CLIMATE AND HEALTH SERIES - REPORT 1

Your Health and Climate Change in Los Angeles County

Los Angeles County Department of Public Health
Division of Environmental Health | August 2014

County of Los Angeles Public Health

What You'll Find in This Report

This report was developed to help inform you, as a resident of Los Angeles County, about the specific, local-level health impacts of climate change, and how to reduce your contribution to climate change.

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Message from the Health Officer

News reports about climate change often refer to melting ice, polar bears, or sea level rise in far-flung places. It can be difficult for people to envision how climate change might affect their lives, especially here in the moderate climate of Los Angeles County.

Yet even here, climate change is expected to bring increasing temperatures, extreme weather, and rising sea levels. These changes to our climate present significant health risks, including respiratory disease, heat-related illness and death, poorer water quality, and vector-borne disease. Certain groups such as children, the elderly, the disabled, those with chronic medical conditions, and those with low incomes are the most vulnerable to these health impacts that arise from climate change. Climate change is a public health issue as well as an environmental one.

It is important to take action now to lessen climate change. Everything that we do now to reduce greenhouse gas emissions reduces the severity of climate change and the impacts we face.

The Los Angeles County Department of Public Health is pleased to provide you with the first report in our *Climate and Health* series. This report, *Your Health and Climate Change in Los Angeles County,* presents important information about what increasing temperatures, extreme weather, and rising sea levels mean for you and your family's health—and what you can do to lessen these impacts.

We must embrace new methods and technologies, make a commitment to activities that help reduce carbon pollution, and recycle and reuse existing resources. See our guide within this report, *10 Actions You Can Take to Reduce Climate Change,* for easy ways to reduce your carbon footprint, including:

- Walking or biking instead of driving
- Using less energy
- Buying local produce
- Sharing information about climate change with your friends and family.

Imagine Los Angeles County with clean air, clean water, healthy food, less traffic, and safe opportunities to walk and bike. By working together, we can make a positive impact on the health of all residents in the county.

Jonathan E. Fielding

Jonathan E. Fielding, MD, MPH
Director and Health Officer

Imagine

Los Angeles County with clean air, clean water, healthy food, less traffic, and safe opportunities to walk and bike.

Angela's Story

Angela is a 39-year-old mother who lives in Sylmar. Every weekday she drives 20 miles to her office, where she is a human resources professional. Her husband, Joe, is an outdoor construction worker. Her 7-year-old son, Alex, is doing well academically, but sometimes misses school because of asthma attacks. Angela has heard a lot about global warming and climate change from the news, but she isn't sure whether it will affect her and her family, or what she can do about it.

How will climate change affect Angela and her family?

- Alex may suffer from more asthma attacks as air pollution becomes worse due to climate change.
- Because outdoor workers are especially at risk for heat-related illness and death, Joe will need to find ways to stay safe on the job. In Sylmar, climate change is predicted to triple the number of *heat days* (when temperatures are over 95°F) from nearly seven days a year now to more than 25 days per year in 2050.
- Angela's community is at risk for wildfires. The hot, dry conditions that result from climate change are expected to lead to more frequent and more severe wildfires, putting her and her neighbors' homes in danger.

What can Angela do about climate change?

Angela realized that by reducing her contribution to climate change, she can save money now and reduce the severity of the future impacts that she and her family will face. So she and her family made some simple changes to help reduce greenhouse gas emissions:

- Angela asked her employer if she can telecommute one day each week. She not only saves on gas, car maintenance, and stress, but she can reduce greenhouse gas emissions related to driving her car.
- Joe changed the light bulbs in their house to energy-efficient bulbs, which use less energy and last longer than regular light bulbs.

- Produce, meats, and other foods are often transported more than 1,500 miles from farm or manufacturer to a person's table. Angela has started buying food at her local farmers' market to not only reduce transportation-related climate change effects, but also support her local economy.
- Angela adjusted her thermostat to 78°F in summer and 68°F in winter to save on energy and money needed for heating and cooling her family's home.

- A school project for Alex prompted the whole family to get involved in recycling. They get a little extra spending money every month, and help the earth by reducing the energy used in creating new cans and bottles.

Read on to pages 12-13 for explanations of these and other things you can do to minimize your contribution to climate change.

Understanding Climate Change in Los Angeles County

Angela's story gives us a snapshot of the climate change impacts and solutions in one area for one family. Current research is examining the many changes that will occur throughout Los Angeles County as the earth's surface warms.

The University of California, Los Angeles (UCLA) Fielding School of Public Health, in partnership with the Los Angeles Regional Collaborative for Climate Action and Sustainability (LARC), recently published several studies that found if greenhouse gas emissions continue to increase globally, climate change could impact Los Angeles County in the following ways:

Increasing Temperatures

On average, the Los Angeles region is expected to warm 4˚ to 5˚ by mid-century. Heat waves could last longer and become more frequent. The number of *heat days* (when temperatures are over 95˚F) are expected to triple in coastal areas and central Los Angeles, while the San Fernando and San Gabriel Valleys will see an almost quadruple increase. Heat days in the desert and mountain areas will increase five to six times the current number.

Decreased Snowfall

The mountains could see a 42% reduction in annual snowfall by mid-century. Winter snowpack is also expected to melt more than two weeks earlier as a result of rising temperatures. Changes in snowfall could reduce fresh water supplies throughout the county.

More Extreme Weather

Changes in climate could increase the frequency, intensity, and duration of extreme weather events such as rain storms. More erratic storms during the winter months could also affect stream flows and cause greater flooding.

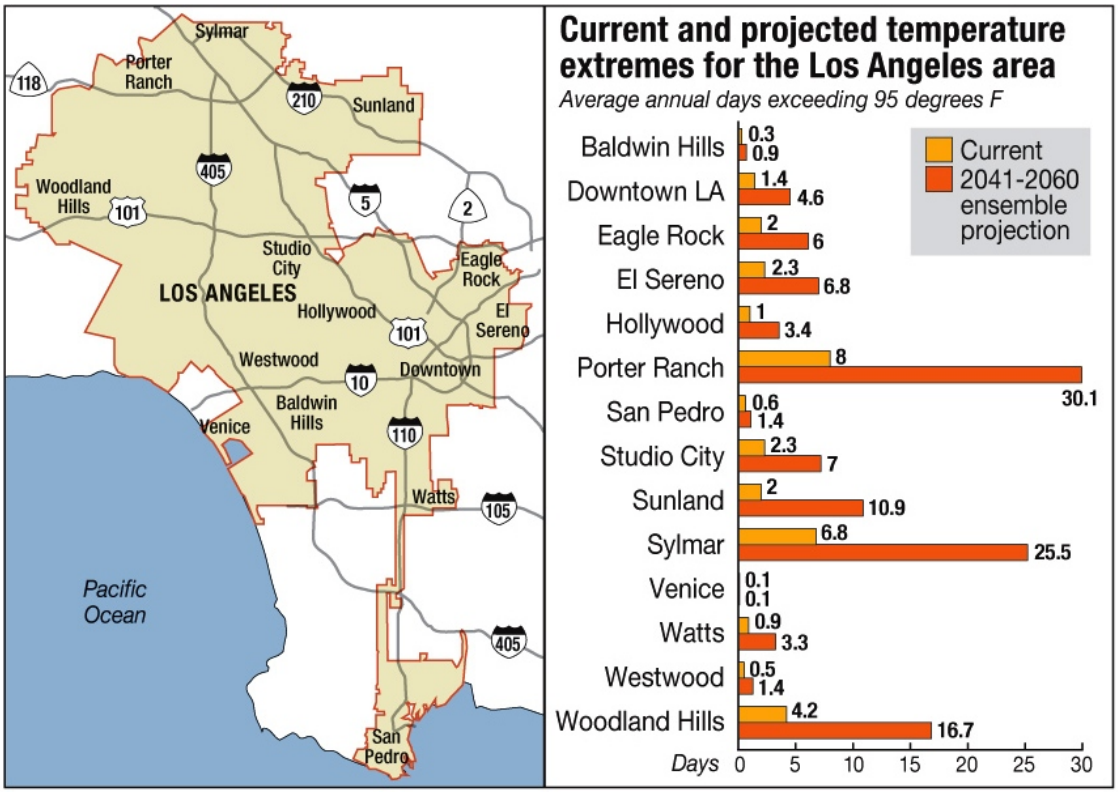
Rising Sea Levels

Climate scientists have predicted that sea level will rise along the California coast 5 to 24 inches between 2000 and 2050. Tides and storm surge can cause coastal flooding in Southern California, especially when big wave storms occur at high tides.

Climate Change Is Here

The Los Angeles region is currently experiencing increasing temperatures, more severe wildfires, and drought—conditions that are consistent with scientists' predictions about climate change. Just as global air and sea surface temperatures have been rising over the last century, so have temperatures here in Los Angeles County, with the warmest winter on record occurring during the 2013-2014 season. Globally, each of the last three decades has become the hottest on record, and scientists expect these trends to continue.

Warmer weather has also been accompanied by drier weather in the Los Angeles region. According to the National Oceanic and Atmospheric Administration (NOAA), 2013 was the driest year for most of the state since recordkeeping began in 1877. Water resources became so stressed that California Governor Edmund G. Brown Jr. declared a statewide emergency due to drought,



Source: UCLA LARC study, 2012; chart based on the mean/average projected by the 19 climate models

calling on all residents to "conserve water in every way possible" (*Governor Brown Declares Drought State of Emergency,* Office of Governor Edmund G. Brown Jr., January 17, 2014). The state's drought conditions received national attention, and Los Angeles County was designated a primary natural disaster area by the U.S. Department of Agriculture.

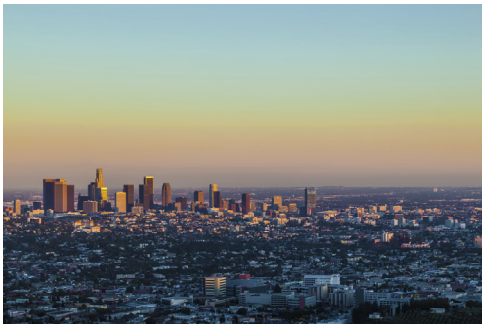
Hot, dry weather also creates ideal conditions for wildfires, and the last decade has challenged fire managers and forest communities throughout the state. Firefighters are braving longer and more unpredictable fire seasons. People who live in mountain and forest communities are more often faced with displacement or loss of their home, and surrounding residents are vulnerable to asthma, bronchitis, and other respiratory ailments due to smoke and ash from such fires. Over the last century, 11 of the 20 largest fires in California took place between 2003 and 2013. The largest and most destructive of these to ever occur in Los Angeles County was the Station Fire, in 2009. A large quantity of dry brush fuel, caused by three years of drought, along with temperatures exceeding 100°F for much of late August 2009, contributed to the fire's severity. As a result of heavy smoke and reduced visibility from the fire, two Los Angeles County firefighters lost their lives when their fire vehicle went off the road.

Wildfires are not the only climate-related hazard affecting lives and property. According to NOAA, global sea levels already have risen an estimated 8 inches between 1880 and 2013. Climate scientists have predicted that sea level along the coast of California will increase 5 to 24 inches between 2000 and 2050. With sea level rise currently surpassing predictions by the Intergovernmental Panel on Climate Change (an international body dedicated to climate science), communities along the California coast are being forced to consider measures to protect their homes, businesses, community buildings, and infrastructure.

How Will Climate Change Affect Your Health?

Experts agree that the predictions mentioned throughout this report will lead to a host of health impacts affecting Angelenos. All residents in Los Angeles County will feel the effects of climate change in some way, but certain groups, such as the youngest and oldest residents, those with low incomes, and those with chronic health conditions, will bear most of the burden.

Respiratory Disease



Los Angeles County suffers from some of the worst air pollution in the country, which is a problem worsened by climate change. Hotter temperatures speed up the chemical reactions that create ground-level ozone, the main component of smog. Ground-level ozone is linked to asthma, bronchitis, heart attack, and premature death.

Children, the elderly, people who work or exercise outdoors, and those with respiratory diseases are at highest risk for negative health outcomes due to air pollution. Daily hospital admissions due to asthma are consistently associated with higher levels of ground-level ozone, and rising temperatures will only worsen these problems.

Heat-related Illness and Death

Increasing temperatures also lead to heat-related illnesses and death. The human body operates best within a narrow range of core body temperature, around 98.6°F. As core body temperature rises, the body cools itself by sweating and increasing blood circulation close to the skin's surface. When this cooling system is unable to keep up with a prolonged heat wave or a drastic change in temperature—both effects of climate change—the individual is at greater risk of heat-related illness.

Outdoor workers such as those in agriculture, construction, firefighting, delivery, and service work are particularly at risk from heat-related illnesses. Other vulnerable groups include athletes, young children, the elderly, and people with chronic medical conditions such as diabetes, heart disease, and respiratory disease. Although preventable, incidents of heat-related illness and death still occur during heat waves. In 2006, California saw deadly heat waves sweep across the state, resulting in an estimated 650 deaths and an excess of 16,000 emergency room visits. A 1995 heat wave in Chicago was responsible for over 700 deaths; many of the victims were elderly and isolated.

Water Quality

Heat can increase the evaporation of bodies of water, reduce snowfall (because what would have fallen as snow instead falls as rain), and lead to more demand for water. When water resources dwindle, the county is affected not only by the lack of water, but also by the quality of water. Pollutants already existing in the water supply become more concentrated in smaller bodies of water, increasing the risk of water-borne illnesses like diarrheal diseases. Studies have shown that higher temperatures have coincided with increased incidence of diarrheal diseases in places like Israel and Australia. Wildfires pose an added concern during times of drought. Ash and debris from wildfires can contaminate drinking water resources, posing a challenge for water treatment systems.

Vector-borne Diseases

Hotter temperatures can cause other hazards less immediately visible than wildfires, such as vector-borne disease. Vectors are living things, commonly insects or rodents, that transmit disease to humans. Vectors like mosquitoes are an increasing concern in the Los Angeles region. The Asian tiger mosquito (*Aedes albopictus,* pictured right), for example, is responsible for outbreaks of Dengue fever in Florida, Hawaii, and Texas, and has been identified recently in the San Gabriel Valley. This and other species of mosquitoes feed more frequently and breed more rapidly in warmer weather. The Asian tiger and other species of mosquitos can also carry West Nile virus (WNV). In 2013, mosquitoes that carried WNV contributed to 9 deaths and 165 infections in the county.

Trauma, Displacement, and Related Illnesses

Los Angeles County is vulnerable to a wide range of natural disasters such as fires, floods, landslides, and windstorms. Disasters can leave hundreds of residents temporarily displaced, without electricity and potable water. Stress from these types of events and anxiety over the possibility of the event occurring again are both associated with heart attacks. When residents are forced to leave their homes or lose their homes due to a natural disaster, medical care for chronic health conditions is interrupted, putting those individuals at risk. Damage to electricity, gas, water, sewer, and waste systems impact the county's ability to maintain potable water systems, electricity, heating or cooling, sanitation, and other necessary utilities. Without the ability to practice basic hygiene and food safety and without access to clean water, all residents are at increased risk of illness.

Climate change researchers predict that all of these effects will increase in frequency, duration, and intensity throughout Los Angeles County. Public Health staff use expert judgment and analysis, along with information from scientific literature, to identify groups of people who are most at risk from the negative effects of climate change. Public Health continues to study climate change and its impact on Los Angeles County to help identify ways it can reduce negative effects and help prepare county residents.

Frequently Asked Questions About Climate Change

What causes climate change?

Humans are releasing carbon dioxide and other greenhouse gases into the atmosphere. (Greenhouse gases are released during the burning of fossil fuels, which occurs during activities like driving or using electricity. Fossil fuels are also burned when energy is used to make new products.) Greenhouse gases are causing the earth to warm and, as a result, the climate is changing around the world as well as in Los Angeles County.

What is the difference between global warming and climate change?

Global warming refers to the warming of the earth's surface and atmosphere due to human-caused (anthropogenic) greenhouse gas emissions. *Climate change* refers to all of the many changes to our climate, such as changes in temperature, rainfall, and wind, that result from the warming of the earth.

It's been really cold in some parts of the country recently. How can global warming be happening when it's so cold?

The term *global warming* can be confusing. Global warming does not mean that all parts of the world will become warmer at all times. In fact, global warming changes the functioning of the varied and complex processes that determine our climate. These changes lead to impacts like more frequent and severe extreme weather, of which cold snaps and intense winter storms are just one example.

How do we know that climate change isn't just part of a natural cycle?

It is true that our planet goes through natural cycles caused by things like volcanic activity or changes in the sun's intensity. This is because Earth's climate responds to whatever forces it to change. However, a great quantity of careful research has established that the global warming that we see today can **only** be explained by human activity, and not by other factors.

How can just one person make a difference when climate change is such a big problem?

Climate change can feel overwhelming, but each person can make a difference by lessening his or her contribution to climate change. Doing so also has other important benefits for you, like improving your health and saving money. See pages 12-13 for *10 Actions You Can Take to Reduce Climate Change*.

How Public Health Is Addressing Climate Change

Because of the wide-ranging health impacts of climate change outlined in the previous section, Public Health has developed a strategy for addressing climate change in Los Angeles County. Called the *Five-Point Plan to Reduce the Health Impacts of Climate Change,* its five strategic priorities are to:

- **Inform** and engage the general public about the nature of climate change
- **Promote** policies that reduce our contribution to climate change
- **Provide** guidance to other agencies on climate preparedness
- **Build** Public Health's capacity to address climate change
- **Adopt** best practices that reduce greenhouse gas emissions within Public Health's facilities.

More information about the *Five-Point Plan* is available in the second report of the *Climate and Health Series*.

Collaboration

Protecting the public's health from climate change requires joining forces with different public agencies. To ensure collaboration among Los Angeles County departments on climate-related issues, Public Health created the Healthy Design Workgroup, which consists of the Los Angeles County Arts Commission, Beaches and Harbors, the Chief Information Office, the Community Development Commission, Fire, the Internal Services Department Office of Sustainability, Parks and Recreation, Public Health, Public Works, and Regional Planning.

The Healthy Design Workgroup pools ideas and resources to promote healthy communities that reduce our contribution to climate change. Internal cooperation is important as well; within Public Health, various divisions meet regularly to share knowledge, discuss how existing programs and activities can help reduce the effects of or adapt to climate change, and solidify working relationships between the divisions.

Planning and Response

Public Health is the lead agency in responding to heat events in the county, issuing Heat Alerts and guidance to schools and other public agencies, and ensuring that appropriate resources, such as cooling centers, are made available to the public. Public Health's programs in emergency preparedness also create plans and conduct drills on how to prepare for the types of emergencies that will increase in frequency and severity with climate change.

Awareness

In 2013, Public Health joined forces with the UCLA Fielding School of Public Health to create a 16-session *Climate and Health* workshop series that focuses on what local public health departments can do about climate change. The workshop series will be made available to other jurisdictions and Public Health will provide guidance, resources, and other support as other agencies adopt their own measures for addressing climate change.

How You Can Help Protect Your Health

The more greenhouse gases we release, the worse climate change will become. By reducing our contribution to climate change now, we can lessen the severity of the impacts we will face and in turn, lessen the severity of the health consequences of climate change.

It is easy to feel that one person's contribution may not make a big difference. You may think "Climate change is such a big problem. What can I do?" Local action is important for many reasons, including its personal benefits to you and your community.

Climate change is often referred to as a global problem with local solutions. The *10 Actions You Can Take to Reduce Climate Change* presented on the next two pages recommends local solutions that have many co-benefits: they can improve your health or save you money—sometimes both. Many are also good for your community. For instance, if you drive less and walk or bike more, you'll be rewarded with an improvement in your own health *and* less air pollution in your community.

It's easy to feel that one person's contribution may not make a big difference but climate change is often referred to as a global problem with local solutions.

Conclusion

The impacts of climate change are many: worsening air pollution, more extreme heat, poorer water quality, changing distributions of vectors and the diseases they carry, and more frequent and severe extreme weather events. But while these impacts may seem unavoidable, how severe they become is under our control.

Local governments can help protect the public from the repercussions of our changing climate. Individuals can make a difference by making easy changes to their homes and habits that lessen their contribution to climate change, and therefore the severity of the impacts that our region will face.

Through the actions of individuals and public agencies alike, along with those of businesses, community groups, and non-profit organizations, we can protect our local communities from climate change.

10 Actions You Can Take to Reduce Climate Change

Change Your Light Bulbs

1 Replace your regular light bulbs with energy-saving CFL (compact fluorescent light) or LED (light-emitting diode) bulbs. Both use at least 75% less energy as compared to regular light bulbs, and last many times longer as well. If 20 million light bulbs were replaced with CFLs, we could all save more than $118 million in energy costs and prevent greenhouse gas emissions equivalent to that of more than 150,000 vehicles annually.

Reduce, Reuse, Recycle

2 Did you know that the energy saved by recycling a soda can, instead of making a new one, can power your television for three hours? Recycling aluminum cans, paper, plastic, and glass saves energy and money. By exchanging these items for money at your local recycling center, a family can save up to $22 per month.

Transport Yourself

3 Leaving your car at home just two days per week will help reduce your greenhouse gas emissions by an average of two tons per year. Walking and biking can also help you lose weight and maintain a healthy, active lifestyle. Every year, California spends an estimated $34 billion in medical costs for cardiovascular disease, obesity, and other health conditions related to being physically inactive and overweight. Enjoy a healthier planet and a healthier you.

Save Money and Water

4 The average person in Los Angeles County uses 123 gallons of water a day, and the average household also pays $51 per month for water. You can save water and save money by:

- Taking showers instead of baths. A four-minute shower uses approximately 20-40 gallons of water; a bath uses more than twice as much water.
- Turning off the water while you brush your teeth. You'll save up to 200 gallons a month.
- Making sure your toilet is in good working order. Approximately 90% of high water bills are due to a leaky or running toilet. Consider installing a water-saving toilet that can save up to $110 in household costs and 13,000 gallons of water every year.

Buy Local

5 Have you thought about the long journey fruits and veggies take to get to your table? Most produce travels an average of 1,500 miles from the farm to your local market. By purchasing produce from local farmers, you can support your local economy, ensure fresher and safer food supplies, and reduce transportation-related greenhouse gases.

Plant a Tree

6 It's good for the air and the earth, and can save you money on cooling costs by providing shade for your home. The U.S. Department of Energy predicts that correct placement of just three shade trees can save an average household up to $250 in energy costs every year. Trees also absorb carbon dioxide and other harmful gases, as well as increase property value and improve the neighborhood. Make it a family activity and plant a tree every year.

Adjust Your Thermostat

7 Heating and cooling accounts for up to 56% of the energy use in a home, making it the largest utility expense. Adjusting your thermostat 10-15% lower in winter or higher in summer can save you the same percent in energy costs, and can prevent 2,000 pounds of CO_2 emissions every year. Set your thermostat to 68˚F in winter and 78˚F in summer for maximum energy efficiency and cost savings.

Drive Less, Stress Less

8 Freeways and streets crowded with miles of brake lights are a familiar sight in Los Angeles County. The American Automobile Association found that a 40-mile round-trip commute costs an average of $22.08 per day, $463.68 per month, and $5,564.16 per year. You can reduce stress, costs, air pollution, and traffic congestion by working one day or more per week from home or working a modified schedule, such as four longer work days instead of five shorter ones. Ask your employer. If you still need wheels, try carpooling with co-workers, taking public transit, or biking to work.

Eat More Veggies

9 One less meat-based meal per week can help the earth, your wallet, and your heart. The United Nations Food and Agriculture Organization found that livestock are one of the most significant contributors to the greenhouse gases CO_2, methane, and nitrous oxide. They are also a major cause of water and land decline, especially in forest areas which are cleared for grazing. By eating more vegetables, you can reduce the demand for livestock and save $237 per year or more on meat-related costs. Numerous health studies have also shown that eating less meat can lead to a reduction in one's risk for heart disease and some forms of cancer.

Sharing Is Caring

10 Help the environment and your friends, family, and neighbors by sharing these valuable steps. By working together to preserve our natural resources, we can all enjoy a healthier, more sustainable Earth.

Sources: U.S. Environmental Protection Agency, Energy Star, Can Manufacturers Institute, and the Los Angeles Department of Water and Power

Glossary of Terms

Air pollution	Chemicals, particles, or biological substances in the air that are detrimental to human health. One component of air pollution in Los Angeles is ground-level ozone (see below), which worsens when temperatures are warm.
Carbon dioxide (CO_2)	A greenhouse gas that, although naturally occurring, is also produced by the combustion of fossil fuels like coal, oil, and natural gas. Activities such as driving gas-powered vehicles and electricity generation through fossil-fuel-fired power plants cause increases in CO_2, contributing to global warming.
Climate change	Changes to the earth's climate caused by an overall warming of the earth's atmosphere (see global warming). These changes are already occurring and are predicted to continue occurring. Different global regions and even local areas will experience different changes related to how climate change affects relevant processes in the atmosphere and the ocean. Effects of climate change include increased, decreased, or more variable precipitation patterns, hotter temperatures, more extreme weather (such as heat waves, cold snaps, and intense storms), and sea level rise.
Dengue fever	A vector-borne disease carried by a few different species of mosquito, including the Asian tiger mosquito (*Aedes albopictus)*. The Asian tiger mosquito is native to tropical and subtropical regions, but has been found recently in Southern California.
Drought	While there are many definitions of drought, it can generally be thought of as a period of unusually dry weather. Because different regions have different patterns of rainfall and other hydrological processes, what is considered "unusually dry" varies by place.
Extreme weather	Unusual or severe weather such as extreme heat, intense storms, and drought. Extreme weather is one result of climate change.
Global warming	The warming of the earth's climate system, which began in the 1800s, sped up starting in the 1970s, and continues today. The overwhelming majority of climate scientists (97%) believe that human activities are causing global warming. Global warming does not mean all regions will experience warmer temperatures all the time; instead, it refers to the warming trend of the earth's climate system.
Greenhouse gas	Any of the several gases (e.g., carbon dioxide and methane) that influence the earth's temperature through what is known as the "greenhouse effect." Greenhouse gases are important to maintaining a comfortable temperature on Earth. But human activities, such as burning fossil fuels, have led to an excess of greenhouse gases in the atmosphere, causing the earth to warm.

Glossary of Terms

Ground-level ozone	Known as "bad" ozone, ground-level ozone is created by chemical reactions involving pollution from vehicles, industrial facilities, and other sources. These chemical reactions speed up in warm weather, making ground-level ozone worse in warmer weather. Ground-level ozone can cause impaired lung function, among other health effects, and is especially concerning for people with asthma or other respiratory conditions.
Heat-related illness	Includes heat exhaustion (a precursor to heat stroke) and heat stroke (a life-threatening emergency). Heat-related illness occurs when the body stops being able to regulate its core temperature, such as during episodes of extreme heat.
LARC (Los Angeles Regional Collaborative for Climate Action and Sustainability)	Housed at the UCLA Institute of the Environment and Sustainability, LARC is a network of leaders in "government, the business community, academia, labor, environmental and community groups" created to "share information, foster partnerships, and develop system-wide strategies to address climate change and promote a green economy through sustainable communities."
NOAA (National Oceanic and Atmospheric Administration)	A federal agency whose mission is, in part, "to understand and predict changes in weather, oceans, and coasts."
Ozone	A gas that occurs in different places in the earth's atmosphere. "Good" ozone is located between 6 and 30 miles above the earth's surface and shields the earth from harmful UV rays. "Bad" ozone, or ground-level ozone (see above), is the main component of smog, and is detrimental to both human health and plant life.
United States Department of Agriculture	A federal department with responsibilities related to farming, agriculture, forestry, and food.
Vector (epidemiological term)	Any living thing that transmits diseases. Vectors include people, animals, and microbes. In the case of Dengue fever, the vector responsible is a type of mosquito.

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