

# SAN DIEGO'S CHANGING CLIMATE:

## A REGIONAL WAKE-UP CALL

A SUMMARY OF THE FOCUS 2050 STUDY PRESENTED BY **THE SAN DIEGO FOUNDATION**



The First Comprehensive Regional Assessment of Climate Change Impacts to San Diego County



This report, commissioned by The San Diego Foundation, is a serious wake-up call for the people of the San Diego region. The science-based findings presented on the following pages represent the best available information for decision makers today.

The question is not whether our climate is changing. The question is whether we will use the scientific knowledge we have now to prepare our communities for the future.

**In year 2050, what future will we have created for our children?**

# IN 2050, IF CURRENT TRENDS CONTINUE...

Sea level will be 12-18 inches higher.

San Diego's climate will be hotter and drier.

We will face a severe water shortage.

Wildfires will be more frequent and intense.

Public health will be at risk, especially among  
the elderly and children.

Native plant and animal species will be lost forever.

We will not be able to meet our energy needs.



## ABOUT THE SCIENCE

The San Diego Foundation's Regional Focus 2050 Study explores what the San Diego region will be like in the year 2050 if current trends continue. More than 40 multi-disciplinary experts from regional universities, local governments, public sector agencies, nonprofits, and private sector organizations contributed to this research.


The range of impacts presented in the Focus 2050 Study are based on projections of climate change on the San Diego region using three climate models and two emissions scenarios drawn from those used by the Intergovernmental Panel on Climate Change (IPCC). A number of analytical models were developed and used for this study to provide quantitative estimates of the impacts where possible. This report draws upon the most current scientific analyses from a broad array of experts in climate science, demography and urban/regional planning, water, energy, public health, and ecology.

This summary document highlights the scientific findings from the Focus 2050 Study.

*For a list of the scientists and agencies that contributed to the Focus 2050 Study, please see the back cover of this report.*

SAN DIEGO COUNTY POPULATION IN 2050 >> 50% more people 25% over the age of 65



A silhouette of a person holding a surfboard on a beach at sunset. The person is standing on a wet, reflective beach, holding a large surfboard horizontally. The sun is low on the horizon, creating a bright glow and reflecting off the water and sand. The sky is filled with scattered clouds, and the ocean waves are visible in the background.

In San Diego County,  
our way of life is closely  
tied to our climate.

## **SCIENTISTS AGREE: THE EARTH'S CLIMATE IS CHANGING.**

While we can reduce the speed and severity of the changes ahead by reducing world-wide emissions of greenhouse gases, some further warming is unavoidable as a result of past emissions that have built up in the atmosphere. As we work to reduce emissions on a global level, we must also begin to prepare for the local impacts that climate change will have on the San Diego region.

The good news is that we can take actions today that will curtail emissions, prepare us for the impacts of climate change, and protect San Diego's health, environment, and economy. By understanding how San Diego will be affected in coming decades, we can protect our community from the most harmful risks.

Some programs and policies are already in place in local cities and at the county level to reduce greenhouse gas emissions. However, much less has been done to prepare for the unavoidable impacts of climate change. Each section of this report describes what actions can be taken now to address these risks.

By 2050, San Diego will look significantly different than it does today. How it looks, however, will depend on the decisions we make today and going forward.



IN 2050, IF CURRENT TRENDS CONTINUE...

# Sea level will be 12-18 inches higher.

- Beaches will shrink and some will disappear completely.
- Fragile sea cliffs will collapse.
- Coastal properties will be flooded with increasing regularity.
- More frequent high waves and rough surf will increase the potential for significant damage.
- Existing tide pools will be destroyed.
- Coastal wetlands will lose their capacity to filter polluted runoff and keep beaches clean.

**Along roughly 70 miles of coastline, rising sea levels will have a major impact on the San Diego region's environment and economy.** When high tide occurs during a large storm, particularly in El Niño winters, flooding will threaten homes, businesses, and hotels in low-lying coastal communities such as Imperial Beach, Coronado, Mission Beach, La Jolla Shores, Del Mar, and Oceanside. The military, port and airport may also be affected.

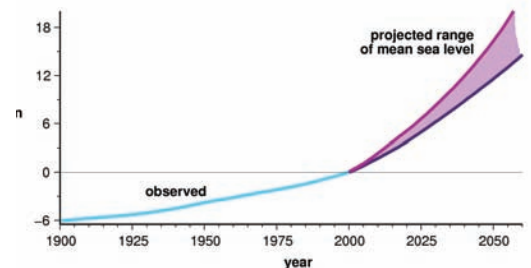
As the decades progress, high surf events will last for more hours, with waves causing even greater coastal erosion and related damage. Rising sea levels will wear away the foundations of sea bluffs, such as those found in Solana Beach or Torrey Pines, significantly changing our coastline.

Sandy beaches and nearby wetlands serve as a barrier to protect coastline developments from high surf. As these areas shrink from more intense wave activity, there may be a greater need for beach sand replenishment. We may also need to build more seawalls and breakwaters to defend homes and

businesses from coastal flooding. In addition to being extremely costly, these structures will destroy beaches and wetlands that do not have space to shift inland.

Beaches and wetlands serve as vital nurseries to numerous fish, shellfish, and shorebirds. They also play a critical role as natural filtering systems for rain water that runs down our streets, picking up pollutants before flowing into storm water drains that lead out to the ocean. Wetlands and estuaries could be devastated, leaving beaches exposed to more pollutants that endanger human and marine life.

Projected sea level rise for San Diego County coastline over the next several decades





2050 Coastal Inundation  
Sea Level Rise and Wave Events  
Site: Mission Beach

**Legend**

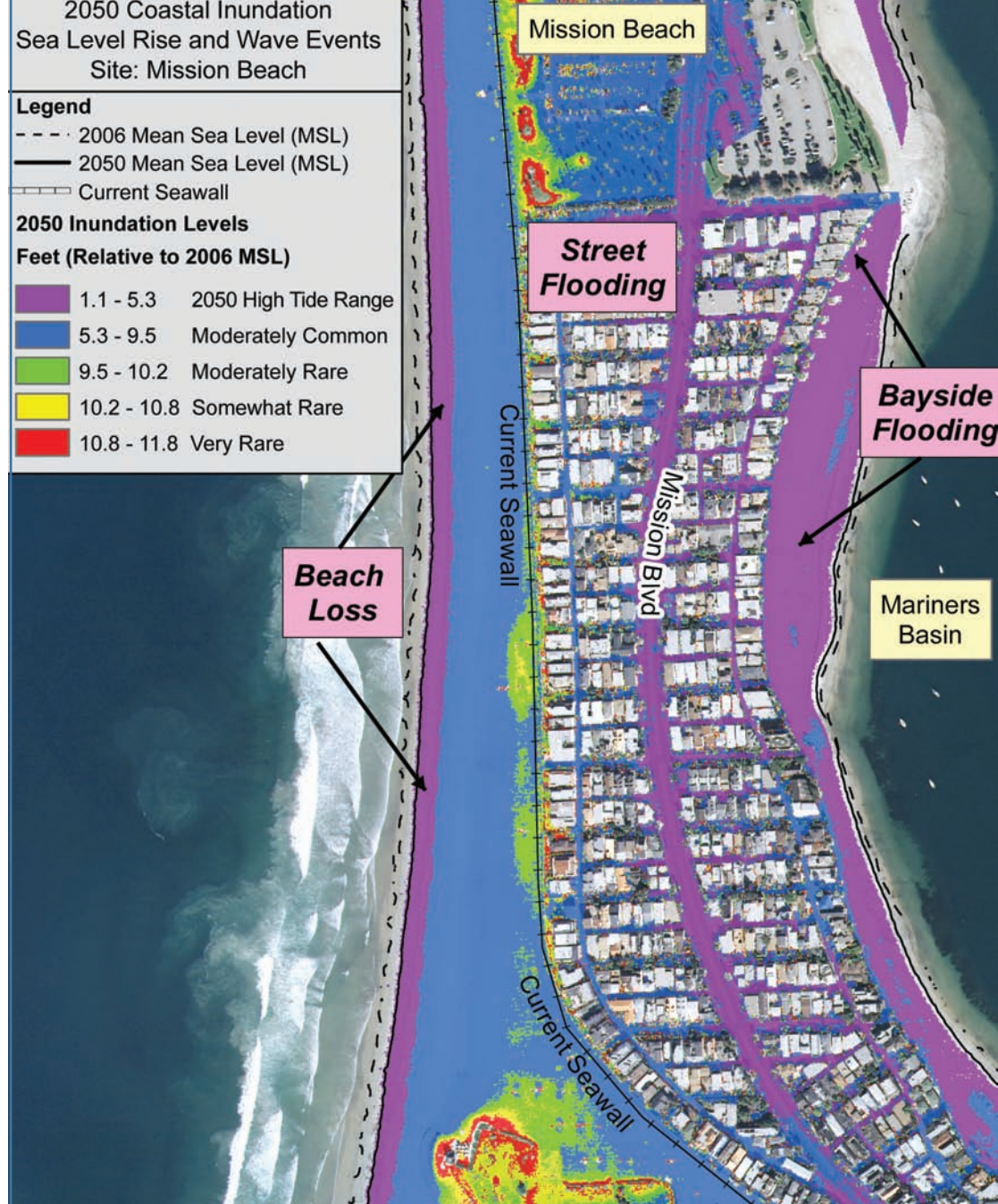
- - - 2006 Mean Sea Level (MSL)
- 2050 Mean Sea Level (MSL)
- ▭ Current Seawall

**2050 Inundation Levels**

**Feet (Relative to 2006 MSL)**

- 1.1 - 5.3 2050 High Tide Range
- 5.3 - 9.5 Moderately Common
- 9.5 - 10.2 Moderately Rare
- 10.2 - 10.8 Somewhat Rare
- 10.8 - 11.8 Very Rare

High tides alone (purple) are expected to flood parts of the sandy beach and bayside streets. Additional “run-up” from common high surf events (blue) floods the majority of the sandy beach, streets and parts of Mission Beach Park. Rare high surf events (green) are expected to breach the seawall and flood streets and sidewalks. Very rare high surf events (red) flood the sandy beach, surface streets and heavily used boardwalk in Mission Beach.



**WHAT CAN WE DO NOW?**

- Residents, business, industry, and public agencies may consider relocating threatened structures.
- Public and private hazard insurance will need to accommodate increased threats to coastal structures.
- Coastal managers can build natural buffers to protect our coastline and let beaches move inland over time.
- Local governments can incorporate expected sea level rise into community planning and structural design requirements to protect coastal property and infrastructure in flood hazard zones.
- In some cases, communities may need to reduce or stop coastal development altogether.

In the coming decades, sea level will rise more than twice as fast as during the last century. *The higher projection of 18 inches assumes that global greenhouse gas emissions continue to increase. The lower projection assumes we are successful in reducing global emissions.*



IN 2050, IF CURRENT TRENDS CONTINUE...

# San Diego's climate will be hotter and drier.

- Average annual temperatures will rise between 1.5 and 4.5 degrees Fahrenheit.
- Heat waves will increase in frequency, magnitude, and duration.
- Early November will “feel” like September currently does.
- Our region will become even more vulnerable to drought.

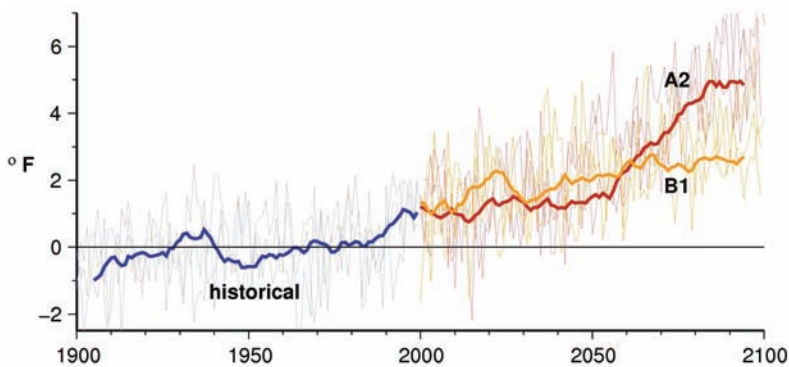
Around the world, the San Diego region is known for sunshine, mild temperatures, and low rainfall. Until recently, we assumed our future climate would remain the same, but we are already seeing changes.

In California, there is less snow and more rain in the mountains during winter. In spring, snow melts more quickly and flowers bloom earlier. Over the past few years, warmer temperatures and less rain in the summer and fall seasons have left San Diego County in the middle of a prolonged drought.

In the decades ahead, summers here will be even hotter. Heat waves — periods of uncomfortably hot days and nights — will be more common, last longer, and reach higher temperatures. Projections indicate that Miramar will be warmer than 84 degrees Fahrenheit for more than a third of the year.

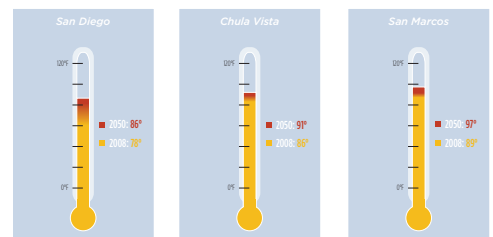
Precipitation in the region will retain its Mediterranean pattern, with winters receiving the bulk of the year's rainfall and summers being dry. Rainfall is hard to predict, but experts agree that it will continue to vary widely from year to year, which means our region will remain highly vulnerable to drought.

Projected annual temperatures for San Diego County over the next several decades



By 2050, San Diego County will experience significantly warmer average temperatures throughout the year. The A2 scenario represents temperatures if global greenhouse gas emissions continue to increase. The B1 scenario represents a significant reduction in global emissions.

Average August Temperature 2008 vs 2050





Heat waves will begin earlier in the year, last longer into the fall, and continue for more days in succession.

### WHAT CAN WE DO NOW?

Decreasing local greenhouse gas emissions today will help slow down climate change after 2050.

- Government, industry, and individuals can all make efforts to reduce the number of miles we drive, utilize more fuel-efficient cars, and use lower emission fuels.
- Regional planning and transportation agencies can improve the connectivity of our transit systems so San Diegans are more able to rely on public transportation and drive less.
- Cities can grow responsibly by implementing “smart growth” principles to make communities more walkable, compact, and climate friendly.
- Local governments can update building codes to better enable developers to create more climate-friendly buildings and communities.

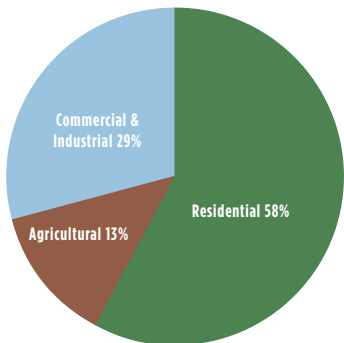


IN 2050, IF CURRENT TRENDS CONTINUE...

# San Diego County will face a severe water shortage.

- San Diego County will require 37% more water than we currently use.
- Our major sources of water — the Colorado River and the rivers of Northern California — could shrink by 20% or more.
- Extended and more frequent droughts will diminish local water supplies.
- We could face an 18% water shortage by 2050.

Water Demand in San Diego County



**San Diego is a major urban area built by importing water from hundreds of miles away into what is essentially a desert environment.**

Aqueducts bring water from the Colorado River and rivers in Northern California, supplying from 75% to 95% of San Diego’s needs. The amount we import each year varies depending on local rainfall, as remaining supplies come from local stream flow, ground-water pumping, and recycled wastewater.

the California Aqueduct, brings water from the rivers of Northern California, fed each spring by melting snowpack in the Sierra Nevada Mountains. In May 2008, the California Department of Water Resources reported that the Sierra Nevada snowpack is only 67% of normal this year. This trend may continue as average winter temperatures rise.

Given these uncertainties, San Diego’s water supply plans are likely to be severely challenged by climate change. We must create significant new water supplies from wastewater recycling, creative water transfer agreements, and desalination of seawater and other sources. In addition to developing new supplies, it is critical that the San Diego region use water more wisely in order to reduce its demands and better position itself for future water negotiations.

By 2050, San Diego County’s demand for water is expected to increase by 37% as a result of population and economic growth. Drought years, which have historically increased water demand by another 7%, might occur as much as 50% as often and be considerably drier. In drought years, parched soil soaks up more surface water and groundwater, increasing the need for imports and other supplies.

Even with current plans in place to conserve, recycle, and augment our available water, it is estimated we could face an 18% shortfall in supply by 2050.

At the same time that our demand for water is increasing, climate change could shrink Colorado River flow by 20% or more. Our other primary water source,

Typical Residential Consumption

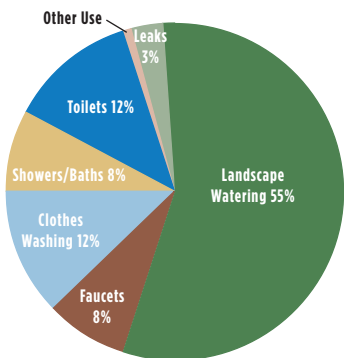






Photo credit: San Diego County Water Authority

Even with new water transfer agreements and canal lining projects, San Diego County could face an 18% shortfall in water supply by 2050.

### WHAT CAN WE DO NOW?

- All consumers can alter their irrigation practices and switch to drought-tolerant landscaping.
- Water districts can modify water rates and use incentives to further encourage water conservation and discourage water waste.
- Local governments can update laws and codes to require residents, businesses, industry, and agriculture to be more water-wise, especially in irrigation and landscaping practices.
- Water managers can invest in expanded water reuse, efficiency, and creative water transfers, as well as desalination practices that use less energy and minimize harmful impacts to the environment.
- All water planners must take climate change into account in developing long-term city and county water supply and land use plans.



San Diego County currently imports up to 95% of its water hundreds of miles from the California and Colorado River aqueducts.





IN 2050, IF CURRENT TRENDS CONTINUE...

# Wildfires will be more frequent and intense.

- Warmer spring temperatures will make the fire season longer.
- Droughts will make vegetation drier and further increase fire risk.
- Santa Ana winds may occur for a longer period of time during the fire season, prolonging extreme fire conditions.
- The number of days each year with ideal conditions for large-scale fires will increase by as much as 20%.

**San Diego County already has one of the worst wildfire conditions in the country, and the situation will worsen with climate change.**

San Diego's unique combination of fire-adapted, shrubby vegetation and extreme fire weather means that fires here are not only frequent, but often very large and extremely intense. Likewise, decades of fire suppression in our region's forests have led to a build-up of potential fuel for fires, increasing vulnerability to larger fires.

Fire occurrence has steadily increased in Southern California, in direct proportion to human population growth as most ignitions are caused by human activities. Most fires start during the summer, when coastal sage and chaparral vegetation have dried to a highly flammable state. Fires that start during the fall, however, burn many more acres because flames are intensified and spread by hot, dry Santa Ana winds.

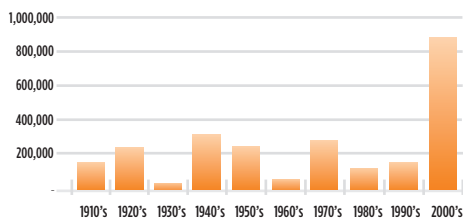
It is not yet clear from climate change models exactly how Santa Ana conditions will affect San Diego regional fire regimes in the future. Some models predict a decrease in the frequency and intensity of Santa Ana conditions while others predict

an increase, particularly during the fire season. If Santa Ana conditions increase significantly earlier in the fire season, this shift could increase the incidence of massive Santa Ana fires, because the winds will begin gusting during the time of year when most fires start.

More frequent fires threaten native plant species by not allowing sufficient recovery time before they burn again. This allows weedy, non-native species, which thrive in post-fire conditions, to multiply. Weedy invaders dry out earlier in the year, catch fire more easily, and burn faster than native plants.

If current trends continue, the San Diego region will experience a large human population increase, with more development and human activities in backcountry areas over the coming decades. As a result of climate change, we can expect higher spring temperatures, scorching summers, drier vegetation, and longer fire seasons. A simultaneous occurrence of all of these factors will increase the likelihood of more devastating firestorms similar to those that destroyed so many homes and lives in 2003 and 2007.

Total Acres Burned by Wildfires in San Diego County by Decade



**In the last ten years, the area burned by wildfires was unprecedented. In 2003 and 2007, wildfires burned nearly 740,000 acres across San Diego County.**



During the 2003 wildfires, 20,000 acres of native pine trees in Cuyamaca Rancho State Park burned so hot that they did not grow back. The forest may be permanently changed unless the pine trees are replanted.

## WHAT CAN WE DO NOW?

- Residents can maintain defensible space near their homes with drought-tolerant, fire-resistant landscaping and irrigation where appropriate.
- Local governments can use building codes to require the use of fire-resistant building design, materials and landscaping.
- Local governments may also consider prohibiting development in fire-prone areas.
- Conservation professionals can manage vegetation in forests to reduce fire intensity and potential ignition sources while protecting critical habitats for native plants and animals.
- Fire professionals can coordinate and centralize regional firefighting information that stays up to date on wildfire risks worsened by climate change, with special attention to how and where fires start.
- Fire professionals can also work with communities to monitor changing climate conditions and develop preparedness plans in backcountry areas along the urban-wildland interface.

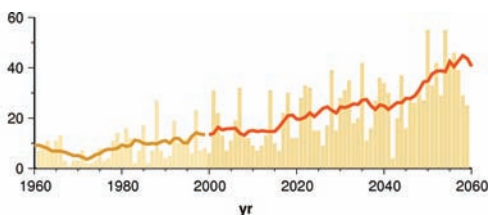


IN 2050, IF CURRENT TRENDS CONTINUE...

# Public health will be at risk, especially among the elderly and children.

- More frequent episodes of extreme heat will cause illness and death.
- Dangerously poor air quality will increase respiratory and cardiac health problems.
- More frequent wildfires will cause fire-related injuries, exposure to hazardous smoke, and deaths.
- More infectious diseases could be spread by mosquitoes and rodents.
- The impacts from climate change will increase demand on medical and public health services, straining our public health system.

Number of extremely hot days in May–September for Chula Vista over the next several decades



If we continue to increase our emissions, the number of hot days above 84 degrees could triple over the next several decades, as shown by the solid line in this graph. The solid line represents a running 11-year average of hot days under one climate model simulation, while the light bars show the projected number of hot days for each year.

Increased heat, air pollution, wildfires, and infectious disease will cause illness and death in San Diego County, especially among the elderly, children, and the chronically ill.

Californians experience the worst air quality in the nation, and San Diego is currently out of compliance with the federal ozone standard. By 2050, more hot sunny days will increase ozone air pollution levels, which can exacerbate asthma and other respiratory and cardiovascular diseases.

Fire-related injuries and death are likely to increase as intense wildfires occur more frequently. Wildfires can also be a significant contributor to air pollution. Wildfire smoke contains numerous toxic and hazardous pollutants that are dangerous to breathe and can worsen lung disease and other respiratory conditions.

Warmer temperatures year-round could lead to growing mosquito populations, increasing the occurrence of West Nile Virus in our region. Hot weather could also bring tropical diseases such as malaria and dengue fever to our region for the first time. In our coastal waters, conditions are likely to favor more frequent “red tides” or harmful algal blooms, which can harbor toxic bacteria and other diseases.

In 2050, with an aging population and more residents living in areas with extreme-heat conditions and poor air quality, the San Diego region will face intensified public health concerns. Without adequate planning, our healthcare and emergency response systems will be pushed to the limit, service may be compromised, and taxpayers will likely feel the burden on our local economy.

## Quick Facts from the 2006 California Heat Wave

Lives lost: **140**

Hospitalizations: **1,200**

Proportion of Hospitalizations Who Were Elderly: **52%**

Added Emergency Room Visits: **16,000**

Added Health Costs: **\$133,000,000**

In California, heat waves have claimed more lives over the past 15 years than all other declared disasters combined.

Source: *The 2006 California Heat Wave: Impacts on Hospitalizations and Emergency Department Visits.* Knowlton, et al.



Mosquito populations thrive in warmer weather, increasing the San Diego region's public health risk of West Nile Virus.

#### WHAT CAN WE DO NOW?

- Public health planners and practitioners should take expected health impacts from climate change into account when making public health system and air quality improvement plans.
- Public health planners and caregivers can better prepare our hospitals and emergency responders to care for the elderly and children during heat waves.
- Public health planners can improve early warning systems during heat waves, provide more access to cooling centers and public swimming pools, and plant shade trees in our cities.
- Public health practitioners can expand disease monitoring, educate the public on preventing the spread of disease, and improve emergency response for disease outbreaks.
- We can all work to promote good health through better nutrition and exercise to reduce risk and increase the resilience of individuals and communities. Our built environment can also contribute to active, healthier lifestyles with more accessible bikeways, public transit, and parks.



Photo credit: Don Getty Photo

IN 2050, IF CURRENT TRENDS CONTINUE...

# Native plant and animal species will be lost forever.

- Some plants and animals will migrate to new habitats, and others will become extinct.
- There will be widespread loss of trees and forests from wildfires, drought, and insect attack.
- Entire ecosystems will be challenged.

**With a rich natural diversity, San Diego County may be home to more plants and animals — many of them imperiled — than any other county in the continental United States.** Our beaches, canyons, mountains and deserts support an amazing variety of plants and animals, some of which are found nowhere else on the planet.

This great biodiversity is already under stress from human population growth and land use changes that have broken up and reduced species habitat to fragmented areas.

The impacts of climate change — more severe and frequent wildfires, extended droughts, sea level rise, higher temperatures, and increased air pollution — all add to the pressures on habitats and the species that live here. As a result, the locations where the temperature, moisture, and other environmental conditions are suitable for a particular species will shift.

Plant and animal species are generally able to adapt to shifting habitats, but the climate change that we are experiencing is so rapid that ecological conditions may shift faster than species are able to follow. Human

changes to the landscape, resulting in fragmented habitats, make it even more difficult for species to adapt. To survive, some animals and plants will have to move up to 95 miles over the next century to find new habitat or they will face extinction.

Drought and unusually warm years have already led to growing insect populations, such as bark beetles, which have attacked and killed drought-stressed trees in San Diego County and throughout western North America. With warmer weather, our region's forests will lose even more trees.

Ecological changes will be cascading as the loss of one species will challenge the ability of other species up and down the same food chain to survive. Top predators like coyotes may be lost if habitat patches become too small or isolated, and that can lead to an increase in smaller predators that prey on native songbirds. The cascading ecological changes we already know to be unfolding in San Diego likely foreshadow the complexity and gravity of the changes to come as the effects of future changes in climate and land use interact over the coming decades.



To put the rate of temperature change for species survival into context, a 1 to 5 degree Fahrenheit increase by 2050 is 10-50 times faster than the temperature changes that occurred when the ice ages receded (2 degrees Fahrenheit per 1,000 years).



Sea level rise will threaten marine life in San Diego County, primarily affecting intertidal species in tide pools and estuaries. Cabrillo National Monument and Scripps Coastal Reserve, both of which are bordered by steep cliffs, will lose much of their marine life.



## WHAT CAN WE DO NOW?

- Local governments and conservation professionals can advance the development of an interconnected network of nature preserves across the variety of landscapes and elevations in our region that allow animals and plants to relocate and adapt to climate change.
- Local governments can also work with neighboring counties and the Mexican government to expand these nature preserves beyond our borders.
- In some cases, conservation professionals may need to actively manage specific species and habitats to enhance their resilience to climate change.
- Conservation professionals and foresters can work to create a forest structure through management that will be more capable of surviving drought conditions.





IN 2050, IF CURRENT TRENDS CONTINUE...

# We will not be able to meet our energy needs.

- In the San Diego region, we will use at least 60% more electricity by 2050.
- Peak electric demand will grow by over 70%, with warmer weather causing about 7% of the increase.
- Higher demand will come from hotter inland areas where our population will grow most, driven primarily by people using air conditioning.

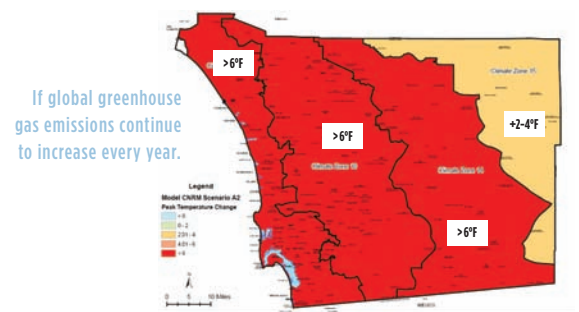
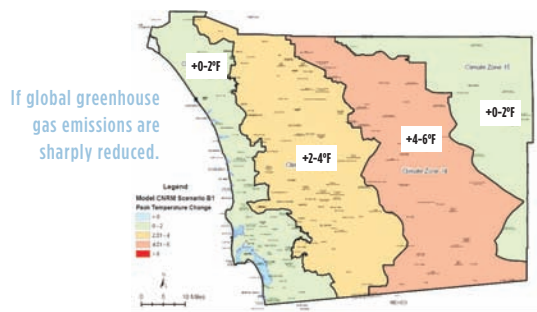
**Warmer temperatures and a growing population will translate into big challenges for the San Diego region’s energy supply by 2050.** The main impact will be higher demand for electricity as a result of the greater need for summer cooling, especially in inland areas where both regional population growth and temperature increases will be highest.

Hotter summers and more frequent, longer and intense heat waves will increase our peak demand for electricity, which could result in blackouts and power outages without adequate planning. In 2006, peak demand for electricity was the highest on record for our region, mostly because of air conditioners running during that year’s unusually hot summer.

Electricity consumption in San Diego County has increased steadily over the past 17 years with the exception of 2000-2001 due to the energy crisis. Voluntary efforts to reduce consumption have helped San Diego avoid extensive outages since 2001, but more recently consumption trends have resumed and even exceeded pre-crisis levels.

To provide our region with a reliable energy supply, we must conserve energy, use it more efficiently, and develop more renewable energy sources. If we do not, we will face energy shortages in the future.

Projected change in summer daytime peak temperatures in San Diego County in the year 2050.





## WHAT CAN WE DO NOW?

- All San Diegans can save energy and use it more efficiently.
- Our electric utility can use more “smart grid” technologies, add renewable energy power plants in the San Diego region, and diversify local and renewable energy sources.
- Local governments can revise building codes and provide incentives for green building and more street tree planting.
- Our government and electric utility can use rebates, tax credits and peak pricing incentives to encourage residential and business installation of renewable energy systems such as solar panels and wind turbines.



A photograph of the San Diego skyline at dusk, with buildings illuminated and their lights reflecting on the water in the foreground. The sky is a deep blue.

**This is a regional wake-up call.** It is now time for the citizens and political leaders of our community to develop plans of action and work together to reduce the harmful effects of climate change on San Diego.

Through sensible adjustments and informed, careful planning, we can reduce and manage the risks described in this report. Decisions about transportation, water and energy resources, public health, ecosystem protection, preparing for natural disasters, and how and where we grow as a region are all part of managing climate change.

The quality of life we experience in the year 2050 will depend on the choices we make today. It's important for us, and it's important for our children.

## THINK GLOBALLY ACT LOCALLY

Our State Government is already developing a report detailing California's climate adaptation strategy, due for release in April 2009. Our local governments and public agencies must complement these efforts with local climate action plans. The cities of San Diego and Chula Vista are already working to implement plans to reduce greenhouse gases. In recent years, Carlsbad, Coronado, Del Mar, Imperial Beach, La Mesa, Solana Beach, and Vista have also committed to reducing their emissions. Their next step is to develop comprehensive action plans. As a region, we need to respond to climate change in a coordinated and systematic way.

### ESSENTIAL ELEMENTS OF A LOCAL CLIMATE ACTION PLAN

1. Conduct a baseline greenhouse gas emissions inventory.
2. Assess local vulnerabilities from climate change.
3. Adopt emissions reduction targets and prioritize areas for climate adaptation.
4. Enact a Local Climate Action Plan with policies to reduce emissions and vulnerabilities to climate change.
5. Conduct regular assessments that incorporate new knowledge into planning processes.

### WHAT CAN YOU DO NOW?

- Contact your mayor, city council members, and county supervisor to encourage the development of a local climate action plan to reduce emissions and prepare our community to be climate-resilient. Send them a copy of this report.
- Share this report with your family, friends and coworkers.
- Get involved in community efforts to conserve our natural resources and become a greener, more sustainable community in order to avoid the most harmful consequences of climate change.
- Finding ways to use less energy and prepare for climate change is everyone's responsibility. Commit to three personal changes you can do to help our environment.



**The time horizon of this study projects only to the year 2050.**

The current trend is that human-caused greenhouse gases emissions are increasing every year. Because the effects of greenhouse gas accumulations on climate are very long-lasting in impact, the levels of warming, amount of sea level rise, and other impacts described will probably not reach their peaks by 2050.

In other words, the anticipated effects outlined for the San Diego region in this report are not the maximum levels that we will experience. These impacts will continue to worsen after 2050, unless there is a major shift in global energy generation and a sharp reduction in greenhouse gas emissions worldwide.

The San Diego Regional Focus 2050 Study forms the basis for a technical assessment that was developed for inclusion in the 2008 Climate Change Impacts Assessment, Second Biennial Science Report to the California Climate Action Team. *For a list of the scientists and agencies that contributed to the Focus 2050 Study, please see the back cover of this report.*

The Focus 2050 Study emulates an approach taken by King County, Washington, a region renowned for its pioneering efforts in climate change planning.

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***About The San Diego Foundation:***

*With a dynamic mix of leadership, grantmaking, and civic engagement, The San Diego Foundation makes the San Diego region a better place to live. Founded in 1975, The Foundation addresses evolving issues facing our region by convening community leaders, providing research and expertise on topics important to our citizens, and partnering with nonprofit organizations to meet urgent and changing needs. By working with individuals, families and organizations to carry out their giving plans, The San Diego Foundation utilizes charitable dollars toward the ultimate goal of improving the quality of life in the greater San Diego region, now and for generations to come.*

*Please visit [www.sdfoundation.org](http://www.sdfoundation.org) for more information.*

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The full text of the Focus 2050 Summary Assessment, and the core scientific working papers that comprise this analysis, are online at [www.sdfoundation.org](http://www.sdfoundation.org). The scientists and other contributors who participated in this effort are:

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