“How Global Climate Trends Affect Local Communities”

Week 1

Building Resilient Cities 2014

Outline

1. General aspects about climate change focusing on the global trends.

2. National and local discussion about this phenomenon focusing on California and afterwards San Diego.

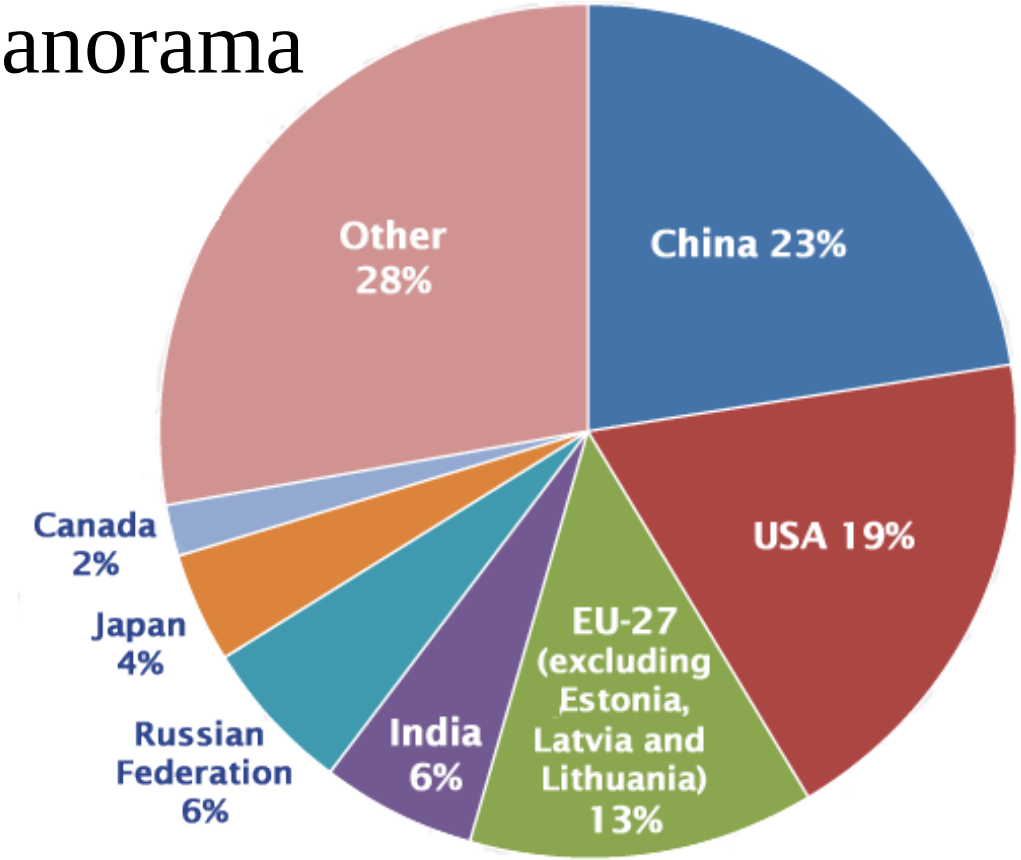
3. What is resilience? How is this concept interconnected with our future?

Climate Change Requires a Multi-level Approach

- Exploring climate change globally to locally

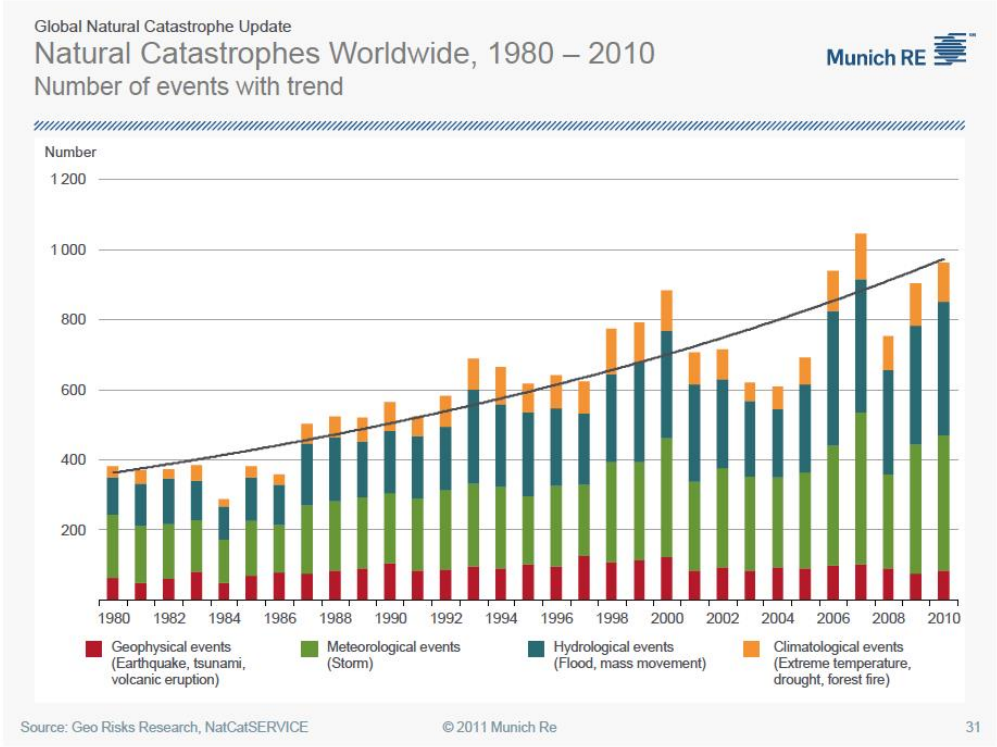
Global > National > California > San Diego

World Panorama



Source: National Co2 Emissions From Fossil-Fuel Burning, Cement Manufacture, And Gas Flaring: 1751-2008.

A Bigger Picture



Extreme Temperature Events

Recently, extreme temperatures that were recorded all over the world led to severe droughts and unexpected cold events.

São Paulo, Brazil

Chicago, Lake Michigan in May 2014

Flood

- **Scientists project that climate change will increase the frequency of heavy rainstorms, putting many communities at risk for devastation from floods.**

New Orleans, USA

Balkans; Serbia, Bosnia

Sea Level Rise

Sea level rises due to two different mechanisms with respect to climate change:

- **Ocean warming due to an increasing global temperature**
- **Melting of ice over land**

Polar Cap Melt

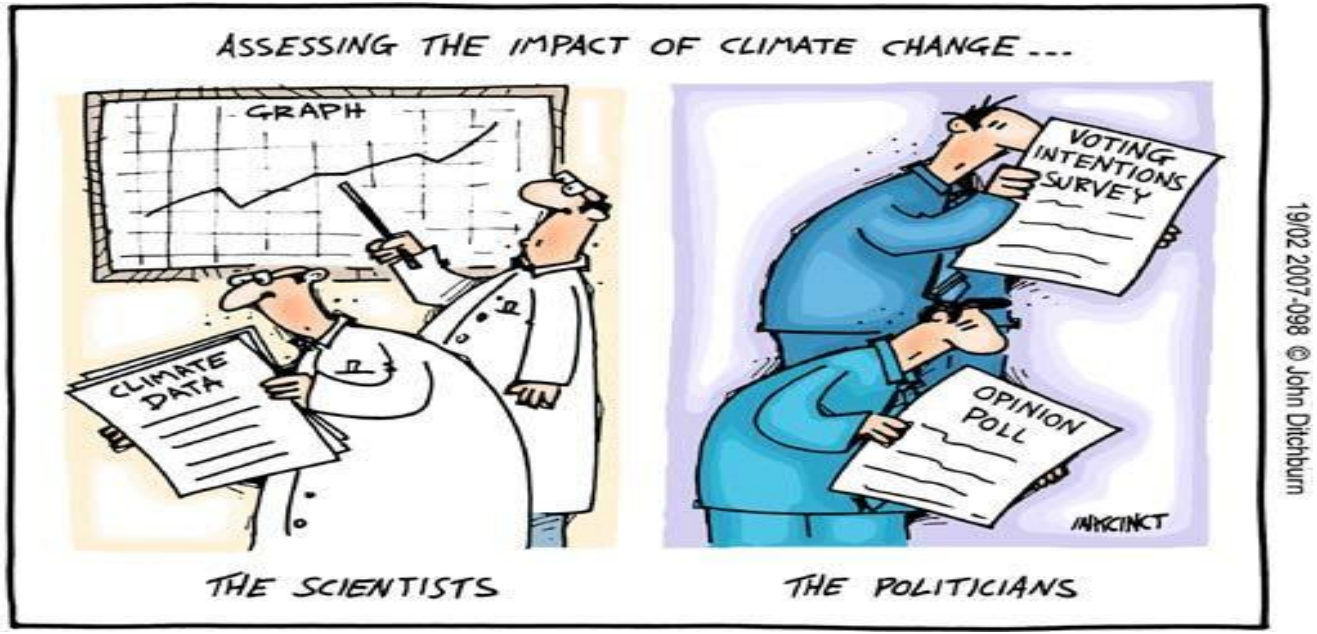
Source: NASA

- **The polar regions are important drivers of the world's climate. When the "everlasting ice" melts at an increasing rate, the rest of the world is affected.**

Greenland

Hard Science vs Hard Politics

- Science is observing, studying and experimenting to learn how the world works.



- "*Politics is the art of looking for trouble, finding it everywhere, diagnosing it incorrectly, and applying the wrong remedies*."
—Groucho Marx

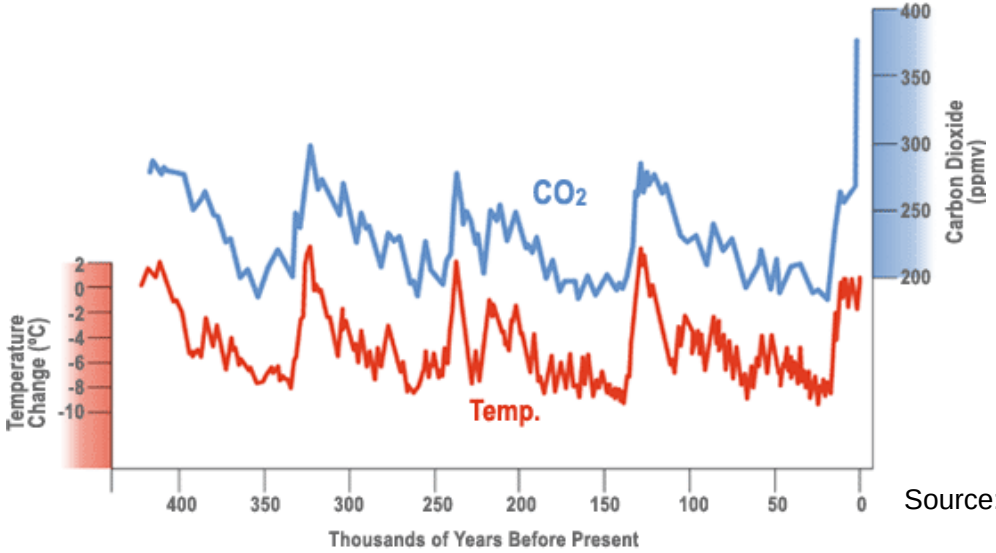
Showing The Way

- 600 + Contributing Authors
- 9200 Scientific papers referenced
- 4 years in the making
- 54,677 comments made by regular people and scientists
- 130 + Countries

Video: Last week tonight - Climate Change

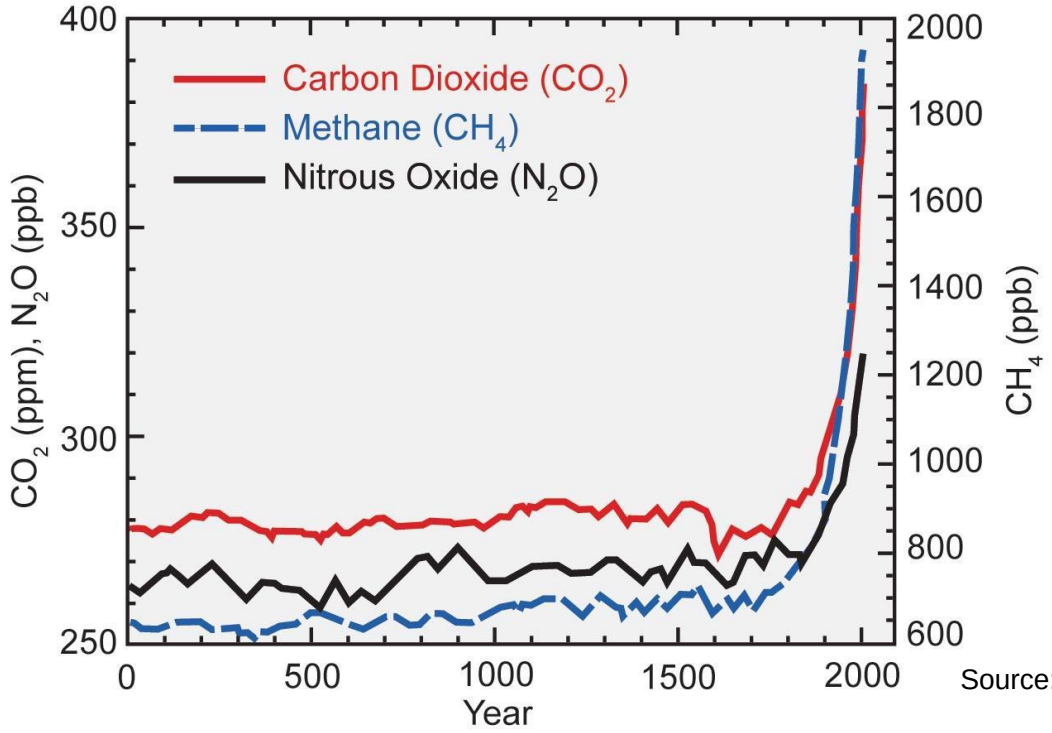
The Intimate Relationship Between CO2 and Temperature

- The strong correspondence between temperature and the concentration of carbon dioxide in the atmosphere observed during the glacial cycles of the past several hundred thousand years.



Source: NOAA

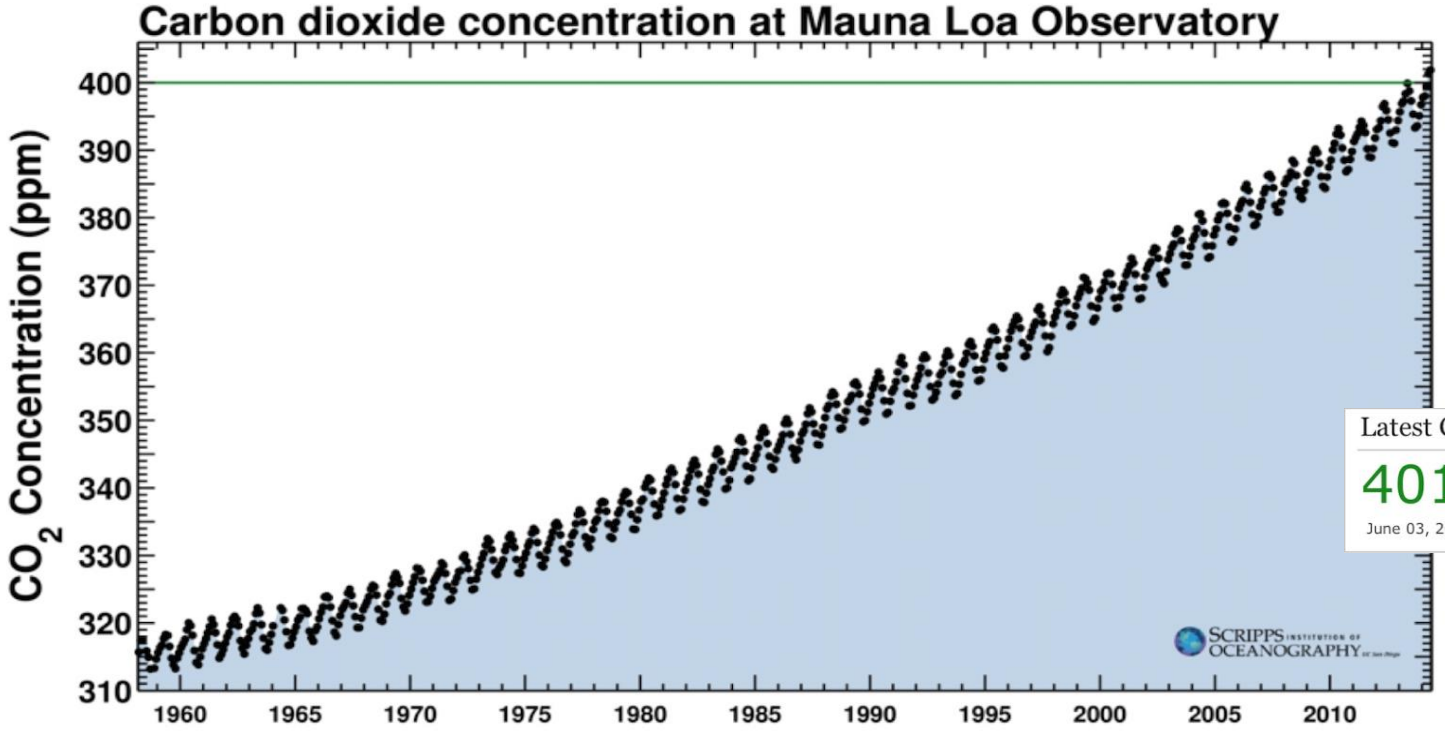
Expanding the Age Scale



Source: National Climate Assessment

Keeling Curve

- A daily record of atmospheric carbon dioxide from Scripps Institution of Oceanography at UCSD

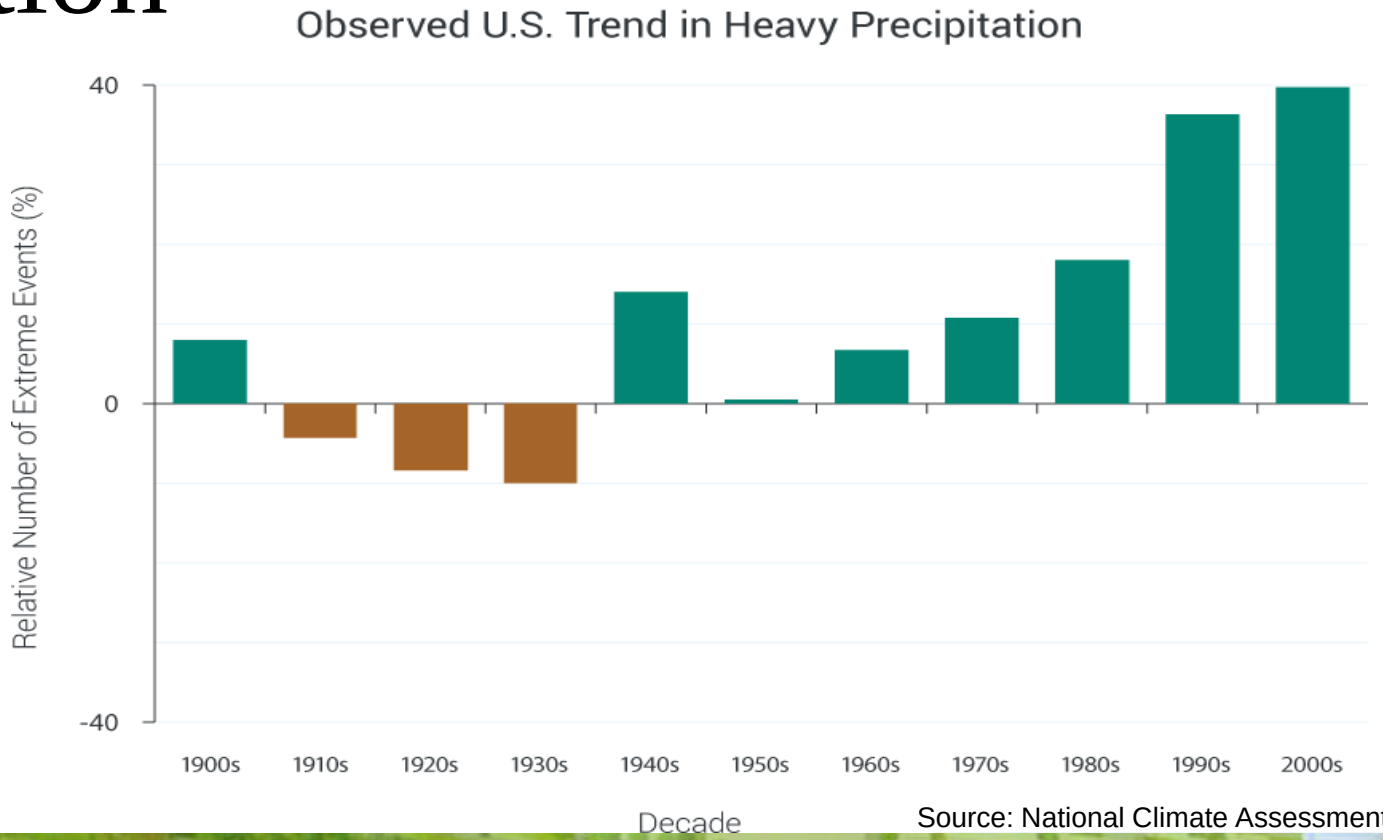


[Video: Global Average Temperature Projection]

United States

Precipitation

An event of heavy precipitation is a two-day precipitation that is exceeded an average of a once-in-a-five-year event.



Source: National Climate Assessment

Precipitation

Part of Colorado received more than 1000% of their normal rainfall for this time of year.

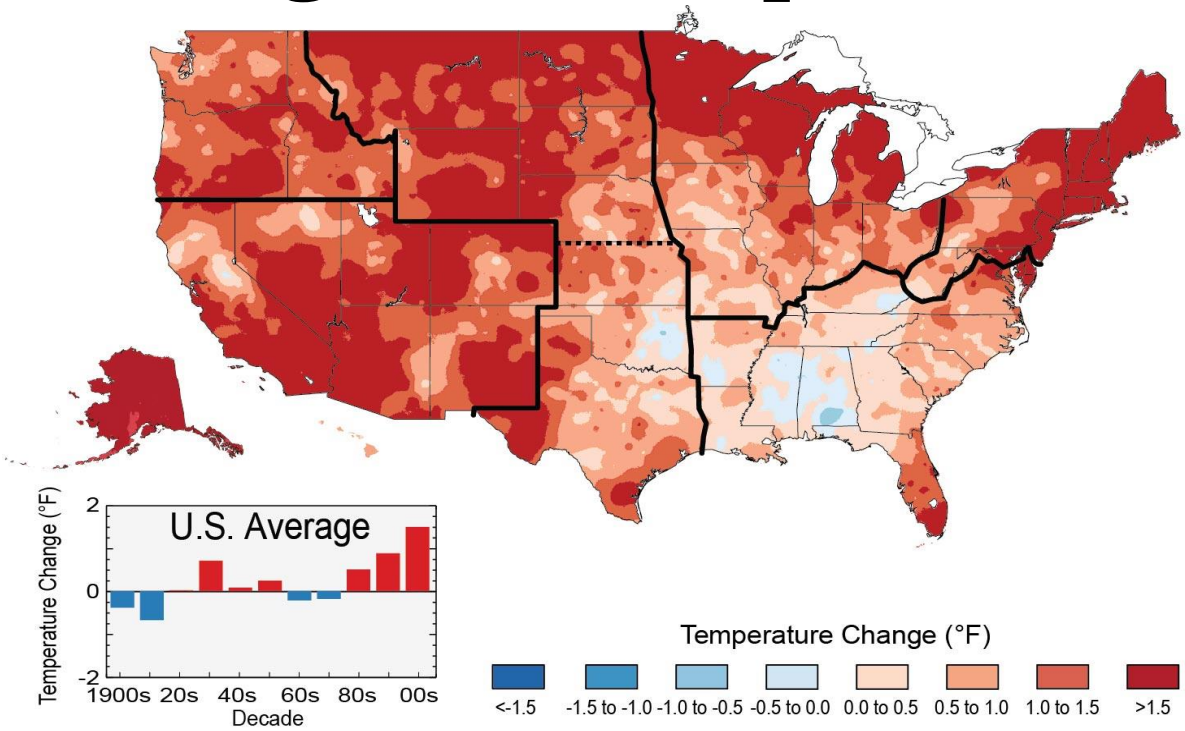
Colorado, Sept 2013

Source: NOAA

Boulder's 2013 flood not only brought unusual rainfall, it came at an unusual time.

On average, April and May are Boulder's wettest months, with precipitation totals of 2.45 and 3.04 inches, respectively, between 1948 and 2005.

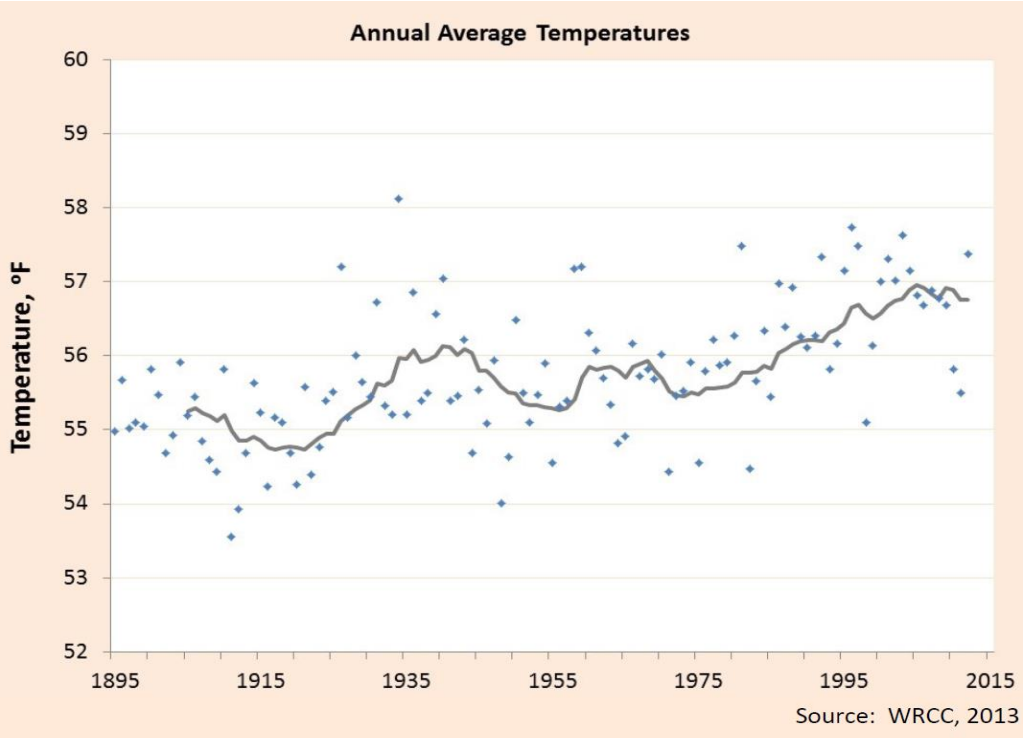
Change in Temperature



The colors show temperature changes over the past 22 years compared to the 1901-1960 average

Source: National Climate Assessment

Change in Temperature



In California, the annual average temperature has increased by 1.5 degrees Fahrenheit since 1975.

Drought Emergency - California

California's driest year on record and amid dropping reservoir levels. Residents are urged to cut water use by 20%.

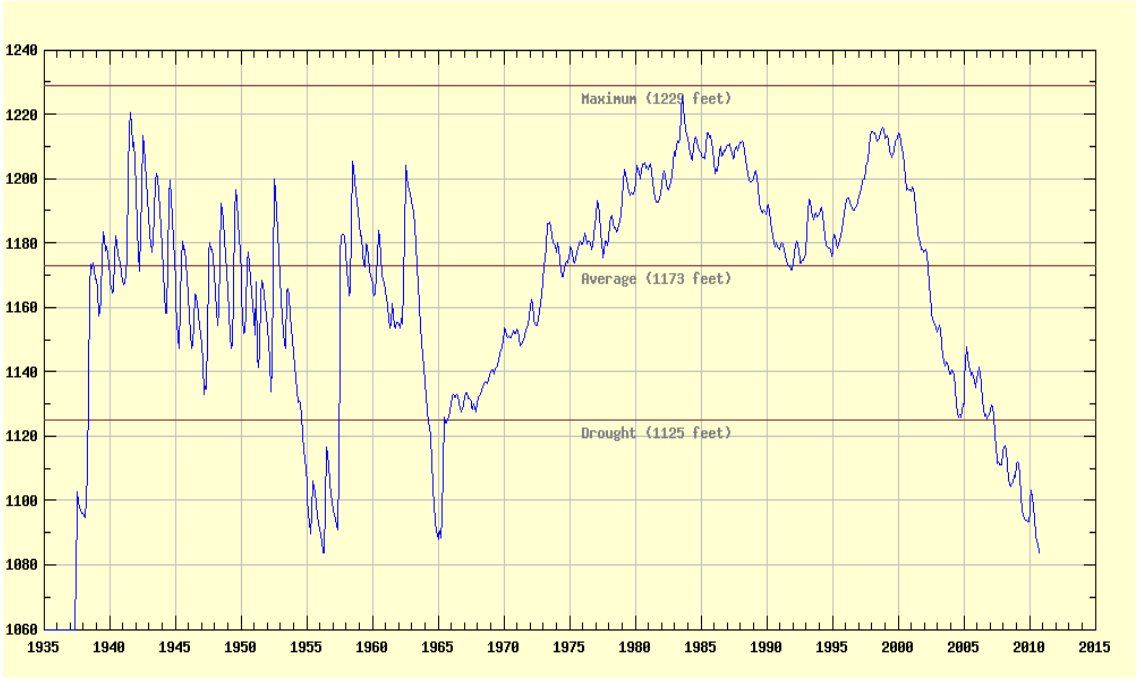
San Jose, California, on January 28, 2014.
Source: National Geographic

Lake Mead Shrinking – Las Vegas

For the past 14 years, the body of water is said to have been diminishing due to a highly extended drought.

Photo by Ethan Miller/Getty Images

Lake Mead Shrinking – Las Vegas

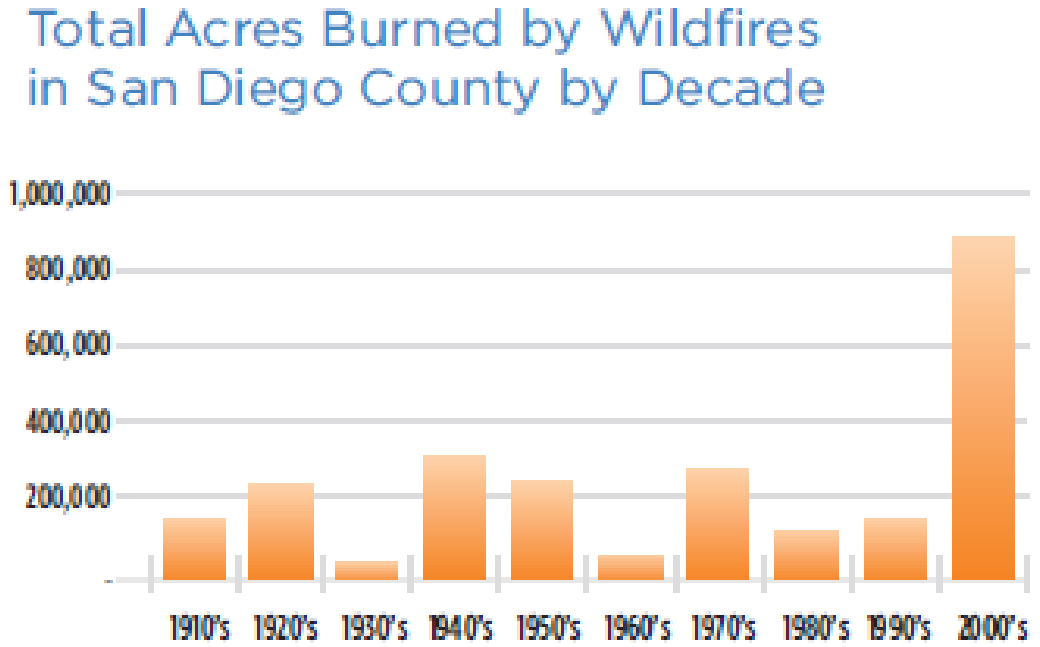


The lake that supplies Las Vegas with most of its water is now at record-low levels.

Source: Data from the U.S. Bureau of Reclamation

San Diego, CA
in
2050

Wildfires

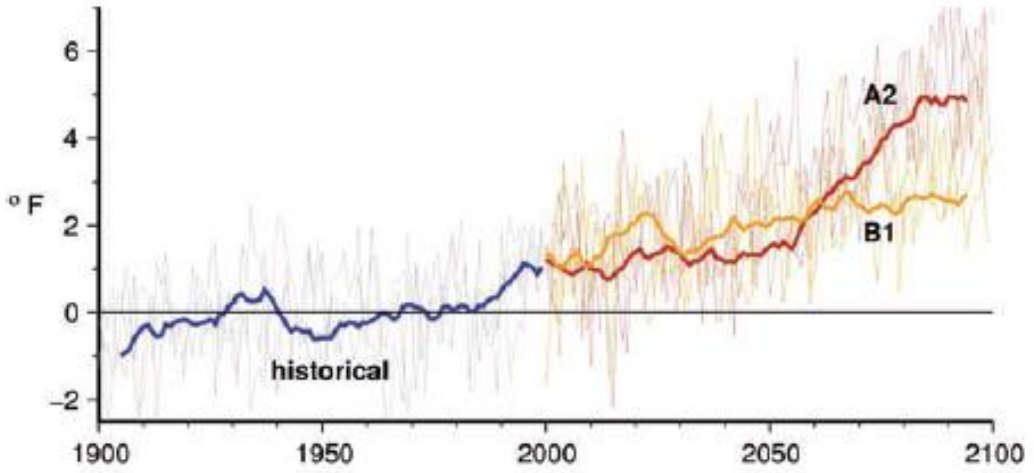


Source: San Diego Foundation

- Wildfires will be more frequent and intense.
- Droughts will make vegetation drier and further increase fire risk.

Hotter And Drier Climate

- Avg. temperature will rise between 1.5 - 4.0°F.
- Heat waves will increase in frequency, duration and magnitude.



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

Source: San Diego Foundation

Severe Water Shortage

Source: San Diego Foundation, Greatecology

San Diego currently imports 75% - 95% of each year from the California and Colorado River aqueducts.

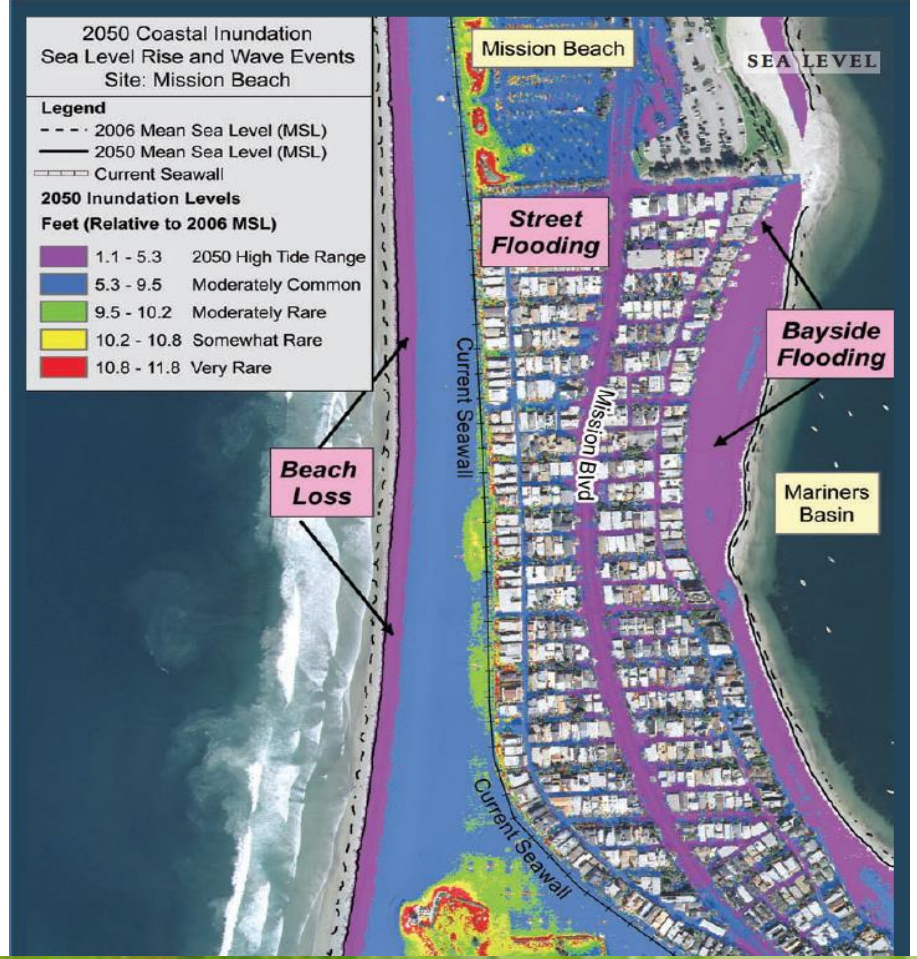
We could face an 18% water shortfall in 2050.

Sea Level

In 2050, Sea level will be 12-18 inches higher.

Some beaches will shrink and existing tide pools will be destroyed.

Photo credit: CNN


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
Mission Beach
SEA LEVEL
Street Flooding
Bayside Flooding
Beach Loss
Current Seawall
Mission Blvd
Mariners Basin
Current Seawall

Video: Water use in San Diego

Ecosystem

Eastern larch bark beetle

They go through a 2-month life cycle in warm weather and a 10-month one in cold weather.

Photo courtesy Fraser McKee

- Some animals will migrate to a place that is more suitable for them to live.
- Others could face extinction due to the rise of temperature.
- Trees and forests will be lost.

Bark beetle feed primarily on the inner bark, which has the same effect as girdling of the tree.

Public Health

- More frequent episodes of extreme heat will cause illness and death, especially among the elderly and children.
- Warmer temperature year-round could lead to growing mosquito populations.

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

Energy Needs

- Electricity consumption has been increasing for the past 17 years.
- We will use at least 60% more electricity in 2050.

Photo credit: Convention Center

Video: Energy Use in San Diego

Resilient Cities

Capability to prepare for, respond to, and recover from significant multi-hazard threats with minimum damage to public safety and health, the economy, and security.

Pillar 1: Risk Identification

- Risk-sensitive decision making.
- providing better information about disaster risks.
- Using Geographic information systems (GIS) data.

Assessing a dike at risk of collapsing in Cameroon due to heavy rainfall and flooding in August 2012.
Photo credit: GFDRR

Pillar 2: Risk Reduction

- Developing new policies.
- Supporting the implementation of risk reduction programs
- Re-establishing function to avoid long-term disruptions.

Several thousand people in Philippines were forced to flee their homes due to heavy monsoon rain in August 2012.

Photo credit: © Herman Lumanog/Dreamstime.com

Pillar 3: Preparedness

- Improving the ability of institutions and communities to prepare for disasters.

Indonesian President Susilo Bambang Yudhoyono being introduced to InaSafe.

Photo credit: Clare Price/AusAID

Pillar 4: Flexibility

- The ability to change, and adapt alternative strategies to prevent disasters.
- Buffering the impact disasters have on their budget.

A boy in a rebuilt seismic-proof house after a magnitude 7.6 earthquake in Pakistan in 2005.

Photo credit: Earthquake Reconstruction and Rehabilitation Authority (ERRA)

Pillar 5: Resilient Recovery

- Developing and sharing knowledge.
- Training on damage assessments and disaster recovery.
- Providing backup or alternative solutions.

Amirka Devi, whose house was damaged in the 2008. Kosi River flood in India. She is pictured here with Pankaj, a social worker who helped to rebuild her home.

Photo credit: Peeyush Sekhsaria/The World Bank

Video: Hurricane Sandy Floods New York

Jacksonville - 2012

Photo credit: Rockefeller Center

- Coastal areas are regarded as “hot spots”, with water levels increasing at twice the rate of most other cities on the planet.

San Francisco - 2013

- San Francisco has been the second consecutive year of dry conditions that depleted their reservoirs and reduced carry-over storage to historically low levels not seen since 1977.

Photo credit: Rockefeller Center

Video: Boulder, Colorado Flood

Conclusion word/summary

- Most cities have one big threat that they are facing.
- Bill Furton: "*San Diego is unique in the sense that we are vulnerable to a wide variety of threats all at the same time.*"

What about San Diego?

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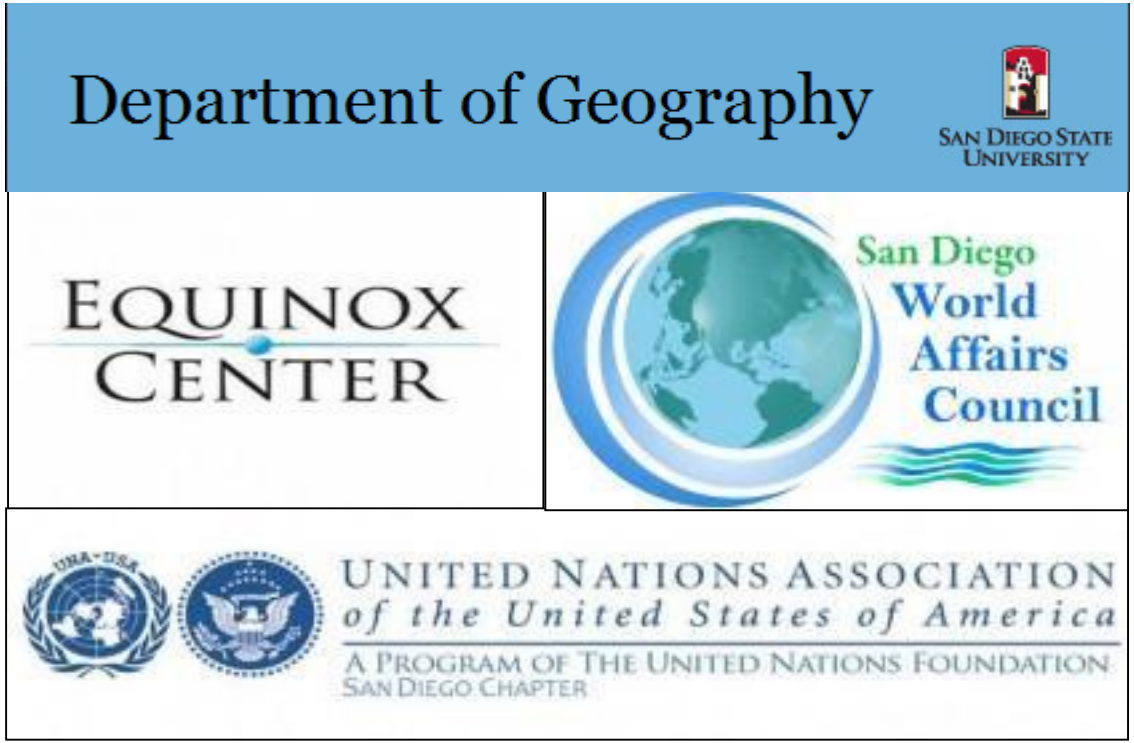
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Thank you for your time.