THE PONTIFICAL ACADEMY OF SCIENCES

THE PONTIFICAL ACADEMY OF SOCIAL SCIENCES

UNIVERSITY OF CALIFORNIA

CLIMATE RESILIENCE SUMMITS

RESILIENT CALIFORNIA SUMMIT

Climate Resilient California and Californians

CRC2 Summit Outcomes and Aspirations
February 27-28, 2025

Innovate Locally to Inspire Change Globally

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**There will be two separate versions of this document; a shorter version withuot projects, and a longer version with about 20 aspirational projects.*

Preface

This document presents the summary of a summit convened in California on February 27-8, 2025. It focused on how to accelerate climate resilience across our state. The summit was sponsored by Vatican's Pontifical Academies of Sciences (PAS) and Social Sciences (PASS), and co-organized with the California Governor's Office of Land-Use and Climate Innovation (GO-LCI), and the University of California Office of the President (UCOP). More than 600 Summit participants included governors from California, Massachusetts, Japan and Kenya; California agency heads (including Natural Resources, Food and Agriculture, Environmental Protection, the Air Resources Board, Emergency Services, and Insurance); national, state and tribal policy makers; California mayors, city council presidents and municipal sustainability officers; heads of California universities and of leading climate-focused NGOs; academic researchers, including a Nobel Laureate economist; and youth climate activists.

The sole purpose of the sub-national summit was to accelerate pathways to protect California and Californians from worsening climate/weather disasters. The two day agenda was designed to inspire and accelerate action. The Summit began with goal-setting talks and panels on what needs to be done, followed by a practical intervention focused on how to take action - guided by an "adaptation blueprint continuum" that encouraged participants to locate themselves within the process and reflect on barriers and strategies for progress.

This summit has been 20 years in the making. The two Pontifical science academies report directly to the Pope and have been organizing climate meetings since early 2000 overseen by Pope John Paul II, followed by Pope Benedict, culminating in a summit in May of 2024, led by Pope Francis, that included mayors and governors across the world, including Governor Newsom from California.

Why mayors and governors and not heads of states? About ten years ago, it became clear to us that planetary scale warming and its associated weather/climate extremes were upon us, and we needed to broaden the fight against climate change to include adaptation. Roughly 90% of climate action and finances across the world are dedicated to mitigating emissions. Because adaptation is ultimately a local activity, that depends on local experiences, preferences and cultures, we at PAS/PASS recognized the importance of summoning local and sub-national leaders.

At the 2024 Vatican summit, we formulated the MAST strategy. Building resilience to climate/weather extremes demands central and equal attention to Mitigation, Adaptation and Societal Transformation. Governors and Mayors at the summit, along with Pope Francis and other experts, signed a Planetary Call to Action*, committing their jurisdictions to the principles of MAST, and to hosting a sub-national regional summit, to launch a global climate resilience movement, chaired by Pope Francis. The California summit is the first of 8-10 summits being planned around the world in 2025.

* https://www.pas.va/en/events/2024/climate_resilience/call_to_action_climate_change.html

Key Take-aways From Sub-national Leaders at the Summit

Governor of California, Gavin Newsom: We know what we want, and we know why. Now, we need to focus on how we implement these changes.

Cardinal Turkson, Chancellor of PAS/PASS: Adaptation and mitigation alone are not enough to address the root causes of climate change; social transformation is key.

Governor of Massachusetts Maura Healey: Climates challenges cannot be solved by one country or city alone. Joining together and combining knowledge and action is essential.

Governor of Vihiga, Kenya, Wilbur K. Ottichilo: Kenya faces extreme climate events that cost 3-5% of GDP annually, making its economy climate-sensitive. Advocated for locally-led initiatives to address structural inequalities within communities.

Governor of Yamanashi Kotaro Nagasaki: Yamanashi created the Fuji Hydrogen Valley Consortium. The Power to Gas (P2G) system uses green hydrogen, carried by trailers to supermarkets; for public transportation and carbon-free agriculture with hydrogen bank.

Former Governor of California, Jerry Brown: The state has the capacity to prepare, and the money is available What needs to be generated is the understanding and the political will across the governor's office, legislature, courts, counties, cities, insurance companies, and property owners.

Former FEMA Head, Deanne Criswell: Climate threats are no longer distant, with once-in-a-lifetime disasters now occurring every few years. Need to invest in pre-disaster mitigation funding, noting that every dollar spent on mitigation saves an average of six dollars.

Representative Scott Peters (50th district-San Diego): Even during the best times for Democrats, we needed Republican votes, so bipartisan support is crucial. One initiative that might help is the National Coordination on Adaptation and Resilience for Security Act (NCARS), which we introduced in the last Congress.

Mayor Rex Parris: I'm a Republican in a Republican city, and we succeeded because clean energy is cheaper.....It's all about amortizing costs, and once we communicated this, the message resonated.

Mayor Rex Richardson, Long Beach: Long Beach's economy has historically been tied to the oil industry, but the city is now focusing on transitioning to a more sustainable future. This transition is guided by the Long Beach Climate Action Plan, which seeks to reduce dependence on oil while maintaining the city's economic leadership.

Larry Kosmont, Chairman, Kosmont Companies: Climate Resilience Districts (CRDs) are a tool for financing infrastructure projects. These districts focus on creating a capital improvement plan (CIP) that prioritizes climate mitigation and resilience. The districts can issue bonds to finance these projects.

Ricardo Lara, Insurance Commissioner: In the insurance sector, we have focused on addressing the protection gap, which refers to the difference between the cost of climate impacts that are insured and those that are uninsured. This gap has grown as climate impacts accelerate, leaving more individuals, households, and businesses vulnerable.

Other Quotes from the Summit

Climate work is as much about the economy as it is about the environment.

Who pays for the risk? The cost of inaction is greater than the cost of action.

Planning is important, but action is better.

From the youth who participated: "How many of you have heard that my generation is going to fix the climate crisis?"

PART I: Vision And Scope of Resilience

1. Resilience: Climate/Weather Extremes

- **Anticipate** Threats and Risks
- **Reduce** Threats and Risks
- **Prepare for** Threats and Risks
- **Respond to** Threats and Risks
- **Recover from** Threats and Risks
- **Rebound from** Threats and Risks

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A One-Earth approach is needed to guide urgent action and speed up policy change and implementation. Amidst the climate emergency, it is imperative to acknowledge the fundamental right of every individual to climate change resilience. *

Signed by Pope Francis with Mayors and Governors from around the world (May 2024).

* https://www.pas.va/en/events/2024/climate_resilience/call_to_action_climate_change.html

2. One California Resilience Plan

We are deeply interconnected. Our relationship with nature—including how we care for one another—shapes outcomes far beyond ourselves, reaching across California, the nation, and the planet. Climate and weather-related challenges are formidable, but they also open pathways for innovation, resilience, and shared prosperity. By coming together in solidarity, we can transform these challenges into opportunities for a more equitable and thriving future.

While California continues to lead with regional efforts to build climate resilience, federal action is also gaining momentum—most notably through the Fix Our Forests Act of 2025, a bipartisan Resilience Plan.

Bipartisan Resilience Plan

In January 2025, the House of Representatives passed the landmark *Fix Our Forests Action (FOFA)* by a bipartisan vote of 279 to 141. Introduced by Representative Scott Peters (D) and Chairman Bruce Westerman (R), the legislation aims to address the nation's growing wildfire crisis by reducing the intensity of forest fires and advancing the restoration of forest health.

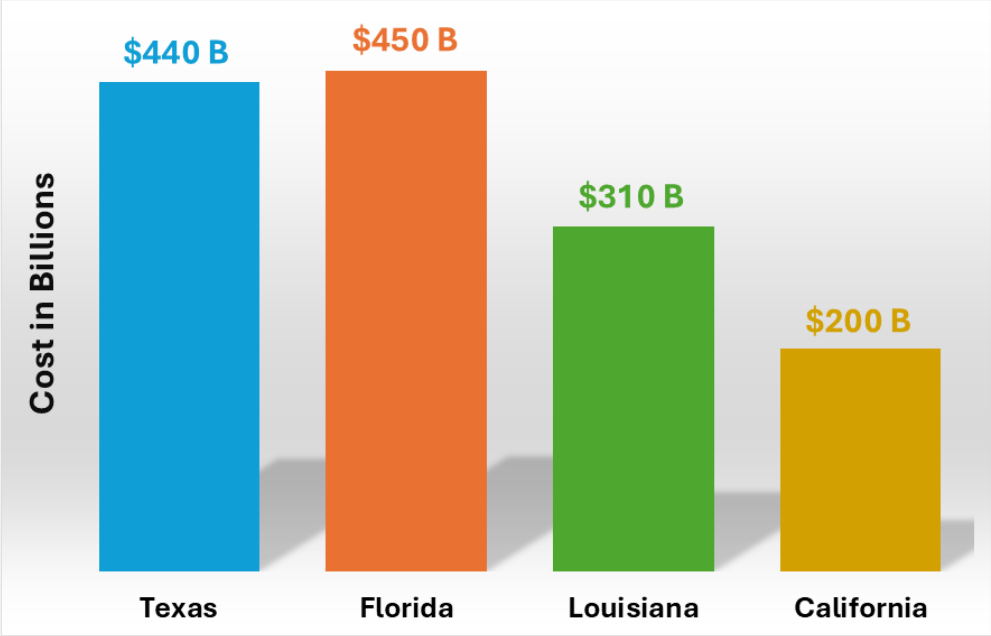
PART II: California's Resilience Ecosystem

3. Keep the California Dream Alive

The Golden State has the largest economy and the biggest population in the United States and is a major contributor to the nation's food supply. However, it is facing extreme weather/climate disasters such as mega-droughts, floods, and heat waves.

California is not alone in experiencing economic damages from weather/climate disasters. With very few exceptions, all 50 states in the nation have been and continue to be impacted by these disasters. Since the 1980s, weather-related disasters have exhibited a clear trend of increasing intensity and frequency. When viewed in conjunction with long-term shifts in average weather patterns (commonly referred to as climate) these events signal an escalating challenge and reinforce the imperative to invest in resilience measures without delay.

Weather and Climate Disaster Costs for 1980 to 2024



Source: NOAA-NCEI Data (https://www.ncei.noaa.gov/access/billions/state-summary/FL).
Includes only disasters that cost a $ billion or more per event.

The economic costs of weather/climate extremes during 1980 to 2024, are shown for the states that rank among the top four with respect to damage costs. The main concern is not only the accumulated costs, but the fact that disaster-related losses are increasing with time by 100% to 300%. For all fifty states of the US, the decadal cost of weather/climate disasters increased from $220B during the 1980s to $994B during the decade from 2010-2019. For the world, these costs increased 150% from $895B from 1978 to 1997 to $2.25T from 1998 to 2017. Data and model-based prediction is that weather/climate disasters will worsen with time in the coming decades. The 2025 LA fires are but one example of such a worldwide phenomenon.

The national data presented in this graph show that climate-related impacts are widespread, affecting states across the country. This national pattern underscores that these challenges are not confined to any one region but are the result of large-scale, systemic forces. It highlights a shared vulnerability — reminding us that no state is exempt and that addressing climate risks will require collective understanding and action.

Investing $1.8 trillion globally in five areas of adaptation from 2020 to 2030 could generate $7.1 trillion in total net benefits.

Reference: Ban Ki-moon, Bill Gates, et al., 2019.

4. The Golden State

California is the fifth largest economy in the world, with 39 million residents. It is home to 4.1 million small businesses employing 7.5 million and is the global center of AI development and innovation. California is also the nation's agriculture powerhouse, producing 11% of the nation's agriculture and ninety percent of the nation's wine supply. Without California and its economy, costs for food and wine across the country would escalate significantly.

The state and nation's economy as well as the nation's agriculture are at risk without actions to mitigate and adapt to intensifying weather and climate disasters.

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According to the Public Policy Institute of California, all 58 counties of the state have a history of severe flood damage,"threatening" more than $900 billion dollars in homes and other buildings.

Wildfires in particular pose an existential threat to California and the nation's economy. Over the last four decades, roughly two-thirds of disaster-related losses were due to wildfires, while the remaining one-third resulted from droughts, storms and floods.

5. Climate Resilience - California Style

California has long been a leader in climate action, reducing greenhouse gas emissions and adapting to climate impacts. Over the decades, California's commitment to climate resilience has evolved, shaped by scientific research, policy innovation, education, and deep community engagement. California's adaptation efforts are guided by a set of key frameworks and strategies that provide a road map for action:

- California's Climate Adaptation Strategy aligns efforts across state agencies and local governments, focusing on six priorities: 1) Strengthening protections for climate-vulnerable communities; 2) Bolstering public health and safety against increasing climate risks; 3) Building a climate-resilient economy; 4) Accelerating nature-based solutions and strengthening natural systems; 5) Making decisions based on the best available science; 6) Partnering and collaborating to leverage resources effectively.
- The Integrated Climate Adaptation and Resilience Program (ICARP) housed within the Governor's Office of Land Use and Climate Innovation (LCI) advances climate adaptation in California by developing actionable science and research, providing guidance and tools, and offering direct grants and technical assistance.
- The California Climate Change Assessments are the scientific foundation for state policy and decision-making, ensuring strategies are grounded in the best available data.

The civil society (largely NGOs) in California have played a major role in climate action throughout the state. Selected examples are given below.

5.1 Civil Society Resilience Actions

It does take a village.

Non-Governmental Organizations in California are creating high-impact resilience actions which are implemented throughout the state. Selected examples of such resilience actions that include all three pillars of MAST, are listed here.

Mitigation:

- The Climate Center, Santa Rosa: Helped pass an historic $10 billion climate bond (Prop 4) for resilient wildfire, water and agriculture. Enacted nation-leading laws including AB1757 establishing bold targets for natural climate solutions and SB59 unleashing the power of EV "batteries on wheels" to keep the lights on, reduce reliance on polluting gas plants and increase resilience to growing extremes.
- Climate Action Campaign, San Diego: Led the charge to pass San Diego's legally-binding 100% clean energy climate plan which helped reduce GHG emissions by 24%; helped create San Diego's Climate Equity Index, to help the city prioritize climate strategies.

Adaptation:

- Climate Resolve, Los Angeles: Developed City/County/Regional Climate Adaptation Plans for major cities and counties in California. Launched the Shine On initiative to drive the adoption of cool surfaces (cool roofs, walls, and pavement) as an essential strategy in combating global climate change.
- Community Environment Council, Santa Barbara: Developed Community Action Plan for Santa Barbara County for achieving Climate Resilience on the California Central Coast

Societal Transformation:

- Ten Strands, San Fransisco: Created the California Environmental Literacy Initiative, which is a collective action network that seeks to ensure access to high-quality environment-based learning for all California's TK–12 students.
- Los Angeles Regional Collaborative, Los Angeles: Created several social-media campaigns such as: Extreme Heat Campaign; CalHeatSource; and Clean Energy Education Campaign.
- ecoAmerica, San Francisco and U.S.: Partners with major national organizations, including faith denominations, to catalyze climate action by providing strategy, guidance, training, and resources tailored to each faith tradition.

6. An Integrated Approach: MAST

California's resilience strategy is further informed by the MAST framework — Mitigation, Adaptation, and Societal Transformation developed by the Pontifical Academy of Sciences (PAS) and the Pontifical Academy of Social Sciences (PASS), ensuring a comprehensive and forward-looking approach to addressing climate impacts.

Mitigation:

California leads the nation in emissions reductions while maintaining economic growth. The state's commitments include cutting greenhouse gas emissions by 85% by 2045, reducing air pollution by 71%, and transitioning away from fossil fuels.

> *"The specter of climate change looms over every aspect, threatening water, air, food, energy systems, and the threats to public health seem equally alarming: The forecasts are worrying, time is running out. We need to halve the rate of warming: in the brief space of a quarter century."*
>
> Excerpt From: Pope Francis, Jorge Mario Bergoglio, Carlo Musso & Richard Dixon. *"Hope."* Random House Publishing Group, 2025-01-14.

Adaptation:

The state prioritizes measures to protect climate-vulnerable communities, enhance public health, strengthen economic resilience, and advance nature-based solutions.

Societal Transformation:

Climate resilience requires the engagement of all Californians ensuring policies reflect community needs and are informed by lived experiences. California's commitment to climate *literacy equips individuals and communities with the knowledge* and skills to actively participate in building a sustainable and resilient future.

MAST
to navigate through weather/climate risks

Part III: Dimensions of Resilience in Context

7. Health and Weather Climate Extremes

Greatest Threat & Greatest Opportunity

Climate Change Is The Greatest Global Health Threat Facing The World In The 21st Century, But It Is Also The Greatest Opportunity To Redefine The Social And Environmental Determinants of Health.
(Lancet Countdown, 2024)

Call To Action

Health is not negotiable. Building climate-health resilience is a necessity for all humans. This is an opportunity for all to thrive, to transform distress into action, and to turn inter-generational trauma to inter-generational flourishing.

Health Impacts of Weather/Climate Extremes Today:

Examples include injury, illness and death from wildfires, extreme heat, drought, landslides, vector-borne diseases, and associated mental health impacts. Climate-driven disasters directly result in loss of livelihoods, businesses, crops, and homes.
https://climateresilience.ca.gov/overview/impacts.html

Record-breaking Health Harms in California:

From 2010 to 2019, California experienced roughly 600 deaths where heat was the primary cause. Extent of wildfires in California has grown by 1000% in the last 30 years. Nearly 30% of wildfire-exposed community members have symptoms of post-traumatic stress disorder, anxiety and depression, even a year after the fires.

Health & Air Pollution Impacts in California:

Particles released by traditional fuels lead to premature mortality, increased heart-lung disease, acute and chronic bronchitis, asthma attacks, emergency room visits.
https://ww2.arb.ca.gov/resources/

Areas Where Health Should Be Included isn Resilience Planning:

Cities and communities organizing around climate resilience should actively involve health and health professionals in several key areas:

1. Climate policy and action plans: Prioritizing health in climate policy and planning is essential. Health effects of weather/climate disasters are deeply connected with social and structural factors.
2. Health system preparedness and response: It is critical to shift from reactive crisis management to proactive resilience planning.
3. Health professional education and workforce training: It is imperative to educate our health-professional workforce to improve community resilience.
4. Youth education: Nearly 85% of youth suffer from moderate to extreme climate anxiety. Climate education can help youth learn how to manage climate stress and take local climate actions.
5. Community education and engagement: Public health messaging plays a critical role in guiding populations on health protocols, disease prevention, and self- care.
6. Sustainable transportation and mobility: Equitable access to efficient, low-emission transportation options is essential for health.
7. Nature-based solutions: Increased uptake of nature-based solutions, improves public health by enhancing air and water quality, reducing heat island effects, and promoting physical activity.

Dr. Erminia Guarneri, MD - *Academy of Integrative Health and Medicine*; **Dr. Sheri Weiser, MD** - *UCSF*; **Dr. Jyoti Mishra** - *UCSD;* **Linda Helland** - *California Department of Public Health*

8. Climate Actions, Youth Voices

At the summit, students from sixth grade to university shared their "climate moments"— the sparks that ignited their passion for action. They highlighted the importance of integrating youth voices into resilience planning. Youth climate leaders need education, support, and opportunities to develop their skills.

Why Youth Voices Matter

1. Long-term Impact: Youth will inherit today's climate decisions.
2. Innovation & Creativity: They bring fresh, bold ideas and new technologies.
3. Equity & Inclusion: Youth amplify marginalized voices.
4. Mobilization & Action: Youth-led movements drive climate policy change.

Where Youth Should Be Included In Resilience Planning

1. Schools & Learning: Sustainable campuses, student-led projects.
2. Data & Monitoring: Training youth in scientific climate research.
3. Urban Green Spaces: Designing climate-friendly infrastructure.
4. Community Education: Peer- driven climate literacy programs.

Call To Action

These students exemplify the passion and creativity of young climate leaders. Their voices must be heard, their education prioritized, and their leadership integrated into resilience planning. Investing in youth-led climate action is essential to building a sustainable and just future for all.

Student Perspectives: What Youth Are Asking of Educational Leaders

"At UCLA Lab School, we are learning about the environmental impact of fast fashion. Our initiatives include upcycling clothes, promoting sustainable fabrics, and advocating for ethical fashion practices." - *Grace Pérez Mancusi (Elementary - UC Los Angeles Lab School, Los Angeles)*

"My school emphasizes climate education through hands-on projects. We examine food supply stability, pesticide use, and ways to make agriculture more resilient to climate change."- *Willem Shpilsky (Elementary - UC Los Angeles Lab School, Los Angeles)*

"I would ask to make learning about the environment and climate change a regular part of our school week. It would be great to engage more in hands-on projects." - *Zachary Fox-DeVol (Middle School - Westside Neighborhood School, Los Angeles)*

"If we are going to solve this problem we can't keep calling it climate problems. We have to rebrand it and cultivate a new culture to show the world that it's a problem with a holistic solution." - *Ananya Gupta (High School - Geffen Academy at UCLA, Los Angeles)*

"The biggest deterrent I see with people entering the climate movement is the giant barrier to entry. That's why I think program at my school that offers free climate change certificates and then pairs these students with host sites as interns are crucial." - *Andrew Rodriguez (Community College - West Los Angeles College, Los Angeles)*

"One of the biggest barriers to action isn't a lack of knowledge — it's the overwhelming weight of it. That's why we need spaces of community and care, where young people can process what's happening, connect with others, and build resilience together." - *Bella Santos (University -UC Berkeley, Berkeley)*

Videos of the students' presentations can be found at this link:
https://tenstrands.org/climate-action-youth-voices/

Chairs: Karen Cowe - *CEO, Ten Strands;*
Dr. Maryanne Wolf - *Director, UCLA Center for Dyslexia, Diverse Learners and Social Justice*

9. Climate Displacement

Global Trends

- From 2010 to 2022, the number of countries that are both climate-vulnerable and refugee-producing quadrupled.
- Climate change is a systemic driver of displacement, not just through rapid-onset disasters (e.g., floods, wildfires, typhoons) but increasingly through slow-onset stressors like heat rise, sea-level rise, drought, and agricultural collapse.
- By 2050, up to 1.2 billion people may be displaced—mostly through internal migration, not international movement.
- Nearly one-third of the global population could be living in regions with an average temperature above 29°C (84°F)—a threshold currently found only in parts of sub-Saharan Africa.
- Climate change intensifies root causes of migration—poverty, food insecurity, and violence — making it a "threat multiplier."
- Migration is often the only adaptive strategy left for communities in collapsing ecosystems.
- By 2050, the number of climate migrants could reach 200 million, or 1 in every 45 people.
- A growing conflict is emerging between the migration rights community and the conservation community, especially in ecologically sensitive zones demanding a new collaborative approach to migration planning.
- The border region itself is an ecological and political hotspot—an intersection of accelerating migration, environmental degradation, and biodiversity loss.

U.S. Trends: International Migration

- The nationalities most commonly encountered at the U.S. southern border are from climate-vulnerable regions.
- Agricultural instability is a major migration driver: 72% of arriving migrants work in agriculture or related sectors.

- Studies show that drought causes 70% more migration in countries like Guatemala than violence or poverty alone.
- Tijuana and other Mexican border cities are under pressure—caught between rising northbound migration and tightening U.S. border controls.

Call To Action for Sanctuary Neighborhood Models

- The Sanctuary Neighborhood Model reimagines refugee hosting beyond temporary camps, with a focus on long-term, dignified and ecologically integrated communities.
- Refugees are not isolated in camps but housed in neighborhood buildings, with infrastructure investments that benefit the wider informal settlement.
- The model operates through a cross-sector partnership, combining efforts from community leaders, academic researchers, public agencies, and a faith-based organization.

California Trends

- California is a regional microcosm of global climate displacement, experiencing extreme heat, drought, and wildfires.
- In 2023, over half of fire-related displacement in the U.S. occurred in California (Campa, 2024).

- From 2017 to 2023, more than 2.2 million Californians were displaced by climate disasters (IDMC, 2024).
- In just the first month of 2025, Los Angeles wildfires displaced residents from 6,800 structures and forced 200,000 people to evacuate.
- The Center on Global Justice at UC San Diego, in partnership with Embajadores de Jesús, co-developed a large-scale shelter in Tijuana, called Santuario Frontera, now the largest shelter along the U.S.-Mexico border, and houses 1,800 people currently, with plans for 2,500 more. It includes dormitories, family housing, an industrial kitchen and dining hall, spaces for fabrication and vocational training, and public gathering spaces.
- The site is dedicated to ecological restoration, sustainable construction, and located in a degraded canyon to protect ecosystems.
- Residents engage in shared governance and daily operations
- The model emphasizes circular economies, vocational training, and social and ecological capital.
- A cost-effective, scalable alternative to state-driven camps — recognized and supported by the City of Tijuana and State of Baja, which are funding street construction and education infrastructure.
- The project promotes a vision where displaced people are not objects of charity but agents of community-building.

10. Low-probability, High-impact Events

Outcomes: Many states have well thought-out climate action plans to respond to weather/climate "natural" disasters. These local and regional plans may not have considered, Low-probability, High-impact Events (LPHIEs, pronounced as LFEEs), the so-called record-breaking disasters.

LPHIEs can be categorized into two types (Chatham House Report, 2023): 'Black Swan' events, which are extremely difficult or nearly impossible to predict, and 'known but unprepared for' events—rare occurrences that governments recognize as potential threats but often dismiss. LPHIEs are typically once-in-a-century or longer weather disasters, some of which, like Black Swans, remain unpredictable. For example, Hurricane Katrina in 2005 impacted Louisiana, Mississippi, Alabama, and Florida, causing $200 billion in damages. Another example is the L.A. Wildfires of January 2025, which led to losses ranging from $76 billion to $131 billion—about 25% to 40% of California's annual budget ($330 billion).

While these disasters are not necessarily caused by ongoing planetary warming, warming acts as a force-amplifier. It significantly increases the likelihood of specific LPHIEs, many of which are considered planetary tipping points. Rather than focusing solely on storms or wildfires, these tipping points include events like the melting of crucial ice sheets and disruptions to major ocean currents. Crossing these thresholds triggers a chain reaction that accelerates warming and destabilizes natural processes, likely resulting in more frequent and severe LPHIEs.

Call To Action

A standing transdisciplinary task force for LPHIEs is needed, which will periodically assess the prospects of LPHIEs, and develop response plans for Black Swan-type deadly weather disasters. We cannot be caught in the web of LPHIEs, unaware and unprepared.

The key question is: how can a state plan for such massive, unpredictable losses? How should we weigh the costs of preparing for these crises against the costs of responding once they occur? Why should we plan for LPHIEs if they are just once-in-a-100-year events?

Because these extreme disasters are no longer rare. The most notable example is California, where the 2025 L.A. wildfires followed the record-breaking Paradise Fire of 2018, which caused $16 billion in damages to a rural town of just 4,800 residents—approximately $3 million per capita. In the U.S., damages from weather disasters have increased by 200%, from $550 billion between 1980 and 1999, to $1.62 trillion from 2000 to 2019. Moreover, some Earth system tipping points are no longer low-likelihood, high-impact events; they are rapidly becoming high-likelihood, high-impact events (https://report-2023.global-tipping-points.org/summary-report/narrative-summary/). These escalating impacts prove the urgent need to plan for LPHIEs, as the frequency and severity of such events continue to rise.

PART IV: Key Outcomes and Strategic Aspirations of CRC2

11. Overarching Objectives

The overarching objectives of CRC2 are:

- **Resilience:**
  - Enable Californians to thrive despite climate challenges
  - Improve and protect the health and well-being of all Californians, including the most vulnerable
  - Preserve California's natural resources and working lands
  - Integrate youth perspectives in resilience planning
- **Mitigation:**
  - Transition from fossil fuels to sustainable alternatives without hindering development
  - Reduce emissions of heat-trapping pollutants to lower long-term climate risks
  - Reduce disaster weather extreme risks through nature-based solutions
- **Adaptation:**
  - Proactively respond to climate disasters, while maintaining governance and institutional stability
  - Integrate adaptation with mitigation and sustainable development
- **Societal Transformation:**
  - Move beyond incremental efforts; transformational steps are needed
  - Unite across political and cultural boundaries, to ensure survival and sustainability
  - Address long-term systemic issues without compromising short-term disaster preparedness
  - Increase public awareness through education and capacity building

12. Outcomes & Aspirations: Overarching

We, the participants of the CRC2 Summit, endorse the Planetary Call to Action* document released in May 2025 signed by Pope Francis and numerous governors and mayors from around the world, including California Governor Newsom. This compact recognized that it is too late to rely on mitigation alone; adaptation and resilience to weather/climate risks are overdue and must have equal footing.

Outcomes:

- **We call on all Californians to Stand in Unity and in Solidarity.** We stay alive and thrive by being united and demonstrate solidarity.
- **We have a limited time frame** (2025 to 2030) to proactively prepare for and respond to the intensifying weather disasters, rather than simply reacting to them, event by event.
- **We call for the health of people and the health of ecosystems to be the founding principles for all Resilience Plans.** Physical and mental health should be central.
- **We adopt the Three-Pillar MAST strategy of Climate Resilience:** Mitigation to reduce risks**,** Adaptation to cope with unavoidable climate risks, and Societal Transformation to survive and thrive beyond the crisis and evolve into a sustainable way of living.
- **Build and implement a near-term (next 10 years) and a long-term plan (next 30 years)** *to be come resilient to extreme weather/climate disasters.*
- **Societal Transformation** demands social/behavioral changes, not just technological solutions, to meet sustainability goals, limit weather/climate extremes, and bolster resilience.

Ramanathan et al., (2024) https://www.pas.va/en/events/2024/climate_resilience/call_to_action_climate_change.html

- **Societal transformation must happen now** and requires transforming and strengthening infrastructure including: energy, land use, urban development, community services, industrial processes, institutions, and economic systems.
- **While California has taken important steps towards resilience**, we need to accelerate these strategies so we can react swiftly and effectively to mega-droughts, mega-fires, mega-floods and the systemic challenges that each of these threats brings to our communities.

Aspirations:

- **We are calling for a One California Resilience Plan.**
- **We must stand together to keep people, communities, and businesses safe.** We are never going to protect our communities by pointing fingers at our neighbor or at the neighboring city or state. Everyone is affected by these worsening natural disasters, and we need the cooperation and participation of leaders and community members across California to support action.
- **Health of the people and the ecosystems must be central to policies that stabilize climate change below dangerous levels.** Physical and mental health should take central place.
- **Advocate for a swift, multifaceted approach to climate resilience:** rapidly reducing emissions, adapting to climate shifts, and implementing innovative financing mechanisms.
- **Resilience should be included in all government policies and community benefits incorporated into private sector development.** We need to rethink systems, identify gaps, and find cleaner, faster, and cheaper solutions.

13. Outcomes & Aspirations: Topical

13.1 Mitigation:

Climate change mitigation is fundamentally a global program implemented by countries under the 2015 Paris Guidelines. In addition to net-zero emissions of carbon dioxide, it is necessary to limit emissions of short-lived climate pollutants, SLCPs (methane, black carbon and ozone precursor gases). Reductions of SLCPs in conjunction with net-zero carbon emissions, will rapidly reduce the rate of warming in half by 2050. California's current mitigation plan to bend the emissions curve of CO_2 and SLCPs, if adopted globally, are consistent with limiting the warming to around 2°C.

The tools used to decarbonize an economy can be broadly characterized as taxing emissions, subsidizing renewable energy, regulating emissions and energy efficiency, and HOPE.

The HOPE policy, in reality, is based on the hope that individual consumers, employees, investors, and corporate leaders will voluntarily adopt greener behavior. A region like California, that decarbonizes unilaterally can be called a climate leader with the hope that other regions will be followers. If the technology has significant spillovers, then the decarbonization by the leader will make it cheaper for all other regions to decarbonize, and many will follow.

The Under2 Coalition led by California and Baden-Württemberg, is an example of how sub-national leaders can join with other regions to cooperatively decarbonize and influence national/ global policy.

If the warming continues at the current pace, carbon removal from the atmosphere may need to be accelerated. The worldwide goal is to remove as much as 300 billion tons of CO_2 accumulated in the atmosphere.

Working Lands: Climate change poses significant threats to agriculture and other working lands. Agriculture is also a significant contributor to greenhouse gas emissions. One example of how sub-national leadership and sector-specific strategies can contribute to global mitigation efforts i through action on working lands. Given the scale and urgency of the climate crisis, mitigations strategies must operate across sectors and landscapes. Working lands - such as farms, forests and rangelands represent a less fully-utilized but vital pathway for advancing climate goals.

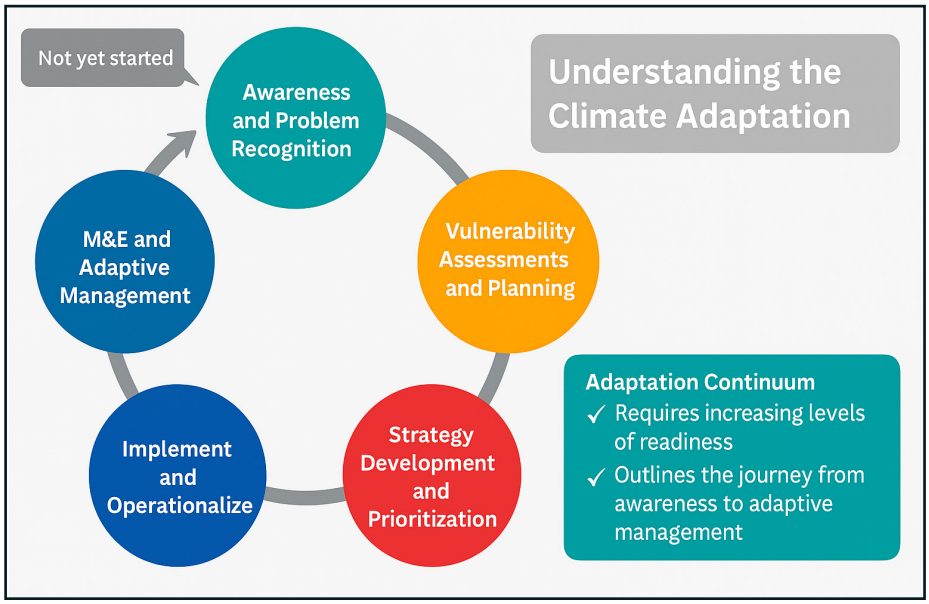
- Agriculture cannot thrive in isolation. California has built partnerships globally to improve irrigation efficiency, reduce energy use, and reduce greenhouse gas emissions.
- Partnership with CA Native Tribes, especially for the restoration of cultural burning traditions, offers many benefits in stewardship of natural resources.
- Agriculture cannot thrive in isolation. We've built partnerships globally to improve irrigation efficiency, reduce energy use, and reduce greenhouse gas emissions.
- California created the Climate Smart Agriculture program to improve irrigation technology and efficiency, reducing energy use and greenhouse gas emissions. Other programs focus on healthy soils. As a result, California has reduced greenhouse gas emissions by 28 million metric tons.
- Healthy soil programs are critical to reduce greenhouse gas emissions, and potentially enhance carbon sequestration.
- Innovations in cattle feed and gut microbiomes have the potential to reduce methane emissions, while sustaining protein supply.
- California's natural ecosystems provide a wide range of benefits and services to people, including carbon storage, water supplies, biodiversity, outdoor recreation, and enhanced physical and mental health.
- Protection and restoration of estuaries and salt marshes can enhance resilience in the face of sea level rise and provide high levels of carbon sequestration.

13.2 Adaptation

Adaptation Outcomes: California and Californians must prepare for weather/climate disasters. Preparation is called adaptation. It can be expensive to adapt to these risks, and the question is:

Adaptation Continuum: Communities exist at all stages of the adaptation continuum, including some that are not on the continuum at all. Investment and technical support are needed to help communities get on the continuum and progress from across the stages. This will require commitment from state and local governments and other community partners.

- Current investments in regional reports through the Fifth California Climate Assessment should be leveraged to get all communities to awareness and problem recognition, the first step on the continuum.
- From there, investment and support will be needed to identify vulnerabilities and develop an adaptation plan.
- Developing a strong commitment to project identification and prioritization, which are the heart of a Resilience Blueprint, is then needed to advance implementation and deployment of projects and plans
- Ongoing monitoring, evaluation, and engagement is then necessary to meet changing needs and climate conditions and ensure that long-term resilience outcomes are met.



The Adaptation Continuum emphasizes that adaptation is not a one-time project but an evolving process that requires building institutional readiness, community involvement, and sustained commitment. It provides a roadmap for moving from basic awareness to fully integrated, adaptive governance structures that can respond to emerging climate risks. The continuum is divided into five key phases:

1. **Awareness and Problem Recognition:**
   This initial stage is characterized by a limited understanding of local climate vulnerabilities and preliminary stakeholder interest. There may be no formal commitments or data collection at this point. Key actions include conducting preliminary risk screenings, raising community awareness, and initiating conversations with policymakers.

2. **Vulnerability Assessments and Planning:**
   As interest grows, stakeholders begin early-stage risk assessments and identify climate-sensitive sectors. Formal vulnerability and risk assessments are conducted, participatory planning processes are launched, and policy gaps and opportunities are identified.

3. **Strategy Development and Prioritization:**
   At this stage, there is stronger institutional commitment to climate adaptation. Climate projections are incorporated into planning, adaptation goals are defined, and priority actions are identified. Cross-sectoral partnerships are often established to strengthen implementation capacity.

4. **Implementation and Operationalization:**
   Adaptation strategies are translated into concrete actions. Adaptation is embedded in governance structures and budgets, stable funding mechanisms are secured, and technical capacity within government and stakeholder organizations is strengthened. Monitoring and evaluation (M&E) frameworks are also developed to track progress.

Adaptation Aspirations:

For more details on health, climate actions by youth and migration, please see Chapters 7, 8 and 9.

- Create city/county-level resilience blueprints. A Resilience Blueprint is a detailed, practical community-designed road map to help communities adapt to climate change and build long-term resilience. A Blueprint should specify specific projects and strategies, focusing on prioritizing and implementing effective climate adaptation measures. The goal of a Blueprint is to create an actionable plan that addresses immediate and long-term climate impacts and promotes long-term resilience, equity, and sustainability.
- Health professionals are uniquely positioned to advocate for climate action because they treat patients suffering from climate-related illnesses, are trusted messengers, particularly nurses, who can communicate the climate-health connection to patients and communities, and serve as community anchors helping to build local resilience to climate impacts.
- Fireproofing homes, public buildings (schools and college campuses) and natural habitats (slopes and canyons in cities), and roof-top cooling of homes are effective actions that can both mitigate risks and help adapt to heat stress and inhibit homes from burning.

City-state-national cooperation is needed to address, for example, anticipated large-scale displacements, migrations, immediate behavioral shifts to cool the planet, transformative education and sustainable food.

- Climate change has also extended the pest season, leading to more generations of damaging pests we have never seen before. This requires immediate attention as crops are being devastated. Monitoring and innovative pest control strategies are critical.
- Demand for water increases in a warming climate, and droughts may become more frequent and intense. Investments in water storage (above and below ground), smart irrigation technologies, and drought tolerant crops and crop varieties will enhance resilience.
- California has invested in additional water storage, including both above-ground storage and aquifers, while also exploring water recycling and conservation.
- Over 60% of our farms are less than 100 acres; A key challenge is ensuring that small farms can recover from weather extremes.

- A hotter climate poses health threats to outdoor workers. Farm workers need adequate protections and health care to sustain agricultural labor force.
- Fire suppression has led to high density forest understory and changes in species composition, which are also a major contributor to high severity fire.
- Restoring forests to their historical structure and function, through mechanical thinning and prescribed fire, is critically important to reduce the incidence of high severity fire.
- Restoration of streams, rivers, and wetlands is especially important to maintain habitat in the face of increasingly variable rainfall, changes in dam management and demands for water storage.
- Protection and restoration of estuaries and salt marshes can enhance resilience in the face of sea level rise and provide high levels of carbon sequestration.
- Enhanced conservation strategies are needed to protect nature, including conservation of climate refugia, increasing connectivity among protected areas to allow for species movement, detecting and halting spread of novel invasive species.

13.3 Societal Transformation

Societal Transformation - Outcomes is the third pillar of MAST, and is essential for thriving in a sustainable future after surviving the crisis. Fundamental shifts in behavior, including consumption, socio-economic systems, and governance.

- The climate and weather extremes we face present a unique opportunity to create a stronger, healthier, and more just world—one that acknowledges our interdependence with the natural world and all living beings. Social and behavioral change begins with a hopeful, shared vision of resilience and must be rooted in shared values. Tangible pathways are needed to evolve behaviors, institutions, and systems to support a just transition to a climate-adapted society.
- Transformation must begin now. It involves strengthening infrastructure across energy, land use, urban development, community services, industrial processes, institutions, and economic systems. Global climate literacy and locally-based environmental education equip people to make informed decisions, adapt to change, and contribute to solutions. Education is vital in shaping informed, responsible, and empowered generations capable of navigating climate complexities, driving innovation, and advancing equitable and sustainable communities.

- Building public support and political will is critical. This involves engaging diverse stakeholders—including faith communities—to foster collective understanding of shared vulnerabilities and to promote collaborative, inclusive solutions. Partnerships with faith-based organizations offer a moral framework for action that bridges ideological divides and mobilizes communities.

Societal Transformation - Aspirations: Reducing demand through social and behavioral change can more rapidly and cost-effectively reduce emissions than developing new technologies alone. This transformation should begin with institutions and industries - the primary drivers of consumption, rather than placing disproportionate responsibility on individuals or vulnerable communities.

- Bold and transformative adaptation efforts can lead to system-wide changes that challenge structures, address social injustices, and rebalance power dynamics.
- Partnerships with faith-based organizations offer powerful opportunities to mobilize communities around a moral framework for climate action, bridging political and ideological divides and catalyzing collective efforts.
- Ensure Food and Water Security. Through a unified strategy that balances agricultural water needs (which consumes 80% of the total water) and the remaining 20% for residential, industry, and public sector needs. California's dependence on out-of-state water sources like the Colorado River, combined with reduced snowpack and earlier melt, underlines the urgency of this integration.
- Recognition of the cost of resilience vs. the escalating cost of disasters without resilience investment.
- Financing strategy for adaptation must factor in low-probability, high-impact weather extreme events... basically, once-in-a-century events occurring more frequently, as witnessed in California and elsewhere in the US, during the 2010 to 2025 period. Identify and emphasize projects with tangible co-benefits, when planning for low-frequency, high-severity events or initiatives where "success" may entail mitigating, but not wholly preventing, impacts from climate events.

We must also acknowledge the cost of resilience versus the escalating cost of disasters when investments are not made. Adaptation financing strategies must anticipate low-probability, high-impact events—once-in-a-century disasters that are now occurring with increasing frequency, as seen in California and across the U.S. between 2010 and 2025.Planning for such events should prioritize projects with tangible co-benefits, even when "success" means mitigation rather than full prevention of climate impacts.

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The Outcomes and Aspirations document should be referred as:
V. Ram Ramanathan, Fonna Forman, Marcelo Suárez-Orozco, Sevin Sagnic; David Ackerly; Ken Alex; Louise Bedsworth; Nicole Capretz; Christina Christie; Ellie Cohen; Karen Cowe; Robert Engle; Debra Gore-Mann; Erminia Guarneri; Linda Helland; David Jones; Rita Kampalath; Nuin-Tara Key; Arunava Majumdar; Jyoti Mishra; Jonathan Parfrey; Meighen Speiser; Sheri Weiser; Maryanne Wolf. 2025: The California Climate-Resilient Summit Outcomes and Aspirations.

The summit agenda including list of speakers and their affiliations can be seen here: https://ramanathan.ucsd.edu/wp-content/uploads/sites/460/2025/02/CRC2-Agenda-with-Cover_PF5.0.pdf

CRC2's Transdisciplinary team members are listed here: https://ramanathan.ucsd.edu/trans-disciplinary-team/