

San Diego, 2050 Is Calling.

HOW WILL WE ANSWER?



FACING THE FUTURE:
How Science Can Help Prepare San Diego Regional Leaders for Climate Change

To my friends and colleagues:

We are proud of our quality of life. Beaches, mountains and deserts – our region is unique. Our natural environment defines us, drives our economy and makes us one of the world's most livable places.

And we value innovation. *Forbes* magazine recognized San Diego as one of the most inventive places in the world.

We can't assume future generations will inherit our high quality of life unless San Diegans take a vital leadership role today.

San Diego, 2050 Is Calling. How Will We Answer? underscores the challenges from a changing climate... affecting our temperate climate, precious resources, natural areas and regional economy. The evidence is clear, and our Convention Center, cities and county, regional agencies and businesses are planning now.

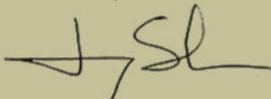
Eight out of 10 people believe climate change is happening. Working together with experts and community leaders, we are finding solutions and preparing for a changing climate so we *can* sustain the quality of life and vibrant economy we value.

With places like the world-renowned Scripps Institution of Oceanography, there is already a strong community of diverse leaders and stakeholders to help us prepare.

As a former San Diego mayor, and current CEO of the San Diego Regional Chamber of Commerce, I invite you to read this report, study the information and join this climate community so that you, too, will be part of the solution to protect the quality of life we value.

Together, San Diegans can lead the way in planning for a changing climate and sustaining our economy while preserving San Diego County's spectacular natural beauty, not just for today, but for generations to come.

Sincerely,



Jerry Sanders

President and CEO, San Diego Regional Chamber of Commerce





People Agree: San Diego's Climate Is Changing

Ninety-seven out of 100 global climate scientists agree that climate-warming trends over the past century are very likely due to human activities. The American Association for the Advancement of Science, a leading scientific organization, states: "Human-induced climate change requires urgent action. Humanity is the major influence on the global climate change observed over the past 50 years. Rapid societal responses can significantly lessen negative outcomes."

Recent public opinion surveys have found that an overwhelming majority – 84% – of San Diego County residents believe climate change is happening, and almost as many expect the impacts to affect them, their families and future generations. This report is meant to provide those who live, do business and govern in our region with up-to-date scientific understanding of how the impacts of climate change are likely to affect our region and how regional leaders are already responding to those impacts. Better understanding can help us, individually and collectively, decide which paths will define the kind of future we want to create.

ABOUT THE SCIENCE

Information for this report was provided by a group of more than 40 multidisciplinary experts from local universities, governments, public sector agencies, nonprofits and private sector organizations throughout the San Diego region. Working together, these experts collected the most up-to-date science based on historical data and current trends, as well as complex models that project the various impacts of climate change expected in the region related to extreme weather events, water supply, wildfires, natural resources and public health.



Contributing scientists from Scripps Institution of Oceanography overlooking Scripps Pier: (L-R) Dr. Alexander Gershunov, Dr. Charlie Kennel, Dr. Michel Boudrias, Dr. Dan Cayan and Dr. Kristen Guirguis

84%

OF SAN DIEGO COUNTY RESIDENTS BELIEVE CLIMATE CHANGE IS HAPPENING



ABOUT "2050 IS CALLING"

This report is part of an effort by the Climate Education Partners (CEP) to develop and implement a climate change education plan for the San Diego region. CEP is working with local expert scientists, educators and a wide range of community leaders, helping San Diegans learn more about, prepare for and respond to the impacts of a changing climate. CEP operates with the understanding that together we can sustain our region's quality of life, economic vibrancy and spectacular natural beauty, not just today, but for all future generations.

To learn more about the research behind this report, visit: www.sandiego.edu/2050.

WHY 2050?



Plaza de Panama, Balboa Park

2050 is not as far away as you think. It's less than four decades away – around the time many children today will have become parents themselves, or some even grandparents. The impacts we expect by mid-century will be the result of our actions over previous decades. Change does not happen overnight. Decisions we make today will affect how well our children are able to cope with the impacts of climate change a few decades from now. **Unless our priorities shift toward reducing emissions of heat-trapping gases and managing the risk of climate change, these impacts are projected to continue to worsen for our children and their children after the year 2050.**

“Taking care of our environment is not just good for our health and quality of life; it also strengthens our economy. Together, we are working with leaders throughout our region who understand the importance of investing in more energy-efficient technology to create high-quality jobs and expand business opportunities in San Diego County. We can put people to work while having a clean and healthy environment.”

Kevin Faulconer, Mayor, City of San Diego
Todd Gloria, Council President, City of San Diego

ACTING NOW VERSUS WAITING

In the absence of more comprehensive action to reduce carbon pollutants and prepare for the changes that are coming, heat-trapping gas emissions are projected to continue increasing over time, making the impacts of climate change more severe. If we choose not to act, the economic costs we will pass down to future generations could include:

- ▶ **Damage to and loss of coastal property and storm and wastewater infrastructure** due to coastal flooding, including homes, businesses and recreational areas
- ▶ **Reduction in regional agriculture and business activity** from potential water supply shortages
- ▶ **Loss of tourism** due to polluted coastal waters and beach erosion
- ▶ **Diminishing benefits that nature can provide us**, such as clean air and water
- ▶ **Costly damage** to homes, businesses and community facilities such as hospitals and schools
- ▶ **Increased costs to taxpayers** to pay for negative health impacts, such as poor air quality, heat-related respiratory ailments and heatstroke

What actions are we taking today? ▶

Local Climate Action Leadership Is Already Under Way

An unprecedented number of local governments and public agencies in the region are working with nonprofits, businesses, communities and philanthropic institutions, such as The San Diego Foundation and Qualcomm Foundation, to address climate change and ensure the ongoing vitality of our economy and environment.

- ▶ **All 19 local governments** (18 cities and the County of San Diego) have performed greenhouse gas emissions inventories.
- ▶ More than half of these local governments are working on or have adopted **Climate Action Plans** to reduce those emissions.
- ▶ The **County of San Diego** is working to minimize the harmful impacts of climate change to our region in the next update of the regional FEMA-approved Hazard Mitigation Plan.
- ▶ Collaboratively, the **Port of San Diego**, its five member cities and the **San Diego County Airport Authority** worked with ICLEI-USA, a national network of local governments, to develop a plan for adapting to sea level rise in the San Diego Bay.
- ▶ The **San Diego County Water Authority**, a leader in the nation in dealing with climate change given our reliance on imported water and its importance to our economy and quality of life, is one of the few metropolitan water agencies nationwide working with climate scientists to integrate climate change projections into our region's future water supply and demand planning.
- ▶ The **San Diego Association of Governments (SANDAG)** has produced the first-ever regional Sustainable Communities Strategy with goals and strategies to reduce how many miles San Diego residents drive, reducing one of the region's largest sources of heat-trapping gas emissions that contribute to climate change.
- ▶ The **Tijuana River National Estuarine Research Reserve** is leading a collaborative climate change adaptation project in the Tijuana River Valley, which contains one of the largest intact coastal wetlands in Southern California, to increase resilience to rising sea levels and coastal flooding into the future.
- ▶ The **Climate Collaborative – San Diego Region** was established as a partnership between public agencies, San Diego Gas & Electric, academia, philanthropy, nonprofit organizations and community leaders, several of which are listed here, to facilitate collaboration among local leaders to preserve our quality of life through a strong economy and healthy environment.

Chula Vista Marina, South Bay

Chula Vista was the first city to plan with sea level rise in mind, putting its comprehensive Climate Action Plan into place.



San Diegans Believe a Strong Economy and a Healthy Environment Go Hand in Hand

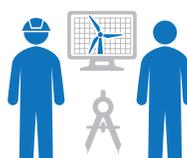
Climate Education Partners conducted interviews with regional leaders across San Diego and learned that the number one concern among leaders is a strong economy.



77% of San Diego County voters believe that we can have a clean environment and a strong economy at the same time without having to choose one over the other.



72% of San Diego County voters believe that the San Diego region should take a leadership position in setting goals for reducing greenhouse gas emissions.



In the San Diego region, there was a **46%** increase in jobs in the clean economy sector from January 2010 to January 2011.



Venture capital investments in clean technology in 2012 in the San Diego region increased **80%** from 2011, totaling \$340 million.



“As a Port Commissioner and a business and real estate attorney, I am hopeful that our region will address the important potential risks and economic losses we may face with more frequent and extensive flooding along our coast. With this in mind, the Port has been working with our bayfront cities, the San Diego Airport Authority and the Navy to identify actions we can take – and are already taking – to make our coastline more resilient to coastal flooding in the future.”

Rafael Castellanos

Commissioner, Unified Port of San Diego, and Partner, Solomon Minton Cardinal Doyle & Smith LLP



“As one of the most innovative regions in the world, we know that our role in addressing climate change will position San Diego to capitalize on our strong and sustainable business and economic development practices.”

Mark Cafferty

President and CEO, San Diego Regional Economic Development Corporation



“Low-income communities will disproportionately bear the burdens of hotter weather and other climate impacts. They have less access to services and adequate health care, and suffer the most from a weaker economy. By working together to address climate change impacts and investing in clean and efficient energy use and public transit, we can help create new job opportunities that ensure both a strong economy and healthy environment, and ensure better access to resources necessary to prepare for climate change impacts.”

Diane Takvorian

Executive Director, Environmental Health Coalition

Regional Leadership and Innovation for a Strong Economy and Healthy Environment



Qualcomm has aggressively worked to increase energy efficiency in its California facilities. In 2012, Qualcomm implemented energy efficiencies that reduced the emissions from heat-trapping gases by **8,712 metric tons**, which is the equivalent of taking **1,815 cars off the road for a year**. Qualcomm was also awarded the “Clean Transportation Award” from San Diego Gas & Electric for the installation of 17 electric vehicle charging stations.

“Qualcomm has a strong commitment to corporate sustainability. It helps us achieve our triple bottom line, which means saving money for the benefit of our shareholders, protecting our environment and ensuring the health and quality of life for our employees.”



Steve Mollenkopf
Chief Executive Officer, Qualcomm Incorporated



The San Diego Convention Center was recently **LEED Silver Certified by the US Green Building Council**. Its efforts to promote “green meetings” have earned the Convention Center multiple recognitions including the American Lung Association’s Clear Air Circle Honoree, Professional Convention Management Association’s Environmental Leadership Award and the State of California Waste Reduction and Conservation of Natural Resources Award.

“Our facility began implementing sustainable business practices more than 20 years ago, and we’re proud to be an environmental leader in our industry. Our entire team is committed to minimizing waste, reducing energy and water use, composting food waste and purchasing environmentally sustainable products, which has earned our building a LEED Silver Certification. Every day is Earth Day at the San Diego Convention Center.”



Carol Wallace
President and CEO, San Diego Convention Center Corporation



From 2008 to 2012, **Life Technologies**, a global biotechnology company headquartered in Carlsbad, has successfully reduced its energy use by **22%**, water use by **52%**, hazardous waste by **13%** and CO₂ emissions by **21%**.

“Over the past 10 years, Life Technologies, now part of Thermo Fisher Scientific, has become 50 percent more energy-efficient while our business has grown. Continuously improving our energy productivity – enabling better management of our resources – is a hallmark of our sustainability strategy. As a result of our energy conservation efforts, we have reduced our environmental impact while delivering a strong financial return. We know sustainability is really just smart business.”



Cristina Amorim
Chief Sustainability Officer, Life Technologies Division of Thermo Fisher Scientific

IMAGINE 2050

OUR PROMISE TO OUR REGION'S FUTURE GENERATIONS

Imagine a future where our children and grandchildren are able to enjoy pure air and crystal-clean water. Where our precious natural resources are protected, tourism is booming and the regional economy is vibrant. Where everyone can enjoy easy access to the beautiful outdoors. Where our beautiful 70 miles of coastline are intact and enjoyed by all. Without local leadership and collaboration to prepare for the impacts of climate change, this future may not be a reality. We can all agree that now is the time to work together to protect our children's and grandchildren's quality of life in the San Diego region.

"We want to be sure our children and their children can enjoy the same strong economy and healthy environment



we enjoy today. Working together on these important climate change impacts, we can fulfill this promise for all future generations."

Tony Young

Former President, San Diego City Council,
and Former CEO, American Red Cross
San Diego/Imperial Counties Chapter



WHAT DOES THE SCIENCE SAY ABOUT THE CLIMATE WE MAY FACE IN 2050?

We are already seeing changes in our local climate. These changes are expected to become more unpredictable and often more pronounced by mid-century. Changes in temperature and in rainfall patterns in our region are the driving forces affecting all other major impacts of climate change, such as water resources, coastal flooding, wildfires, threats to wildlife and even public health. The expected impacts of climate change are summarized here and described in more detail on pages 8-19, keyed to the icons below.



TEMPERATURE & PRECIPITATION

We expect to experience hotter and more humid heat waves and less frequent but more intense rainfall.

OUR CHANGING CLIMATE WILL AFFECT OUR NATURAL RESOURCES AND QUALITY OF LIFE IN MANY WAYS:



WATER RESOURCES

Warming, compounded by less frequent precipitation, will worsen droughts and threaten our imported and local water sources.



COASTAL FLOODING

Extreme high tides and winter storms magnified by sea level rise will result in more frequent and widespread coastal flooding.



WILDFIRES

Wildfire seasons may be longer and more extreme, with warming temperatures, drier soils and vegetation and less frequent rains.



NATURE'S BENEFITS

Our beautiful coastlines and beaches and our region's unique plants and animals, along with the benefits they provide San Diegans, will be threatened.



HEALTH

More extended heat waves and less nighttime cooling will put our health at risk.



TEMPERATURE & PRECIPITATION

We expect to experience hotter and more humid heat waves and less frequent but more intense rainfall.

The science and why it matters:

- In the next 40 years, global temperatures could increase twice as fast as they have in the last 40 years; San Diego regional temperature increases are expected to exceed this trend.
- We expect to experience more days of extreme high temperatures each year, and heat waves could be longer and more humid with less cooling at night.
- We expect to experience less frequent but more intense rainstorms, with heavy flood events like that of December 2010 in Mission Valley becoming more common.

A word from the scientists

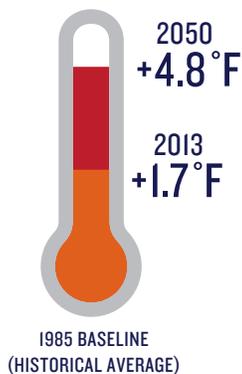
“Actions we take now to reduce emissions of heat-trapping gases can slow warming in 2050 and beyond. In fact, what leaders at all levels decide to do in coming years will determine the climate and quality of life that our children and grandchildren inherit.”

Margaret Leinen, PhD

Director, Scripps Institution of Oceanography, UC San Diego



ANNUAL AVERAGE TEMPERATURE IS INCREASING AND WILL CONTINUE TO INCREASE BETWEEN NOW AND 2050:



WE EXPECT TO SEE CHANGES IN OUR REGION'S PRECIPITATION PATTERNS:



16% FEWER RAINY DAYS



8% MORE RAINFALL DURING THE BIGGEST RAINSTORMS

Perspectives from local leaders:

"The San Diego region has become a national model for addressing the challenges of climate change. We have done so by forging an unprecedented collaboration of a wide range of diverse experts and community leaders, working together to sustain the special quality of life and economic vibrancy San Diegans value."

Ron Roberts

Supervisor, San Diego County Board; Chair, San Diego County Air Pollution Control Board; and Member, California Air Resources Board

"Communities like Imperial Beach, National City, La Mesa and Solana Beach have already taken action to encourage walking and biking. This helps reduce our driving and also makes our communities safer, healthier and more livable. All of the cities across our region can follow their lead."

Elyse Lowe

Deputy Executive Director, Circulate San Diego

"In our region and across California, we are taking steps to make our transit system cleaner, with expanded use of alternative and renewable fuels. That's our way of working together for our community's health and the future of our region."

Paul Jablonski

Chief Executive Officer, Metropolitan Transit System



America Plaza Trolley Station

Answering the call: opportunities for regional leaders

Since heat-trapping gases are generated locally from a variety of human actions, we can do our part by reducing emissions at home and across the San Diego region. Reducing emissions will alter the speed and severity of changes ahead.

- Reduce the number of miles we drive, utilize more fuel-efficient and electric cars and use lower-emission fuels.
- Improve the connectivity of our transit systems so San Diegans and visitors are more able to rely on public transportation and drive less.
- Implement "smart growth" principles to make communities more walkable, compact and climate-friendly.
- Encourage and adopt measures to make buildings and communities more resource-efficient through energy efficiency, water conservation, waste reduction, and generation and use of renewable energy.

Warming, compounded by less frequent precipitation, will worsen droughts and threaten our imported and local water sources.

The science and why it matters:

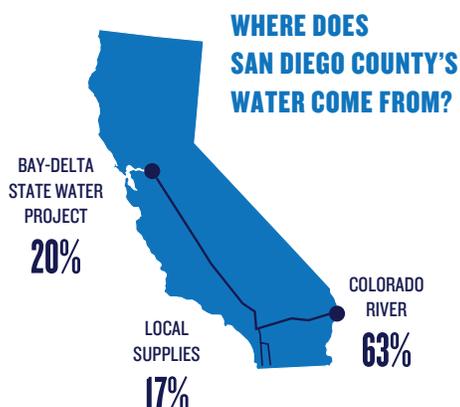
- Our water demand is expected to increase 46 percent by 2035 due to our growing population, rising temperatures, longer intervals without rain and increased evaporation from the soil and water reservoirs.
- Local water supplies will be under stress from more intense and frequent drought, as well as from more evaporation and increasing water demand due to rising temperatures.
- Water availability from both the Sierra Nevada (via the State Water Project) and the Colorado River will also be under more stress from warming temperatures and more extended droughts that reduce the amount of snowpack and river flow.
- The potential for diminished water availability from imported water sources will increase the need to meet regional water demands through new local supply development such as water reuse and seawater desalination, as well as increase the need to stretch available supplies through efficient water use practices.

A word from the scientists

“Our history is written in water, not ink. Our future prosperity depends upon a stable and secure water supply, which is increasingly imperiled from climate change and growing demand. In coming years, we will need to take much more aggressive action to expand water conservation, recycling and storage.”

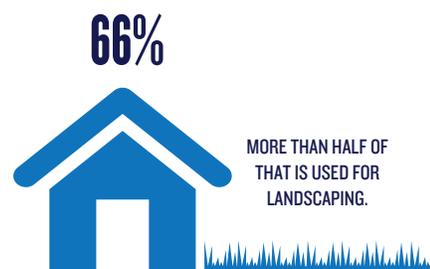
Charlie Kennel, PhD

Professor and Director Emeritus, Scripps Institution of Oceanography, UC San Diego, and Former Director, Mission to Planet Earth, NASA



WARMER TEMPERATURES MEAN LESS SNOWPACK AND GREATER EVAPORATION. SCIENTISTS ARE EXPECTING A 12% DECREASE IN THE RUNOFF AND STREAMFLOW THAT IS REPLENISHING OUR MAJOR WATER SOURCES.

RESIDENTIAL USE MAKES UP 66% OF TOTAL WATER DEMAND IN SAN DIEGO





Perspectives from local leaders:

"We recognize that climate change could have substantial impacts on the reliability of our region's water supply, and we have incorporated adaptation strategies into our region's long-term water management plan. Our strategy to diversify our water supply sources – through conservation, water transfers, recycling, seawater desalination, and storage and conveyance projects – is providing our region with increased protection from climate-related impacts such as droughts."

Maureen Stapleton

General Manager, San Diego County Water Authority

"Our region's farming economy – which contributes \$5.1 billion annually – has already seen the impacts of diminishing water supplies and increasing water costs. Some farmers have destroyed avocado trees to reduce costs. Our ability to produce locally grown food and sustain our region's fifth largest industry will depend on how well we invest in and safeguard our water supplies in coming years."

Julie Walker

President, San Diego County Farm Bureau, and Co-Owner/
Founder of Obra Verde Growers in Valley Center

Olivenhain Dam and Reservoir

Answering the call: opportunities for regional leaders

- Adopt water-efficient irrigation practices and switch to drought-tolerant landscaping and agriculture.
- Promote water conservation and avoid wasting water.
- Expand water storage and reuse to reduce our reliance on imported water.
- Find ways to reduce the energy used and cost associated with water recycling and seawater desalination as part of the effort to diversify and increase our water supply.
- Take climate change impacts into account when developing long-term city and county water supply and land use plans.
- Identify ways to facilitate the wider adoption of local water supply projects such as water recycling, potable reuse and seawater desalination.





COASTAL FLOODING

Extreme high tides and winter storms magnified by sea level rise will result in more frequent and widespread coastal flooding.

The science and why it matters:

- With higher sea levels and occasional heavy winter storms, our shoreline communities will be more vulnerable to beach loss and coastal cliff erosion.
- Sea level in our region is expected to rise nearly three times faster between now and 2050 than it did in the prior half century.
- In some parts of our region, we could see what is currently defined as a 1-in-100-year extreme coastal flood occur on an annual basis by 2050.
- We will face greater likelihood of costly damage to coastal homes and businesses, as well as the port and airport, naval bases, highways and railroad tracks.

A word from the scientists

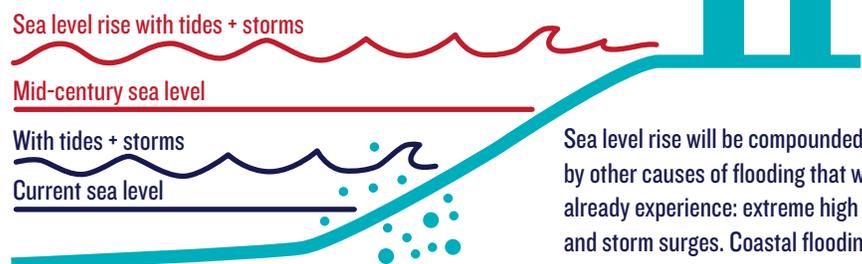
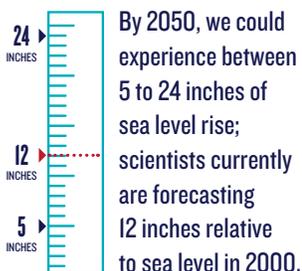
“The largest sea levels and impacts will probably occur when large winter storms coincide with high astronomical tides, especially during El Niño conditions. Low-lying areas such as Imperial Beach, Coronado, downtown San Diego, La Jolla Shores, Del Mar and the Oceanside Harbor appear to be particularly vulnerable. Enhancing coastal resilience will require sustained monitoring and scientific investigation along with strong coordination that includes our local jurisdictions and public agencies.”

Dan Cayan, PhD

Research Meteorologist, Scripps Institution of Oceanography, UC San Diego, and Oceanographer, Water Resources Division, U.S. Geological Survey



HOW WILL SEA LEVEL RISE AFFECT COASTAL FLOODING?





Perspectives from local leaders:

“Working together with our community, scientists and experts, the City of Chula Vista demonstrated its leadership by becoming the first city in our region and one of the first cities in the nation to adopt a Climate Action Plan that contributes to our efforts to make our city more resilient and better prepared for a sustainable future.”

Cheryl Cox

Mayor, City of Chula Vista

“The Navy is assessing the threats from coastal flooding and other climate change impacts to our facilities and operations to identify cost-effective measures to strengthen the resilience of our installations, update local response plans, maintain mission readiness and ensure we’re always ready to help our neighbors.”



Rear Admiral Patrick Lorge

Commander, Navy Region Southwest

Living Coast Discovery Center, Chula Vista

Answering the call: opportunities for regional leaders

- Discuss risks, costs and benefits of developments in flood hazard zones.
- Incorporate expected sea level rise into community planning and structural design requirements to protect coastal property and infrastructure in flood hazard zones.
- Protect existing and build new natural buffers, such as wetlands, to protect our coastline from flooding.
- Install green infrastructure, such as bioswales, around buildings and other paved areas to manage storm water and reduce flooding and pollution.
- Proactively coordinate efforts across flood hazard zones to balance what may be competing priorities for residents, businesses and entire communities.



La Jolla Shores Beach & Tennis Club
Photo by Alexander Gershunov

According to a study by Climate Central:

\$1.5 billion

of real estate in San Diego County is less than 3 feet above the local high tide line and thus at increasing risk from coastal flooding.

Wildfire seasons may be longer and more extreme, with warming temperatures, drier soils and vegetation and less frequent rains.

The science and why it matters:

- A hotter and drier climate, along with less frequent rainfall, will increase the frequency and severity of droughts and could alter fire fuel conditions in ways that promote larger, more catastrophic fires.
- The fire season may be longer and less predictable, putting more homes, firefighters and natural lands at risk for longer stretches of time.
- If current land use and development patterns continue, the economic cost of wildfires will continue to increase; these costs include a need for increased firefighting resources and the cost of rebuilding affected homes, businesses and infrastructure.
- We may also suffer from a higher number of poor air quality days as a result of more frequent and larger fire events.

A word from the scientists

"It's too easy to forget that wildfires have already extracted a huge cost in our region in the last decade. We can reduce future costs and safety risks by keeping new housing within existing urban areas, reducing fire-loving, non-native plants and devoting adequate firefighting resources to quickly control wildfires."

Matt Rahn, PhD

Director, Wildfire Research Center, San Diego State University, and Associate Professor, UC Merced



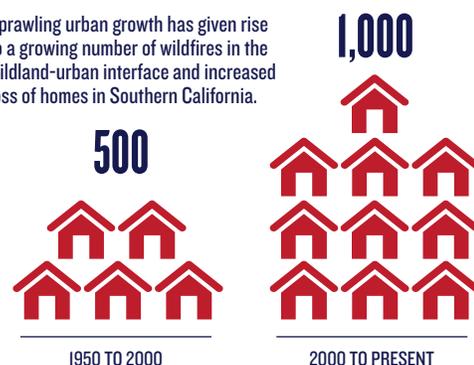
THREE OF CALIFORNIA'S 10 LARGEST WILDFIRES WERE IN SAN DIEGO COUNTY AND BURNED 646,661 ACRES



The wildfires of 2003 and 2007 together cost more than **\$4.5 BILLION** in damages and incalculable indirect costs in lost workdays, business shutdowns and decreased tourism.

HOMES LOST ANNUALLY TO WILDFIRES IN SOUTHERN CALIFORNIA

Sprawling urban growth has given rise to a growing number of wildfires in the wildland-urban interface and increased loss of homes in Southern California.





Perspectives from local leaders:

“While fighting wildfires is inherently dangerous, the construction of more homes in more remote locations makes it even more challenging and costly to protect lives and prevent property loss while safeguarding our firefighters. As wildfire conditions worsen in coming decades, we need to better integrate fire risk assessment into our land use planning decisions along and near the wildland-urban interface.”



Thom Porter

Assistant Region Chief (formerly San Diego Unit Chief),
CAL FIRE Southern Region

© John Gibbins/U-T San Diego/ZUMAPress.com

Scripps Ranch, Cedar Fire of 2003

Answering the call: opportunities for regional leaders

- Maintain up to 100 feet of defensible space near homes and other structures.
- Encourage and adopt fire-resistant building design, materials and landscaping.
- Direct new development and redevelopment toward existing urban areas in order to avoid developing more homes and businesses in outlying, fire-prone areas.
- Encourage coordinated and centralized regional firefighting information that stays up-to-date on wildfire risks worsened by climate change, with special attention to how and where fires start.
- Ensure that firefighting resources are commensurate with the elevated risk the region will face.

- ▲ The term “wildfire” has become a misnomer. Large wildfires frequently threaten homes, businesses and lives, shifting the focus to structure defense. Simultaneously, a new paradigm is emerging, we are witnessing a dramatic shift in the frequency and intensity of wildfires due to a variety of factors, most of which are human-caused. As our population grows, decisions on developing and managing the wildland-urban interface will determine our vulnerability and the risks imposed on our firefighters.

Our beautiful coastlines and beaches and our region's unique plants and animals, along with the benefits they provide San Diegans, will be threatened.

The science and why it matters:

- Rising sea level will encroach on our existing wetlands, reducing their capacity to buffer storms and filter storm water runoff.
- Rising temperatures and changes in rainfall patterns may occur much faster than plants and wildlife are able to adapt, threatening the survival of some species.
- Our current conserved lands may not be sufficient to enable native wildlife to adapt to climate changes.
- The year-round benefits that the outdoors provide to our health and well-being, such as reducing depression, alleviating stress and encouraging exercise, may be diminished.

A word from the scientists

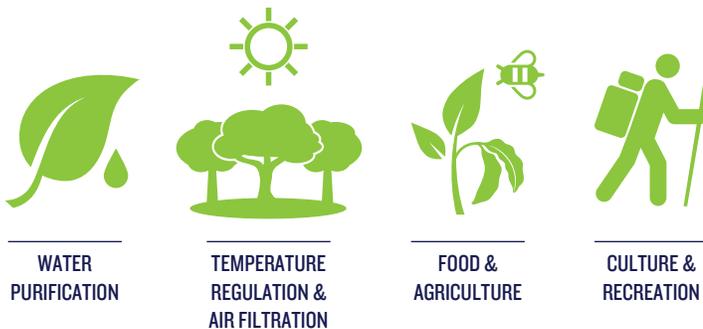
"Climate change will bring growing impacts to our region's wildlife, as well as the waters and lands that sustain all San Diegans. The San Diego Zoo's Institute for Conservation Research is now working with local wildlife officials and conservation organizations to better protect natural lands and resources for future generations."

Joan Embery
Conservation Ambassador, San Diego Zoo Global



WHAT ARE NATURE'S BENEFITS?

Humans benefit from the many resources and natural processes that are supplied by healthy, functioning ecosystems.



Our Greater San Diego Vision found one of the four core values that people cherish across the region is the opportunity for enjoyment of the outdoors with family and friends.



Agua Hedionda Lagoon, Carlsbad



Perspectives from local leaders:

"We are already taking steps to conserve and restore the lands along our rivers, streams and reservoirs, to protect our vital drinking water supplies that people, plants and animals all need. We must continue, as well as increase, these efforts, not just for today, but for all future generations – after all, this is our legacy."

Scott Peters

Congressman, US House of Representatives, CA-52

"Climate change has already begun to transform the places where we live. We pride ourselves on the fact that 45% of the land in San Diego County is open space. It is critical that we continue to plan for these spectacular natural areas and resources so they are healthy and resilient enough to cope with this great threat to our natural systems."

Michael Hager, PhD

President and CEO, San Diego Natural History Museum



Torrey Pines State Beach

Answering the call: opportunities for regional leaders

- Protect and preserve the health of our coastal wetlands and river habitats that filter polluted runoff, keep our coastal waters swimmable and are home to thousands of plants and animals.
- Steward our region's globally unique and diverse wildlife for future generations to enjoy.
- Continue developing an interconnected network of nature preserves across a variety of landscapes in our binational region to enhance nature's resilience to climate change and protect nature's essential benefits of clean water, clean air, high-quality food and a healthy lifestyle.
- Use more native, drought-tolerant plants in landscaping and farming while actively monitoring and controlling invasive species to strengthen resiliency to drought.

- ▲ Climate change threatens the iconic beaches of San Diego. A recent study by San Francisco State University economists found that, by 2050, San Diegans could lose 20% of Torrey Pines State Beach to flooding and erosion, resulting in annual losses of:

\$6.1 million

in recreation and habitat value

\$27.7 million

in tourism spending and local and state tax revenue

\$4.8 million

in beach sand replenishment



More extended heat waves and less nighttime cooling will put our health at risk.

The science and why it matters:

- Our elderly, children, low-income residents and the chronically ill are at highest risk from the health impacts of climate change.
- Extreme high temperatures and extended heat waves have historically caused heat-related illness and death and may do so more frequently.
- While air quality across the San Diego region has improved since the '70s and '80s, future poor air quality from wildfires and days of high ozone pollution will increase respiratory and cardiac health problems for people with respiratory and chronic illness.
- Warming temperatures and wildfires are already affecting the populations and prevalence of rodents, mosquitos and other animals that carry and spread disease, potentially exposing San Diegans to more infectious diseases.

A word from the scientists

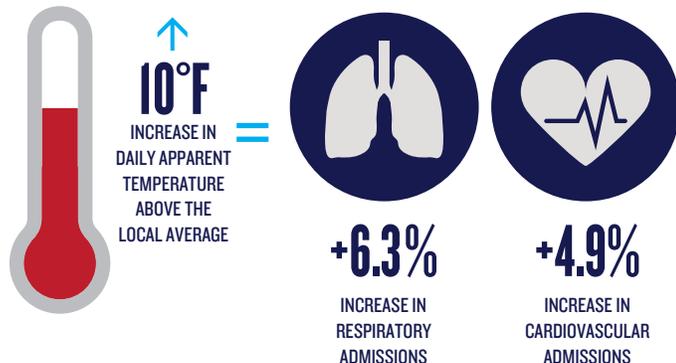
"With more extreme weather, we will see an increase in childhood asthma, infectious diseases and heat-induced heart failure. Our children and grandparents, as well as the chronically ill and people with lower incomes, will be most vulnerable."

Jenny Quintana, PhD

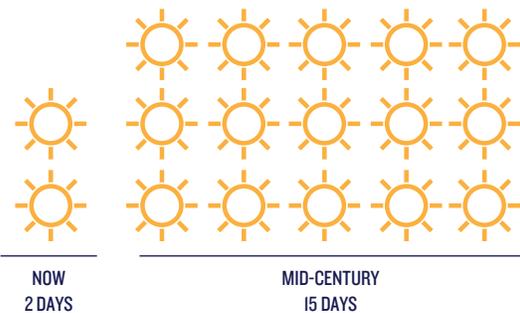
Associate Professor, Division of Environmental Health, San Diego State University



ONE STUDY MODELED THE HISTORIC IMPACTS OF INCREASING TEMPERATURES ON HOSPITALIZATIONS AND FOUND THAT:



BY 2050, SCIENTISTS EXPECT THAT WE WILL HAVE 7 TIMES AS MANY DAYS OF EXTREME HEAT PER YEAR THAN THE PRE-2000 HISTORICAL AVERAGE.





Perspectives from local leaders:

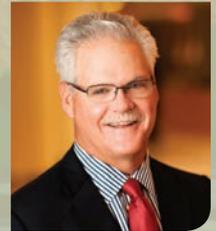
"We know that climate change will affect people's health in our region. That's why the County is working with the National Weather Service to better understand our local weather conditions and how to proactively respond to weather extremes to protect the health and well-being of all San Diegans."



Wilma Wooten, MD, MPH

Public Health Officer, San Diego Health and Human Services Agency, County of San Diego

"There are significant health risks from extended heat waves, poor air quality and lack of rain that adversely impact our smog and ozone levels. During heat waves, wildfires and high pollution days, we may see more ER visits and hospital admissions across the county, particularly among individuals with respiratory ailments, such as asthma or chronic obstructive pulmonary disease. Those with respiratory ailments will need to take more precautions as conditions worsen – and will need to be aware of current emergency response efforts created for critical periods, not just as health care providers but with a community-wide response."



Michael W. Murphy

President and CEO, Sharp HealthCare

Hidden Canyon Community Park, Carlsbad

Answering the call: opportunities for regional leaders

- Take expected health impacts into account when making and approving public health system and air quality improvement plans.
- Manage and restore natural areas in urban neighborhoods to increase shade; this can help cool buildings and paved pedestrian routes, as well as improve air and water quality.
- Ensure that hospitals and emergency responders have sufficient resources and are prepared to address the expected health impacts.
- Continue to improve early warning systems during heat waves, provide education about heatstroke symptoms and increase access to cooling centers and public swimming pools.
- Expand disease monitoring, educate the public on preventing the spread of disease, and improve emergency response for disease outbreaks.

OUR FUTURE, OUR 2050

“TOGETHER WE ARE CAPABLE OF GREAT THINGS!”



“Our mural was a team effort that began with drawing a city of buildings. As we started to paint, the city was transformed into a natural landscape with beautiful mountains, sunshine, plants and wild animals within a sustainable community. Together we are capable of great things, and if we take the steps to care for our region now, by 2050, San Diego will be transformed like our mural – full of blue skies, open green spaces, clean water and a bright future for all of us.”

Max Guinn
Founder, Kids EcoClub (age 13)

Inspired by the impacts of climate change on our region, Kids EcoClub joined together with artist and educator Patti Fox to facilitate student murals at 11 elementary, middle and high schools across the San Diego region and bring forth the students’ collective vision for our region in the year 2050. Across the county, students expressed concerns about water use, pollution, climate change and transportation, as well as immense optimism about their ability and their community’s ability to make a difference. The murals will be on display at the 2014 San Diego County Fair and the San Diego Museum of Natural History.



Students at Encanto Elementary School collaboratively created the mural above to illustrate their vision and hope for the future of our region.

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REVIEWS FOR

“SAN DIEGO, 2050 IS CALLING. HOW WILL WE ANSWER?”

“The information provided in the San Diego 2050 Report is timely and critical. It will help us face increasing challenges of climate change to our region’s economy and quality of life. Based on the latest science from our world-renowned Scripps Institution of Oceanography, this is a must-read for business and community leaders.”

Ash Israni
Chairman, Pacifica Companies



“We used the previous version of the 2050 Report to inform the Port of San Diego’s recently adopted Climate Action Plan. We look forward to using this update as an important touchstone as we continue the Port’s efforts to address climate change.”

Cody Hooven
Senior Environmental Specialist,
Port of San Diego



“We’ll definitely be referencing *San Diego, 2050 Is Calling* to understand and address the impacts of our region’s changing climate. We look forward to using it to catalyze important conversations and collaborations in transportation planning.”

Matthew Tucker
Executive Director, North County
Transit District



ABOUT CLIMATE EDUCATION PARTNERS

Climate Education Partners – San Diego Region (CEP) is a collaborative team of multidisciplinary experts from the University of San Diego, UC San Diego’s Scripps Institution of Oceanography, California State University San Marcos, The San Diego Foundation and The Steve Alexander Group. Climate Education Partners is developing a new model for educating high-profile decision-makers, community leaders and the general public in the San Diego region about climate science. This project is one of only six National Science Foundation projects being funded through the Climate Change Education Partnership (CCEP) program.

Climate Education Partners
••••• SAN DIEGO REGION
For San Diego’s Future

ABOUT THE SAN DIEGO FOUNDATION

The San Diego Foundation is dedicated to improving the quality of life of communities across the San Diego region by providing leadership for effective philanthropy that builds enduring assets and by promoting community solutions through research, convenings and actions that advance the common good. Through Climate Education Partners, The Foundation’s Climate Initiative led the development of this report, which is an update of a prior report produced by The San Diego Foundation in 2008, *San Diego’s Changing Climate: A Regional Wake-Up Call*.



ABOUT THE NATIONAL SCIENCE FOUNDATION

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