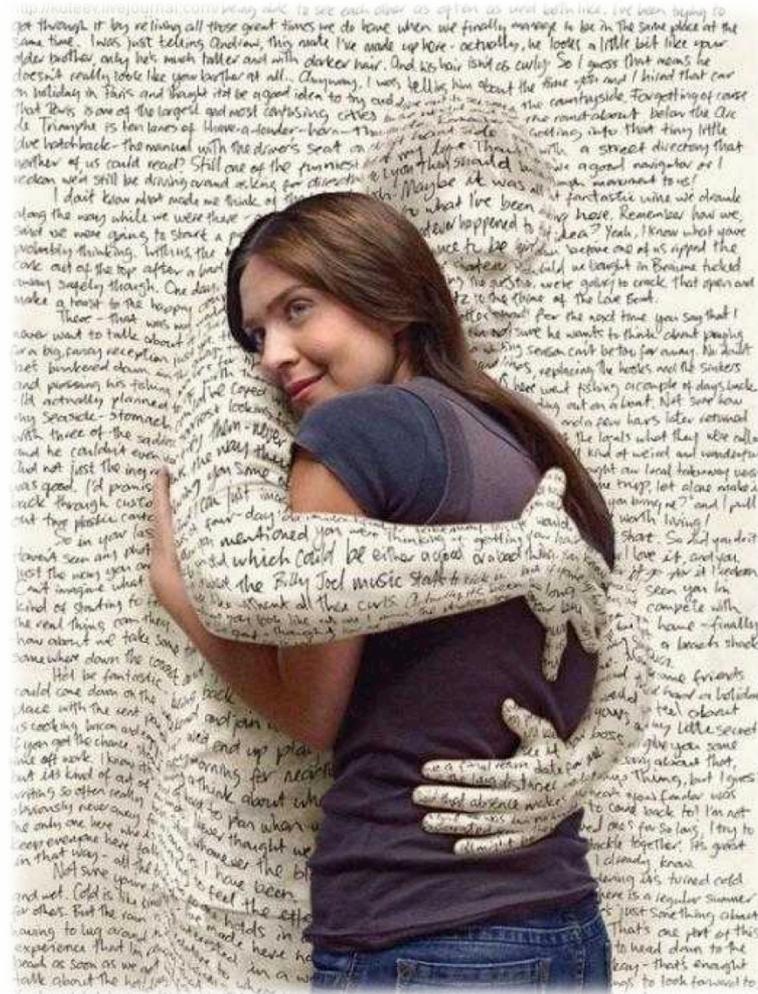


# CH. 13A – CALIFORNIA'S RESOURCES AND NATURAL HAZARDS

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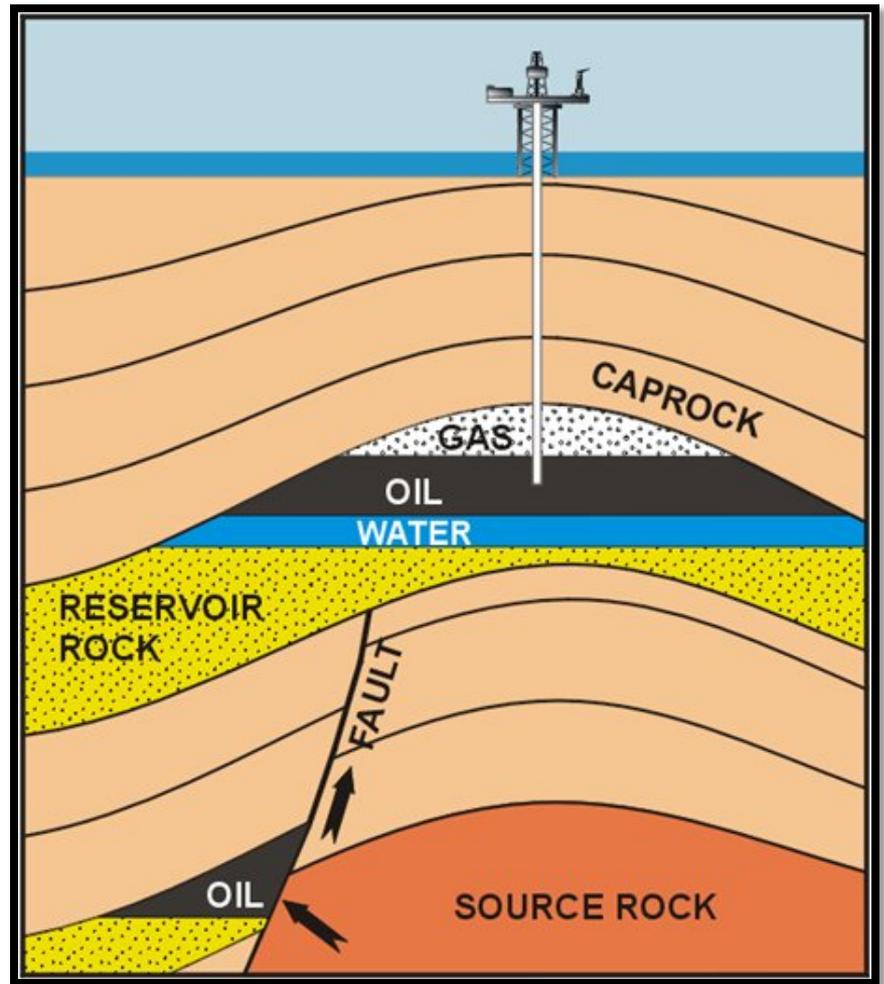
Ag Earth Science

# Chapter 13A Vocabulary



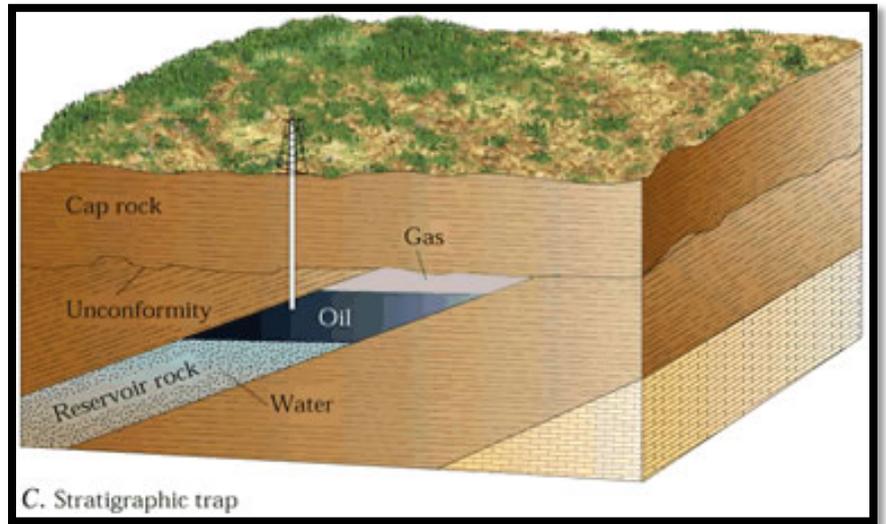
# source rocks

- Rocks in which oil forms



# reservoir rocks

- Porous rocks in which oil collects and becomes trapped



# geothermal field

- An area of land where magma lies relatively close to the surface and heats the groundwater





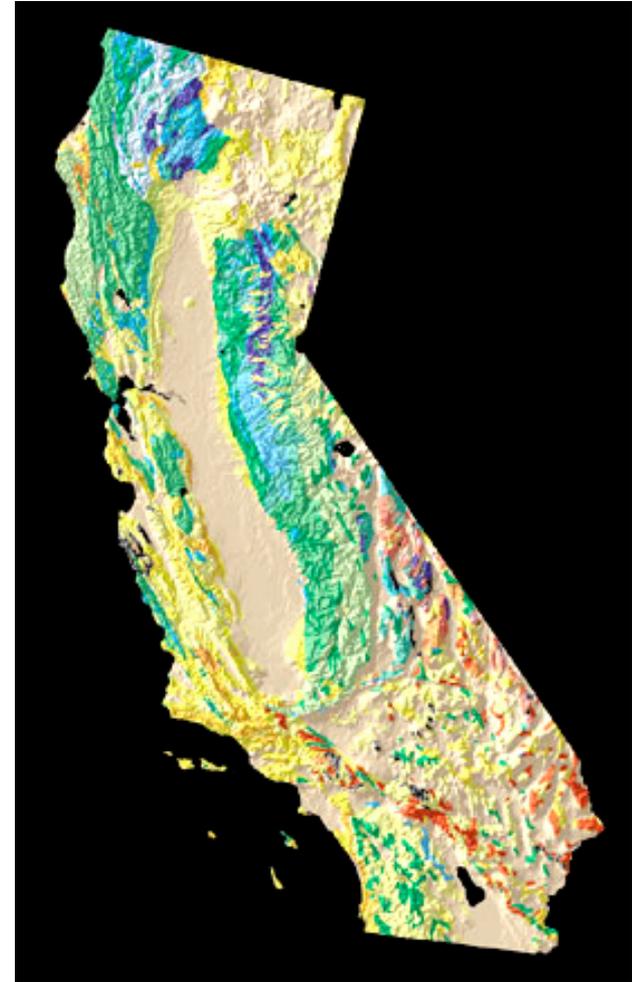
# Geology in California

- Some of the features of the California landscape formed as the result of tectonic processes that took place deep beneath the surface. Wind, water, ice, and other agents of erosion at the surface carved other features of the landscape.



# Geology in California

- Geologic Processes Inside Earth
  - Interactions between tectonic plates built the mountains of California
    - Subduction of oceanic plate and North American plate formed large pools of magma underneath. Large masses of igneous rock was uplifted to form the Sierra Mountains.
    - Pacific plate and North American plate are part of California's transform fault.



# Geology in California

- Surface Geological Processes
  - Water erosion shaped the state's mountains, hillsides, and river valleys
  - Glacial ice has also shaped California's landscape
  - Deposition of sediment produced landscapes as diverse as the Mojave Desert and Central Valley



# California's Mineral Resources

- California's major mineral resources include sand, gravel, crushed stone, building stone, gold, silver, iron, evaporate minerals, and clay.



# California's Mineral Resources

- Industrial Minerals
  - Sand and gravel are California's most valuable industrial minerals
    - Road-building and construction
  - (Crushed Stone)  
Limestone is another valuable mineral used to make cement.



# California's Mineral Resources

- Metallic Minerals
  - Gold, silver, and iron are the major metallic minerals mined in California.
  - Gold and silver often occur in quartz veins in igneous and metamorphic rocks that formed during the mountain building.
  - Placer deposits form when dense minerals settle out of moving water.



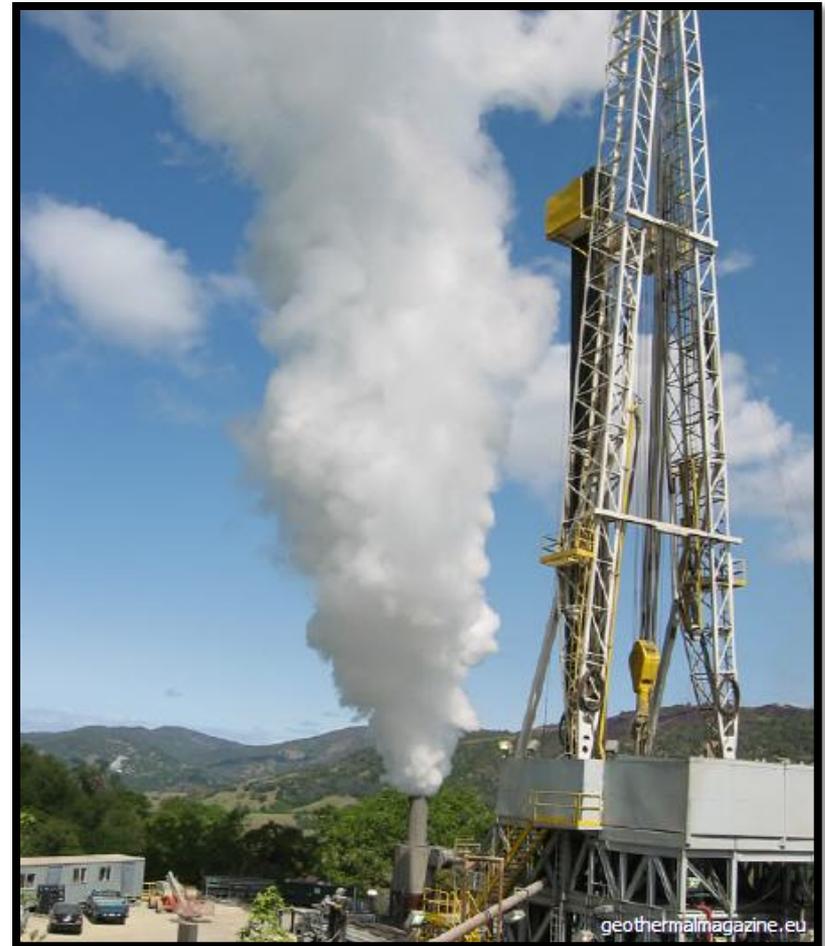
# California's Mineral Resources

- Nonmetallic Minerals
  - California has an abundance of borates, gypsum, and clay
  - Everyday materials such as fiberglass, detergents, glass, ceramics, and insulation often contain borates.
  - Gypsum is used in wallboard, plaster, and cement.
  - Clay is used in ceramics
  - Gemstones form when mineral-rich solutions crystallize deep underground.



# California's Energy Resources

- California's major energy resources – oil, natural gas, geothermal energy – are the result of geologic processes that occur deep beneath the surface



# California's Energy Resources

- Oil
  - About 15% of the oil produced in the US comes from California
  - The rocks in which oils comes from in California are called “source rocks”. Most source rocks are shale.
  - Over time, oil often migrates from the source rocks to nearby porous rocks, or reservoir rocks, and becomes trapped. Wells are drilled above reservoir rocks to bring oil to the surface.



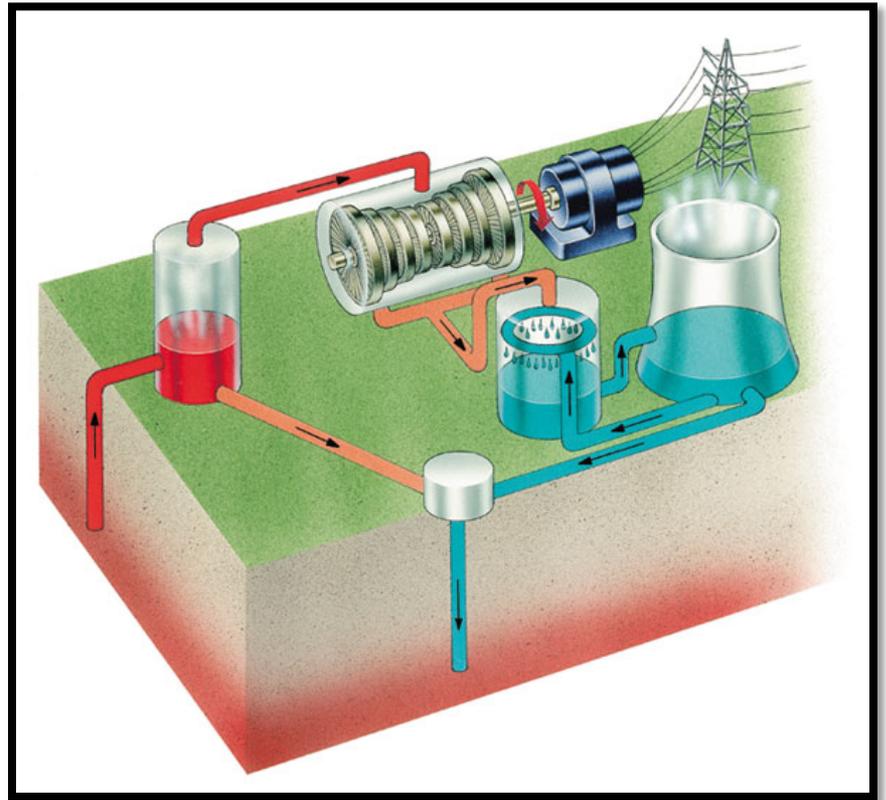
# California's Energy Resources

- Natural Gas
  - Natural gas often forms along with oil
  - Natural gas is a mixture of several gases, including methane



# California's Energy Resources

- Geothermal Energy
  - California's geology makes it a leading state in the production of geothermal energy.
  - A geothermal field is an area where magma that is relatively close to the surface heats up the groundwater.



# California's Soil Resources

- The soils of California include soils of the Sierras, soils of the Coast Ranges and cascades, valley soils (including the central valley), and desert soils.
- In general, California's fertile valley soils are the most important soil resource because it is used for agriculture (food) production. It takes over 500 years to build up 2.5 cm of soil.
- Conservation is important to protect California's valuable soil resources.
- Biggest challenge to soil is erosion and salinization.

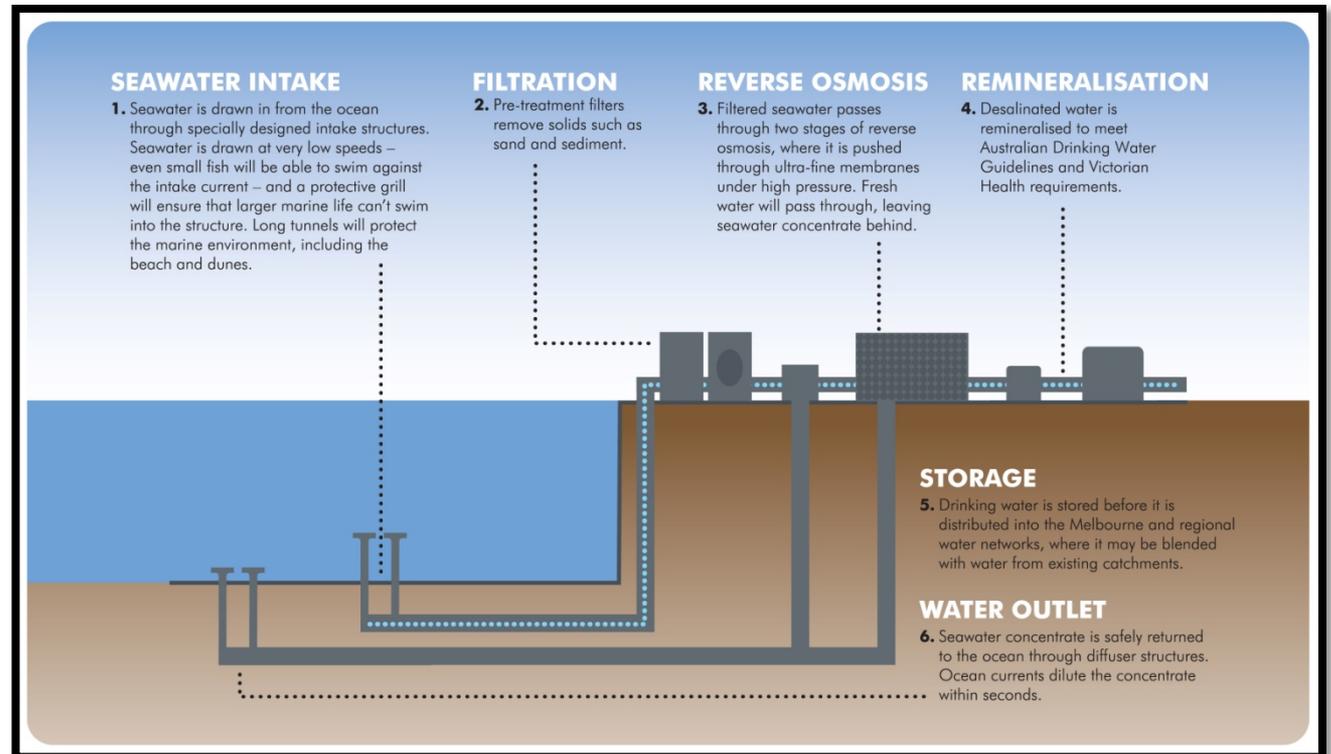


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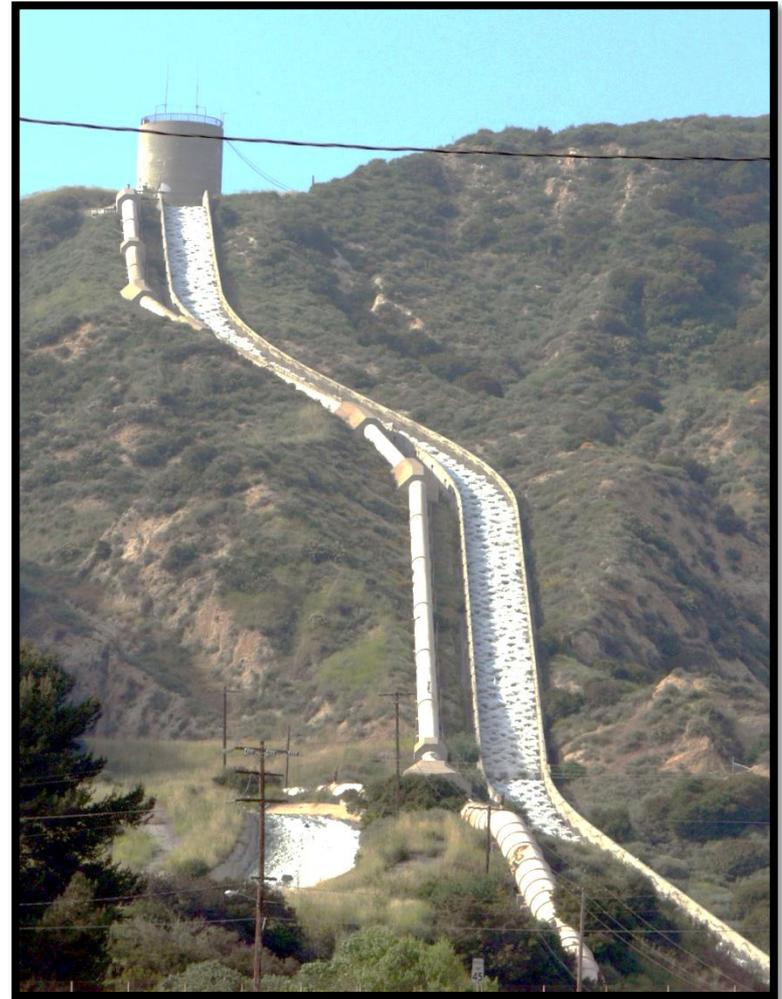
# desalination

- A process in which salt is removed from ocean water to produce fresh water



# aqueduct

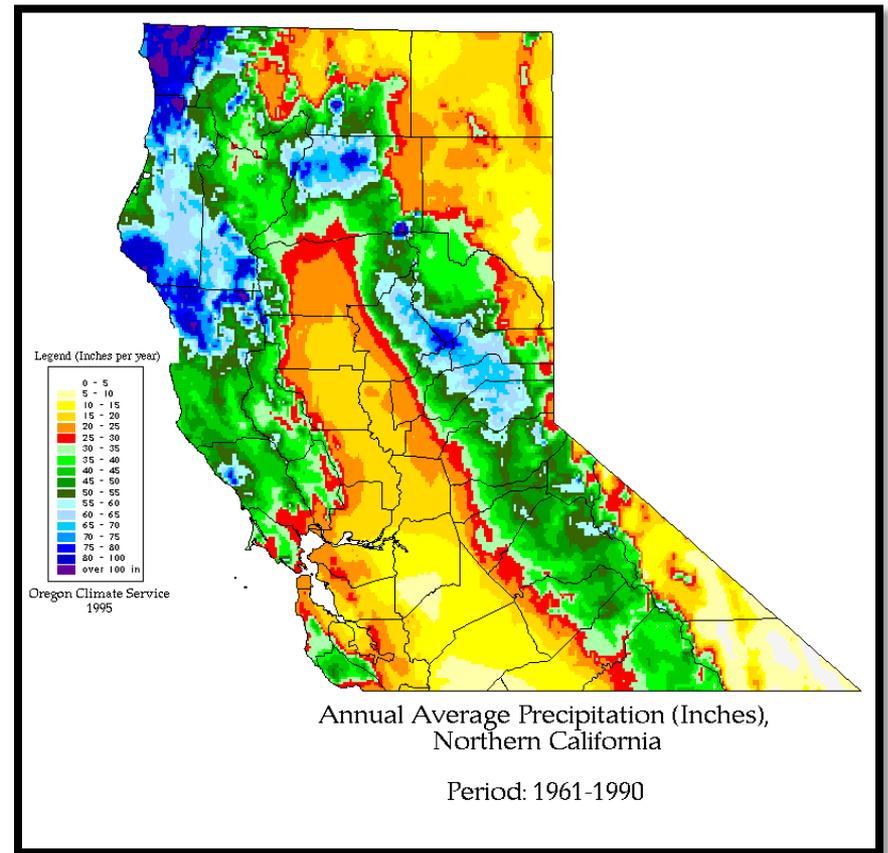
- A pipe or channel through which water flows from a higher elevation to a lower elevation





# California's Water Supply

- The main sources of California's freshwater supply are precipitation, surface water, and groundwater
- Precipitation
  - Most of the state's precipitation is concentrated in northern California



# California's Water Supply

- Surface Water
  - Some of California's precipitation flows back into the lakes, rivers, and streams that make up the state's drainage basins
  - The Colorado River, which forms California's border with Arizona, begins in the Rocky Mountains of Colorado and provides a major source of water for southern California.



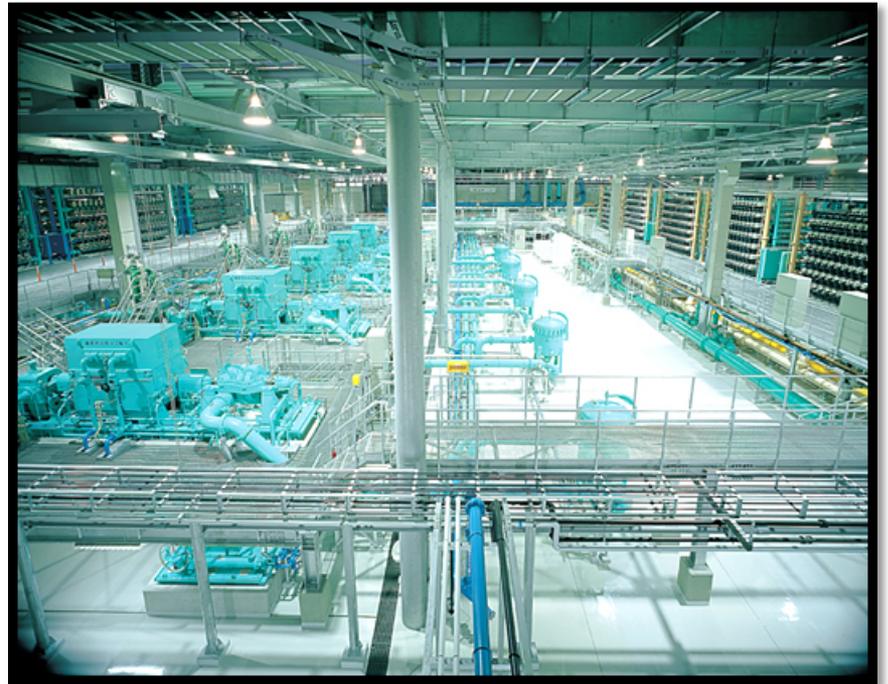
# California's Water Supply

- Groundwater
  - Groundwater accounts for about 30% of the freshwater used in California
  - Most groundwater comes from aquifers in the San Joaquin – Tulare Lake drainage basin



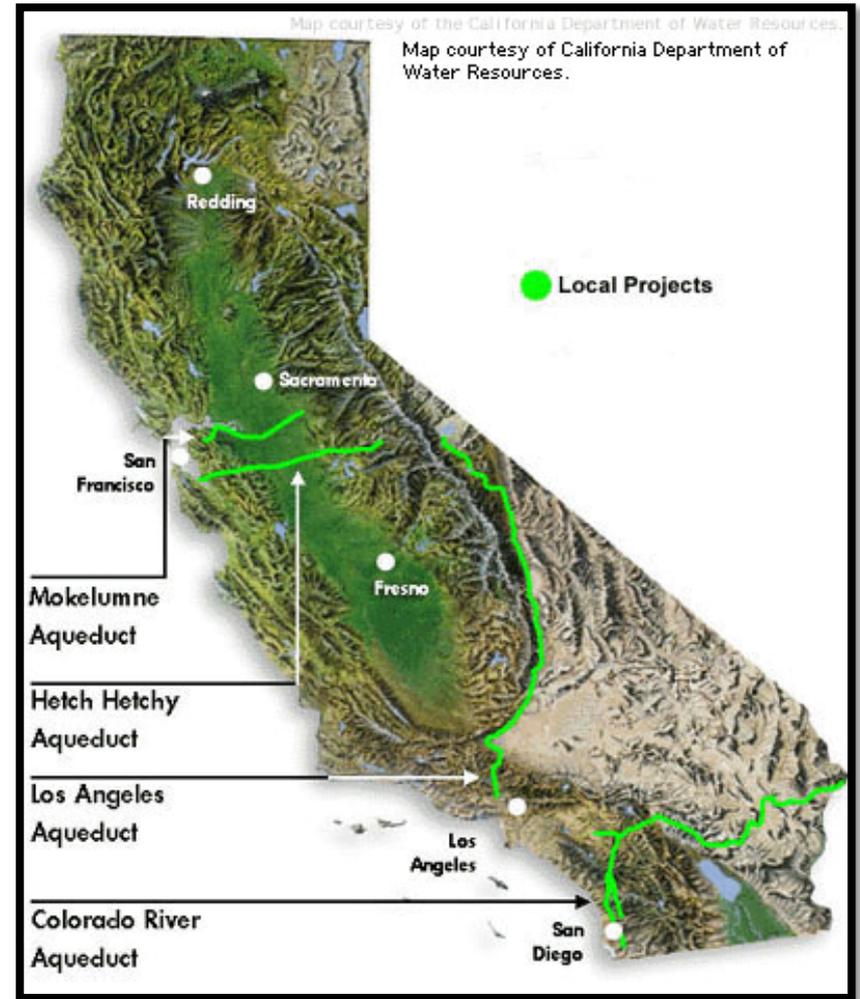
# California's Water Supply

- Desalinization of Sea Water
  - Desalinated (removing salt) ocean water, although expensive, is growing in importance as a source of fresh water for some coastal communities



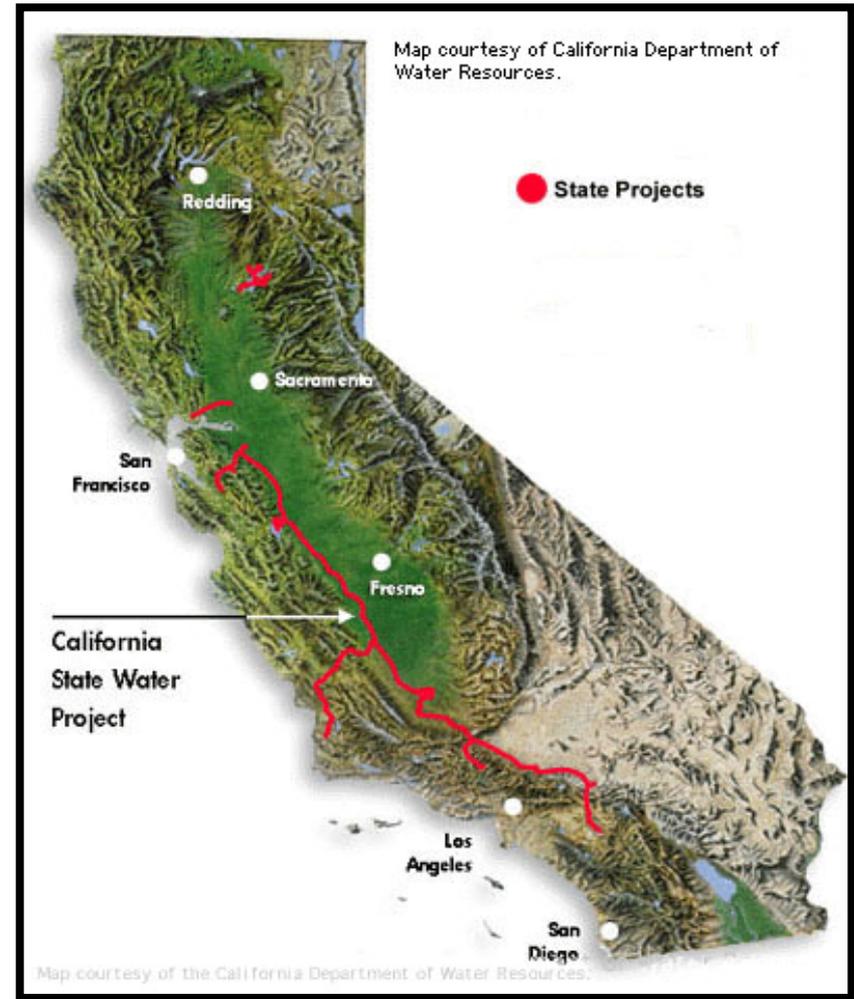
# California's Water Projects

- To meet freshwater needs throughout the state, California has an intricate network of water storage and distribution systems, or water projects.
- Local Water Projects
  - California's major local water projects consist of long aqueducts that carry water from its sources to where it is needed.
  - An aqueduct is a pipe or channel through which water flows from a higher elevation to a lower elevation



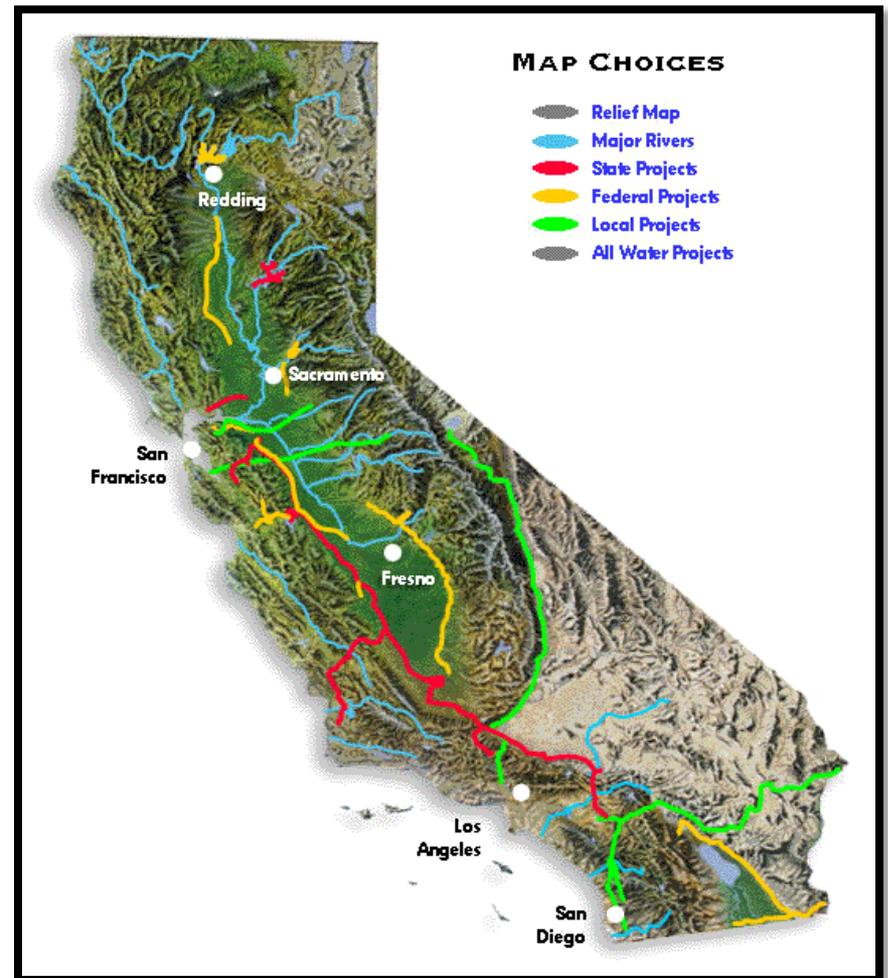
# California's Water Projects

- State Water Project (SWP)
  - One of the nation's largest water distribution systems
  - The project transports rain and melted snow from the Feather River drainage basin in northern California and provides fresh water to the bay area, southern California, and the Central Coast.
  - Water is also provided for San Joaquin Valley's agriculture.
  - The "California Aqueduct" is main delivery system and the SWP also has 5 hydroelectric plants that generate electricity.



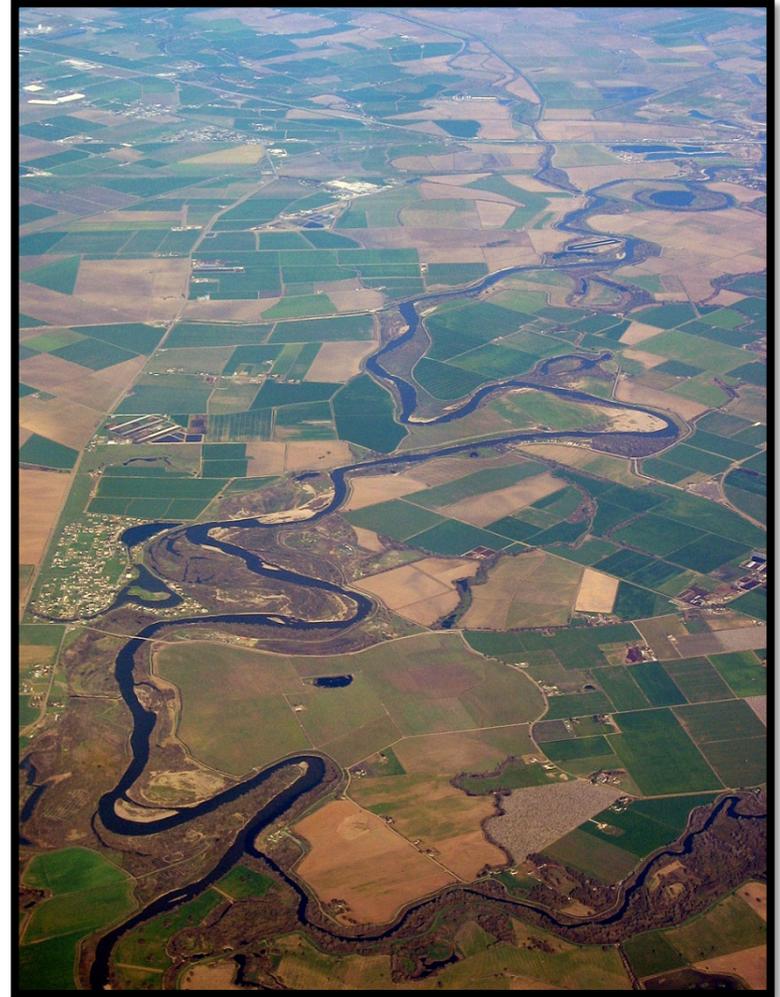
# California's Water Projects

- Federal Water Projects
  - Federal government has constructed major water ways in California that include the All-American Canal, the Coachella Canal, and the Central Valley Project.
  - The All-American Canal and Coachella canal move water from the Colorado River



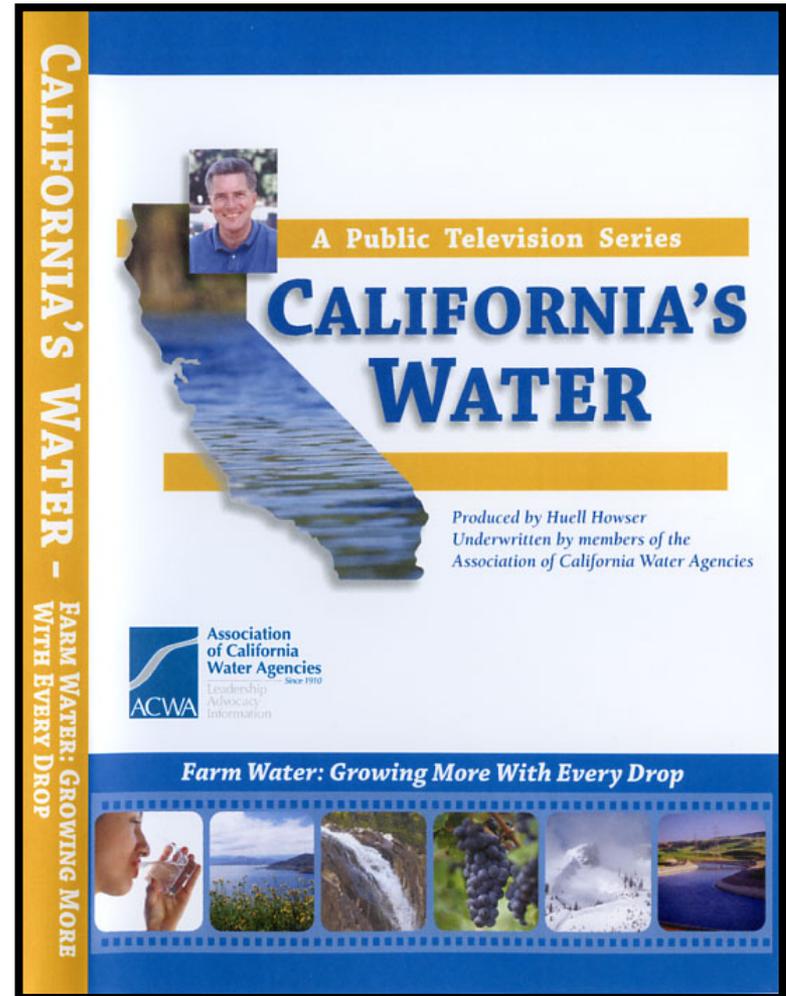
# Water Needs

- Most of California's water supply is used to grow crops. The rest is used in homes, businesses, and industries, or has been set aside for recreation or wildlife use.
- Agriculture
  - About 80% of fresh water used in California each year goes toward irrigating crops.
  - Almost 2/3 of the water used in agriculture is surface water. The remaining 20% is groundwater.



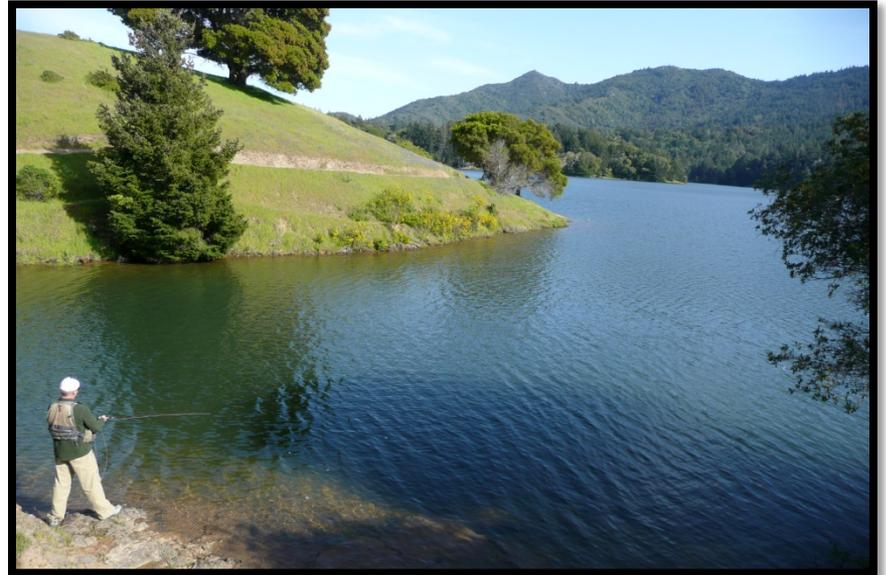
# Water Needs

- Houses and Businesses
  - Water used for drinking, cleaning, cooking, washing, bathing, flushing, and landscaping.
- Industry
  - Water is one of the most important industrial needs/resources



# Water Needs

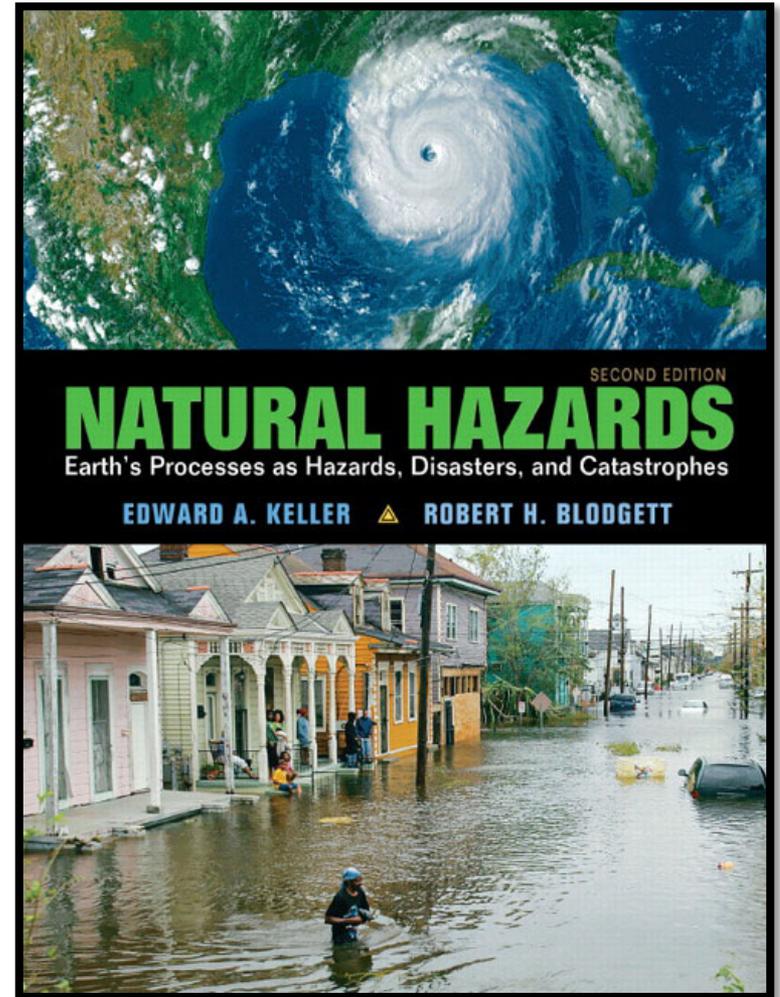
- Recreation and Wildlife
  - Water set aside for lakes, rivers, and streams to protect wildlife/environment and provide recreational activities (fishing, boating, swimming, etc...) to humans.





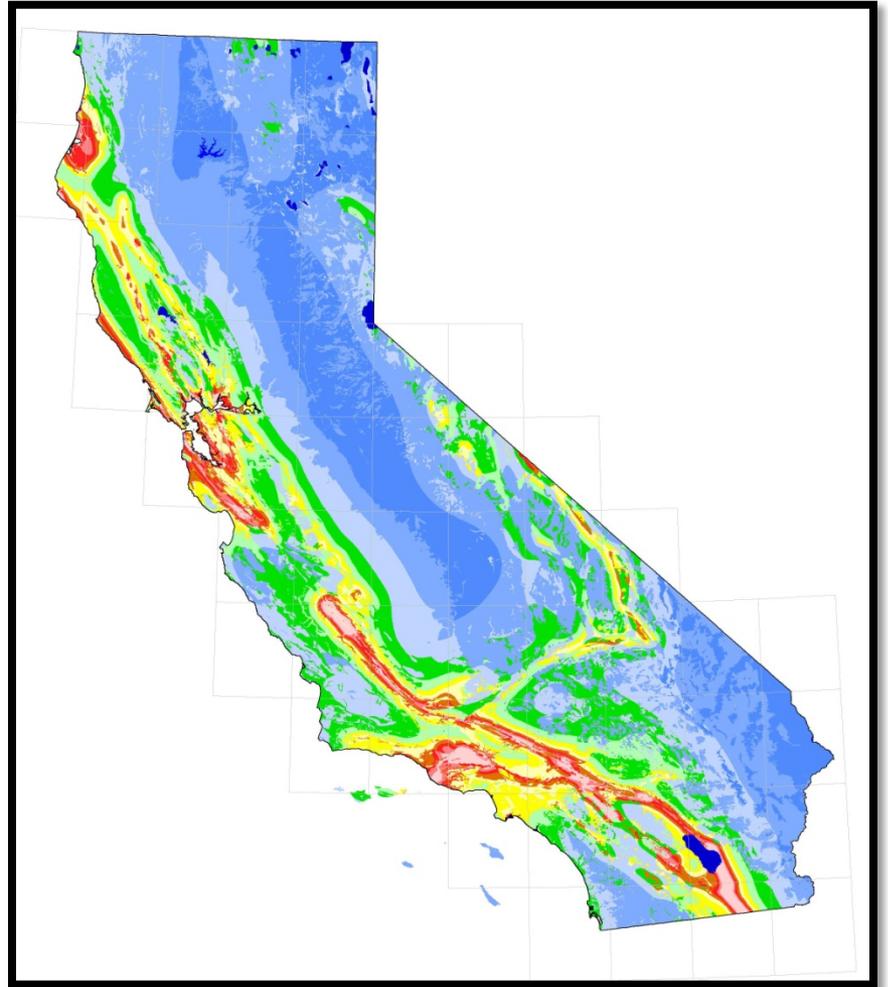
# natural hazard

- An event that results from earth processes and that can cause damage and endanger human life



# seismic shaking

- A measure of how much ground movement occurs during an earthquake



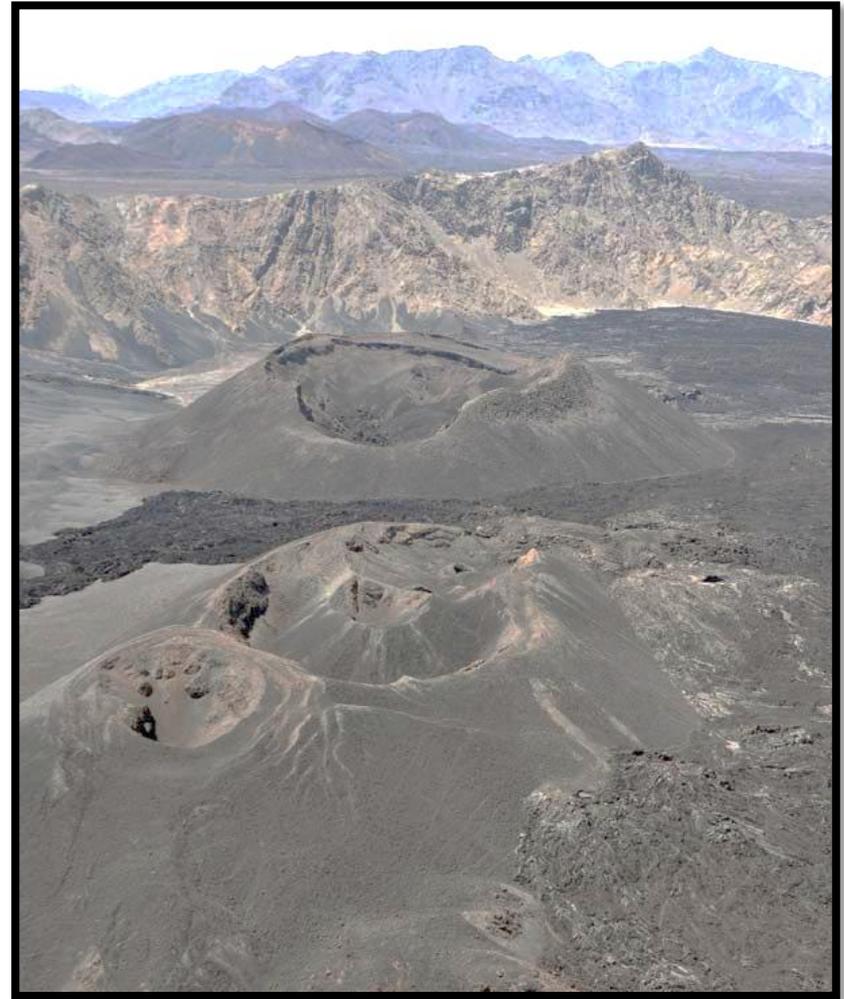
# modified Mercalli scale

- A measure of how strong an earthquake felt and how much damage it did at a particular location

Modified Mercalli Scale		Richter Magnitude Scale
I	Detected only by sensitive instruments	1.5
II	Felt by few persons at rest, especially on upper floors; delicately suspended objects may swing	2
III	Felt noticeably indoors, but not always recognized as earthquake; standing autos rock slightly, vibration like passing truck	2.5
IV	Felt indoors by many, outdoors by few, at night some may awaken; dishes, windows, doors disturbed; motor cars rock noticeably	3
V	Felt by most people; some breakage of dishes, windows, and plaster; disturbance of tall objects	3.5
VI	Felt by all, many frightened and run outdoors; falling plaster and chimneys, damage small	4
VII	Everybody runs outdoors; damage to buildings varies depending on quality of construction; noticed by drivers of automobiles	4.5
VIII	Panel walls thrown out of frames; fall of walls, monuments, chimneys; sand and mud ejected; drivers of autos disturbed	5
IX	Buildings shifted off foundations, cracked, thrown out of plumb; ground cracked; underground pipes broken	5.5
X	Most masonry and frame structures destroyed; ground cracked, rails bent, landslides	6
XI	Few structures remain standing; bridges destroyed, fissures in ground, pipes broken, landslides, rails bent	6.5
XII	Damage total; waves seen on ground surface, lines of sight and level distorted, objects thrown up into air	7

# volcanic field

- An area that is covered by volcanic rocks





# California's Natural Hazards

- A natural hazard is an event that results from earth processes and that can cause damage and endanger human life.



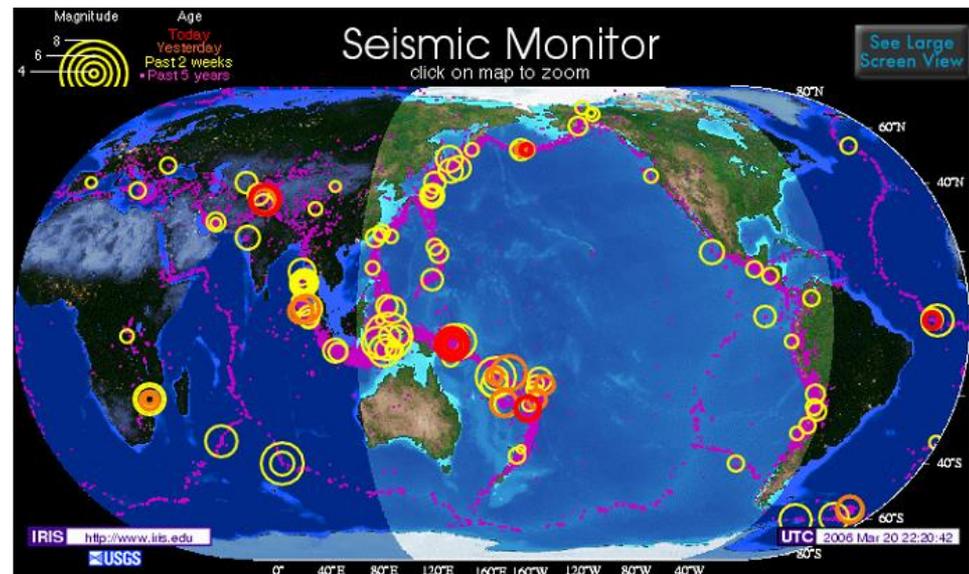
# California's Earthquake Hazards

- Natural hazards may result from California's earthquakes include tsunamis, seismic shaking, liquefaction, and landslides.
- Tsunamis
  - A tsunami is a wave formed when the ocean floor shifts suddenly during an earthquake
  - Over the past 200 years, more than a dozen tsunamis have hit California (Most recently in 2011 from the Japanese earthquake).



# California's Earthquake Hazards

- Seismic Shaking
  - Seismic shaking is a measure of how much ground movement occurs from a quake
  - The modified Mercalli scale describes the effects of seismic shaking.



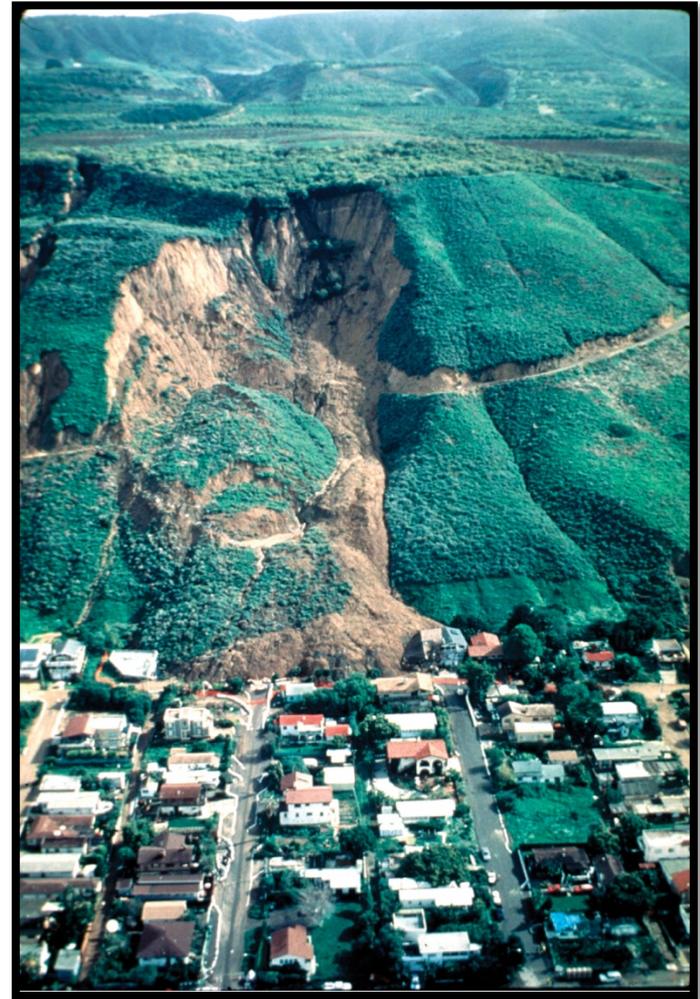
# California's Earthquake Hazards

- Liquefaction
  - Liquefaction occurs when water-soaked soil turns to a thick, soupy liquid during an earthquake



# California's Earthquake Hazards

- Landslides
  - Earthquakes often cause loose rock and soil on slopes to move.



# California's Volcanic Hazards

- Natural hazards from volcanic eruptions in California include volcanic ash, lava flows, and volcanic gases.
- California's Cascade range (Black Butte, Mount Shasta, Medicine Lake Volcano, and Lassen Peak) are all classified as active volcanoes.



# California's Volcanic Hazards

- A volcanic field is an area that is covered by volcanic rocks.
- Many of California's volcanic fields are located in eastern and south central part of the state. (example – Mammoth Lake)



# California's Storm Hazards

- Two main storm-related hazards in California are mudflows and flooding
- Mud flows
  - A mudflow is a mass of very wet soil, and sometimes rock, that flows quickly downhill.
  - Most common mudflows are from a previous fire that destroyed vegetation followed by a lot of rain



# California's Storm Hazards

- Flooding
  - When too much rain and melting snow fill river channels in a short period of time
  - Other floods are flash floods where mountains and deserts receive large amounts of rain in a short period of time.



