Disaster Resilient Universities (DRU) Network
Climate Resilience Roundtable

Findings and recommendations from a roundtable hosted by the Disaster Resilient Universities (DRU) Network® and the University of Oregon Institute for Resilient Organizations, Communities, and Environments

This project was supported by a generous gift from Deloitte & Touche LLP (Deloitte). Points of view or opinions in this document are those of the authors. Deloitte was not involved in the creation of this paper or part of any research referenced within.

Contents

Executive Summary

On December 7, 2023, 24 professional leaders in safety, risk management, emergency management, sustainability, and compliance from nine institutions of higher education (IHEs), one commercial property insurer, a building engineering and consulting firm, and Deloitte & Touche LLP gathered in Oakland, California, for an in-person roundtable discussion. The objective was to understand how IHEs can become more resilient to climate change – particularly the risk assessments, resilience planning, stakeholder collaboration, and community engagement necessary to make IHEs better able to handle hazards related to climate change. The event was held at the University of California's Office of the President.

The objective of the roundtable was to review new hazard vulnerability assessment (HVA) methodologies that incorporate future climate-related hazard projections, as well as share best practices for community engagement and enterprise risk management in climate-resilience planning. The roundtable participants also discussed how stakeholders can link, leverage, and align to develop a proactive and strategic approach to campus climate-resilience planning.

The roundtable was facilitated by the Disaster Resilient Universities (DRU) Network, the University of Oregon Institute for Resilient Organizations, Communities, and Environments (IROCE), and the University of California System.

Amina Assefa of the University of California and André Le Duc of the University of Oregon facilitated the roundtable discussion. This report contains key takeaways and conclusions that constitute the principal findings of the roundtable discussions.

Topics discussed

The roundtable participants discussed several topics related to IHE climate resilience, including:

- How to use and alter traditional hazard vulnerability assessments (HVAs) to address climate adaptation and mitigation efforts.
- Ways IHEs can leverage and align their climate-resilience planning efforts.
- Ideas for how IHEs can get more support for climate resilience from the campus, the community, the private sector, and partners.

The group also formulated several recommendations that may help IHEs address challenges associated with building climate resilience:

1. Define key terms.
2. Diversify the team responsible for climate resilience.
3. Evaluate climate risk over different time periods.
4. Backtest hazard vulnerability assessments.
5. Reduce exposure to climate hazards.
6. Reduce sensitivity to climate hazards.
7. Increase adaptive capacity.
8. Frame adaptation to raise interest in climate resilience.
9. Embrace the need to be flexible in the face of uncertainty.

About the Disaster Resilient Universities (DRU) Network®

Established in 2005, the DRU Network facilitates open communication, discussion, and resource-sharing among university and college practitioners in all areas of safety, risk, continuity, and emergency management. The DRU Network provides peer-to-peer information-sharing among members, helping them and others mitigate, prepare for, respond to, operate during, and recover from all types of campus emergencies.

About IROCE

The University of Oregon Institute for Resilient Organizations, Communities, and Environments links, leverages, and aligns resources, professional networks, researchers, practitioners, and practical tools to help communities, organizations, and groups adapt and thrive in the face of adversity. Its mission is to cultivate collaborative, trust-based learning environments for multidisciplinary teams to focus on addressing some of the most significant risks facing their organizations. Contact resilient@uoregon.edu to learn more about IROCE or to become a member of the DRU.

Acknowledgments

We wish to thank the University of California System for its help coordinating and hosting the roundtable. We also wish to thank Deloitte & Touche LLP for its generous sponsorship of this event. Readers interested in speaking with Deloitte on how it can assist with risk management in higher education may contact Cynthia Vitters (cvitters@deloitte.com) or Jake Braunsdorf (jbraunsdorf@deloitte.com).

Background

Climate change is a long-term alteration in weather patterns and temperatures. According to the United Nations, the average temperature on the surface of the Earth is approximately 1.1°C higher than it was in the late 1800s. The decade 2011-2020 was the hottest on record. Several UN reports state that keeping the increase below 1.5°C could avoid the worst climate effects and preserve a livable climate. According to the UN, current policies are expected to create a 3°C temperature rise by the end of the century.[1]

Climate changes create or exacerbate a variety of hazards, such as flooding, droughts, extinctions, disease, wildfires, and water and food shortages. These hazards can in turn spread diseases, overwhelm hospitals, stress energy grids, damage roads, spark chemical accidents, and create other emergencies.

All of these situations may affect institutions of higher education (IHEs) and their communities. The specific risks vary by institution and region, however. Some campuses may be more susceptible to flood hazards or smoke from wildfires, for example; others may be more vulnerable to extreme heat or frequent hurricanes. Similarly, certain IHE departments, functions, or facilities may be more susceptible to increasingly frequent water damage, intense heat, power outages, or poor air quality. Furthermore, some groups of students or employees may be more vulnerable to certain types of hazards or extreme conditions.

Accordingly, climate change now demands collaboration across IHE disciplines to develop comprehensive and effective climate-resilience strategies.

Why this discussion is important now

Climate change will affect IHEs. More extreme weather can disrupt operations, instruction, research, housing, community programs, and athletic events, among other things. For IHEs, climate change creates new risks and increases existing risks.

Although it can be very hard for IHE leaders to put climate risk at the top of the agenda, IHEs can actively mitigate the effects of climate change. They have an opportunity to develop strategies that help their surrounding communities counter the effects of climate change at a local level.

How climate resilience works

The objective of climate resilience is to enable IHEs to respond to and recover effectively from short-term and long-term climate-related events. An IHE demonstrates climate resilience when it is able to withstand climate-related disturbances by retaining an ability to operate and continue its mission. Climate-resilient IHEs are places upon which students, employees, and community members can rely for learning and research.

---

[1] https://www.un.org/en/climatechange/what-is-climate-change

Critical barriers

Often, the work to achieve climate resilience is part of an IHE's enterprise risk management (ERM) function, which typically involves identifying risks, as well as assessing and categorizing those risks. However, climate resilience is not easy to implement or maintain. IHEs face four key challenges:

1. Difficulty incorporating climate resilience into existing emergency management or ERM programs.
2. Difficulty measuring the impact of future climate hazards.
3. Difficulty tying climate resilience to IHE strategy and budget allocations.
4. Difficulty obtaining buy-in, participation, or accountability for climate resilience.

Accordingly, on December 7, 2023, 24 professional leaders in safety, risk management, emergency management, sustainability, and compliance from nine institutions of higher education (IHEs), one commercial property insurer, a building engineering and consulting firm, and Deloitte & Touche LLP gathered in Oakland, California, for an in-person roundtable discussion about ways IHEs can address hazard risks, resilience planning, stakeholder collaboration, and community engagement related to climate change. Key questions included:

- How do IHEs define climate resilience?
- What are the characteristics of climate resilience in IHEs?
- What do linking, leveraging, and aligning climate-resilience efforts look like for IHEs?
- What can IHEs do now to improve those efforts?
- What barriers stand in the way?

These questions sparked a critical discussion.

Discussion

IHE leaders have a lot to consider as they work to achieve climate resilience. Questions such as these are common:

1. How exactly do we incorporate climate resilience into our hazard vulnerability assessments on campus?
2. What specific groups of people should we also consider when we build those HVAs?
3. What's the best way to collaborate with the community and with other stakeholders to develop solutions for the IHE's climate challenges?
4. What changes can we make in the next 12-24 months to link, leverage, and align resources and needs?
5. What barriers or blockers stand in the way of taking these actions, and how can we overcome them?

Roundtable participants had these questions and others during the discussion, which occurred in three sessions, including several case studies.

Discussion session 1: Hazard vulnerability assessments as a data-driven foundation for climate-resilience planning

The first part of the roundtable discussion had three objectives:

1. Explore the University of California's new hazard vulnerability assessment (HVA) methodology, which incorporates climate hazard projections.
2. Discuss the benefits and limits of using HVAs for climate adaptation and mitigation efforts.
3. Discuss how IHEs can incorporate DEI principles into their HVA methodology and processes.

Exploring new hazard vulnerability assessment (HVA) methodologies

The first part of the discussion centered around a case study of the University of California's climate hazard vulnerability assessments. The objective was to evaluate the possibility of using HVAs as a data-driven foundation for climate-resilience planning.

The University of California (UC) system contains 10 campuses, six health locations, and several extension offices.[2] The UC Office of the President coordinates, provides oversight to, and ensures that the components all work together as one system.

In 2023, the UC system Emergency Management Council determined that the HVA process could be utilized to help understand how the changing climate may impact UC locations. Each campus in the UC system typically does an HVA every three to five years, health locations do HVAs annually, and the UC system last did a systemwide HVA in 2007. A subcommittee formed in June 2023 with the goal of developing a methodology to incorporate future climate hazard projections into its current HVA processes. The idea was to find scientific data on anticipated

[2] https://www.universityofcalifornia.edu/campuses-locations

climate-related hazards, determine what problems those hazards might create, and forecast how those problems would affect the UC system.

Heard at the roundtable: *"For climate change, it's very hard to forecast the effects. We live in complex systems that are inherently unstable, and if there's an aberration, there's a profound impact. Covid had an impact on global supply chains that we wouldn't have seen coming 25 years ago...We have to morph the capability of the organization to handle these crises. We're attempting to influence the culture of leadership, which is hard…we have to prepare for the risks we can't anticipate."*

Accordingly, the UC added two components to its HVA:

1. **A climate change coefficient,** which quantifies future climate changes in specific geographic areas.
2. **An equity coefficient,** which quantifies whether and how specific climate hazards affect certain campus community populations.

The UC devised separate assessment scales for its campuses and its health locations. These HVAs also incorporate the effects of climate hazards on mental health.

Heard at the roundtable: *"We know emergencies and hazards cause physical injuries, but they also cause mental injuries. We thought it was important to include that in the assessment."*

In order to construct these coefficients, the UC HVA incorporated two measures of vulnerability to climate hazards:

1. **The Texas A&M U.S. Climate Vulnerability Index**, which measures susceptibility to various climate-related hazards through 2050. It measures vulnerability to a hazard rather than the likelihood that the hazard will occur. The index uses 184 sets of data to rank more than 70,000 U.S. Census tracts.[3]
2. **The Centers for Disease Control and Prevention (CDC)/Agency for Toxic Substances and Disease Registry (ATSDR) Social Vulnerability Index**, which uses 16 U.S. Census data sources to identify communities and populations affected by disasters or outbreaks.[4]

The UC HVA rates hazards as "highest vulnerability," "higher vulnerability," "average vulnerability," and "lowest vulnerability" for the current year and for 2050.

When the number of extreme weather days increases, the likelihood that a campus will experience a simultaneous unrelated emergency increases. Accordingly, the UC HVA also considers concurrent emergencies (more than one emergency happening at a time).

---

[3] https://climatevulnerabilityindex.org/
[4] https://www.atsdr.cdc.gov/placeandhealth/svi/index.html

Incorporating DEI principles into HVAs

Although incorporating a climate-change coefficient into an HVA poses several challenges for IHEs, a greater challenge may be incorporating an equity coefficient, which quantifies whether and how specific climate hazards affect certain populations.

The UC system is currently measuring 20 different population groups in order to construct a proprietary and customized social vulnerability index. These measures may ultimately become qualitative rather than quantitative inputs, according to UC.

Advantages of using HVAs for climate adaptation and mitigation efforts

The UC system identified three advantages to incorporating forward-looking data sets and campus population data into HVAs:

1. **Efficiency.** The process relies on standardized definitions and lists of climate hazards, which can save time and help ensure consistent application of the methodology across the campus system.
2. **Specificity**. The data sets help IHEs assess vulnerability by detailed Census tract or by neighborhood, which helps IHEs with unique geography or highly variable surroundings accurately determine how various climate hazards affect specific parts of their campuses.
3. **Practicality.** The process is replicable, allowing other IHEs to adopt the methodology.

> Heard at the roundtable: *"We had to find some statistics that support the climate hazards of the future. We didn't want opinions; we wanted data-based predictions to anticipate future effects and forecast their impact."*

Discussion session 2: Working effectively across stakeholders and functional teams

The second part of the roundtable discussion had three objectives:

1. Discuss how IHE emergency management, risk management, and sustainability teams can leverage and align climate-resilience planning efforts.
2. Explore ways that stakeholders such as governments, NGOs, academia, and businesses can collaborate to help IHEs address complex challenges related to climate change.
3. Share best practices, tools, and resources for creating innovative climate-resilience solutions.

The discussion centered around a case study of the University of California's climate-resilience collaboration efforts and a case study of the University of Oregon's thermal heating system transition.

Exploring climate resilience collaboration at the University of California

The first case study focused on finding ways IHEs can ensure they meet the needs of the people and communities affected by climate-based hazards and events. Researchers from building engineering and consulting firm Introba and the University of California system reported findings from a series of focus groups with students and other stakeholders. The focus groups discussed the effects of potential climate hazards in the campus community.

In general, the respondents' top concerns about the effects of climate-related events included but were not limited to:

- Supply chain issues
- Inability to provide or perform core services
- Higher costs
- Power outages
- Hospital overcrowding
- Absentee staff

Furthermore, respondents with preexisting conditions or respondents who had outdoor jobs worried about difficulty breathing due to poor air quality caused by wildfire smoke, for example. Many respondents worried about whether and how climate change would increase the cost of living or the affordability of the area. Hospital staff members wondered about increases in patient volumes due to heat and smoke-induced illnesses.

Roundtable participants set forth eight key steps to developing equity-centered climate-resilience planning:

1. Gather a cross-department planning team.
2. Identify affected populations.
3. Identify relevant stakeholders.
4. Identify how specific climate-based hazards affect those populations and stakeholders.
5. Analyze IHE vulnerabilities.
6. Develop a vision for helping the identified populations and stakeholders.
7. Identify and prioritize solutions.
8. Implement the solutions.

Roundtable participants also said that equity-centered climate-resilience planning has two advantages:

1. **Anchoring.** Equity-centered climate-resilience planning can help IHEs focus on the needs of its full community, which can help it anticipate and thus reduce the cost of damage and program disruptions.
2. **Accessibility.** It can alleviate barriers to post-event resources that some vulnerable groups may experience.

Leveraging and aligning climate-resilience planning efforts: Oregon’s thermal heating system transition study

Determining whether and how to become more climate resilient is often a complex process. IHEs may question whether they can afford to avoid being part of the climate problem. A case study of the University of Oregon’s potential switch to lower-carbon heating systems highlights the intricacies of these decisions.

Much of the University of Oregon’s electricity comes from renewable hydropower. However, its largest source of carbon emissions comes from heating buildings. The IHE’s heating system relies on central boilers that use natural gas to distribute heat via steam tunnels. Although natural gas is inexpensive on a per-BTU basis and is a relatively efficient way to power steam distribution systems, transmitting heat in other ways could reduce the IHE’s carbon emissions. However, switching methods requires careful evaluation of several factors.

The University of Oregon had four options to reduce its carbon footprint:

1. **Status quo.** In this scenario, the university would not change its system. Despite that, it still expects a 30% reduction in greenhouse gas emissions due to anticipated regulatory changes in natural gas production. However, the price of that decarbonized natural gas may be higher, thus raising the university’s heating costs.
2. **Switch to steam and electric.** In this scenario, the university would implement an electrode boiler, which could decrease carbon emissions by 85%. Although the capital costs are relatively low to make the switch, electricity costs more than natural gas, and the local utility may have to upgrade its infrastructure to handle the university’s higher electricity needs. If the local utility is unable to make those upgrades, the university would have to pay a third party to burn gas or coal to create electricity, which would negate some of the greenhouse gas reductions.
3. **Switch to gas and hot water.** In this scenario, which could reduce the university’s carbon emissions by 50% by 2040, the university would need to dig trenches to all 85 buildings on campus in order to add hot water lines. The related capital costs are very high.
4. **Switch to electric and hot water.** In this scenario, which could reduce the university’s carbon emissions by 85% by 2040, the university would switch to electricity and hot water but also add a heat sink. This would require locating spare land, drilling a 1,400-foot well, and burying excess heat in the summer for use in the winter. Additionally, because electricity costs much more than natural gas, a 60% reduction in electricity use would still cost the university more than it spends on natural gas.

The case study highlighted several tenets of leveraging and aligning certain climate-resilience efforts.

1. **Beware tuition dependency.** Heavy reliance on tuition dollars may affect leaders’ willingness to make capital outlays and/or raise operating expenses. If IHEs cannot finance, borrow, or fundraise the money necessary to pay for transitions to lower-carbon footprints, they may have to raise tuition, which can disappoint students and hinder recruiting efforts.

2. **Consider other timing opportunities.** Efforts that require a high degree of construction or ground moving may be easier to implement in the recovery phase of an event. For example, in the case study's scenario, digging wide trenches to 85 buildings might be best done during post-earthquake recovery efforts.
3. **Protect the IHE's mission.** IHEs do not help students, employees, or communities if they go bankrupt.
4. **Align on a definition of "resilient."** Making an organization resilient is not always the same as making an organization sustainable. For example, calls for decarbonization can be louder than calls for resilience, even if resilience is more likely to prevent immediate losses of life, assets, and research. Resilience may be the more effective investment if the IHE's decarbonization efforts do not materially mitigate the global crisis.
5. **Acknowledge the challenging nature of the investment.** IHEs may have difficulty convincing leadership to spend money on infrastructure and facilities that students and employees can't see or interact with.

Many IHEs, like the University of Oregon, have multiple efforts to assess. For example, over the past several years, IHEs in the Pacific Northwest have experienced long-duration smoke events due to the size and intensity of wildfires. In addition, what used to be one- or two-day events can now last for weeks, significantly affecting campus operations. Accordingly, IHEs may need to increase building filtration and cut off air intakes during wildfire smoke events. However, increasing building filtration systems could be cost-prohibitive depending on the size and age of campus buildings.

Heard at the roundtable: *"There are certain things that garner attention from execs in their language; if we're not attuned to that, we can't communicate to them. Our top risk is that we're tuition-dependent; Anything that impacts tuition is a problem."*

Discussion session 3: Whole community engagement and resilience coordination

This session had three objectives:

1. Discuss how IHEs can contribute to climate resilience and address climate anxiety through campus, community, private-sector engagement, and partnerships.
2. Explore the most significant barriers that IHEs face in this context.
3. Discuss how IHEs can innovate and problem-solve to cultivate partnerships on campus and in communities.

Heard at the roundtable: *"Some student populations are just concerned about having functioning showers, clean campuses, access to internet and food – it's almost a privilege to worry about other things."*

Contributing to climate resilience through campus, community, private-sector engagement, and partnerships

Roundtable participants noted that IHEs often have difficulty knowing where to focus or how to prioritize their assets when trying to balance climate-centric programs with financial sustainability. Participants noted that understanding the cost of the interruption of a key service is one evaluation method. Knowing how a hazard will affect specific buildings or areas (rather than the whole campus) is also important.

Roundtable participants mentioned that IHEs are right to look at how to harden assets to vulnerability, but because their resources are finite, IHEs can't protect everything. Understanding which assets can't ever fail and which assets can tolerate some limited disruption can help IHEs discern and prioritize to minimize the disruption of their missions.

One participant's school, for example, has gone from experiencing two to three days per year of wildfire smoke to experiencing two to three weeks of wildfire smoke per year. Accordingly, when the IHE remodels all or part of a building, HVAC updates are now part of the package. Another IHE that has a campus near a coastline now insists on building new buildings uphill in anticipation of rising sea levels.

Providing a quantitative assessment of how much it will cost to repair or replace a certain asset after a climate-related event – or how long it will be out of service – can also be a compelling argument for making investments, the participants noted.

> Heard at the roundtable: *"We're tiering things by security to look at it from a capital investment perspective and then combining it with operational needs and space utilization to assess how to proceed."*

Barriers IHEs face

Contributing to climate resilience and addressing climate anxiety through campus, community, private-sector engagement, and partnerships can be difficult for IHEs. Roundtable participants highlighted three particular challenges.

1. **Churn.** New presidents and new staff members can hinder climate-resilience efforts if their arrival brings big strategic changes, staffing shakeups, budgetary revamps, or other significant changes that slow down, limit, or distract from climate-resilience activities.
2. **Short-sightedness.** IHEs often make long-term investments in buildings that are meant to last for 50 to 75 years. Roundtable participants said many IHE leaders therefore may need to be made aware now of campus infrastructure that will become vulnerable to climate hazards in 10 to 15 years. Participants said that climate change is accordingly an important factor in new infrastructure spending and deferred maintenance issues that plague many campuses.
3. **Lack of awareness about the value of marginal improvement.** Small changes in construction or remodeling projects can add a significant amount of climate resilience –

as long as IHEs are able to make a compelling argument for the change. For example, changing plans to erect a new building four feet above grade instead of three feet above grade adds cost, but it also adds climate resilience by shielding the building and its assets from storm surges and rising sea levels over the life of the building.

Innovation to cultivate partnerships on campus and in communities

Participants discussed new ways IHEs are approaching stakeholders to form partnerships in climate resilience, as well as how to address climate anxiety among students and in the community.

One participant noted that one compelling argument to form partnerships in climate resilience is to compare continued increases in property insurance rates (due to climate change) to the cost of adding resilience features that reduce property risk. One IHE applied climate resilience to its campus tree inventory, identifying which trees can survive temperature changes and noting which types of climate-resilient trees the campus should plant going forward.

Infrastructure projects are harder to win support for from IHE leaders because many of the projects are invisible to students and employees who typically don't directly use the finished product. The roundtable participants noted, however, that green infrastructure projects are job drivers in addition to builders of climate resilience.

Heard at the roundtable: *"It's a lot easier to name a park after a donor than to name a sewer line after a donor."*

Roundtable participants said it was becoming more and more important that IHEs understand the financial trade-offs of green infrastructure. For example, green rooftops (on which a garden or water collection system might sit) are popular ideas, but some insurers may charge more to insure those buildings because green roofs are expensive to replace and often leak. In addition, the wind can pick up vegetation and stones on green roofs, thus raising the risk of damage.

Potential Recommendations

IHEs cannot eliminate the risk of climate-related disasters. However, they can minimize those risks and develop plans for climate-related events. Here are some recommendations from the roundtable participants.

Define key terms. Language means different things in different professions, so it's important to define key terms. Roundtable participants said that, at a minimum, climate-resilience teams should align on their own definitions of these terms:

- Organizational resilience
- Organizational velocity
- Climate resilience
- Adaptive capacity

Diversify the team responsible for climate resilience. Assembling a climate-resilience working group of people from across different functional areas of an IHE can boost involvement and support for climate-resilience initiatives.

Evaluate climate risk over different time periods. This mitigates the risk that leaders focus only on events that occur during their tenures, and it helps inform different measures of return on investment. IHEs tend to have long-term mind-sets; participants suggest looking at three time horizons when doing climate-resilience planning: zero to three years (an ERM standard), 10 years (a capital planning standard), and a period equal to the actual useful life of the asset the IHE wants to build or maintain.

Backtest hazard vulnerability assessments. Showing that the IHE could have saved on labor expenses or boosted revenue with a different response to a previous incident can make for a compelling argument to invest in climate resilience.

Reduce exposure to climate hazards. To ensure that key activities, resources, and assets (economic, social, cultural, and environmental) are out of harm's way, IHEs may have to create ways to redirect a hazard (e.g., by constructing a sea wall) or move things of value to another location (e.g., relocating computer servers or document archives from a flood-exposed basement).[5]

Reduce sensitivity to climate hazards. Sometimes it is not practical to eliminate exposure to a risk. Roundtable participants said that in such cases, IHEs can take measures to reduce their

[5] The University of California Carbon Neutrality Initiative Framework for J.E.D.I.-Centered Climate Resilience Planning framework defines exposure as the nature or degree to which the element or group is within the reach of a climate-related hazard, such as whether a building is within a flood extent or whether students are on campus during periods of extreme heat. One attendee noted that exposure tends to be similar for all impacts to assets or services in a location. For example, a campus may or may not be close to the coast where sea level rise would be a hazard. Exposure differs for different population groups.

susceptibility to harm. This can be as simple as encouraging staff and students to drink more water during a heatwave, for example.[6]

Increase adaptive capacity. Roundtable participants said IHEs must increase their ability to cope with and adjust to change. IHEs can do this by having continuity plans in place to ensure, for example, that backup power is in place should a storm or heatwave result in an electricity outage.[7]

Frame adaptation to raise interest in climate resilience. Roundtable participants said that asking focus groups and other parties two questions can help IHEs raise interest in climate resilience:

1. Which populations should bear the brunt of climate effects?
2. How should students help spread a message?

IHEs must also determine if climate resilience includes advocating for basic student needs (housing, transportation, food).

Embrace the need to be flexible in the face of uncertainty. IHEs want to be nimble and ready where they can, with awareness that they are making trade-offs, have limited resources, and can't say yes to everything. Knowing what risks to accept can hasten climate-based decision-making and provide alignment on where to focus resilience efforts.

---

[6] The University of California Carbon Neutrality Initiative Framework for J.E.D.I.-Centered Climate Resilience Planning framework defines sensitivity as the degree to which elements or groups have preconditions that make them particularly susceptible to climate-change hazards. For example, individuals with pre-existing respiratory conditions are generally more sensitive to smoke events; older infrastructure is generally more sensitive to flood events.

[7] The University of California Carbon Neutrality Initiative Framework for J.E.D.I.-Centered Climate Resilience Planning framework defines adaptive capacity as the degree of ability to prepare for and respond to impacts and consequences (e.g., a population or service that is already under stress has lower adaptive capacity). The adaptive capacity of a group or population is typically directly related to existing public health and socioeconomic harms, which can be discovered even before specific climate hazards are identified.

Appendix 1: Participants

The following people attended the climate resilience roundtable.

Facilitators:

- Amina Assefa, Director of Emergency Management and Business Continuity, University of California Office of the President
- Andre Le Duc, Vice President and Chief Resilience Officer, University of Oregon

Other Attendees:

- Ryan Bell, Associate Director of Sustainability, University of California Office of the President
- Jake Braunsdorf, Senior Manager, Deloitte & Touche LLP
- Ash Chaudhry, Risk Management Research Consultant, Stanford University
- Anagha Dandekar Clifford, Deputy Campus Counsel, University of California at San Francisco
- Justin Dombrowski, Executive Director of Enterprise Emergency Management, University of California at San Francisco
- Brian Fox, AVP Budget, Financial Analysis and Data Analytics, University of Oregon
- Daniel Furman, Senior Staff Engineering Specialist - Climate & Structural Resilience, FM Global
- Joy Glasier, Senior Planner and Landscape Architect, University of California at San Francisco
- Christopher Godley, Director of Emergency Management, Stanford University
- Robin Hawker, Climate Resilience Associate Principal, Introba
- Alicia Jensen, Program Manager, Emergency Management and Business Continuity, University of California Office of the President
- Hope Kaye, Director of Emergency Services, San Francisco State University
- Grant Madden, Business Continuity Manager, University of California, San Diego Health
- Hailey Maxwell, Manager of Emergency & Continuity Planning, University of British Columbia
- Carrie Metzgar, Campus Sustainability Officer, University of California at San Diego
- Matt Moustakas, Executive Director of Risk Management, Texas Woman's University
- Nicole Poletto, Sustainability Analyst, University of California, San Diego Health
- Lindsey Salfran, Executive Assistant and IMT Planning Chief, University of Oregon
- Brian Smith, Chief Ethics and Compliance Officer/Senior Associate Vice Chancellor - Research Infrastructure and Operations, University of California at San Francisco
- Joel Sonkin, Climate Resilience Specialist Leader, Deloitte & Touche LLP
- Matt St. Clair, Chief Sustainability Officer, University of California Office of the President
- Cynthia Vitters, Managing Director, Deloitte & Touche LLP

Appendix 2: Key Resources

The members of the DRU roundtable recommend the following additional resources. If you have a resource to add to this list, please email the link to resilient@uoregon.edu.

- DRU Library: A digital collection of resources covering a wide range of resilience topics; built upon the work of the former National Center for Campus Public Safety's (NCCPS) resource library.
- CDC/ATSDR Social Vulnerability Index (CDC/ATSDR SVI): Uses 16 U.S. census variables to help local officials identify communities that may need support before, during, or after disasters.
- FM Global resources
    - 2023 Global Resilience Index: Country-Level Data to Keep Your Business Resilient, Responsibly
    - Climate resilience product suite (FM Global clients only)
    - Hurricane, typhoon, and cyclone loss control center
    - "Know More Risk" video series
    - Natural Hazard Toolkit and maps (flood, severe weather, windstorm, and earthquake)
    - Property loss prevention data sheets
    - Water damage resources
- Maleyeff et al. (2023). "Climate Change Risk Assessment for a University Campus." *Proceedings of the 54th Annual Conference of the Decision Sciences Institute.*
- Sheffield, et. al. (2017). "Climate Change and Schools: Environmental Hazards and Resiliency." *International Journal of Environmental Research and Public Health*, 14(11): 1397.
- *Universities on Fire: Higher Education in the Climate Crisis*, by Bryan Alexander.
- University of California Office of the President, "Leading on Climate" series.
- U.S. Climate Vulnerability Index: Uses 184 sets of data to rank more than 70,000 U.S. Census tracts and identify which communities face the greatest challenges from impacts of climate change.