



California's Fifth Climate Change Assessment

Climate Research Topics

OVERVIEW:

This list represents research topics that demonstrate a gap in the State's research portfolio, existing literature or knowledge base, align with the State's climate change priorities, and fall within the scope of the State's Fifth Climate Change Assessment (Fifth Assessment).

- » Responses and input from over 200 experts and community partners throughout State agencies, academic communities, non-government organizations, California Native American tribes, and other interested residents of California were used to develop this list of gaps in the State's understanding about climate change impacts and adaptation pathways. Read more about the research topic identification process on OPR's site.
- » General themes of governance, economics and financing, equity, traditional knowledge(s), and monitoring are considered necessary cross-cutting themes relevant to all listed research gaps.
- » The scopes of the topics listed below are broad. While in alignment with the broader topics in this list, related research projects conducted as a part of the Fifth Assessment will be necessarily narrower in scope.
- » The research topics listed below will be used to inform future scoping of Fifth Assessment research processes, including research conducted through CNRA's Core Climate Research Program, and where relevant, the Tribal Research Program, Regional and Topical Synthesis Reports, and CEC EPIC Grants Program.
- » The research topics below are listed in no particular order and do not represent a hierarchy or priority amongst the topics.



TOPICS:

- » Evaluation of climate change adaptation strategies to understand the equity implications and potential unintended consequences on vulnerable communities, including potential for job loss as well as workforce opportunities in emerging and expanding industries and technologies.
- » Increased understanding of climate change-related occupational hazards, including which workers are most vulnerable to the impacts of climate change and best practices to mitigate these impacts.
- » Health (mental and physical) and social consequences (short-term, chronic, and cumulative) of climate change-related extreme events and impacts, including, but not limited to, extreme heat, wildfire smoke and toxicity, water supply and quality, and flooding.
- » Explore how climate-related events will impact emergency system capacity and potential responses to the loss, damage, or adverse impact of major infrastructure (e.g., major roads, water conveyance structures, Delta levees, electrical and gas transmission, etc.).
- » Effectiveness of cooling strategies for buildings and neighborhoods on indoor heat exposure and associated energy demand.
- » Housing solutions to increase climate resilience including the health, social, and economic benefits of building new and retrofitting existing affordable housing to be resilient to projected climate change impacts.
- » Climate change-driven landslide risk to transportation infrastructure, communities, and habitats.
- » Effects of toxic mobilization from climate induced impacts, including but not limited to, saltwater intrusion, groundwater contamination and inundation, changes in tidal reach, and the combined flood risk from tides, surges, and river discharges.
- » Impacts of sea level rise on salinity levels in groundwater and freshwater inland ecosystems and corrosion of critical infrastructure, including adaptation opportunities in response to these impacts and concerns.
- » Impacts of sea level rise on coastal habitats and communities including estuaries, beaches, dunes, inland waterways, groundwater rise and flooding, sediment transport, wetland migration pathways, vulnerability of coastal infrastructure, public access, and the adaptation strategies in response to these impacts and concerns.
- » Effects of increasing water temperatures, varying precipitation patterns, and associated events (such as harmful algal blooms and ocean acidification) on fish and other aquatic and marine ecosystems, including, but not limited to, impacts on species such as chronic and acute physiological changes, sex ratios, and fecundity.
- » Impacts of drought and climate change-induced aridity on surface and groundwater supply, changes to surface-groundwater connections, and recharge potential, including the economic and equity impacts of these changes.
- » Impacts and cascading effects of future extreme heat and drought on agricultural productivity including, but not limited to, the effect on crop patterns, pollinator health, food security (cost and nutritional availability), and economic viability. Evaluate how competing uses for water during periods of drought have impacted agricultural production, and the effect of future climate changes, regulations, and water systems.
- » Quantification of the compounding and cascading effects of climate change and the historically top natural hazards in California such as earthquake, fire, tsunami, and flood. Quantify the compounded hazards on the built environment.

- » Combined heat and drought impacts on soil quality, soil dust levels, and resultant air quality changes in deserts and other California ecoregions.
- » Effects headwater management practices have on downstream water supply and quality, hydrology, habitat quality, and biodiversity. Examples may include, but are not limited to, identifying practices that maximize snowpack retention, measure watershed yield based on management induced changes in forest form (e.g., density/basal area), and identifying what conditions resulting from potential forest management techniques will maintain, support, or degrade habitats and ecosystem services.
- » Roles of wetlands and their associated ecosystem functions in maintaining carbon storage, water supply, water quality, flood control, biodiversity, and habitat connectivity. This may consider various habitat restoration techniques, including animal and other process-based restoration such as beavers.
- » Identification of climate refugia or habitat conditions that can provide increased climate resilience and support species adaptation to climate change. This includes, but is not limited to, identification of critical population connectivity, migration pathways and corridors, and habitat restoration and conservation opportunities.
- » Impacts of climate change (including extreme events) on biodiversity and native species, including what factors affect vulnerability and resilience, ways to identify the greatest threats to biodiversity caused by climate change (including but not limited to invasive species and pests), understanding how species or populations will respond to climate change, and identifying techniques and metrics for tracking and monitoring the effects of climate change on biodiversity.
- » Effects and consequences of climate change on nature-based climate solutions, as well as necessary modifications to ensure actions are successful. Examples may include how prescribed fire burn windows will need to be modified to account for drought or heat, how biodiversity conservation can incorporate species migration and population connectivity, how coastal wetland restoration can account for sea level rise projections, and how mountain meadow restoration can incorporate wildfire management.
- » Impacts of climate change on forest health and how cultural and prescribed burning can build resilience to these impacts.
- » Climate change-related impacts on tribal cultural resources, culturally important species, traditional gathering areas, ceremonial sites, other cultural sites, as well as the impacts communities and individuals may experience due to (further) loss of their culture.
- » Effects of climate change on California Native American tribes' traditional food sources, food systems, and culturally important species.
- » Impacts of drought and water availability on land use development and housing growth, including strategies to improve access to residential water supply efficiency and increase drought resilience.
- » Effect of building codes on improving resilience to climate change-induced events and extremes, such as extreme heat, wildfire, or flooding.
- » Effects of climate-related events on short-term (e.g. evacuation, tourism) and long-term human migration patterns, population distribution, population density, and other demographics. This may include the related economic, transportation, and land management planning considerations for event-specific and longer-term climate trends.