



# CLIMATE CHANGE BRIEF 2023 UPDATE

Honolulu Climate Change  
Commission Meeting

March 31, 2023



# The Honolulu Climate Change Commission

- Gather the latest science and information on climate change impacts to Hawai'i, with a focus on O'ahu
- Advise the CCSR, Mayor, City Council, and executive departments of the City as they look to draft policy and engage in planning for future climate scenarios

# Climate Change Brief

## Purpose

- Update to the 2018 summary of the best-available science on climate change and related impacts
- Scientific basis for City planning and decision-making
- Foundation for guidance and recommendations from the Commission
- Community resource for understanding types and timing of climate change impacts and responses

# Climate Change Brief

## Purpose

- It does not provide detailed guidance and recommendations
  - The Commission also produces topically-focused guidance documents
- This updated version includes *Progress and Next Steps* highlighting recent and ongoing efforts to address climate change impacts

# Recent Key Climate Change Reports

- IPCC Special Reports:
  - Global Warming of 1.5° C (2018)
  - Climate Change and Land (2019)
  - The Ocean and Cryosphere in a Changing Climate (2019)
- IPCC 6<sup>th</sup> Assessment Reports (AR6):
  - WG I - The Physical Science Basis (2021)
  - WG II - Impacts, Adaptation and Vulnerability (2022)
  - WG III - Mitigation of Climate Change (2022)
  - Synthesis Report (March 2023)
- Fifth US National Climate Assessment (NCA5; in-prep, public review draft)

# Climate Change Brief

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*The content of this paper rests solely with the Honolulu Climate Change Commission.*

# Climate Change Brief

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# Climate Change Brief

## Contents

- Local Observations
- Global Observations
- Projected Impacts
- Progress & Next Steps



# CLIMATE CHANGE INDICATORS AND IMPACTS

## IPCC AR6 Synthesis Report (SPM, 2023)

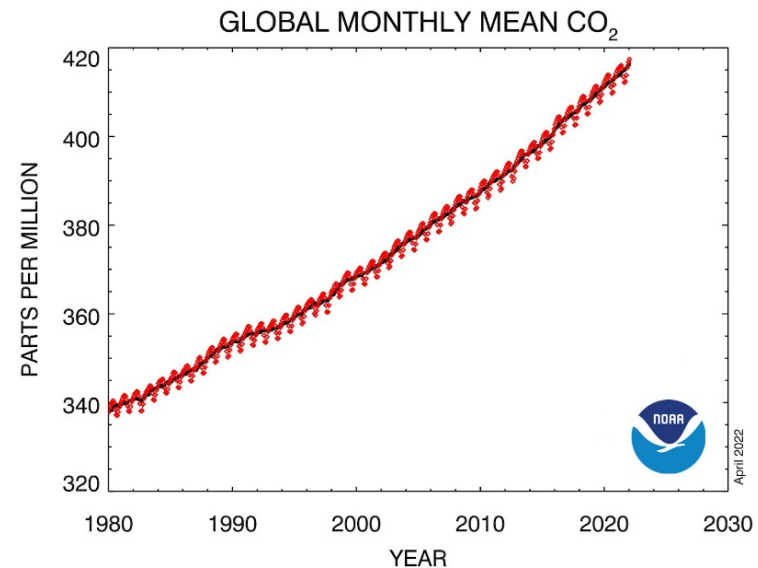
- **Climate change is a threat to human well-being and planetary health. There is a rapidly closing window of opportunity to secure a livable and sustainable future for all.**
- **The choices and actions implemented in this decade will have impacts now and for thousands of years.**

Intergovernmental Panel on Climate Change (IPCC). 2023. AR6 Synthesis Report: Climate Change 2023. <https://www.ipcc.ch/report/sixth-assessment-report-cycle/>

# CLIMATE CHANGE INDICATORS AND IMPACTS

## Energy and Greenhouse Gases

- **Global atmospheric carbon dioxide concentrations (420 ppm) are higher than at any time in at least 2 million years.**
- Approximately 80% of Hawaii's GHG emissions come from O'ahu.
- O'ahu's GHG emissions declined 18% from 2005 to 2018 (18.8 to 15.4 MMTCO<sub>2</sub>).

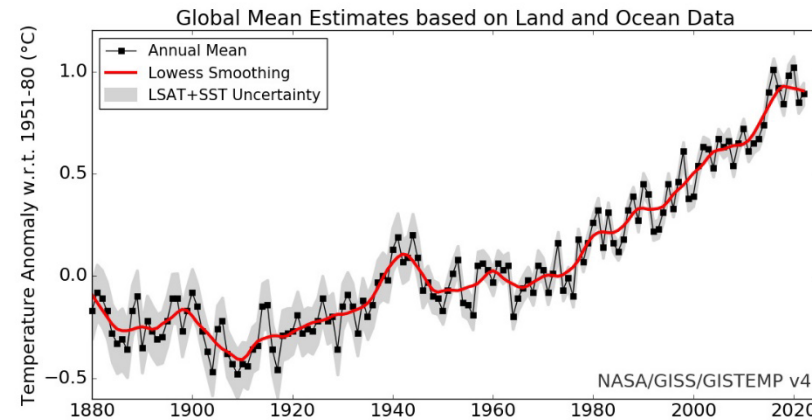


Global atmospheric carbon dioxide concentration (black line) measured from NOAA's Mauna Loa Observatory.

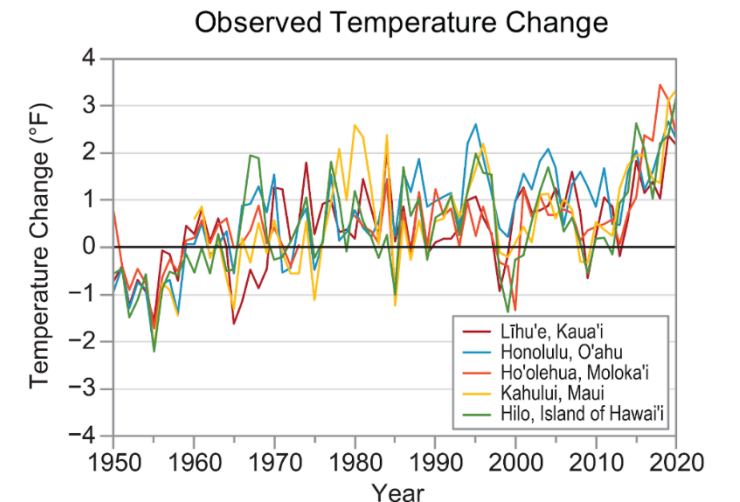
# CLIMATE CHANGE INDICATORS AND IMPACTS

## Atmosphere and Ocean Warming

- **Human activities, principally through emissions of greenhouse gases, have unequivocally caused global warming, with global surface air temperature reaching 1.1°C (2°F) above 1850–1900 in 2011–2020.**
- **Without a strengthening of policies, global warming of 3.2°C (5.8°F) is projected by 2100.**
- Average air temperature has risen 1.1°C (2°F) in Hawai‘i since 1950.



Global surface temperatures relative to 1880-1920 (Source: NASA GISS).



Hawai'i observed temperature changes since 1950 (Source: NOAA-NCEI)

# CLIMATE CHANGE INDICATORS AND IMPACTS

## Precipitation and Streamflow

- **Globally, human influence has likely increased the frequency of concurrent heatwaves and droughts.**
- Rainfall and streamflow have declined in Hawai'i over the past century.
- Predictive models for Hawai'i do not agree on total rainfall nor extreme rainfall occurrence late in this century.



# CLIMATE CHANGE INDICATORS AND IMPACTS

## Sea Level Rise and Coastal Impacts

- The City Climate Change Commission provided updated guidance on sea level rise in July, 2022.
- A 2022 State of Hawai‘i Sea Level Rise Vulnerability and Adaptation Report Update provides a detailed assessment of progress in preparing the state and counties for sea level rise.



# CLIMATE CHANGE INDICATORS AND IMPACTS

## Extreme Weather

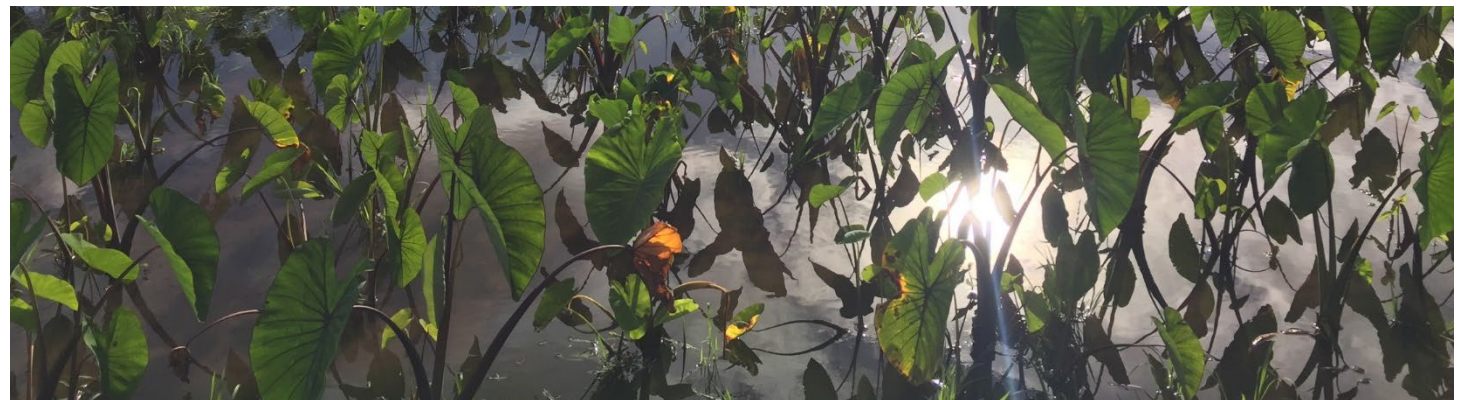
- **Human-caused climate change is already affecting weather and climate extremes in every region across the globe.**
- Historical extreme rainfall trends across the Hawai'i vary with the definition of "extreme" and time periods of reference.
- Drought frequency, duration, and magnitude have increased statewide in both the wet and dry seasons.
- More frequent tropical cyclones are projected near Hawai'i, due to northerly-shifting storm tracks, though models are uncertain.



# CLIMATE CHANGE INDICATORS AND IMPACTS

## Food Systems

- **Globally, climate change has reduced food and water security, hindering efforts to meet UN Sustainable Development Goals.**
- The majority of food (85-90%) in Hawai'i is imported, leaving food supply chains vulnerable to climate-related disasters.
- As of March 2021, 48% of Hawai'i families reported experiencing food insecurity.
- CCSR hired a Food Security and Sustainability Program Manager in 2020.



# CLIMATE CHANGE INDICATORS AND IMPACTS

## Human Health

- **In all regions (globally) increases in extreme heat events have resulted in human mortality and morbidity.**
- **The occurrence of climate-related food-borne and water-borne diseases and the incidence of vector-borne diseases have increased.**
- In 2021, the city passed the halfway point toward its goal of planting 100,000 trees to reduce urban heat
- City has a FEMA grant to begin developing a network of community resilience hubs for services in case of disaster, access to health services, public cooling centers, and more.



# CLIMATE CHANGE INDICATORS AND IMPACTS

## Disproportionately Impacted Communities

- **Loss of ecosystems and their services has cascading and long-term impacts on people globally, especially for Indigenous Peoples and local communities.**
- **Prioritizing equity, climate justice, social justice, inclusion and just transition processes can enable adaptation, ambitious mitigation actions, and climate resilient development.**
- Low-income individuals tend to lack the resources needed to respond and recover from hazard events.
- In 2020, 33% of Hawaii's households were classified as "asset limited, income constrained, employed" (ALICE)

# CLIMATE CHANGE INDICATORS AND IMPACTS

## Terrestrial and Marine Ecosystems

- **Globally, climate change has caused substantial damages, and increasingly irreversible losses, in terrestrial, freshwater, cryospheric, and coastal and open ocean ecosystems.**
- Invasive species and climate change are having interactive and compounding impacts on Hawaii's terrestrial and marine ecosystems.
- The challenges we're facing in O'ahu's watersheds and coastal ecosystems are inextricably linked to land use practices in City jurisdiction.



(Photo: Oahu Board of Water Supply)



Hawaii coral reef bleaching (DLNR)

# AREAS FOR FUTURE RESEARCH

- Projections of future rainfall and flooding impacts, and drought
- Next-generation modeling of sea level rise impacts
- Impacts of climate change on local food systems, human health, and communities
- Continued monitoring of physical and socioeconomic climate change data