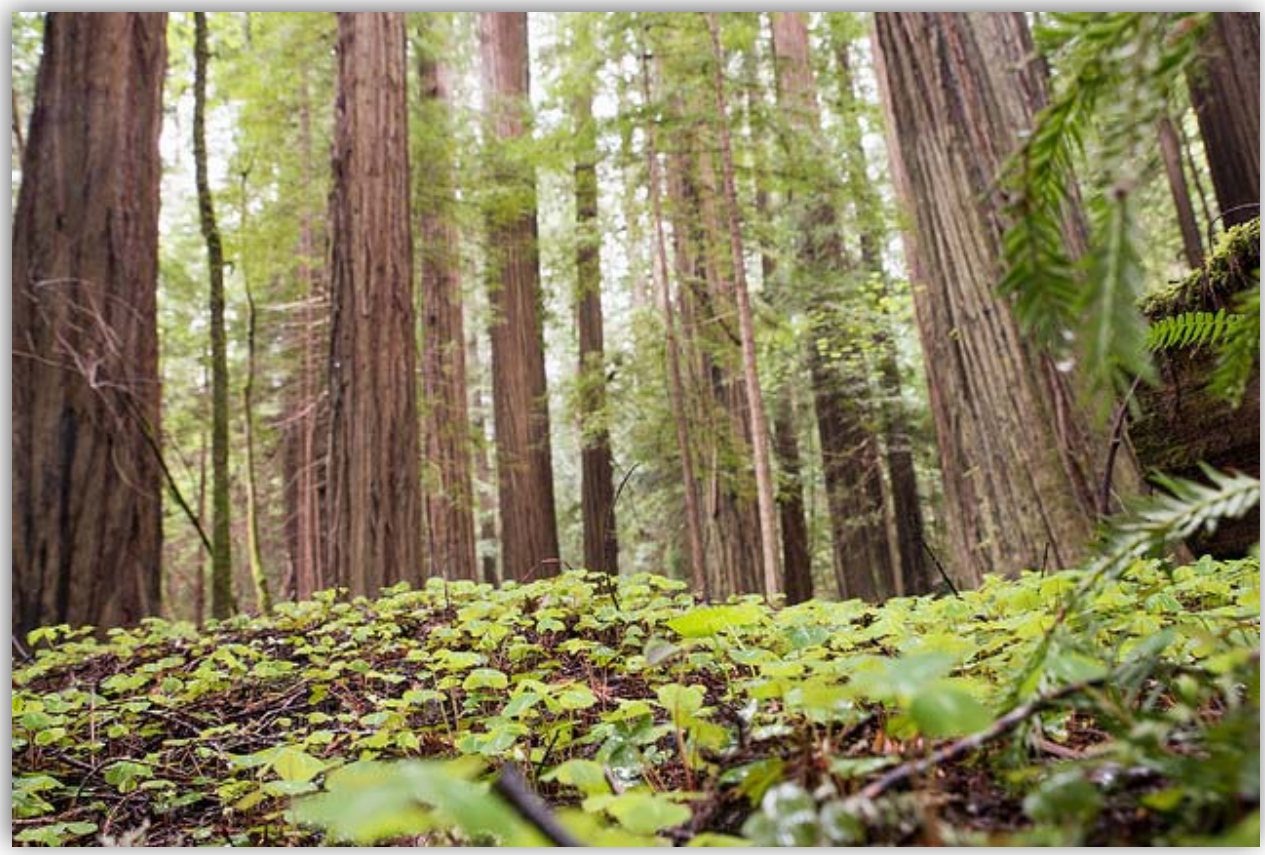
**Existing Challenges Further Exacerbated by Climate Change Events**

i. Earthquake
ii. Inadequate Health Systems
iii. Drug/Alcohol Abuse
iv. Homelessness

## 4.0 Strengths and Assets

Strengths and assets are resources, capacity, and characteristics of the campus and community that can be leveraged to overcome climate change impacts. Listed below are the shared strengths and assets most salient to this assessment:

| | |
|---|---|
| i. | City government is actively planning for sea level rise and other climate disruptions; |
| ii. | Municipal water supplies and conveyance system to campus and community are stable; |
| iii. | There is significant local expertise in self-sufficiency, farming, and sustainable living practices; |
| iv. | There is a high concentration of educated, actively engaged members of the community; |
| v. | The community and campus encompass substantial green space, protected wetlands, community forest, parks and trails, and |
| vi. | There is a high level of collaboration and shared resources for campus-community emergency response. |



*Campus and community forests are identified as a climate resiliency asset by providing wildlife habitat, carbon sequestration, nutrient cycling, air and water purification, and other services.*

## 5.0 Initial Indicators of Resilience

Indicators of resilience provide a means for the campus-community to track progress towards increased resilience over time. Tracked by qualitative or quantitative measures, these indicators represent strengths, assets or vulnerabilities. Additionally, indicators represent one or more of the five dimensions of resilience: Social Equity & Governance, Health & Wellness, Ecosystem Services, Economic, and Infrastructure.

| **5.1 Social Equity & Governance Indicators** | | **Metric of Measurement and Current Status** |
|---|---|---|
| i. | Integration of resiliency and Sustainability into governance | Qualitative: City of Arcata has a Community Green House Gas Reduction Plan, an Energy Committee and a Zero Waste Action Plan. HSU has a Climate Action Plan, an Advisory Committee on Sustainability, a Sustainability Policy, and includes sustainability as a goal within its 2015-2020 Strategic Plan.[ii] |
| ii. | Inter-agency communication and planning | Qualitative: The City, campus and other agencies share resources and communications. |
| iii. | Community connections and engagement | Qualitative: There is a high level of student, faculty and staff volunteering, interning, or otherwise engaging with the community and with the City government (e.g., serving on Committees). |
| iv. | Vulnerable populations | Quantitative: Approximately 40% of the population of Arcata are persons in poverty.[iii] |
| v. | Rapid response communication networks | Qualitative: emergency communications systems in place and improving to notify campus community in case of disaster (e.g., earthquake, tsunami). |
| vi. | Expanding support networks, resources and services for vulnerable Students | Quantitative: Campus' two year retention rate is approximately 61%.[iv] |

| 5.2 Health & Wellness Indicators | | Metric of Measurement and Current Status |
|---|---|---|
| i. | Access to healthcare | Qualitative. Health clinics, urgent care and hospitals on and off campus are able to meet demand. |
| ii. | Food insecurity | Quantitative. Approximately 25% of HSU students report very low food security. HSU Health Education and Social Work departments are working to improve student access to basic needs.[v] |
| iii. | Housing insecurity | Quantitative. 19% of HSU students reported being homeless one or more times in the last 12 months based on the combined HUD and DOE definitions. HSU Health Education and Social Work departments are working to improve student access to basic needs.[vi] |
| iv. | Gardening and urban farming | Campus and community both host community gardens and offer gardening classes and workshops. |

| 5.3 Ecosystem Services Indicators | | Metric of Measurement and Current Status |
|---|---|---|
| i. | Coastal buffer | Qualitative. In the community, there are active programs to restore/protect marsh, estuary, and wetland areas to enhance buffer, carbon sink, biodiversity and Pacific Flyway characteristics. On campus, there are academic programs researching climate change-related impacts on wetlands and mitigation strategies. |
| ii. | Sustainable forest management | Quantitative. 2,350 acres of forest is managed by the community to protect/enhance habitat, provide recreation, sequester carbon, implement fuels reduction, and generate revenue. On campus, the Forestry department concentrates instruction in sustainable forest management.[vii] |
| iii. | Urban water management | Qualitative. Water resources continue to provide stable water supply. Domestic water supply and conveyance is well-managed and an Urban Water Management and Conservation Plan is in place to meet future demand.[viii] |
| iv. | Floodplain management | Qualitative. Flood hazard mitigation standards protect floodplains from over-development.[ix] |

| | | |
|---|---|---|
| v. | Urban green space | Quantitative. 23% of community is designated natural resource lands.[x] |
| vi. | Agricultural capacity | Quantitative. 23% of City's acres are designated Agricultural.[xi] |

| **5.4 Economic Indicators** | | **Metric of Measurement and Current Status** |
|---|---|---|
| i. | Campus budget | Quantitative. The campus is eliminating programs, cutting spending and positions to address a budget deficit of $9 million. The campus has projected a 2018-2019 operating budget of $135 million.[xii] |
| ii. | Community budget | Qualitative. City of Arcata maintains a balanced budget with revenues that match ongoing anticipated expenditures.[xiii] |
| iii. | Funding for research | Quantitative. 21% of campus' faculty and staff researchers are engaged in sustainability or climate resilience research.[xiv] |
| iv. | Diversified economy | Qualitative. The local economy is diversified, with multiple small businesses and a variety of employers within six targets of opportunity: Diversified Health Care, Building and Systems Construction and Maintenance, Specialty Agriculture, Food, and Beverages, Investment Support Services, Management and Innovations Services, and Niche manufacturing. |
| v. | Green investment | Quantitative. Campus has the Humboldt Energy Independence Fund, funded at $13/student per semester, to fund energy, sustainability and resiliency improvements. Community pursues and receives funding for local sea level rise activities; e.g., Coastal Commission Round 1 ($54,000) and California Coastal Conservancy Climate Ready/Arcata Living Shoreline grant ($86,000). |

| 5.5 Infrastructure Indicators | | Metric of Measurement and Current Status |
|---|---|---|
| i. | Multi-modal transportation alternatives | Qualitative. Campus hosts bike share, car share, ride share, and subsidized bus pass programs, and conducts outreach campaigns to increase participation. |
| ii. | Water storage | Qualitative. The municipal water system currently has storage capacity for 4.8 million gallons, to supply two-three days of water to campus and community in event of emergency, and is planning more storage. The City also has built interties/redundancy into neighboring cities' water systems.[xv] |
| iii. | Energy insecurity | Qualitative. Neither campus nor community are currently on a micro-grid that can operate in times of grid outage. |
| iv. | Emergency operations | Qualitative. Campus has a robust communications program to contact/provide instruction to campus community, including daily Emergency Conditions report, text alerts, and ongoing emergency continuity planning. |
| v. | Emergency power | Quantitative. Campus propane and diesel generators can provide emergency power to critical infrastructure, but vulnerable because of storage limitation and required fuel imports into the county. |

## 6.0 Initial Opportunities to Improve Resilience

Initial opportunities are near-term actions to improve resilience on campus and/or within the community. Stakeholders within the campus-community structure identified a number of initial opportunities to increase shared resilience:

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|---|---|
| i. | Support efforts to increase local, grid-tied renewable energy generation and storage to strengthen energy security. This includes supporting the Redwood Coast Energy Authority's pursuit of an offshore wind energy project off our coast, as well as the development of a micro-grid (designed by the Schatz Energy Research Center at HSU) at the regional airport. |
| ii. | Reduce transportation-related risks by enhancing multi-modal transportation, improving bike and pedestrian connectivity between the campus and the community, and better aligning bus scheduling and capacity to service the campus. |

| | |
|---|---|
| iii. | Direct HSU's Information Technology Services to mitigate vulnerabilities within the campus' communications system by further integrating redundancies into campus informational technology networks. |
| iv. | The City of Arcata appoints more than 50 community members to its various committees and task forces (e.g., Energy Committee, Forest Management Committee, Open Space & Agriculture Committee, Transportation Safety Committee, Wetlands & Creeks Committee) which review plans, policies, trends, and activities within their areas of focus (in a public meeting format) and make recommendations to the City Council and City Staff. Opportunities exist, therefore, to integrate climate change resiliency into the decision-making process of the committees. By doing so, more community members will participate in planning for resiliency, and the City will gain additional input and advice on addressing vulnerabilities and strengthening community resiliency within critical areas of concern. |
| v. | Last but not least, the campus can play a significant role in preparing the next generation to be active agents of resiliency in whichever community they land upon graduation. Therefore, the campus shall seek opportunities to develop student learning outcomes around climate change resiliency, and a process to integrate climate change resiliency across the curriculum. |

*Blue Lake Rancheria's microgrid, designed by the Schatz Energy Research Center at Humboldt State University, includes solar, battery storage, and back-up generator systems to power critical infrastructure in the event of a power outage.*

## 7.0 Next Steps

Making resiliency a strategic priority, so that major planning efforts and activities are conducted with the five interrelated dimensions of resilience in mind, may require a significant shift in how the campus operates, develops, serves its students, and ultimately participates as an active partner in regional resiliency planning. Although it is understood that this shift will take time, there are certain actions that can be taken now to advance climate change resiliency. In the coming years, the HSU Office of Sustainability (OS) will work with stakeholders to facilitate open forums for students, community members, and other local stakeholders, to bring in more perspectives to the conversation. The OS will look to participate in climate adaptation planning efforts sponsored by local and regional stakeholders. Additionally, the OS will continue to engage campus units on integrating resiliency education and planning into academics, campus business continuity, emergency operations and hazard mitigation planning. This initial assessment provides an important starting point for the work ahead, and we look forward to continuing on the path to integrate climate change resiliency into campus and community planning.

## 8.0 Endnotes

[i] Vulnerabilites 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. The County of Humboldt Hazard Mitigation Plan Update (2014) includes a risk assessment associated with climate change impacts, https://humboldtgov.org/506/Local-Hazard-Mitigation. 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.

[ii] For information on campus sustainability planning and policies, go to https://facilitymgmt.humboldt.edu/sustainability. For information on City sustainability planning and policies, go to http://www.cityofarcata.org/184/Environmental-Services.

[iii] US Census Quick Facts: https://www.census.gov/quickfacts/fact/table/arcatacitycalifornia/BZA110215#viewtop

[iv] HSU Institutional Effectiveness: http://pine.humboldt.edu/~anstud/humis/reten.html

[v] California State University Basic Needs Initiative: *Study of Student Basic Needs*, Crutchfield and Maguire, January 2018, https://www2.calstate.edu/impact-of-the-csu/student-success/basic-needs-initiative/Pages/Research.aspx

[vi] From the *Study of Student Basic Needs*, California State University Basic Needs Initiative, Crutchfield and Maguire, January 2018.

[vii] See City of Arcata Forest Management Plan, http://cityofarcata.org/196/Forest-Management-Plan.

[viii] City of Arcata Urban Water Management Plan: https://www.cityofarcata.org/326/Drinking-Water.

[ix] City of Arcata Flood Hazard Mitigation Standards: http://www.cityofarcata.org/DocumentCenter/View/6013.

[x] City of Arcata Land Use Element: https://www.cityofarcata.org/DocumentCenter/View/38.

[xi] City of Arcata Land Use Element: https://www.cityofarcata.org/DocumentCenter/View/38.

[xii] For information on the HSU budget, go to: https://budget.humboldt.edu/budget-frequently-asked-questions

[xiii] For information on the City of Arcata budget, go to: http://www.cityofarcata.org/776/2017-2018-Approved-Budget.

[xiv] See HSU's 2017 Sustainability Tracking, Assessment & Rating System (STARS) report, credit AC-9: Research and Scholarship: https://stars.aashe.org/institutions/humboldt-state-university-ca/report/2017-04-21/

[xv] See the City of Arcata 2010-2014 Economic Development Strategic Plan, http://www.cityofarcata.org/Archive.aspx?AMID=36