

Foothill Collaborative for Sustainability (FoCuS)
PO Box 1812
Murphys, CA 95247
May 31, 2007

Mintier and Associates
1415 20th Street
Sacramento, CA 95814

Dear Mr. Mintier and colleagues,

The Foothill Collaborative for Sustainability (FoCuS) respectfully submits the enclosed document for consideration as you prepare the Background Report for the Calaveras County General Plan update.

While we trust Mintier and Associates to do a thorough assessment of the current state of our county, we want to be sure that the related "long-view" issues of Climate Change and Peak Oil are included for consideration as the planning process proceeds. These issues are not ones that have historically been incorporated in the planning process. It is our position that they must be taken into account during this General Plan update and into the future. We feel that to ignore considering these is to consciously elect to undertake an uncontrolled experiment with the future well-being of the county's citizens.

This is not meant to be an exhaustive document, but a suggestive one. We hope that it will be a springboard for significant community dialogue and education. Our Board and members stand ready as resources for this important conversation, necessary for ensuring the future of our land and all those who live upon it. This document emerged from discussion among the members of our Natural Resources FoCuS Group, and was pulled together by member Mickey Williamson. Mickey is the contact for any questions or communication with our organization. You can reach her by phone at 209-728-0710 or email at mickeyw@goldrush.com.

Thank you for your time and consideration of our comments.

Sincerely,

The Board of Directors of FoCuS (Listing is included as Attachment 12)

cc:

Stephanie Moreno, Director, Community Development Agency
Bill Claudino, Supervisor, District 1
Steve Wilensky, Supervisor, District 2
Merita Callaway, Supervisor, District 3
Tom Tryon, Supervisor, District 4
Russ Thomas, Supervisor, District 5

Calaveras County General Plan Update
Existing Conditions, Constraints, and Opportunities
Submitted to Mintier and Associates for the
Background Report
June 1, 2007
By FoCuS:
The Foothill Collaborative for Sustainability
www.foothillsustainability.org

Existing (and Future) Conditions

County General Plans, in Calaveras County and other counties in the State of California, have not, until recently, needed to take into consideration two global situations with considerable local potential consequences: Climate Change and Peak Oil. We strongly urge that these be taken into consideration as the General Plan Update process proceeds.

There is now almost universal recognition that climate change due to greenhouse gas emissions is here and threatens to drastically alter our natural and human environments. "Climate Change 2007" was released by the United Nations in February, documenting historical changes and projecting future trends. Closer to home, the State of California has produced "Our Changing Climate: Assessing the Risks to California." (This is submitted as Attachment 1.) That the State of California is taking climate change seriously is reflected in the law suit initiated this year by the State Attorney General against San Bernardino County for failing to take climate change into account in its General Plan revision. A news release included as Attachment 2 highlights climate change and the Modesto General Plan. With this global recognition, many individuals and organizations throughout the world are now recommending strategies to 1) lessen likely future impacts, and 2) be prepared for the emergence of several possible scenarios. Attachment 3, a section from the Sierra Nevada Alliance "Climate Change Toolkit," suggests important questions for planning.

The implications of the peak in world oil and gas production may not be receiving the widespread press and agreement that we are now seeing with climate change, yet it predicts consequences for our way of living that are more drastic and likely more imminent. The coming reduction in availability of cheap fossil fuels will not simply be felt at the gas pump. Our oil supplies make possible energy for heating, industrial production and transport, food production and transport, construction of our homes, manufacture of a wide range of taken for granted products....in short, almost every aspect of our current daily lives. Calaveras County is rural. By definition we are far removed from the sources of many of the essentials for life. If, as some experts believe, we will experience a drastic reduction in available oil resources by as soon as 2040, the 20-30 year General Plan revision must begin to plan for this eventuality now. An overview of the issues related to Peak Oil is appended as Attachment 4.

Constraints

1. Much is currently being studied, written, and presented about these issues and their potential impacts. There is a need for dedicated county attention to studying the range of possible local impacts and educating the citizens of the county. This is not “business as usual” and may require new county departments or commissions.
2. Not everyone, including some of our elected officials, acknowledge the existence of Climate Change and Peak Oil. To continue to ignore these in the face of currently available information constitutes making a conscious choice to subject every citizen in the county, now and in the future, to an uncontrolled experiment with the forces of nature.
3. Many responses to these challenges will require funding. Sources of such funding may not be currently known. Study may be required to locate the resources to implement the opportunities.
4. Many county residents are likely not informed about these issues. Incorporating strategies in the General Plan will require community education.
5. The County is limited in human and financial resources and faces many pressing and immediate needs and challenges that may overshadow these environmental and public safety issues. Choosing to save resources now may in fact necessitate backbreaking mitigation efforts in a few decades.

Opportunities

There are infinite opportunities for addressing climate change and peak oil! Many communities all around the world, small and large, urban and rural, are developing strategies. We strongly urge that Calaveras County take advantage of its relatively small population and rural character and seize this moment to become a model of sustainability and a leader in promoting a vision for a new way of living. In particular, we want to see:

1. The adoption by the County of the Precautionary Principle for all decision-making. This places the burden of proof on the supplier and not the recipient, and requires always choosing “the alternative that presents the least potential harm to human health and (the City’s) natural systems.” (City and County of San Francisco Precautionary Principle – This document is found in Attachment 5.) Closer to home, Sierra counties, too, have documented their principles (Attachments 6 and 7).
2. Support for and encouragement of sustainable and on-site energy production for residential and commercial use. Small hydro-turbines, wind turbines, and solar energy should be prioritized as the least impactful on the environment. Local self-reliance in this area is key to securing the health and security needs of this county’s population. Both land availability and zoning allowances as well as economic incentives need to be considered and where possible specified in the General Plan components in concert with other government agencies and entity’s interests.

County human resources include residents with the necessary knowledge in the field of alternative energy sources. (Related General Plan Elements: Land Use, Conservation, Open Space, Housing, Safety)

3. Establishing county governmental policy for sustainable building methods in all areas of construction: public buildings, business and industry, housing. We suggest the county learn about and take advantage of sustainable building benefits, survey existing successful communities, and establish benchmarks, standards, and goals. Incentives could be offered for sustainable development. As with #2, above, there are people living and working in Calaveras County who have knowledge and experience in sustainable building. In Executive Order D-16-00, former Governor Gray Davis established sustainable building goals for California State government; an excerpt from a 2003 Update on Sustainable Building Initiatives is presented as Attachment 8. (Related Elements: Land Use, Conservation, Open Space, Housing)
4. A Circulation Plan that begins to reduce and eventually eliminate reliance on fossil fuels. This includes local and regional public transportation that is affordable, convenient, and uses sustainable technology; a countywide system of pedestrian and bicycle paths and crossings (this opportunity currently has potential in work being done in the Calaveras Council of Governments – see Attachment 9.); county investment in hybrid vehicles or those powered by alternative fuels; car-sharing and ride-sharing; community planning that locates housing in close proximity to retail services, health services, schools, and recreation. (Related Elements: Land Use, Circulation, Conservation, Open Space, Housing, Safety, Noise)
5. Support and encouragement of sustainable food crop development within the county in order to better secure the health and food security of this county's population. Land availability, water availability, energy availability, appropriate zoning and incentives need to be provided to local growers and harvesters for producing and marketing crops locally. Specific opportunities include incentives for local small-parcel farming, establishing a seed bank, supplying locally grown food to schools and health care institutions, farming education, and food access for low-income families and individuals. (Related Elements: Land Use, Conservation, Open Space, Safety)
6. Support and encouragement of locally based businesses and entrepreneurial enterprises that utilize local resources, including those considered "waste products" and recycled materials, in order to enhance a local value-added economy that employs residents and their families for generations to come. We suggest that the county assist communities in creating "green" entrepreneurial zones within which new business activity based on local resources can be incubated and fostered to enhance local economic development and security. (Related Elements: Land Use, Conservation, Open Space, Safety)
7. Preserve and protect open space, plant and wildlife habitat, and the variety of species that live in or travel through Calaveras County. Assure public access to open space. Preserve the scenic and agricultural value of our county through smart growth and development, sustainable forestry practices and oak management. Oak ordinances exist in neighboring counties. Guidelines for responsible forestry are

available from local citizen groups (Ebbets Pass Forest Watch). Attachment 10 is an example of preservation of agricultural and rural lands from Mariposa County.

8. Establish safe and adequate water supply, storage, and conservation plans. Take a proactive stance in interface with CCWD and other water districts. Ensure that county water resources are adequate for all current and future development well into the future. Encourage, and mandate where necessary, citizen and developer participation in good water stewardship (low-flow shower heads and low-flush toilets, for example). The Sierra Nevada Alliance offers the resource of the Sierra Water and Climate Change Campaign; a fact sheet from this program is offered as Attachment 11. (Related Elements: Land Use, Conservation, Housing, Safety)
9. Support, encourage, and provide for local access to the full range of primary allopathic, traditional, and alternative health care services. (Related Elements: Land Use, Circulation, Safety)
10. Support and encourage viable and vibrant communities. Local communities would provide for the needs of residents: a strong system of public education, quality child care that is available and affordable, recreation opportunities for all residents but most especially children and youth, support systems for seniors that allow them to age in place, a variety of housing styles and price ranges, convenient community centers that foster communication and participation, flourishing arts and cultural resources. (Related Elements: Land Use, Circulation, Conservation, Open Space, Housing, Safety, Noise)

This listing of opportunities with the potential to address the related issues of Climate Change and Peak Oil is not exhaustive, merely suggestive. At the same time, we recognize that what is presented here is a considerable stretch for Calaveras County in 2007. But a considerable stretch, a remaking of the way we view our world, is exactly what these two existing and future conditions ask of all of us. We can begin to stretch now, or we can wait. How long can we wait before the situation we face is an emergency? We don't know. How much better to start now, while we have time.

The county has resources to help move it in these directions. Many people have the skills, expertise, and willingness. The Board and members of the Foothill Collaborative for Sustainability (FoCuS) are ready to support county initiatives toward sustainability and local self-reliance.

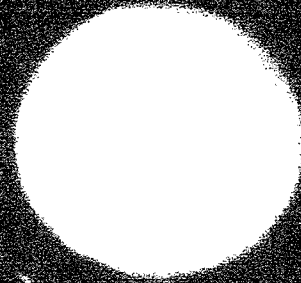
Thank you for your attention and your consideration of these issues for inclusion in the Background Report for the General Plan update process.

List of Attachments

1. "Our Changing Climate: Assessing the Risks to California," A Summary Report from the California Climate Change Center:
http://www.climatechange.ca.gov/biennial_reports/2006report/index.html
2. "Climate Change Added to Modesto Planning," Adam Ashton, May 3, 2007, <http://www.modbee.com/local/story/13541527p-14145345c.html>
3. Excerpt from Sierra Nevada Alliance "Climate Change Toolkit,"
http://www.sierranevadaalliance.org/programs/db/pics/1133215435_14399.f_pdf.pdf
4. Some Background on Peak Oil, The Community Solution,
www.communitysolution.org/peakqanda.html
5. Text of the San Francisco Precautionary Principle, Source: Greenaction for Health and Environmental Justice,
<http://www.greenaction.org/cancer/alert061803.shtml>
6. County of Amador, Mission and Values Statement,
<http://www.co.amador.ca.us/mission.htm>
7. Nevada County General Plan, Introduction, pages 12-14,
<https://docs.co.nevada.ca.us/dsweb/Get/Document-170021/>
8. "Building Better Buildings: An Update on State Sustainable Building Initiatives," October 2003, Prepared by the Sustainable Building Task Force and the State and Consumer Services Agency, Executive Summary.
<http://www.ciwmb.ca.gov/GreenBuilding/Blueprint/2001/>
9. Bicycle and Pedestrian User Survey, Calaveras Council of Governments,
http://www.calacog.org/docs/bike_ped_user_survey1.pdf
10. Excerpts from the Mariposa County General Plan, Sierra Nevada Alliance,
http://www.sierranevadaalliance.org/programs/db/pics/1172008463_26714.f_pdf.pdf
11. Fact Sheet, "Water and Climate Change Campaign," Sierra Nevada Alliance,
http://www.sierranevadaalliance.org/programs/db/pics/1123856921_22513.f_pdf.pdf
12. List of the Board of Directors of the Foothill Collaborative for Sustainability (FoCuS), www.foothillsustainability.org

Our Changing Climate

Assessing the Risks to California



A Summary Report from
the California Climate Change Center



Because most global warming emissions remain in the atmosphere for decades or centuries, the choices we make today greatly influence the climate our children and grandchildren inherit. The quality of life they experience will depend on if and how rapidly California and the rest of the world reduce these emissions.

In California and throughout western North America, signs of a changing climate are evident. During the last 50 years, winter and spring temperatures have been warmer, spring snow levels in lower- and mid-elevation mountains have dropped, snowpack has been melting one to four weeks earlier, and flowers are blooming one to two weeks earlier.

These regional changes are consistent with global trends. During the past 100 years, average temperatures have risen more than one degree Fahrenheit worldwide. Research indicates that much of this warming is due to human activities, primarily burning fossil fuels and clearing forests, that release carbon dioxide (CO₂) and other gases into the atmosphere, trapping in heat that would otherwise escape into space. Once in the atmosphere, these heat-trapping emissions remain there for many years—CO₂, for example, lasts about 100 years. As a result, atmospheric concentration of CO₂ has increased more than 30 percent above pre-industrial levels. If left unchecked, by the end of the century CO₂ concentrations could reach levels three times higher than pre-industrial times, leading to dangerous global warming that threatens our public health, economy, and environment.

The latest projections, based on state-of-the-art climate models, indicate that if global heat-trapping emissions proceed at a medium to high rate, temperatures in California are



expected to rise 4.7 to 10.5°F by the end of the century. In contrast, a lower emissions rate would keep the projected warming to 3 to 5.6°F. These temperature increases would have widespread consequences including substantial loss of snowpack, increased risk of large wildfires, and reductions in the quality and quantity of certain agricultural products. The state's vital resources and natural landscapes are already under increasing stress

due to California's rapidly growing population, which is expected to grow from 35 million today to 55 million by 2050.

This document summarizes the recent findings of the California Climate Change Center's "Climate Scenarios" project, which analyzed a range of impacts that projected rising temperatures would likely have on California. The growing severity of the consequences as temperature rises underscores the importance of reducing emissions to minimize further warming. At the same time, it is essential to identify those consequences that may be unavoidable, for which we will need to develop coping and adaptation strategies.

In 2003, the California Energy Commission's Public Interest Energy Research (PIER) program established the California Climate Change Center to conduct climate change research relevant to the state. This Center is a virtual organization with core research activities at Scripps Institution of Oceanography and the University of California, Berkeley, complemented by efforts at other research institutions. Priority research areas defined in PIER's five-year Climate Change Research Plan are: monitoring, analysis, and modeling of climate; analysis of options to reduce greenhouse gas emissions; assessment of physical impacts and of adaptation strategies; and analysis of the economic consequences of both climate change impacts as well as the efforts designed to reduce emissions.

Executive Order #S-3-05, signed by Governor Arnold Schwarzenegger on June 1, 2005, called for the California Environmental Protection Agency (CalEPA) to prepare biennial science reports on the potential impact of continued global warming on certain sectors of the California economy. CalEPA entrusted PIER and its California Climate Change Center to lead this effort. The "Climate Scenarios" analysis summarized here is the first of these biennial science reports, and is the product of a multi-institution collaboration among the California Air Resources Board, California Department of Water Resources, California Energy Commission, CalEPA, and the Union of Concerned Scientists.

California's Future Climate

California's climate is expected to become considerably warmer during this century. How much warmer depends on the rate at which human activities, such as the burning of fossil fuels, continue. The projections presented here illustrate the climatic changes that are likely from three different heat-trapping emissions scenarios (see figure below).

Projected Warming

Temperatures are expected to rise substantially in all three emissions scenarios. During the next few decades, the three scenarios project average temperatures to rise between 1 and 2.3°F; however, the projected temperature increases begin to diverge at mid-century so that, by the end of the century, the temperature increases projected in the higher emissions scenario are approximately twice as high as those projected in the lower emissions scenario. Some climate models indicate that warming would be greater in summer than in winter, which would have widespread effects on ecosystem health, agricultural production, water use and availability, and energy demand.

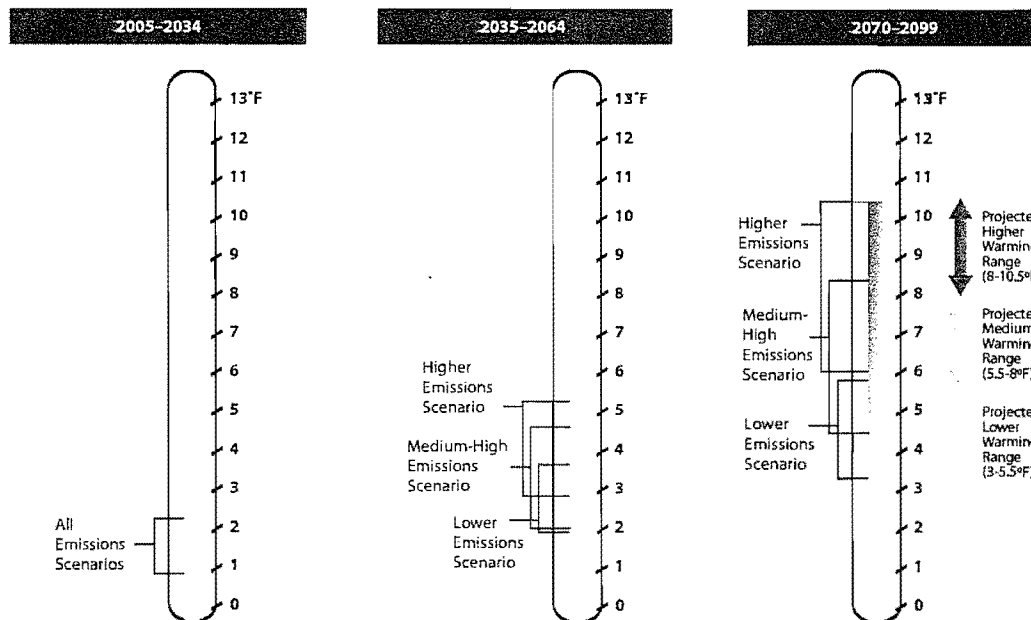
Toward the end of the century, depending on future heat-trapping emissions, statewide average temperatures are expected to rise between 3 and 10.5°F. The analysis presented

here examines the future climate under three projected warming ranges:¹

- **Lower warming range:** projected temperature rises between 3 and 5.5°F
- **Medium warming range:** projected temperature rises between 5.5 and 8°F
- **Higher warming range:** projected temperature rises between 8 and 10.5°F

Precipitation

On average, the projections show little change in total annual precipitation in California. Furthermore, among several models, precipitation projections do not show a consistent trend during the next century. The Mediterranean seasonal precipitation pattern is expected to continue, with most precipitation falling during winter from North Pacific storms. One of the three climate models projects slightly wetter winters, and another projects slightly drier winters with a 10 to 20 percent decrease in total annual precipitation. However, even modest changes would have a significant impact because California ecosystems are conditioned to historical precipitation levels and water resources are nearly fully utilized.



California is expected to experience dramatically warmer temperatures during the 21st century. This figure shows projected increases in statewide annual temperatures for three 30-year periods. Ranges for each emissions scenario represent results from state-of-the-art climate models.

¹ These warming ranges are for illustrative purposes only. These ranges were defined in the original Climate Scenarios analysis to capture the full range of projected temperature rise. The exact values for the warming ranges as presented in the original summary report are: lower warming range (3 to 5.4°F); medium warming range (5.5 to 7.9°F); and higher warming range (8 to 10.4°F).

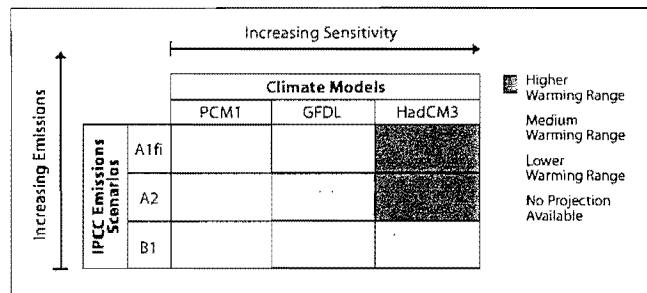
Projecting Future Climate

How much temperatures rise depends in large part on how much and how quickly heat-trapping emissions accumulate in the atmosphere and how the climate responds to these emissions. The projections presented in this report are based on three different heat-trapping emissions scenarios and three climate models.

Emissions Scenarios

The three global emissions scenarios used in this analysis were selected from a set of scenarios developed by the Intergovernmental Panel on Climate Change's (IPCC) *Special Report on Emissions Scenarios*, based on different assumptions about population growth and economic development (measured in gross domestic product).

- The **lower emissions scenario (B1)** characterizes a world with high economic growth and a global population that peaks by mid-century and then declines. There is a rapid shift toward less fossil fuel-intensive industries and introduction of clean and resource-efficient technologies. Heat-trapping emissions peak about mid-century and then decline; CO₂ concentration approximately doubles, relative to pre-industrial levels, by 2100.
- The **medium-high emissions scenario (A2)** projects continuous population growth and uneven economic and technological growth. The income gap between now-industrialized and developing parts of the world does not narrow. Heat-trapping emissions increase through the 21st century; atmospheric CO₂ concentration approximately triples, relative to pre-industrial levels, by 2100.
- The **higher emissions scenario (A1fi)** represents a world with high fossil fuel-intensive economic growth, and a global population that peaks mid-century then declines. New and more efficient technologies are introduced toward the end of the century. Heat-trapping emissions increase through the 21st century; CO₂ concentration more than triples, relative to pre-industrial levels, by 2100.



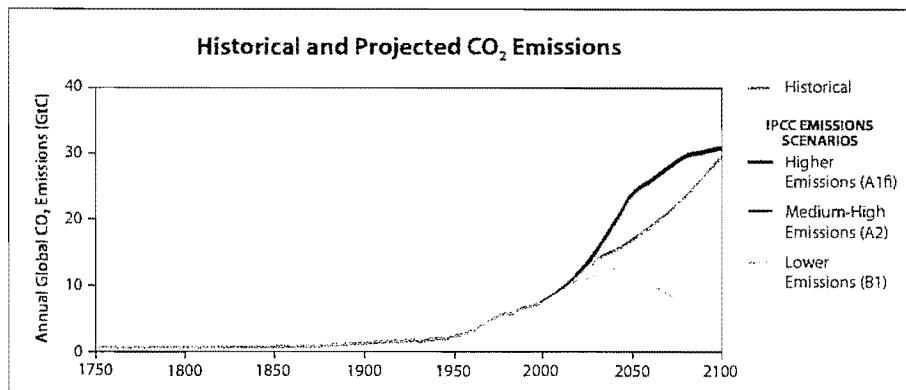
This matrix shows the temperature increases that result from the three climate models, assuming emission inputs indicated in the IPCC emissions scenarios. The resulting temperatures are grouped into three warming ranges defined in the "Climate Scenarios" analysis.

Climate Sensitivity

The three models used in this analysis represent different climate sensitivities, or the extent to which temperatures will rise as a result of increasing atmospheric concentrations of heat-trapping gases. Climate sensitivity depends on Earth's response to certain physical processes, including a number of "feedbacks" that might amplify or lessen warming. For example, as heat-trapping emissions cause temperatures to rise, the atmosphere can hold more water vapor, which traps heat and raises temperatures further—a positive feedback. Clouds created by this water vapor could absorb and re-radiate outgoing infrared radiation from Earth's surface (another positive feedback) or reflect more incoming shortwave radiation from the sun before it reaches Earth's surface (a negative feedback).

Because many of these processes and their feedbacks are not yet fully understood, they are represented somewhat differently in different global climate models. The three global climate models used in this analysis are:

- **National Center for Atmospheric Research Parallel Climate Model (PCM1):** low climate sensitivity
- **Geophysical Fluids Dynamic Laboratory (GFDL) CM2.1:** medium climate sensitivity
- **United Kingdom Met Office Hadley Centre Climate Model, version 3 (HadCM3):** medium-high climate sensitivity



As this figure shows, CO₂ emissions from human activities (such as the burning of fossil fuels) were negligible until around the so-called industrial age starting in the 1850s.

Public Health

Continued global warming will affect Californians' health by exacerbating air pollution, intensifying heat waves, and expanding the range of infectious diseases. The primary concern is not so much the change in average climate but the projected increase in extreme conditions, which pose the most serious health risks.

Poor Air Quality Made Worse

Californians currently experience the worst air quality in the nation, with more than 90 percent of the population living in areas that violate the state's air quality standard for either ground-level ozone or airborne particulate matter. These pollutants can cause or aggravate a wide range of health problems including asthma and other acute respiratory and cardiovascular diseases, and can decrease lung function in children. Combined, ozone and particulate matter contribute to 8,800 deaths and \$71 billion in healthcare costs every year. If global background ozone levels increase as projected in some scenarios, it may become impossible to meet local air quality standards.

Higher temperatures are expected to increase the frequency, duration, and intensity of conditions conducive to air pollution formation. For example, if temperatures rise to the medium warming range, there will be 75 to 85 percent more days with weather conducive to ozone formation in Los Angeles and the San Joaquin Valley, relative to today's conditions. This is more than twice the increase expected if temperature rises are kept in the lower warming range.

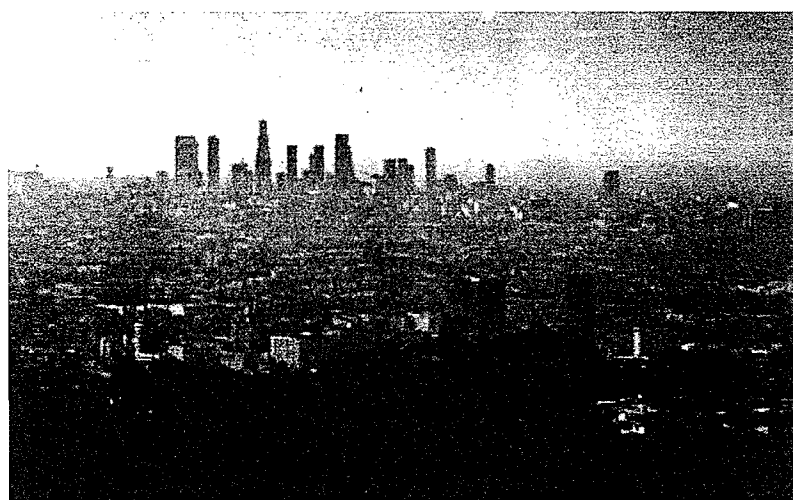
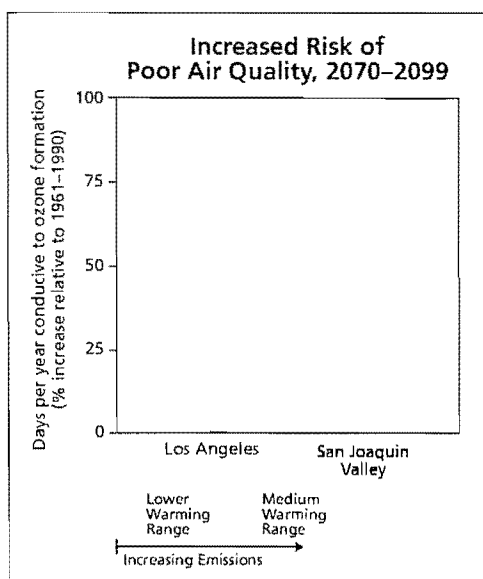
Air quality could be further compromised by increases in wildfires, which emit fine particulate matter that can travel long distances depending on wind conditions. The most recent analysis suggests that if heat-trapping gas emissions are not significantly reduced, large wildfires could become up to 55 percent more frequent toward the end of the century.

More Severe Heat

By 2100, if temperatures rise to the higher warming range, there could be up to 100 more days per year with temperatures above 90°F in Los Angeles and above 95°F in Sacramento. This is a striking increase over historical patterns (see chart on p. 6), and almost twice the increase projected if temperatures remain within or below the lower warming range.

As temperatures rise, Californians will face greater risk of death from dehydration, heat stroke/exhaustion, heart attack, stroke, and respiratory distress caused by extreme heat. By mid century, extreme heat events in urban centers such as Sacramento, Los Angeles, and San Bernardino could cause two to three times more heat-related deaths than occur today. The members of the population most vulnerable to the effects of extreme heat include people who are already ill; children; the elderly;

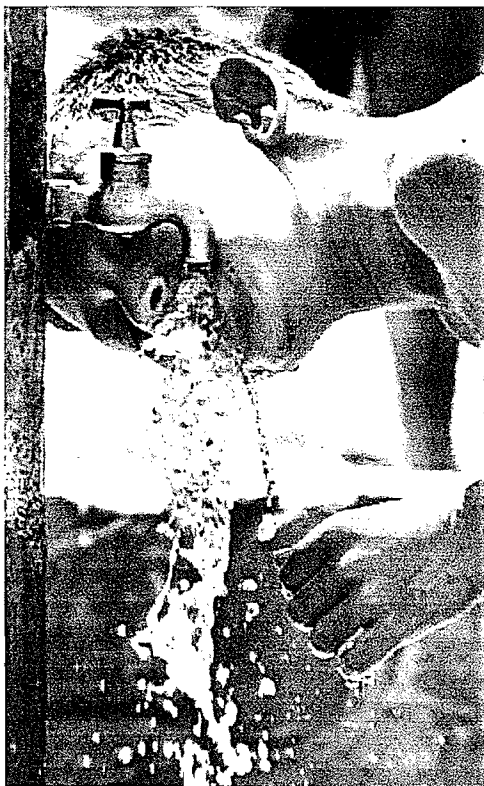
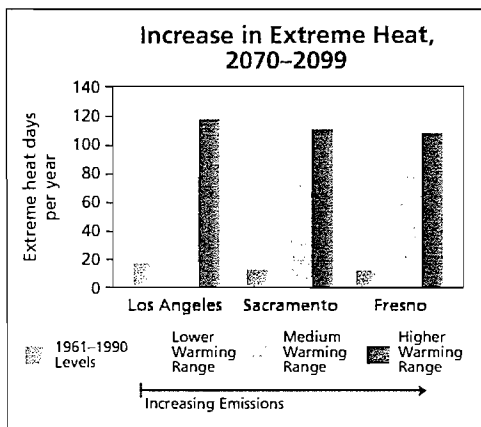
As temperatures rise, Californians will face greater risk of death from dehydration, heat stroke, heart attack, and other heat-related illnesses.



Cars and power plants emit pollutants that contribute to global warming and poor air quality. As temperatures increase, it will be increasingly difficult to meet air quality standards throughout the state.

and the poor, who may lack access to air conditioning and medical assistance.

More research is needed to better understand the potential effects of higher temperatures and the role that adaptation can play in minimizing these effects. For example, expanding air conditioner use can help people cope with extreme heat; however, it also increases energy consumption, which, using today's fossil fuel-heavy energy sources, would contribute to further global warming and air pollution.



Stockphoto

Water Resources



If global warming emissions continue unabated, Sierra Nevada snowpack could decline 70 to 90 percent, with cascading effects on winter recreation, water supply, and natural ecosystems.

Most of California's precipitation falls in the northern part of the state during the winter while the greatest demand for water comes from users in the southern part of the state during the spring and summer. A vast network of man-made reservoirs and aqueducts capture and transport water throughout the state from northern California rivers and the Colorado River. The current distribution system relies on Sierra Nevada mountain snowpack to supply water during the dry spring and summer months. Rising temperatures, potentially compounded by decreases in precipitation, could severely reduce spring snowpack, increasing the risk of summer water shortages.

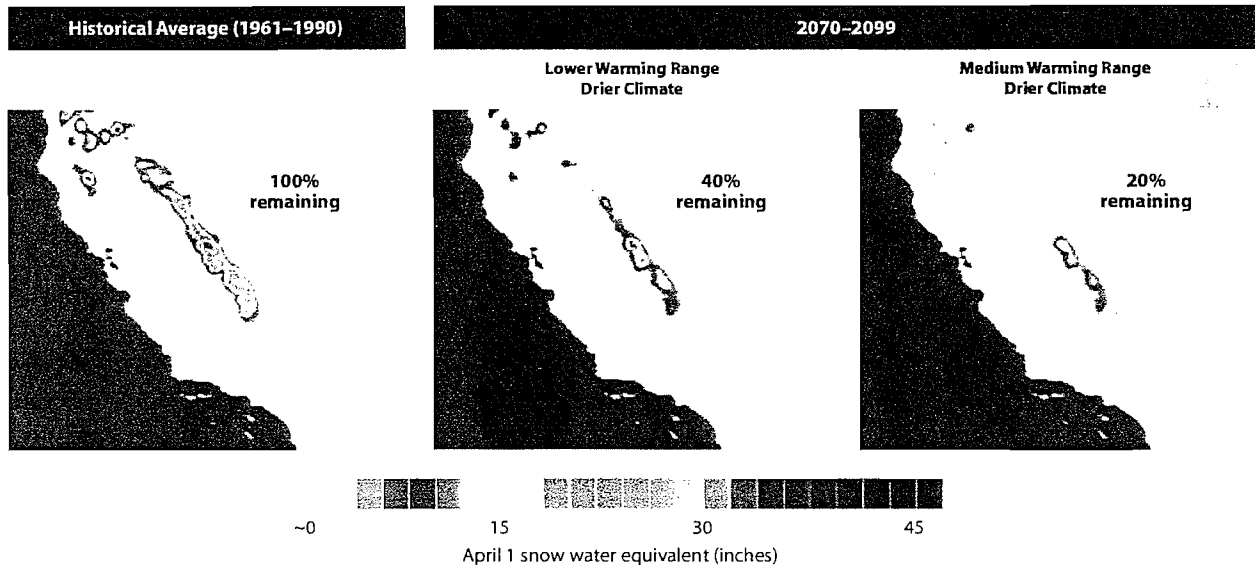
Decreasing Sierra Nevada Snowpack

If heat-trapping emissions continue unabated, more precipitation will fall as rain instead of snow, and the snow that does fall will melt earlier, reducing the Sierra Nevada spring snowpack by as much as 70 to 90 percent. How much snowpack will be lost depends in part on future precipitation patterns, the projections for which remain uncertain. However, even under wetter climate projections, the loss of snowpack would pose challenges to water managers, hamper hydropower generation, and nearly eliminate skiing and other snow-related recreational activities. If global warming emissions are significantly curbed and temperature increases are kept in the lower warming range, snowpack losses are expected to be only half as large as those expected if temperatures were to rise to the higher warming range.

Challenges in Securing Adequate Water Supplies

Continued global warming will increase pressure on California's water resources, which are already over-stretched by the demands of a growing

Decreasing California Snowpack



economy and population. Decreasing snowmelt and spring stream flows coupled with increasing demand for water resulting from both a growing population and hotter climate could lead to increasing water shortages. By the end of the century, if temperatures rise to the medium warming range and precipitation decreases, late spring stream flow could decline by up to 30 percent. Agricultural areas could be hard hit, with California farmers losing as much as 25 percent of the water supply they need.

Water supplies are also at risk from rising sea levels. An influx of saltwater would degrade California's estuaries, wetlands, and groundwater aquifers. In particular, saltwater intrusion would threaten the quality and reliability of the major state fresh water supply that is pumped from the southern edge of the Sacramento/San Joaquin River Delta.

Coping with the most severe consequences of global warming would require major changes in water management and allocation systems. As more winter precipitation falls as rain

instead of snow, water managers will have to balance the need to fill constructed reservoirs for water supply and the need to maintain reservoir space for winter flood control. Some additional storage could be developed; however, the economic and environmental costs would be high.

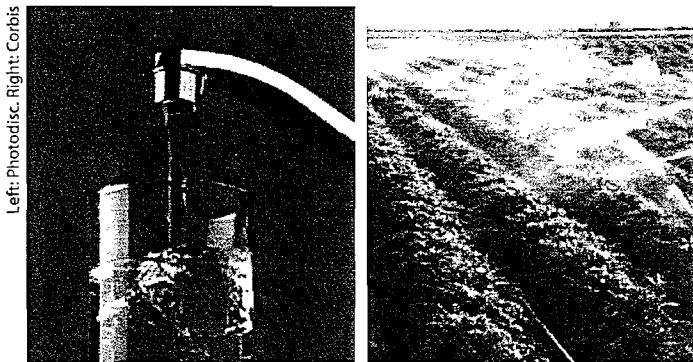
Potential Reduction in Hydropower

Higher temperatures will likely increase electricity demand due to higher air conditioning use. Even if the population remained unchanged, toward the end of the century annual electricity demand could increase by as much as 20 percent if temperatures rise into the higher warming range. (Implementing aggressive efficiency measures could lower this estimate.)

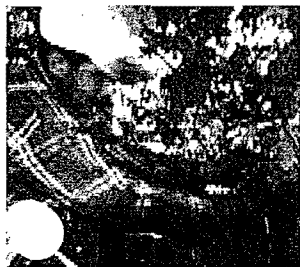
At the same time, diminished snow melt flowing through dams will decrease the potential for hydropower production, which now comprises about 15 percent of California's in-state electricity production. If temperatures rise to the medium warming range and precipitation decreases by 10 to 20 percent, hydropower production may be reduced by up to 30 percent. However, future precipitation projections are quite uncertain so it is possible that precipitation may increase and expand hydropower generation.

Loss of Winter Recreation

Continued global warming will have widespread implications for winter tourism. Declines in Sierra Nevada snowpack would lead to later starting and earlier closing dates of the ski season. Toward the end of the century, if temperatures rise to the lower warming range, the ski season at lower and middle elevations could shorten by as much as a month. If temperatures reach the higher warming range and precipitation declines, there might be many years with insufficient snow for skiing and snowboarding.



Rising temperatures, potentially exacerbated by decreasing precipitation, could increase the risk of water shortages in urban and agricultural sectors.



Agriculture

California is home to a \$30 billion agriculture industry that employs more than one million workers. It is the largest and most diverse agriculture industry in the nation, producing more than 300 commodities including half the country's fruits and vegetables. Increased heat-trapping emissions are expected to cause widespread changes to this industry, reducing the quantity and quality of agricultural products statewide.

Although higher carbon dioxide levels can stimulate plant production and increase plant water-use efficiency, California farmers will face greater water demand for crops and a less reliable water supply as temperatures rise. Crop growth and development will change, as will the intensity and frequency of pest and disease outbreaks. Rising temperatures will likely aggravate ozone pollution, which makes plants more susceptible to disease and pests and interferes with plant growth.

To prepare for these changes, and to adapt to changes already under way, major efforts will be needed to move crops to new locations, respond to climate variability, and develop new cultivars and agricultural technologies. With adequate research and advance preparation, some of the consequences could be reduced.

Increasing Temperature

Plant growth tends to be slow at low temperatures, increasing with rising temperatures up to a threshold. However, faster growth can result in less-than-optimal development for many crops, so rising temperatures are likely to worsen the quantity and quality of yield for a number of California's agricultural products. Crops that are likely to be hard hit include:

Wine Grapes

California is the nation's largest wine producer and the fourth-largest wine producer worldwide. High-quality wines produced throughout the Napa and Sonoma Valleys and along the northern and central coasts generate \$3.2 billion in revenue

each year. High temperatures during the growing season can cause premature ripening and reduce grape quality. Temperature increases are expected to have only modest effect on grape quality in most regions over the next few decades. However, toward the end of the century, wine grapes could ripen as much as one to two months earlier, which will affect grape

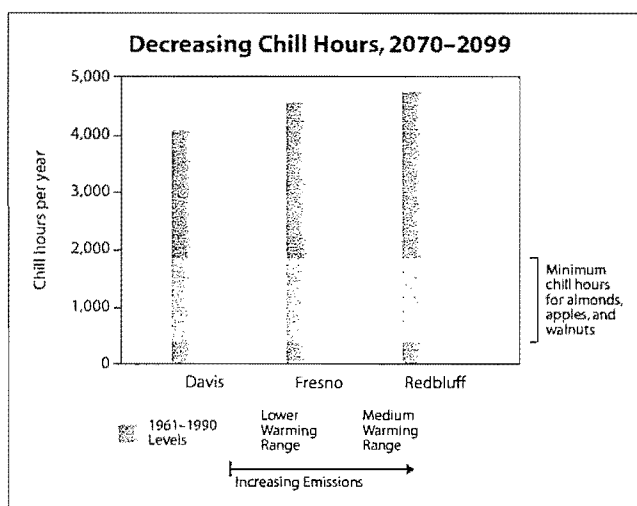


IndexOpen

quality in all but the coolest coastal locations (Mendocino and Monterey Counties).

Fruits and Nuts

Many fruit and nut trees are particularly sensitive to temperature changes because of heat-accumulation limits and chill-hour requirements. Heat accumulation, which refers to the total hours during which temperatures reach between 45 and 95°F, is critical for fruit development. Rising temperatures could increase fruit development rates and decrease fruit size.



For example, peaches and nectarines developed and were harvested early in 2004 because of warm spring temperatures. The fruits were smaller than normal, which placed them in a lower quality category.

A minimum number of chill hours (hours during which temperatures drop below 45°F) is required for proper bud setting; too few hours can cause late or irregular bloom, decreasing fruit quality and subsequent marketable yield. California is currently classified as a moderate to high chill-hour region, but chill hours are diminishing in many areas of the state. If temperatures rise to the medium warming range, the number of chill hours in the entire Central Valley is expected to approach a critical threshold for some fruit trees.

Milk

California's \$3 billion dairy industry supplies nearly one-fifth of the nation's milk products. High temperatures can stress dairy cows, reducing milk production. Production begins to decline at temperatures as low as 77°F and can drop substantially as temperatures climb above 90°F. Toward the end of the century, if temperatures rise to the higher warming range, milk production is expected to decrease by up to 20 percent. This is more



Increasing temperatures will likely decrease the quantity and quality of some agricultural commodities, such as certain varieties of fruit trees, wine grapes, and dairy products.

than twice the reduction expected if temperatures stay within or below the lower warming range.

Expanding Ranges of Agricultural Weeds

Noxious and invasive weeds currently infest more than 20 million acres of California farmland, costing hundreds of millions of dollars annually in control measures and lost productivity. Continued climate change will likely shift the ranges of existing invasive plants and weeds and alter competition patterns with native plants. Range expansion is expected in many species while range contractions are less likely in rapidly evolving species with significant populations already established. Should

range contractions occur, it is likely that new or different weed species will fill the emerging gaps.

Increasing Threats from Pests and Pathogens

California farmers contend with a wide range of crop-damaging pests and pathogens. Continued climate change is likely to alter the abundance and types of many pests, lengthen pests' breeding season, and increase pathogen growth rates. For example, the pink bollworm, a common pest of cotton crops, is currently a problem only in southern desert valleys because it cannot survive winter frosts elsewhere in the state. However, if winter temperatures rise 3 to 4.5°F, the pink bollworm's range would likely expand northward, which could lead

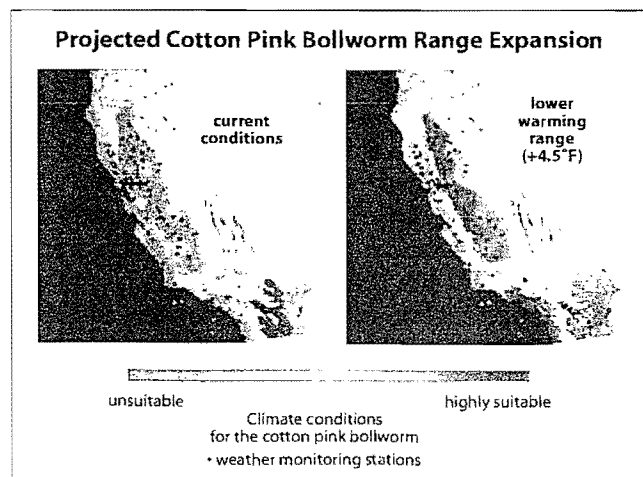
to substantial economic and ecological consequences for the state.

Temperature is not the only climatic influence on pests. For example, some insects are unable to cope in extreme drought, while others cannot survive in extremely wet conditions. Furthermore, while warming speeds up the lifecycles of many insects, suggesting that pest problems could increase, some insects may grow more slowly as elevated CO₂ levels decrease the protein content of the leaves on which they feed.

Multiple and Interacting Stresses

Although the effects on specific crops of individual factors (e.g., temperatures, pests, water supply) are increasingly well understood, trying to quantify interactions among these and other environmental factors is challenging. For example, the quality of certain grape varieties is expected to decline as temperatures rise. But the wine-grape industry also faces increasing risks from pests such as the glassy-winged sharpshooter, which transmits Pierce's disease. In 2002, this bacterial

disease caused damage worth \$13 million in Riverside County alone. The optimum temperature for growth of Pierce's disease is 82°F, so this disease is currently uncommon in the cooler northern and coastal regions of the state. However, with continued warming, these regions may face increased risk of the glassy-winged sharpshooter feeding on leaves and transmitting Pierce's disease.



As temperatures rise, the climate is expected to become more favorable for the pink bollworm (above), a major cotton pest in southern California. The pink bollworm's geographic range is limited by winter frosts that kill over-wintering dormant larvae. As temperatures rise, winter frosts will decrease, greatly increasing the winter survival and subsequent spread of the pest throughout the state.



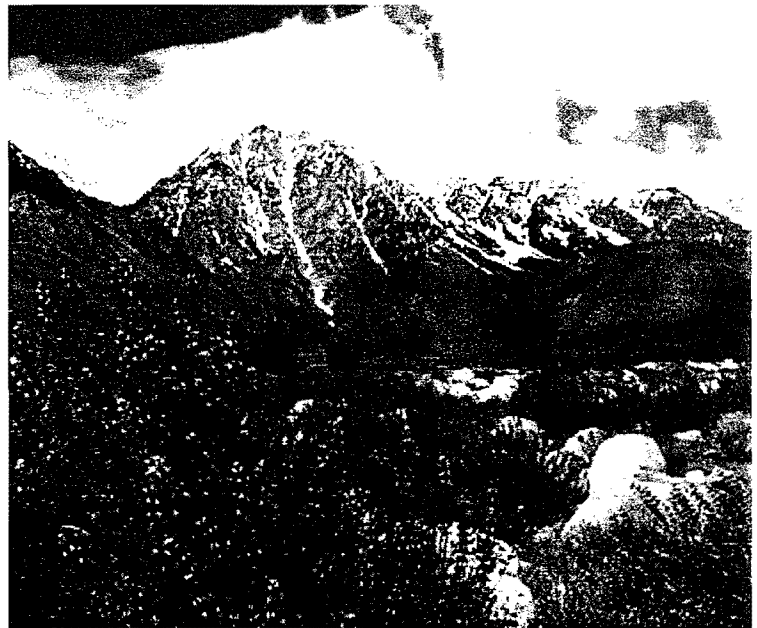
Forests and Landscapes

California is one of the most climatically and biologically diverse areas in the world, supporting thousands of plant and animal species. The state's burgeoning population and consequent impact on local landscapes is threatening much of this biological wealth. Global warming is expected to intensify this threat by increasing the risk of wildfire and altering the distribution and character of natural vegetation.

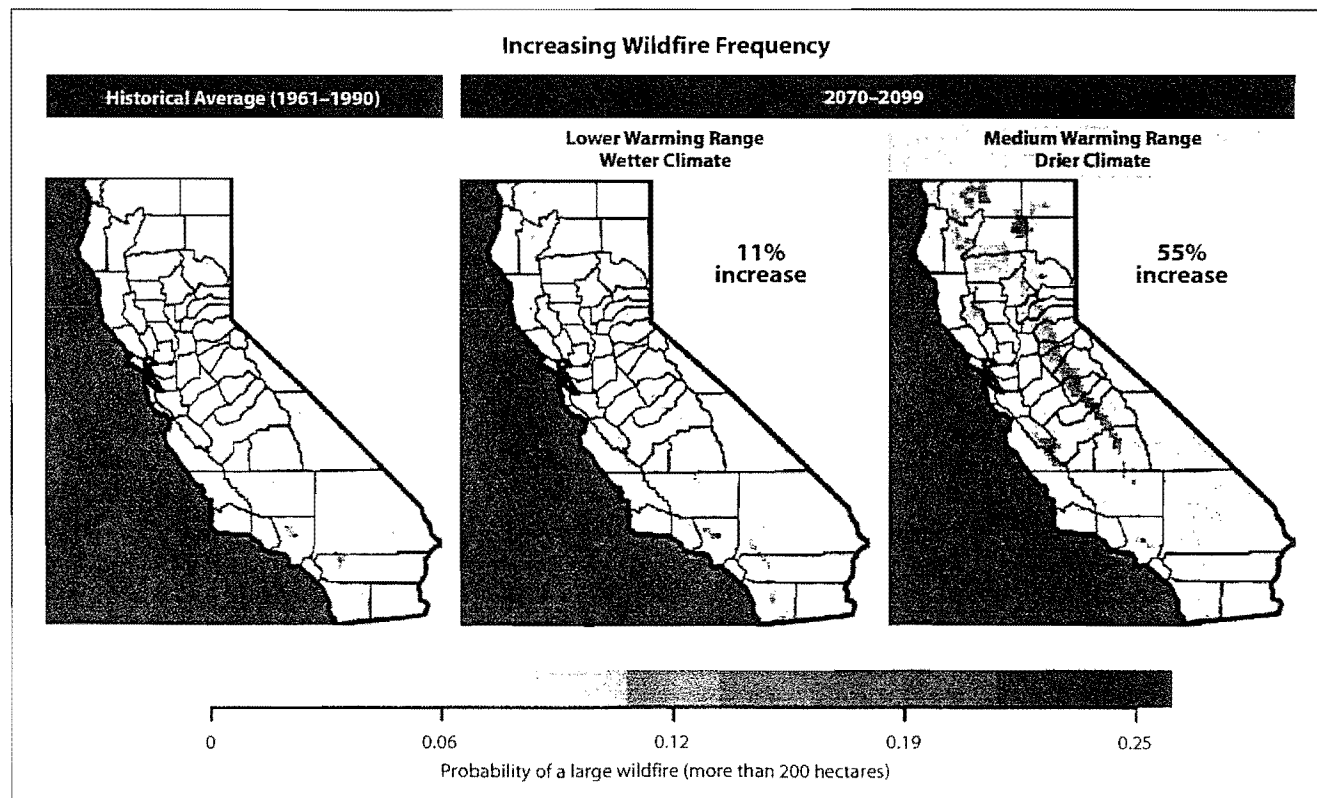
Increasing Wildfires

Fire is an important ecosystem disturbance. It promotes vegetation and wildlife diversity, releases nutrients into the soil, and eliminates heavy accumulation of underbrush that can fuel catastrophic fires. However, if temperatures rise into the medium warming range, the risk of large wildfires in California could increase by as much as 55 percent, which is almost twice the increase expected if temperatures stay in the lower warming range.

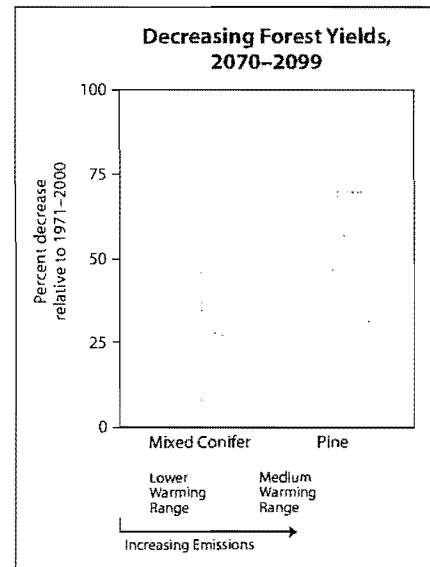
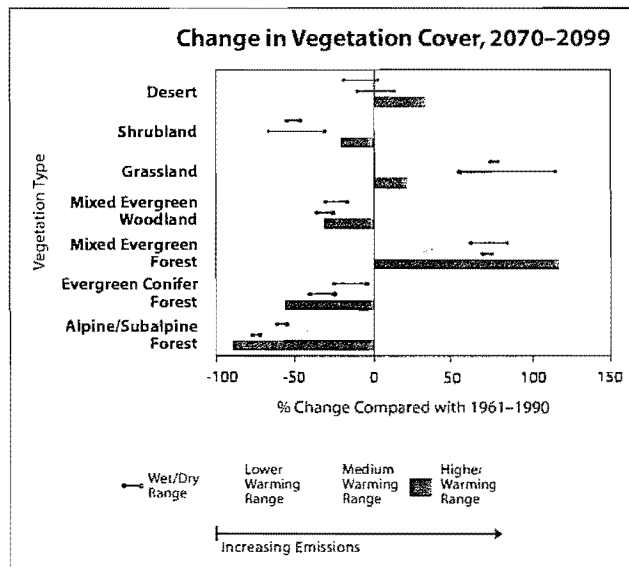
Because wildfire risk is determined by a combination of factors including precipitation, winds, temperature, and landscape and vegetation conditions, future risks will not be uniform throughout the state. In many regions, wildfire activity will depend critically on future precipitation patterns. For



Global warming threatens alpine and subalpine ecosystems, which have no place to move as temperatures rise.



Vegetation cover over the 21st century will depend on both temperature and precipitation. The lower and medium warming range bars reflect vegetation cover under a wetter climate (blue) and a drier climate (brown) projected in the different climate models. For the higher warming range, only a drier climate was considered.



example, if precipitation increases as temperatures rise, wild-fires in the grasslands and chaparral ecosystems of southern California are expected to increase by approximately 30 percent toward the end of the century because more winter rain will stimulate the growth of more plant "fuel" available to burn in the fall. In contrast, a hotter, drier climate could promote up to 90 percent more northern California fires by the end of the century by drying out and increasing the flammability of forest vegetation.

Shifting Vegetation

Land use and other changes resulting from economic development are altering natural habitats throughout the state. Continued global warming will intensify these pressures on the state's natural ecosystems and biological diversity. For example, in northern California, warmer temperatures are expected to shift dominant forest species from Douglas and White Fir to madrone and oaks. In inland regions, increases in fire frequency are expected to promote expansion of grasslands into current shrub and woodland areas. Alpine and subalpine ecosystems are among the most threatened in the state; plants suited to these regions have limited opportunity to migrate "up slope" and are expected to decline by as much as 60 to 80 percent by the end of the century as a result of increasing temperatures.

Declining Forest Productivity

Forestlands cover 45 percent of the state; 35 percent of this is commercial forests

such as pine plantations. Recent projections suggest that continued global warming could adversely affect the health and productivity of California's forests. If average statewide temperatures rise to the medium warming range, the productivity of mixed conifer forests is expected to diminish by as much as 18 percent by the end of the century. Yield reductions from pine plantations are expected to be even more severe, with up to a 30 percent decrease by the end of the century.

The risk of large wild-fires in California could increase by as much as 15 percent.





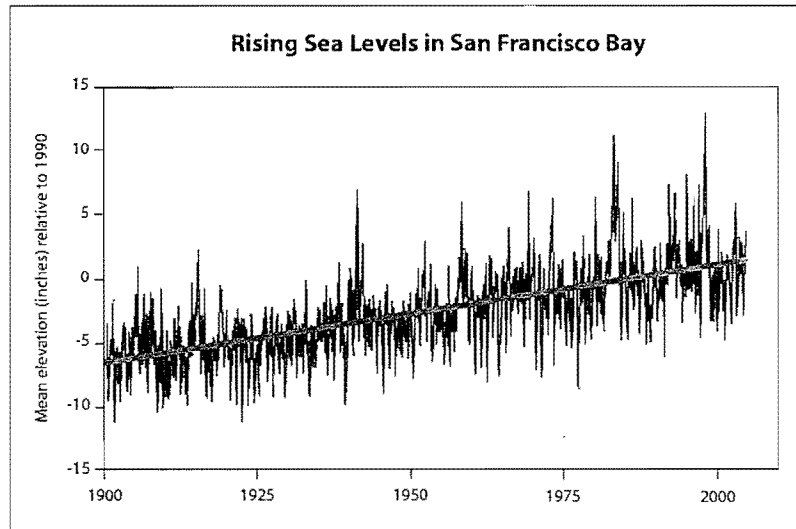
Rising Sea Levels

California's 1,100 miles of coastline are a major attraction for tourism, recreation, and other economic activity. The coast is also home to unique ecosystems that are among the world's most imperiled. As global warming continues, California's coastal regions will be increasingly threatened by rising sea levels, more intense coastal storms, and warmer water temperatures.

During the past century, sea levels along California's coast have risen about seven inches. If heat-trapping emissions continue unabated and temperatures rise into the higher warming range, sea level is expected to rise an additional 22 to 35 inches by the end of the century. Elevations of this magnitude would inundate coastal areas with salt water, accelerate coastal erosion, threaten vital levees and inland water systems, and disrupt wetlands and natural habitats.

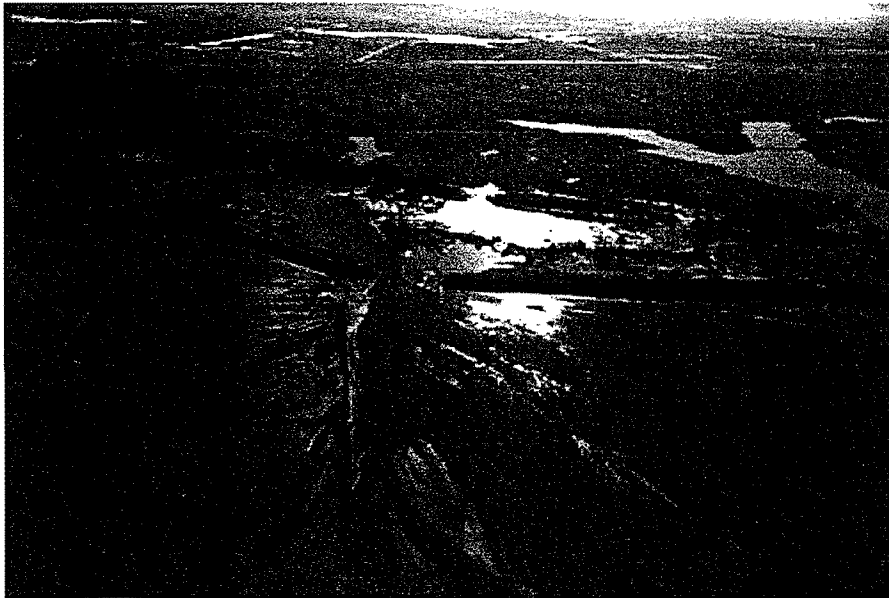
Increasing Coastal Floods

The combination of increasingly severe winter storms, rising mean sea levels, and high tides is expected to cause more frequent and severe flooding, erosion, and damage to coastal structures. Many California coastal areas are at significant risk for flood damage. For example, the city of Santa Cruz is built on the 100-year floodplain and is only 20 feet above sea level.



Although levees have been built to contain the 100-year flood, a 12-inch increase in sea levels (projected for the medium warming range of temperatures) would mean storm-surge-induced flood events at the 100-year level would likely occur once every 10 years.

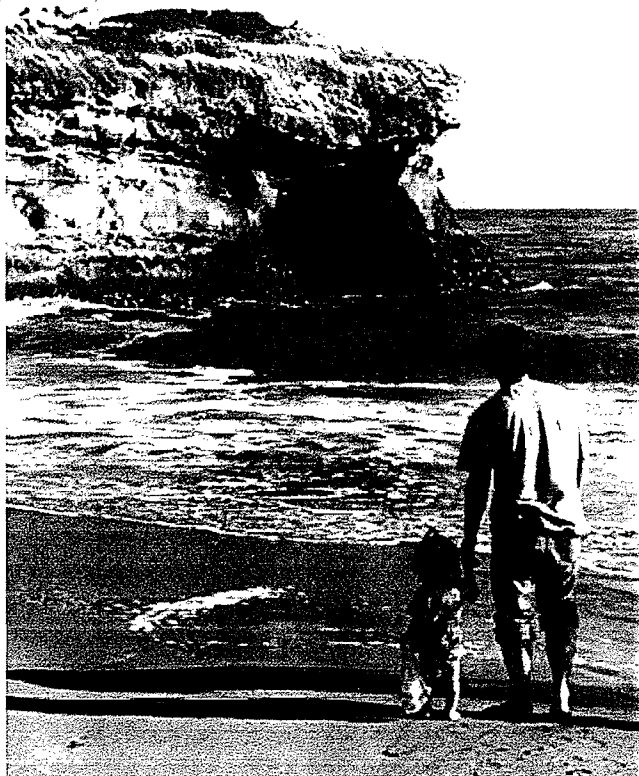
Flooding can create significant damage and enormous financial losses. Despite extensive engineering efforts, major floods have repeatedly breached levees that protect freshwater supplies and islands in the San Francisco Bay Delta as well as fragile marine estuaries and wetlands throughout the



Robert A. Epplert/CA Governor's Office of Emergency Services

Sea levels could rise up to three feet by the end of the century, accelerating coastal erosion, threatening vital levees, and disrupting wetlands.

Rising sea levels and more intense storm surges could increase the risk for coastal flooding.



Many California beaches are threatened from rising sea levels and increased erosion, an expected consequence of continued global warming.

state. Continued sea level rise will further increase vulnerability to levee failures. Some of the most extreme flooding during the past few decades has occurred during El Niño winters, when warmer waters fuel more intense storms. During the winters of 1982–1983 and 1997–1998, for example, abnormally high seas and storm surges caused millions of dollars' worth of damage in the San Francisco Bay area. Highways were flooded as six-foot waves crashed over waterfront bulkheads, and valuable coastal real estate was destroyed.

Continued global warming will require major changes in flood management. In many regions such as the Central Valley,

where urbanization and limited river channel capacity already exacerbate rising flood risks, flood damage and flood control costs could amount to several billion dollars.

Shrinking Beaches

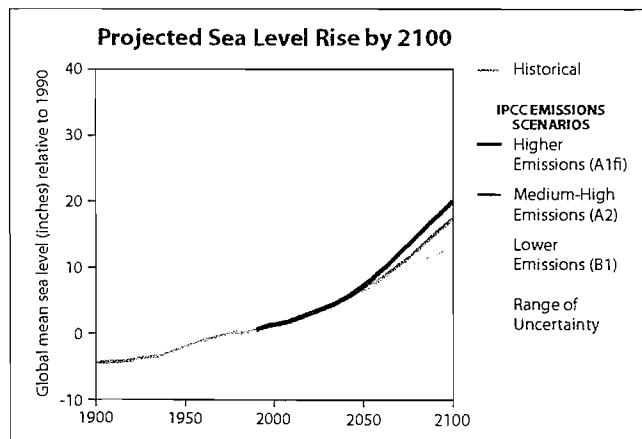
Many of California's beaches may shrink in the future because of rising seas and increased erosion from winter storms. Currently, many beaches are protected from erosion through manmade sand replenishment (or "nourishment") programs, which bring in sand from outside sources to replace the diminishing supply of natural sand. In fact, many of the wide sandy beaches in southern California around Santa Monica, Venice, and Newport Beach were created and are maintained entirely by sand nourishment programs. As sea levels rise, increasing volumes of replacement sand will be needed to maintain current beach width and quality. California beach nourishment programs currently cost millions of dollars each year. As global warming continues, the costs of beach nourishment programs will rise, and in some regions beach replenishment may no longer be viable.

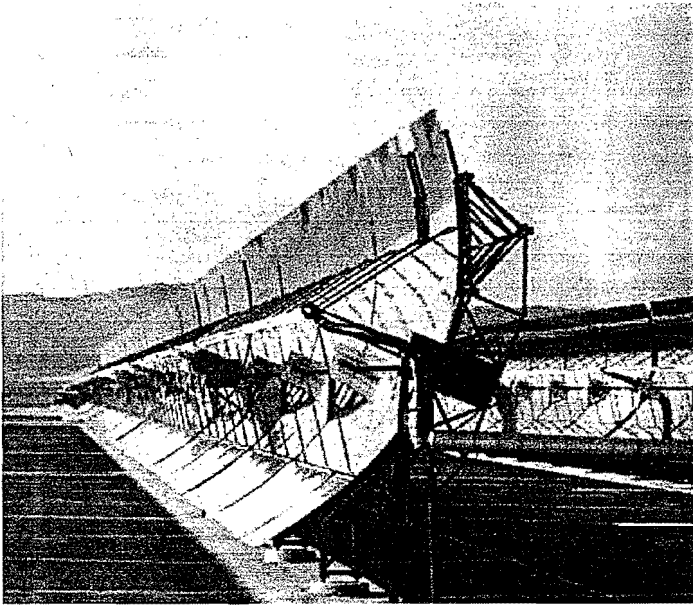
Multiple Causes of Coastal Flooding

Several factors play a role in sea level and coastal flooding, including tides, waves temperature, and storm activity. Sea levels fluctuate daily, monthly, and seasonally; the highest tides occur in winter and in summer, during new and full moons. Sea levels often rise even higher during El Niño winters, when the Eastern Pacific Ocean is warmer than usual and westerly wind patterns are strengthened.

Coastal flooding usually occurs during winter storms, which bring strong winds and high waves. Storm winds tend to raise water levels along the coast and produce high waves at the same time, compounding the risk of damaging waves—a doubling of wave height is equivalent to a four-fold increase in wave energy. When these factors coincide with high tides, the chances for coastal damage are greatly heightened.

As sea levels rise, flood stages in the Sacramento/San Joaquin Delta of the San Francisco Bay estuary may also rise, putting increasing pressure on Delta levees. This threat may be particularly significant because recent estimates indicate the additional force exerted upon the levees is equivalent to the square of the water level rise. Estimates using historical observations and climate model projections suggest that extreme high water levels in the Bay and Delta will increase markedly if sea level rises above its historical rate. These extremes are most likely to occur during storm events, leading to more severe damage from waves and floods.





Cleaner energy and vehicle technologies can help California reduce global warming emissions, improve air quality, and protect public health.

Managing Global Warming

Continued global warming will have widespread and significant impacts on the Golden State. Solutions are available today to reduce emissions and minimize these impacts.

The projections presented in this analysis suggest that many of the most severe consequences that are expected from the medium and higher warming ranges could be avoided if heat-trapping emissions can be reduced to levels that will hold temperature increases at or below the lower warming range (i.e., an increase of no more than 5.5°F). However, even if emissions are substantially reduced, research indicates that some climatic changes are unavoidable. Although not the solution to global warming, plans to cope with these changes are essential.

Reducing Heat-Trapping Emissions

Reducing heat-trapping emissions is the most important way to slow the rate of global warming. On June 1, 2005,

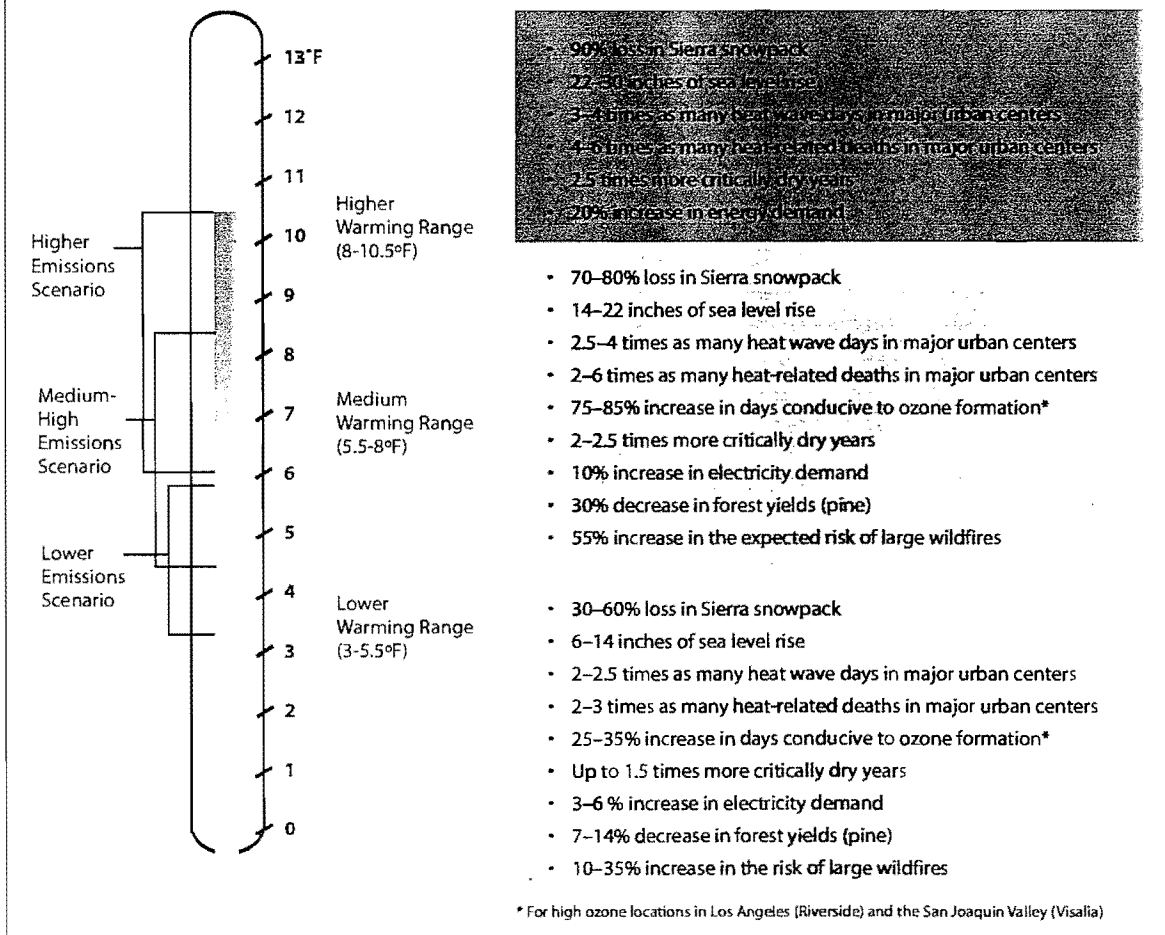
California's actions
can drive global
progress to address
global warming.

Governor Arnold Schwarzenegger signed an executive order (#S-3-05) that sets goals for significantly lowering the state's share of global warming pollution. The executive order calls for a reduction in heat-trapping emissions to 1990 levels by 2020 and for an 80 percent emissions reduction below 1990 levels by 2050. These emission reduction targets will help stimulate technological innovation needed to help transition to more efficient and renewable transportation and energy systems.

Coping with Unavoidable Climatic Changes

Because global warming is already upon us, and some amount of additional warming is inevitable, we must prepare for the changes that are already under way.

Summary of Projected Global Warming Impact, 2070–2099 (as compared with 1961–1990)



Preparing for these unavoidable changes will require minimizing further stresses on sensitive ecosystems and implementing management practices that integrate climate risks into long-term planning strategies.

California's Leadership

California has been a leader in both the science of climate change and in identifying solutions. The California Climate Change Center is one of the first—and perhaps the only—state-sponsored research institution in the nation dedicated to climate change research, and other state agencies such as the Air Resources Board support similar research. Continuing this strong research agenda is critical for developing effective strategies for addressing global warming in California.

The state has also been at the forefront of efforts to reduce heat-trapping emissions, passing precedent-setting

policies such as aggressive standards for tailpipe emissions, renewable energy, and energy efficiency. However, existing policies are not likely to be sufficient to meet the ambitious emission reduction goals set by the governor. To meet these ambitious goals California will need to build on its legacy of environmental leadership and develop new strategies and technologies to reduce emissions.

California alone cannot stabilize the climate. However, the state's actions can drive global progress. If the industrialized world were to follow the emission reduction targets established in California's executive order, and industrializing nations reduced emissions according to the lower emissions path (B1) presented in this analysis, we would be on track to keep temperatures from rising to the medium or higher (and possibly even the lower) warming ranges and thus avoid the most severe consequences of global warming.

By reducing
heat-trapping
emissions, severe
consequences
can be avoided

The full text of the Climate Scenarios analysis overview report, and the core scientific papers that comprise this analysis, are online at www.climatechange.ca.gov. The scientists that participated in this effort are:

July 2006
CEC-500-2006-077

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Support was provided in part by the California Energy Commission and the California Environmental Protection Agency. The material contained in this document does not necessarily represent the views of the funding agencies or the State of California.



Attachment 2

From the Modesto Bee
May 3, 2007

Concerns about climate change stand to reshape Modesto's future environmental impact reports under a policy the City Council approved Monday.

By a 4-3 vote, the council expanded an ongoing update of Modesto's primary planning document to incorporate references to global warming.

The move is targeted at complying with a 2006 state law that requires reductions in emissions that contribute to global warming, such as carbon dioxide.

Smaller cities in Stanislaus County, such as Hughson and Waterford, addressed aspects of global warming in recent revisions to their general plans, the documents that describe where and how the communities can grow.

Their general plans now encourage builders to develop energy-efficient homes, plant trees and create walking-friendly neighborhoods.

The work that Modesto approved piggybacks on a \$937,280 contract the council awarded in September to bring the city's general plan and master environmental impact report into compliance with new studies that describe demands on roads, sewers and storm drains.

Patrick Kelly, planning division manager, said including the global warming study would add about \$11,500 to the contract.

Council members Janice Keating, Will O'Bryant and Kristin Olsen voted against incorporating the climate change discussion into the general plan update.

They argued that it made more sense to consider climate change when the city completely revises the general plan, a task the city is expected to undertake soon after it completes the more limited contract it launched in September. Also, the state has not detailed what it expects of local governments under the climate change law.

Mayor Jim Ridenour joined Councilmen Bob Dunbar, Brad Hawn and Garrad Marsh in voting to include the climate change discussion in the update.

They said they favored moving to comply with the state law because doing so would strengthen the city's planning documents against potential environmental challenges.

Kelly said incorporating evaluations of global warming into planning documents could raise questions about air quality and water resources. It isn't clear how climate change would affect the San Joaquin Valley, but some water suppliers anticipate collecting less snowfall while receiving more rain, which stands to change the state's water delivery systems.

Bee staff writer Adam Ashton can be reached at aashton@modbee.com or 578-2366.

Chapter 5: Working with Climate Change

Beyond these five guiding principles there is specific work that you can be doing to ensure your projects and planning are relevant to a future climate change. The following sections are devoted to important planning areas where we need to start taking climate change impacts seriously. Each section describes the possible impacts of climate change, what leaders need to be taking into account in their planning, as well as a wide range of questions, studies, and models that you can use to increase the effectiveness of your work. This is not an exhaustive list and different studies will be called for at different times. However, it is important, whatever table we are sitting at, to take the lead in bringing climate change into the planning processes—if we don't it is highly unlikely that anyone else will.

Hydropower Relicensing (PPB 20)

"If we want to effectively protect against environmental degradation caused by global climate change, locking in new 30-year FERC licenses based on the status quo does us no good. Relicensing stakeholders must look ahead and anticipate operational and environmental challenges in order to structure creative and flexible solutions to future climate scenarios."

Laura Norlander,

Director, California Hydropower Reform Coalition

What Hydropower Relicensing Leaders Need to be Thinking About

In the next 15 years, licenses for over 100 dams in the Sierra will expire. When the original licenses were issued decades ago by the Federal Energy Regulatory Commission (FERC), there simply wasn't the same understanding about how the natural processes of rivers worked. In many cases, the laws protecting the environment hadn't even been enacted. Now when existing hydro-dam licenses expire, local dam owners must obtain new licenses that comply with updated standards. This is a once-in-a-lifetime opportunity to improve the health of our rivers. The new licenses will last for 30-50 years and in that time climate change will be causing an impact throughout our watersheds. The FERC process is important because studies done to examine how the current projects have impaired natural ecosystems will form the basis for new improvements. It's imperative that the people who are working on negotiating FERC settlements demand that climate change impacts be taken into account in the studies leading up to relicensing.

Issues to Look at—Questions to Ask

- Flood management studies should model a variety of climate change scenarios (based on temperature changes of varying degrees) to illustrate flood flow impacts, identify potential changes to current dam operations, and facilities that could minimize negative impacts to the watershed and surrounding communities.

- Fisheries above dams and in reservoirs behind dams frequently depend on cold water inflow and a cold water pool. With inflow from snowpack and rain potentially coming at earlier times of the year, studies may be needed to examine different management practices to protect or maintain cold water fisheries.
- Fisheries downstream from dams frequently depend on cold water releases from dams at certain critical times in their life cycles. Studies may be needed to ensure that there will be enough cold water for releases at the appropriate times to maintain fishery health.
- There should be a systematic re-examination of engineering design criteria and operating rules for existing dams and reservoirs under varying climate change conditions.
- Increased use of forecasting tools for water management should be encouraged. This can help reduce damage associated with extreme events.
- All climate change studies should model various scenarios based on water year types. You also need to keep in mind that more rain earlier increases the risk of accidental spillage, which needs to be planned for so that ecosystems don't become unnaturally flooded. Perhaps this is a good thing, since dams typically stifle natural flow events- we don't really know.
- How will existing mitigation strategies like fish ladders, screens, or hatcheries be affected by climate change?

Watershed Assessment, Restoration, and Protection

"Climate, in large part, drives the character of our watersheds and landscapes, and it is changing, perhaps faster than we care to believe. To keep from being overwhelmed by this change we should look to manage our watersheds to accommodate change."

*Stefan Lorenzato, Statewide Watershed Coordinator,
California Department of Water Resources*

What Watershed Leaders Need to be Thinking About

With higher temperatures and changes in the snowpack expected, the watersheds of the Sierra are particularly vulnerable to the impacts of climate change. When discussing watershed management and restoration and when prioritizing projects, it will be important to consider future climate change impacts and build adaptive management strategies into your plans. Restoration projects need to have a reasonable chance of success based on a range of climate change projections (i.e., under future projected flow regimes based on climate change modeling), and management plans need to be designed to manage watersheds pro-actively over time rather than in a piecemeal, reactive fashion. It will be essential to coordinate monitoring efforts with as many stakeholders as possible. This will improve data and encourage the shared use of weather, climate, and hydrologic modeling to aid understanding of water-related impacts and management strategies.

Restoring and maintaining watersheds (for example, by restoring appropriate vegetation) can be an important integrated strategy for adapting to climate change impacts. Such activities, if successful, can reduce sediment loads, limit flooding, and reduce water temperatures – all of which can help mitigate potential negative impacts of climate change effects on the watershed. (PPA 21) (PPB 21,22)

Potential Impacts of Climate Change on Watersheds (PPB 23)

- Warmer climates and less water in the summer time will affect riparian-dependent organisms and ecosystem functions.
- Rising temperatures in surface waters are likely to force out some cold water fish species like salmon and trout that are already suffering from drastically reduced habitat. Increasing temperatures also reduce dissolved oxygen in water, which negatively affects ecosystem and fish health.
- The collapse of the usual winter storm systems and expansion of summer by two months will lead to drier soils, which in turn, will lead to decreased summer flows, more stress on vegetation, and a decrease in groundwater recharge.
- In saline lakes on the east side of the Sierra, variations in total runoff may affect the health of lakes as more fresh water enters the system.
- More frequent higher in-stream flows will transport larger volumes of sediment more frequently. This will alter the geomorphology (the shape, slope, size, and flow) of rivers and streams, resulting in greater deposition and bigger downcuts. Habitat quality and quantity may change along with channel stability.
- Rising water temperatures and changes in ice cover brought about by climate change are of particular importance to the ecology of lakes, streams, and their biological communities in the Sierra. Such changes are likely to affect how ecosystems function.

Issues to Look At—Questions to Ask (PPB 24)

- How will climate changes affect groundwater aquifers, including quality, recharge rates and flow dynamics?
- How will projected vegetation changes affect water supply as we go through climate change?
- Will special aquatic features, such as springs, fens, and meadows be viable under future climate conditions?
- Regional climate models need to be localized to establish as clear a picture as possible of what will happen to local watersheds.
- Flow gauges may need to be added to tributaries of major watersheds to provide more detailed baseline information for use in comparing and forecasting future climate change flow impacts.
- Reservoirs: How will changes in inflow alter the temperature profile of the reservoir and the temperature of reservoir water releases? What impact might projected temperature alterations have on downstream fisheries – especially regarding the timing of cold water releases needed for spawning?
- Studies regarding the cumulative effects of current restoration efforts in light of climate change projections may be needed.. This will give context to future potential planning efforts and will help ensure that future actions have a high chance of success.

Fish Restoration

"We need to adaptively manage our fisheries so they can sustain themselves in a changing world. We have to ensure that, despite climate change impacts, there will be healthy habitat available to maintain the diverse fish of the Sierra."

*Tom Martens, editor at large,
California Fly Fisher Magazine*

What Fish Restoration Leaders Need to be Thinking About (PPB 25)

For thousands of years, wild salmon and trout have survived in highly variable and unpredictable environments by evolving diverse behaviors that enable them to inhabit a wide variety of streams, estuaries, and the open ocean. With higher air and water temperatures, and likely changes in stream flows, climate change will bring even more uncertainty to the viability of various environments for salmon and Steelhead trout. Such changes are likely to further threaten already declining habitat for these species and others.

Potential Impacts (PPB 26)

- Experts project that temperatures will increase substantially under future climate change conditions and spring snowpack in the Sierra Nevada will decline between 25 to 40 percent. This will affect the timing and quantity of stream flow that will, in turn, affect fishery's habitat.
- Climate change may affect the vegetation growth necessary for fishery habitat. Scientists project that changes in riparian vegetation and upland vegetation will affect nutrients in the watershed that, in turn, may change and affect species dynamics.
- More extreme storms and higher flows at certain times of the year could cause channel erosion and could deposit sediment that could change the geomorphology of certain river reaches and affect critical spawning habitat.

Issues to Look at—Questions to Ask (PPB 27)

- How will climate change alter the hydrology of a particular watershed?
- How will sediment transport dynamics be affected by projected climate change impacts in your watershed?
- What will temperatures be like under different climate change scenarios? Can fish survive under those conditions? How do time and temperature specific changes impact specific life cycle needs?
- How will new groundwater pumping demands (due to projected changes in surface flow) affect stream flows and temperatures?
- Will changing temperatures encourage invasive fish species and predators? How will climate change impacts affect changes in fish communities?
- Will higher temperatures encourage disease in fish populations?

Forestry

"If we take proactive measures now to actively manage forest density, substitute thriving tree species for failing species, and salvage trees during dieback, we may be able to minimize the negative ecological and economic impacts of climate change over the next century on U.S. forests."

*Carole Kennedy Watershed Program Manager,
Forest Soil Scientist, Tahoe National Forest*

What Forestry Leaders Need to be Thinking About (PPB 28)

The wide-range of natural ecosystems in the Sierra Nevada support thousands of plant and animal species. Projected increases in temperature and fire frequency resulting from climate change will likely cause rapid changes in vegetation distribution. This has serious implications for ecosystem health and species diversity (UCS). Increases in "disturbances," such as wildfire and pests in particular, can damage or kill large sections of forest, effectively "wiping the slate clean" for a new forest with different constituents. In a changing climate, however, there may not be any nearby trees suitable for establishing a new forest; the slate may stay clean in some areas. (Mote)

In addition to managing forests for overall ecosystem health in the face of climate change, forest protection is also critical to reducing the effects of greenhouse gases.

Potential Impacts (PPA 22) (PPB 29,30)

- Alpine and sub-alpine vegetation will likely be displaced as mixed evergreen conifer forests extend their range upward in elevation. Losses of alpine and sub-alpine vegetation cover could reach 40-50 percent before 2050 and 60-80 percent by 2100.
- Throughout much of the northern part of the Sierra Nevada, forest composition will likely change from evergreen conifer forests (dominated by Douglas fir and white fir) to mixed evergreen forests (dominated by tan oak, madrone and live oak).
- Scientists expect warmer temperatures and drier conditions in most inland areas, including the Sierra Nevada, to increase fire frequency, leading to likely displacement of shrub-lands and woodlands by grasslands.
- Increased fire and drought are likely to lead to the type of environment ripe for the invasion and spread of introduced species.
- Insects and pathogens, by virtue of their mobility and short reproduction times, can respond to climate change much more rapidly than tree populations. As a result, insects and diseases are likely to cause some of the early impacts of climate change on forests.
- There will likely be a differential movement of species in response to climate change, leading to a forest that looks different than today's.
- Drier soils will make it harder for seedlings to get started and big trees to grow, except at the highest elevations.

Issues to Look at—Questions to Ask (PPB 31)

- The prominent role fire plays in the projections suggests that more work needs to be done assessing changes in fire risk and the associated impact on property, air quality, and ecosystems.
- Studies should investigate opportunities to restore native forests on historically forested lands with appropriate consideration for the ecosystems and economies that currently exist—this could potentially provide significant carbon storage at a relatively low cost.
- Studies should be done to illustrate how forests can be used as temporary carbon sinks.
- Studies will also be needed to investigate the role of various fuel reduction strategies, including prescribed natural burns and projected climate change effects.
- Ground-truthing of regional predictions for particular local forests will be needed in order to set priorities.

Flooding

“Climate Change has the potential of affecting a wide variety of water resource elements. These range from water supply, hydroelectric power, sea level rise, more intense precipitation events and larger floods, water use, and a number of miscellaneous items which include water temperature changes.”

*Maury Roos, State Hydrologist,
California Department of Water Resources*

What River/Flood Leaders Need to be Thinking About (PPB 32)

Old assumptions based on the climate of the past—especially those concerning the probability, frequency, and severity of floods—should be carefully re-evaluated in the light of climate change projections.

Potential Impacts (PPB 33)

- More precipitation will likely fall as rain, and snowpack will develop later and will melt earlier.
- Flooding potential will increase in the winter and early spring and decrease later in the spring, causing more water shortages in summer.
- Heavier flows will likely overload storm and wastewater systems and could damage water and sewage treatment facilities, mine tailing impoundments, and landfills, increasing the risk of contamination and accompanying impacts on human health.

Issues to Look at—Questions to Ask (PPB 34)

- Watershed studies are needed that show the impacts of increased rain and altered timing of snowmelt on potential erosion and slope failure.
- Impacts to reservoir management issues; operating procedures and rule curves of reservoirs will have to change (for more on reservoirs, see sections on Hydropower Relicensing).
- Systematic re-examination of engineering design criteria and operating rules of existing dams and reservoirs under varying climate change conditions.
- Water districts and agencies will need to increase the use of forecasting tools for water management. This can help reduce damages associated with extreme events.
- Studies to ensure that the current “year-class” concept works.
- If floods come more often, what will the cumulative damage be to levees—will levee foundations be under pressure more often and, therefore, be weakened faster? Will there be a loss of foundation strength?
- We need studies evaluating the existing levee system and its ability to hold additional floodwaters under different climate change projections.
- Studies need to be done to evaluate the relative costs and benefits of new floodplain development and to ensure that critical infrastructure is not situated in the floodplain.

Land Use Planning

“We’re already seeing the impacts of climate change on the ecosystems of the Sierra. We need to address these changes in all our current and future land use planning decisions to make sure that we protect our economic and ecological future for generations to come.”

Terry Watt, Planning Consultant

What Land Use Leaders Need to be Thinking About (PPB 35)

New development is occurring rapidly throughout the Sierra. Ensuring that planners consider new development in the light of climate change projections will be important. Conflicts over land and water that pit the needs of new development against the need to maintain healthy natural ecosystems may be exacerbated by climate change impacts. We need to prepare for the consequences of climate change through careful planning and investments in adaptation strategies.

Potential Impacts (PPB 36)

- Wildlife that depend upon a particular location for some or all of their life cycles (like Sierra Nevada Bighorn Sheep) will quickly decline as the nature of their place changes.
- Wildlife corridors, which often occur along waterways, will degenerate causing in-breeding and loss of access to food.
- Costs for protecting endangered species will skyrocket as food sources and protective cover change and move.
- Climate change impacts will break up ecosystem community coherency.

Issues to Look at—Questions to Ask (PPB 37)

- Studies of different water conservation and efficiency efforts and their effectiveness in reducing water demands—as a means of potentially mitigating changes in flow and water availability.
- Investigation of more efficient water delivery methods that minimize waste and increase water conservation capabilities.
- Further research is needed on the effectiveness of potential adaptation strategies, such as the flexibility to transfer water across basins and water users and to integrate the use of surface and groundwater, to get water where it is needed most.
- Improved management of urban development should be looked at to help reduce habitat fragmentation. Studies are needed to identify the sites of migration corridors to help some species move to more suitable locations.
- Explore greater use of reclaimed water.
- Water pricing and market mechanisms need to be pro-actively examined as ways of increasing efficiency of water use.
- The effects of planting less water-demanding crops and landscaping should be studied as well as investigating more efficient agricultural irrigation methods.
- Studies are needed to investigate mechanisms to reduce soil moisture loss.
- The reuse of municipal wastewater, improvement of management of urban stormwater runoff, and the collection of rainwater for local use all need to be studied as ways of enhancing urban water supplies.
- Studies are needed to examine potential changes in water supply and demand in long-term planning and infrastructure design.
- In rural areas basic infrastructure (i.e. culverts, irrigation ditches, etc.) should be re-examined to take future climate change impacts into account.
- Seasonal forecasting should be encouraged to manage water better at the watershed level.
- We need to develop a shared information resource; (i.e. a regional water management database that could improve cooperation among federal, state, and academic communities).
- Agencies should explore opportunities to enhance urban groundwater recharge.

Joyce Techel

From: "Joyce Techel" <jaytee@caltel.com>
Sent: Wednesday, May 09, 2007 8:45 PM
Subject: Fw: No response needed --climate change issues in General Plans

Subject: FW: climate change issues in General Plans

fyi

Climate change added to Modesto planning

Concerns about climate change stand to reshape Modesto's future environmental impact reports under a policy the City Council approved Monday.

By a 4-3 vote, the council expanded an ongoing update of Modesto's primary planning document to incorporate references to global warming.

The move is targeted at complying with a 2006 state law that requires reductions in emissions that contribute to global warming, such as carbon dioxide.

Smaller cities in Stanislaus County, such as Hughson and Waterford, addressed aspects of global warming in recent revisions to their general plans, the documents that describe where and how the communities can grow.

Their general plans now encourage builders to develop energy-efficient homes, plant trees and create walking-friendly neighborhoods.

The work that Modesto approved piggybacks on a \$937,280 contract the council awarded in September to bring the city's general plan and master environmental impact report into compliance with new studies that describe demands on roads, sewers and storm drains.

Patrick Kelly, planning division manager, said including the global warming study would add about \$11,500 to the contract.

Council members Janice Keating, Will O'Bryant and Kristin Olsen voted against incorporating the climate change discussion into the general plan update.

They argued that it made more sense to consider climate change when the city completely revises the general plan, a task the city is expected to undertake soon after it completes the more limited contract it launched in September. Also, the state has not detailed what it expects of local governments under the climate change law.

more from the Modesto (CA) Bee

posted by kern webmaster @ 12:07 PM 0 comments

No virus found in this incoming message.

Checked by AVG Free Edition.

Version: 7.5.467 / Virus Database: 269.6.6/794 - Release Date: 5/8/2007 2:23 PM

5/29/2007

Attachment 4

Some Background on Peak Oil

Source: The Community Solution (www.communitysolution.org)

Q: What is Peak Oil?

A: Peak Oil is the point in time when, on a worldwide basis, we will be extracting the most oil per day from the ground that we ever will. Before Peak Oil we were not extracting as much, and after Peak Oil we will not be extracting as much. Peak Oil is the point in time of maximum extraction.

Q: Why should I be concerned about Peak Oil?

A: Peak Oil represents a profound change in the conditions that have allowed economic growth to proceed over the years. In the past few decades, there has been enough oil to meet demand because the supply has been growing at the same time demand has been growing. This will no longer be true after Peak Oil. Demand will not be met as supplies dwindle and oil prices will rise. Other energy sources will not be able to do for us what oil did.

Q: Will this just mean higher prices at the pump?

A: Higher prices at the pump will certainly be one consequence. But oil is so ingrained in the way we live that the implications will go well beyond higher gasoline prices.

Think about the implications of a higher price at the pump. Factor in that the average distance food travels in the U.S. from where it is made to where it is consumed is 1,200 miles. When it costs more for fuel, it will cost more to move food. When it costs more to move food, food prices will go up. Also, when it costs more for fuel, it will cost more to operate tractors, combines and other farm machinery. If it costs more to operate farm equipment, the price of food will go up.

Furthermore, if it costs more to manufacture widgets because it is more expensive to deliver the raw materials to the factory, the price of widgets will go up and people will buy fewer widgets. The widget factories won't be able to justify having as many workers and will let many go. People will have lost their jobs at a time when food is more expensive than ever.

This is only scratching the surface of possible implications. Peak Oil will affect every aspect of global industrial society that uses energy directly or indirectly. The price of gasoline is one small part of the picture.

Q: Does the arrival of Peak Oil mean we are running out of oil?

A: No. It means we have extracted about half of the oil we ever will—about one trillion barrels out of a total two trillion barrels that the Earth has provided us. It also means we have extracted most of the easy-to-get-at stores of oil. It is a warning sign that oil extraction on a large scale cannot continue forever, and that society will have to get along with less oil in the near future.

Q: If half of the oil that ever existed is still in the ground, and demand for oil is rising now, why can't we keep increasing oil extraction?

A: The oil that remains will not be as easy to get at as the oil we have taken so far.

Oil reservoirs are not like tanks that can be easily emptied. They are more like sponges. (Picture using a straw to extract all the water from a sponge!) Extracting oil depends on pressure inside the reservoir to force the oil out. This works well enough when the reservoir is first tapped, but as pressure decreases, the pressure needs to be maintained. Sometimes this is done by injecting seawater or carbon dioxide. However, forcing the oil too much can damage a reservoir and reduce the overall amount that can be extracted. One can never extract all the oil from a reservoir (or water from a sponge by using a straw). There always comes a point when more effort is put into extracting the oil than is economically justifiable.

Here's another way to think about it: Oil production is subject to the law of diminishing returns. Initial efforts yield a lot of oil easily, but later efforts become more and more inefficient (you get less output for your effort), until the point arrives when it's not worth putting more effort into it. Harvesting a jar of peanut butter is also subject to the law of diminishing returns. It's easy to get it out at first, but as you dig deeper you don't get as much peanut butter with each spoonful. There comes a point when you're putting in a lot of effort scraping peanut butter off the sides of the jar and getting very little for your trouble. At some point you discard the jar, even though there may be a spoonful or two left.

Q: When will Peak Oil occur?

A: According to the extensive reserve and depletion analyses by petroleum geologists and oil exploration scientists in the Association for the Study of Peak Oil and Gas (ASPO), Peak Oil will occur around 2008. (www.peakoil.net)

Q: What will the history of oil extraction look like?

A: The history of oil extraction will resemble a bell curve, with its uppermost point occurring in or near the year 2008.

Q: Why is oil production described by a bell curve and a peak? Why isn't it linear or some other shape?

A: The bell curve is a common shape for the extraction of many resources.

Production started out in the late nineteenth century when the first discoveries of oil led to a few wells being drilled. Interest in oil extraction increased as people realized how useful it was and as economies around the world began to feed off of oil and grow. More and more oil was discovered and the rate of extraction increased.

After a point in the mid-1960s, oil discoveries started slowing down. (The year 1964 was a peak – not in production, but in discovery.) This wasn't because people stopped looking, but because the oil that was left was harder to find – even with the use of advanced technology. All of the largest, easiest-to-exploit oil fields had already been discovered. Every year we discover less than the year before. Since discoveries came to a maximum point and have dwindled and we have been actively harvesting those discoveries, oil production must also come to a maximum point and dwindle.

Because we can still squeeze more oil out of existing reservoirs, and we do still discover tiny additional reservoirs, oil production will not fall off a cliff and stop all of a sudden. It will gradually slow down when the easier-to-get oil has been extracted and the smaller oil fields and the harder-to-get oil become the supplies we are exploiting.

Q: Aren't we discovering more oil all the time?

A: Yes, but not enough to keep up with what we're using. Worldwide discovery peaked in 1964. Every year after that, we have discovered less than the year before. We are now using about five barrels of oil for every one barrel we discover.

Think of the oil we have discovered as a savings account, or better yet, an inheritance, but we're not earning any interest on it (the amount of oil that is actually in the reservoirs does not increase). We have a certain amount of money (oil) available to use, say \$100,000. We spend \$5,000 per month, and earn \$1,000 per month (new discoveries add more oil to our "account"). This obviously can't go on forever. We have a net deficit of \$4,000 per month. At this rate, the \$100,000 will only last for 25 months. We have another problem, however. We're not using the money (oil) at a constant rate. As the population grows and people try to emulate the lifestyle of the United States, the demand for oil is increasing rather than staying constant.

Q: What is the difference between extraction and production?

A: Extraction refers to the removal of the oil from the ground. Production refers to the entire process of extracting, refining, and using the oil.

Q: What are some of the consequences of Peak Oil?

A: Countries will likely experience conflict internally and externally. There is a strong chance that wars will take place to decide who will control the remaining oil.

As long distance transportation for food and other important goods becomes too expensive and energy intensive with declining oil supplies, local communities will have to become more self-reliant and self-sustaining. In effect, the process of globalization will reverse as a massive economic re-localization effort begins out of necessity.

Peak oil will call into question our growth-based economic system. Thus the rising standards of living to which we have become accustomed may actually begin to decline after the peak. At the same time we believe that our quality the life may actually rise as people become more interdependent and cooperative within their local communities.

Q: What will happen as Peak Oil occurs?

A: Oil prices will start to go up. Any goods that are produced with the help of oil will become more expensive.

Q: What will happen after Peak Oil occurs?

A: As the global supply of oil begins to fall below the world's rising demands, there will be a shortage. Oil prices will go up exponentially. For example, just a few years ago in California a 5 percent shortage in natural gas led to a 400 percent price increase.

Because oil is used to transport the goods of our consumer society from all over the nation and globe, the price of most products will also go up. Food prices will be the most evident as food spending as a percentage of income rises.

Furthermore, because energy prices and the economy are so closely linked, an economic recession will be the most likely consequence. Rising national and consumer debt, increased unemployment, and increased social unrest will all follow.

As we acclimate ourselves to a world of scarce oil, the use of oil for non-essential purposes will decrease dramatically. Miles driven will decrease and people will drive more fuel efficient vehicles. People will use less oil directly and indirectly because they cannot afford it. Living in a suburb will become more difficult since cars won't be able to be used as much to get around. Families will likely spend more time with each other. There will be an increasing interest in organic farming out of necessity as food prices continue to escalate.

Oil production will decrease steadily each year until it is all gone in about 40 years. There will still be oil left but it will be too costly to get it out – that is, it may take more energy to get it out than it contains. The oil interval in human history will be over.

Q: We have enough oil to last 40 or 50 years. What's the problem?

A: Though we will still be extracting oil for another 40-50 years, every year after the peak our oil production and consumption will decline further. Keep in mind too that the quality of the remaining oil is not as good as the first half of the oil we extracted. Peak Oil will bring tremendous changes to a world that is not only dependent upon oil but is dependent upon ever increasing amounts of oil. Peak Oil represents the onset of a fundamental change in our way of life. At the point when oil is basically gone, industrial society as we know it will be gone.

Also keep in mind that even if oil production could be maintained at current levels for 40-50 years, that is not a long time to come up with alternative arrangements!

Q: What is per capita oil production and what significance does it have?

A: The amount of oil available per person is per capita oil production. The amount of oil produced per person began declining in the late 1970s. If world population had remained constant, we would now have more oil available per person. But because the world population is rapidly increasing, there is less oil available per person today than there was in the early 1970s.

This leads to the observation that some populations, such as that of the United States, use more than their fair share of oil on a per capita basis. U.S. citizens use twenty times the oil of the average world citizen; Europeans use fifteen times the oil of the average world citizen.

Q: What is "energy returned on energy invested" (EROEI)?

A: When considering the use of any energy source to replace oil, an important concept is that of energy return on energy invested (EROEI). Energy resources are exploited at a cost. In other words, one needs to use energy to get energy. EROEI is the ratio that measures this. If the ratio is less than one—that is, if it takes more energy to get an energy source (such as oil from the ground) than is in the energy source, there is no benefit to extracting it.

People exploit the resources that are easiest to access first, and only exploit the resources that are hard to get at later on. Thus, as the age of cheap oil draws to a close, the remaining energy resources available to exploit are naturally the ones that are not as easy to access and use. Any substitution for oil will involve using a fuel of lower energy density and/or lesser convenience.

Q: I heard that the U.S. has 200 years of coal left, so why can't we just replace the oil with coal?

A: It is not meaningful to speak of a certain number of years left re: coal because that assumes a constant demand between now and then. If coal were to replace oil then it would last closer to 50 years than 200. Importantly, while coal can be used for some applications that oil is currently used for, oil is the best fuel for transportation. It would be impractical to power cars with coal.

Since coal has less energy stored in the same amount of mass than oil, more coal (by weight) is needed than oil to provide the same amount of power. Indeed, the railroad industry moved away from coal-fired steam engines to diesel-electric locomotives because an engine that uses petroleum-based diesel fuel is inherently more efficient.

Because the energy density of coal, roughly speaking, is about half that of oil, one would need coal weighing approximately twice as much as the equivalent amount of gasoline in order to power the car. That would be equivalent to about 12 pounds of coal for every one gallon of gasoline, which weighs about 6 pounds. And even then, while twice as much coal contains about the same amount of energy as gasoline, it does not burn as hot as gasoline does, so the equivalent amount of coal would not provide the equivalent horsepower to gasoline burned in a car's engine.

Concerns continue to mount over the sulfur and carbon oxides that are released when coal is burned. These chemicals fall back to the earth as "acid rain" and accumulate in bodies of water often killing all plant and animal life. The acidification of lakes and rivers in the Northeastern U.S. from Midwestern coal plants is well-documented.

Over the past decade a scientific consensus has developed on the issue of global climate change. Carbon dioxide released from coal plants is a major contributor to the accumulation of "greenhouse gases" in the atmosphere. These gases trap additional heat that usually escapes from the earth. An overall heating trend can cause erratic temperature changes and extreme weather events.

Q: What about hydrogen?

A: There are no reserves of hydrogen gas that can be pumped. Hydrogen has to be manufactured. Manufacturing hydrogen, like manufacturing anything else, takes energy.

Think of hydrogen like electricity. You cannot mine electricity from the ground—you have to create it. To create it, you have to convert a source of energy into electricity.

Oil, natural gas, solar radiation, and coal are examples of energy sources. They can be mined or collected and used directly. Electricity, hydrogen, and disposable batteries are examples of energy carriers. They cannot be mined. They have to be created by using energy sources.

Whenever energy is converted from a source to a carrier, energy is lost. (This phenomenon is described by the second law of thermodynamics.) This means that more energy goes into making electricity than is delivered on the other end of the transmission line. More energy goes into making batteries than is collected from the battery. The same is true of hydrogen.

It is always more efficient to use oil, natural gas, solar radiation, or coal directly than to turn it into electricity. But it is not always more convenient or useful.

Most hydrogen produced today is made by stripping the hydrogen from natural gas molecules (they have one carbon atom and four hydrogen atoms) in a process called steam reformation. High temperature steam reacts with the natural gas in the presence of a catalyst. In addition to supplying the hydrogen, natural gas is often burned in order to create the high temperature steam. Increasing use of natural gas at a time when natural gas demand is increasing and natural gas is on its way to peaking just like oil is foolhardy.

Because of its limitations, hydrogen cannot live up to the high hopes politicians hold for it. Talking about the "hydrogen economy" will keep people from dealing with the real issues. The boom associated with oil and natural gas will soon be over.

Q: What about using ethanol made from corn as a substitute for gasoline?

A: In order to consider the potential benefit from the production of ethanol, one needs to consider how much energy went into creating the ethanol. The farming of today uses a great deal of energy from oil to grow the crops we have. If we use just as much or more energy to make the ethanol than we get out of the ethanol, then there is no benefit to making it. This turns out to be the case. Plus, one must consider how much farmland it would take to grow the crops.

Q: We'll simply develop alternative sources of energy to keep the economy going. This won't be so difficult, will it?

A: Oil is the most concentrated and convenient source of energy available to us. It is high quality energy that burns hotter than coal and wood. Energy from oil and other fossil fuels is not susceptible to the vagaries of weather in the way that energy generated from wind and photovoltaic panels is.

Alternative sources of energy are often used to make electricity, and the energy density of batteries to store the energy does not compare with the energy density of oil. (Batteries provide hundreds of watt-hours per kilogram at best compared to 13,500 Wh/kg for gasoline.) This means that it will take more weight in batteries to do the same work as a certain amount of oil.

Alternatives can provide energy, but not in the amount it takes to satisfy the growing consumption of global industrial society. This means that it will be impossible to maintain the same level of energy use we currently have.

Q: How will we know when we've arrived at the peak?

A: It won't be possible to tell for sure when the peak occurs until after it actually happens. There are warning signs we can look for, however. If OPEC announces that they have no spare capacity, it is a good indication that they can no longer control world oil prices.

Q: Surely we'll find a technological fix to get ourselves out of this bind. Don't you think?

A: There is a difference between technology and energy sources. Technology has never invented a new material. (Except in bubble chambers) Technology is machines that use energy. New energy technology is an oxymoron. Energy comes from the earth in the form of wood, coal, oil, gas, uranium. Technology has only invented ways to use energy. A nuclear power plant is a container for uranium reacting. Also new technology normally takes more energy.

Q: Where can I find more information on Peak Oil?

A: You can view our Power Point presentations at <http://www.communitysolution.org/problem.html> for more details and some powerful graphs. Also, be sure to visit our resources page, which has a list of helpful books and websites.

Attachment 5

Text of the San Francisco Precautionary Principle Policy

Chapter 1 Precautionary Principle Policy Statement

Sec. 100. FINDINGS.

The Board of Supervisors finds and declares that:

A. Every San Franciscan has an equal right to a healthy and safe environment. This requires that our air, water, earth, and food be of a sufficiently high standard that individuals and communities can live healthy, fulfilling, and dignified lives. The duty to enhance, protect and preserve San Francisco's environment rests on the shoulders of government, residents, citizen groups and businesses alike.

B. Historically, environmentally harmful activities have only been stopped after they have manifested extreme environmental degradation or exposed people to harm. In the case of DDT, lead, and asbestos, for instance, regulatory action took place only after disaster had struck. The delay between first knowledge of harm and appropriate action to deal with it can be measured in human lives cut short.

C. San Francisco is a leader in making choices based on the least environmentally harmful alternatives, thereby challenging traditional assumptions about risk management. Numerous City ordinances including: the Integrated Pest Management Ordinance, the Resource Efficient Building Ordinance, the Healthy Air Ordinance, the Resource Conservation Ordinance, and the Environmentally Preferable Purchasing Ordinance apply a precautionary approach to specific City purchases and activities. Internationally, this model is called the Precautionary Principle.

D. As the City consolidates existing environmental laws into a single Environment Code, and builds a framework for new legislation, the City sees the Precautionary Principle approach as its policy framework to develop laws for a healthier and more just San Francisco. By doing so, the City will create and maintain a healthy, viable Bay Area environment for current and future generations, and will become a model of sustainability.

E. Science and technology are creating new solutions to prevent or mitigate environmental problems. However, science is also creating new compounds and chemicals that are already finding their way into mother's milk and causing other new problems. New legislation may be required to address these situations, and the Precautionary Principle is intended as a tool to help promote environmentally healthy alternatives while weeding out the negative and often unintended consequences of new technologies.

F. A central element of the precautionary approach is the careful assessment of available alternatives using the best available science. An alternatives assessment examines a broad range of options in order to present the public with different effects of different options considering short-term versus long-term effects or costs, and evaluating and comparing the adverse or potentially adverse effects of each option, noting options with fewer potential hazards. This process allows fundamental questions to be asked: "Is this potentially hazardous activity necessary?" "What less hazardous options are available?" and "How little damage is possible?"

G. The alternatives assessment is also a public process because, locally or internationally, the public bears the ecological and health consequences of environmental decisions. A government's course of action is necessarily enriched by broadly based public participation when a full range of alternatives is considered based on input from diverse individuals and groups. The public should be able to determine the range of alternatives examined and suggest specific reasonable alternatives, as well as their short- and long-term benefits and drawbacks.

H. This form of open decision-making is in line with San Francisco's historic Sunshine Act, which allows citizens to have full view of the legislative process. One of the goals of the Precautionary Principle is to include citizens as equal partners in decisions affecting their environment.

I. San Francisco looks forward to the time when the City's power is generated from renewable sources, when all our waste is recycled, when our vehicles produce only potable water as emissions, when the Bay is free from toxins, and the oceans are free from pollutants. The Precautionary Principle provides a means to help us attain these goals as we evaluate future laws and policies in such areas as transportation, construction, land use, planning, water, energy, health care, recreation, purchasing, and public expenditure.

J. Transforming our society to realize these goals and achieving a society living respectfully within the bounds of nature will take a behavioral as well as technological revolution. The Precautionary approach to decision-making will help San Francisco speed this process of change by moving beyond finding cures for environmental ills to preventing the ills before they can do harm.

Sec. 101. THE SAN FRANCISCO PRECAUTIONARY PRINCIPLE.

The following shall constitute the City and County of San Francisco's Precautionary Principle policy. All officers, boards, commissions, and departments of the City and County shall implement the Precautionary Principle in conducting the City and County's affairs:

The Precautionary Principle requires a thorough exploration and a careful analysis of a wide range of alternatives. Using the best available science, the Precautionary Principle requires

the selection of the alternative that presents the least potential threat to human health and the City's natural systems. Public participation and an open and transparent decision making process are critical to finding and selecting alternatives.

Where threats of serious or irreversible damage to people or nature exist, lack of full scientific certainty about cause and effect shall not be viewed as sufficient reason for the City to postpone measures to prevent the degradation of the environment or protect the health of its citizens. Any gaps in scientific data uncovered by the examination of alternatives will provide a guidepost for future research, but will not prevent protective action being taken by the City. As new scientific data become available, the City will review its decisions and make adjustments when warranted.

Where there are reasonable grounds for concern, the precautionary approach to decision-making is meant to help reduce harm by triggering a process to select the least potential threat. The essential elements of the Precautionary Principle approach to decision-making include:

1. Anticipatory Action: There is a duty to take anticipatory action to prevent harm. government, business, and community groups, as well as the general public, share this responsibility.
2. Right to Know: The community has a right to know complete and accurate information on potential human health and environmental impacts associated with the selection of products, services, operations or plans. The burden to supply this information lies with the proponent, not with the general public.
3. Alternatives Assessment: An obligation exists to examine a full range of alternatives and select the alternative with the least potential impact on human health and the environment including the alternative of doing nothing.
4. Full Cost Accounting: When evaluating potential alternatives, there is a duty to consider all the costs, including raw materials, manufacturing, transportation, use, cleanup, eventual disposal, and health costs even if such costs are not reflected in the initial price. Short- and long-term time thresholds should be considered when making decisions.
5. Participatory Decision Process: Decisions applying the Precautionary Principle must be transparent, participatory, and informed by the best available information.

Sec.102. THREE YEAR REVIEW.

No later than three years from the effective date of this ordinance, and after a public hearing, the Commission on the Environment shall submit a report to the Board of Supervisors on the effectiveness of the Precautionary Principle policy.

Sec. 103. LIST OF ALL ENVIRONMENTAL ORDINANCES AND RESOLUTIONS.

The Director of the Department of the Environment shall produce and maintain a list of all City and County of San Francisco ordinances and resolutions which affect or relate to the environment and shall post this list on the Department of the Environment's website.

Sec. 104. CITY UNDERTAKING LIMITED TO PROMOTION OF GENERAL WELFARE.

The Board of Supervisors encourages all City employees and officials to take the precautionary principle into consideration and evaluate alternatives when taking actions that could impact health and the environment, especially where those actions could pose threats of serious harm or irreversible damage. This ordinance does not impose specific duties upon any City employee or official to take specific actions. In adopting and undertaking the enforcement of this ordinance, the City and County of San Francisco is assuming an undertaking only to promote the general welfare. It is not assuming, nor is it imposing on its officers and employees, an obligation for breach of which it is liable in money damages to any person who claims that such breach proximately caused injury nor may this ordinance provide any basis for any other judicial relief including, but not limited to a writ of mandamus or an injunction.

Attachment 6

COUNTY OF AMADOR –

Mission and Values Statement

The Mission of Amador County is to provide leadership, accountability, and fiscal integrity to maintain a high quality of life for all our citizens.

It is the vision of Amador County to allow the elected Board, Commissions, appointed advisory committees, and departments to focus on their services through the following values:

- Amador County understands the importance of professional ethical standards and is dedicated to providing high quality services in a courteous and timely manner.
- Amador County strives to ensure the safety of our citizens and treat them with dignity and respect.
- Amador County strives to maintain an economical structure to ensure cost effective services.
- Amador County believes in working together through cooperation, partnership, and innovative means to resolve issues and provide services to our citizens.
- Amador County understands the need for protecting our environment, agricultural, historical, and open space areas.

The General Plan

The Nevada County General Plan is the long-term policy guide for the physical, economic and environmental future of the County. It is comprised of goals, objectives, policies, and implementation measures, which are based upon assessments of current and future needs and available resources, and which are intended to carry out the four central themes which are critical to the future of Nevada County and its quality of life.

The General Plan is a dynamic document because it is based on community values and an understanding of existing and projected conditions and needs, all of which are subject to change over time. It is the intent of the County that this General Plan provide both for a desirable degree of flexibility to be able to accommodate change in a beneficial way, and for a sound long-term foundation for development based on good planning principles that remain timeless.

The General Plan provides a basis to guide future decisions by County officials and other governmental agencies, as well as for residents, property owners, building developers, business establishments, and industries. The role of the General Plan is to provide the **framework for the future physical growth** of the County, and serve as the **foundation for land use decisions**. It expresses long term community development goals and embodies public policy related to the distribution of future land use, both public and private (General Plan Guidelines, OPR). Because it embodies public policy, it is intended to be used by County decision makers to review new development in order to ensure that such development will contribute to achieving the vision for Nevada County which is inherent in the General Plan.

The General Plan Philosophy

To facilitate and guide the development of the General Plan's goals, objectives, policies and implementation measures the Nevada County Central Themes were established. In four short statements the County sets the framework upon which the General Plan is based. In preparing the goals, objectives and policies, the Central Themes provided the basic direction and provided a standard by which the appropriateness of goals, objectives and policies were tested.

The Central Themes are:

Fostering a rural quality of life;

Sustaining a quality environment;

Development of a strong diversified, sustainable local economy; and

Planned land use patterns will determine the level of public services appropriate to the character, economy and environment of each region.

Supporting themes were defined to further articulate the vision of Nevada County's future. These supporting themes also became central to the preparation of goals and objectives, and have further served as guidance in the delineation of policies to set specific direction for the future physical development of the County. The supporting themes are:

Reduce dependence on the automobile by clustering future growth;

Encourage the creation and enhancement of communities by providing for diverse and viable centers for those areas;

Provide urban services only in areas with sufficient land use intensities or population densities;

Ensure that intensive growth will only be allowed concurrent with the provision of needed services, to include, participating in financing, public studies programs, phased construction projects, or phased construction projects that enhance public benefit.

Ensure the long term quality of natural resource values at the same time ensuring the sustainability of agriculture, logging and mining activities;

Minimize conflicts due to incompatible land uses.

Once the central themes and supporting themes were established, a set of statements expressing how the General Plan is to operate were developed. These statements expanded on the Themes.

- The General Plan is to **direct urban growth into *Community Regions*** that can effectively and economically provide urban types of services. Eventually, urban and suburban residents demand such amenities as paved streets, water and sewer services, and related facilities - urban services that cannot be extended to widely scattered homes and subdivisions.
- The General Plan is to **preserve the character of rural areas** - to prevent the "partial suburbanization" of rural and natural areas. This partial suburbanization creates permanent scattered low-density arrangements that can never be adequately or feasibly served. Many areas of the Sierra foothills are experiencing development and parcelization that is neither urban or rural, a blurring of patterns that creates permanent structural problems related to public services, safety, and environmental preservation.
- The General Plan is to **allow some margin of flexibility** in the plan as to specific land use arrangements within the *Community Regions* and *Rural Regions*; and to allow for a **moderate amount of growth** in the County. A moderate annual growth rate would allow the County to establish "concurrency" - this is so that the provisions of public services keep pace with new developments.

- The General Plan is to **preserve the natural environment** of the County. This includes the preservation of natural habitats, water resources, forests, mineral resources, and scenic qualities of Nevada County.

Based upon these planning principles, the General Plan divides the County into *Community Regions* and *Rural Regions*.

All portions of the County not included within a *Community Region* shall be considered to be within the *Rural Regions* of the County. Within these *Rural Regions*, growth is provided for only those types and densities of development which are consistent with the open, rural lifestyle, pastoral character, and natural setting which exists in these areas. *Rural Places* are established within the *Rural Regions* to recognize the existence of defined places as centers of activity for the surrounding rural areas, each containing some combination of residential or commercial uses. *Rural Centers* are intended to provide various supporting commercial uses for the *Rural Regions*. Minimum parcel sizes range from five acres to 10, 20, 30, 40 and 160 acres.

The *Community Regions* contain higher residential densities and provide for a broad range of residential, commercial, cultural, public, and quasi-public uses, located for convenience, efficiency, and affordability. These *Community Regions* should be compact, self-sustaining areas of more intensive development where such development can be served most efficiently and effectively with a full range of urban services and facilities, such as public sewer and water.

The range of land uses within the *Community Regions* would be more extensive and would include a full range of residential uses including single family and multiple family, commercial, industrial, public, educational, cultural, and recreational facilities. Residential densities would range from 1.5 acre lots down to four dwelling units per acre. Multiple family residential densities would have a maximum of twenty units per acre.

EXECUTIVE SUMMARY

California state government's sustainable building initiatives and programs clearly place the state at the forefront of the nation's green building movement. The state's leadership is evidenced by a diverse range of policy and program accomplishments, including the construction of the nation's first LEED Gold state owned office building; groundbreaking research showing that sustainable building is a cost-effective financial investment; the construction of the 10th University of California campus in Merced that will ultimately be the greenest campus in the world; the adoption by the UC Board of Regents of a systemwide *Green Building Policy and Clean Building Standard*, which will revolutionize the way the University builds buildings; and the construction of high performance K-12 schools with state school construction bond funds.

Sustainable buildings use key resources like energy, water, materials, and land much more efficiently than buildings that are simply built to code. They create healthier work, learning, and living environments, with more natural light and cleaner air, and are cost effective – saving taxpayer money. Investing in appropriate sustainable features on the front end of construction, such as dimmable lights and high efficiency HVAC systems, pays off during the life of the building, often many times over.

Two Executive Orders, issued by Governor Davis, launched California on the sustainable building road.

- Executive Order D-16-00, signed in August 2000, establishes the Governor's sustainable building goal: "to site, design, deconstruct, construct, renovate, operate, and maintain state buildings that are models of energy, water and materials efficiency; while providing healthy, productive and comfortable indoor environment and long-term benefits to Californians."¹
- Executive Order D-46-01, signed in October 2001, provides guidance on the process the Department of General Services will use to locate and lease space, including such considerations as proximity to public transit and affordable housing; preserving structures of historic, cultural, and architectural significance; opportunities for economic renewal; and sensitivity to neighborhood and community concerns.²

To help implement the Governor's sustainable building goals, the Secretary of the State and Consumer Services Agency, Aileen Adams, established the Sustainable Building Task Force (SBTF), a unique partnership of more than 40 governmental agencies. Members include the California Integrated Waste Management Board, the California Energy Commission, the Department of Health Services, the Department of General Services, the Air Resources Board, the University of California, the Community College system, and the Department of Finance. Over the past several years, this group has worked to use its

combined building, environmental, and fiscal expertise to integrate sustainable building into the state's capital outlay program, including several nationally recognized projects.

Building Better Buildings: An Update on State Sustainable Building Initiatives (Blueprint 2003) is the first in a series of progress reports on the state's sustainable building efforts. Specifically, the report highlights notable policy and program achievements; describes key Task Force partnerships; provides an in-depth look at several significant sustainable building projects; and details Task Force goals for the coming years.

Some of the Task Force's most significant accomplishments over the last two years include:

- Over \$2 billion of current state contracts for capital outlay design and construction projects now include energy efficiency and sustainable building performance criteria.
- The Education Headquarters Building (Block 225) of the Capitol Area East End Complex became the first state government owned building in the nation to receive the distinguished Leadership in Energy and Environmental Design (LEED) Gold Award from the US Green Building Council in January 2003.
- The pioneering economic analysis report, *The Costs and Financial Benefits of Green Buildings*, indicates that investing an additional 0 to 2% of a building's construction costs in sustainable building design measures upfront results in savings of 20% or more of those construction costs over the building's lifetime (assumed, conservatively, to be 20 years). In other words, an initial upfront investment of up to \$100,000 to incorporate green building features into a \$5 million project would result in a savings of \$1 million (in today's dollars) over the life of the building. This report, which has attracted national interest, is scheduled for release in October 2003.
- Last year the average energy use in state buildings was reduced by 20%. In particular, energy efficiency at the five building Capitol Area East End Complex exceeds Title 24 energy requirements by over 30% (42% at the Block 225 Education Building), resulting in nearly \$500,000 in energy savings annually. Other operations and maintenance best practices in state facilities focus on environmentally friendly cleaning product standards, building material emissions testing, and integrated pest management.
- An acre (50,000 square feet) of photovoltaic panels, the largest rooftop array on any state building, at the Franchise Tax Board Butterfield State Office Building, supplies nearly a half a megawatt (470 kWp) of electricity. This is enough electricity to power more than 400 homes in the Sacramento area.

- The University of California Board of Regents, with significant input from the Task Force, adopted a landmark, system-wide *Green Building Policy and Clean Energy Standard* to guide new construction and major renovation projects on the 10 UC campuses. This policy will impact over 20 million square feet of space slated for construction over the next ten years.
- The Chancellor of the University of California Merced, with support from the UC Merced “Red Team” chaired by the Secretary of the State and Consumer Services Agency, established a goal to construct the greenest campus in the country with an initial target of LEED Silver for all construction.
- Over 150 representatives from the public, private and non-profit sectors attended the UC Merced “Conference on Building and Operating Sustainable College Campuses in the 21st Century”. The conference was planned in large part by members of the Sustainable Building Task Force and supported by a grant from the U.S. Environmental Protection Agency.
- Thirteen high performance demonstration schools under construction throughout the state serve as models for the integration of high performance features into \$15 billion of bond funded school construction projects statewide.
- Five school districts in California, including the Los Angeles Unified School District, have adopted the high performance school construction guidelines established in the Collaborative for High Performance Schools (CHPS) *Best Practices Manual*. This Manual serves as a national model for high performance school construction and has also been adapted for use by the Federal Department of Energy and the State of Massachusetts.
- The Office of Library Construction included sustainable building design questions in bond funding applications for over \$130 million library construction dollars allocated during the first round of funding. Eight library projects, approved during the first funding cycle, will pursue LEED certification.
- The Division of the State Architect launched the Sustainable Schools Website to provide a comprehensive clearinghouse on sustainable school construction issues.
- A *Sustainable Facilities* category was added to the 2003 Governor’s Environment and Economic Leadership Awards, the most prestigious environmental award given by the state.
- The USC Marshall School of Business Women’s Leadership Board, a group of undergraduate students (both men and women), worked with the SBTF to develop a business school case study on the organizational process the SCSA used to integrate sustainability into the capital outlay process.
- The Department of General Services established a standard for the use of environmentally preferable cleaning products in state buildings.

Even with these major accomplishments, California's path to sustainability is paved with policy considerations and program issues that still need to be addressed. Targets for the coming years include:

- Obtaining a cost-effective LEED Silver level or higher for major state projects;
- Encouraging all school construction projects to use the Collaborative for High Performance Schools criteria to ensure that bond funds are spent wisely on schools that will stand the test of time;
- Publishing and implementing recommendations developed in the economic analysis report, *The Costs and Financial Benefits of Green Buildings*;
- Working to incorporate in statute the sustainable building policies and programs implemented through Executive Order D-16-00;
- Developing recommendations to establish renewable energy and green power standards for state projects;
- Integrating "total building" commissioning and facility performance evaluations as standard Department of General Services policy for all new construction, infrastructure, and rehabilitation projects to ensure that state buildings continue to operate as designed over time; and
- Adopting performance guidelines to incorporate environmentally friendly practices into facility operations and maintenance.

As we move forward to pursue these and other goals, the Sustainable Building Task Force remains steadfastly committed to improving the state's building process one step at a time, ever mindful of John Muir's observation that:

***"WHEN ONE TUGS AT A SINGLE THING IN NATURE, (S)HE FINDS IT
ATTACHED TO THE REST OF THE WORLD."***



CALAVERAS COUNCIL
OF GOVERNMENTS

Bicycle and Pedestrian User Survey

Calaveras Council of Governments Bicycle and Pedestrian Master

The Calaveras Council of Governments is currently preparing a Bicycle and Pedestrian Master Plan and we need your input! The goal of the plan is to make the county a more enjoyable place for you and your family to bike and walk for recreation, to school, or to work. Filling out this survey will help us create a plan that meets your needs and desires. If you have additional information to share or questions about the process, feel free to contact the Calaveras Council of Governments through the contact information below.

What area of Calaveras County do you live in? _____

TELL US ABOUT BICYCLING IN CALAVERAS COUNTY

Why and where do you bike?
(check all that apply)

- ☐ For on-road recreation (i.e. road bicycling)
- ☐ For off-road recreation (i.e. mountain biking)
- ☐ For exercise/ health reasons
- ☐ For pleasure/ to walk pets
- ☐ For shopping/ errands
- ☐ To get to work
- ☐ To get to school
- ☐ To get to the bus stop
- ☐ I don't bike
- ☐ Other (describe) _____

How many days per week do you ride? _____

What is the average distance of your rides?

- ☐ Under 2 miles
- ☐ 3-5 miles
- ☐ 6-10 miles
- ☐ 11-24 miles
- ☐ 25 and above

Where are your favorite places or routes to bike?
Please be specific.

What prevents you from biking more often?

- ☐ Destinations are too far away
- ☐ Too many cars / cars drive too fast
- ☐ Drivers don't share the road
- ☐ I travel with small children
- ☐ No bike paths, lanes or bike routes
- ☐ I have to carry things
- ☐ Not enough time
- ☐ Insufficient lighting
- ☐ Bikeways/roads in poor condition
- ☐ Weather
- ☐ Other (describe) _____

Where are the most difficult places for you to bike and why? Where would you ride if you could?

Please rank your preference for bicycle facilities, on a scale of 1 to 4 (1 being most preferred and 4 being least preferred)

Off-street paved bike paths _____

On-street bike lanes _____

Bike routes or boulevards _____

Unpaved trails or dirt paths _____

What can be done to encourage you to bicycle in Calaveras County?

TELL US ABOUT WALKING IN CALAVERAS COUNTY

Why and where do you walk?

- ☐ For exercise / health
- ☐ For pleasure/ to walk pets
- ☐ For shopping/ errands
- ☐ To get to work
- ☐ To get to school
- ☐ To get to the bus stop
- ☐ I don't walk
- ☐ Other (describe) _____

Where are your favorite places to walk?

What prevents you from walking more often?

- ☐ Places are too far away
- ☐ Too many cars / cars drive too fast
- ☐ Drivers don't stop for pedestrians
- ☐ I travel with small children
- ☐ No sidewalks
- ☐ No curb ramps
- ☐ Sidewalks are in poor condition
- ☐ I have to carry things
- ☐ Not enough lighting
- ☐ Difficult to cross the street
- ☐ Weather is too hot/ rainy. Etc..
- ☐ Other (describe) _____

Where are the most difficult places for you to walk and why? Where would you walk if you could?

TELL US ABOUT GETTING TO SCHOOL

If you have children, do they walk or bike to school?

- ☐ Every day
- ☐ Sometimes
- ☐ Never
- ☐ N/A

If you'd like, tell us more about how they get to school.

ADDITIONAL INFORMATION

What other non-motorized transportation do you use? (Horseback riding, in-line skating, etc.)

Is there one specific project (for example, a new sidewalk) you would like to see completed?

Do you have any additional comments?

Would you like more information?

Please fill in your contact information if you'd like us to contact you regarding future meetings.

Name: _____
Address: _____
City: _____
Zip: _____
Email: _____

For more information contact:

Calaveras Council of Governments
Tel: 209.754.2094 Fax: 209.754.2096
Timothy J. McSorley, P.E., Executive Director
tmcSorley@calacog.org
Mary Kelly, Senior Administrative Analyst
mkelly@calacog.org

Mail or Fax Surveys to:

Calaveras Council of Governments, P. O. Box 280, San Andreas, CA 95249, Fax 209.754.2096

Mariposa County General Plan

***Best General Plan in the Sierra includes
many model land use policies***



SIERRA NEVADA ALLIANCE

Keeping light in the range.

January 2007

In December 2006 Mariposa County adopted a new General Plan which surpasses other Sierra plans for protecting open space and agriculture, preventing sprawl, and preserving rural community character. While there is still room for improvement, Mariposa's new plan represents a major step forward for sustainable land use planning in the region.

Protection of agricultural lands: Mariposa County's new General Plan is the best in the Sierra for the preservation of agriculture. Under the plan, 61% of the County (426,000 acres) is set aside for agriculture -- mostly cattle grazing. By comparison, land designated for Residential Development is just 13% of the County (86,700 acres), and it is clustered around existing towns. In areas set aside for agriculture, the maximum density allowed is one house per 160 acres. If a developer or landowner wants to change the land use designation to residential -- to build a subdivision -- the General Plan lays out a series of mandatory findings which must be met before the land can be converted to residential. These findings are the most protective of any county in the Sierra, and they are among the best in the state.

➤ *Implementation Measure 10-2a1: Areas of the General Plan classified as Agriculture/Working Landscape and proposed for reclassification to a Residential, Planning Area, or Natural Resource land use classification will be reviewed against the following criteria. No land within the Agriculture/Working Landscape land use classification shall be changed to a Residential, Planning Area or Natural Resource land use classification unless the Board of Supervisors adopts all of the following findings:*

- *The subject property is not within an area in which the majority of the surrounding parcels are currently being used or historically have been used for agriculture, timber, or mineral purposes.*

(continued on next page)



Some of the 425,000 acres protected as Agriculture/Working Landscape under Mariposa County's New General Plan

- *The soils, water rights, topography, terrain, and location are not suitable as an economic production unit of sufficient quality for commercial agricultural production.*
- *There are no other lands within the proposed land use classification available for the proposed or similar project.*
- *The characteristics and size of the subject properties make it unsuitable for open space, conservation easements, or other preservation opportunities which further implement the goals and policies of the General Plan.*
- *The subject property has not been identified in the County General Plan or any area plan as a location with characteristics worthy of preservation within the Agriculture/Working Landscape land use classification.*

Protection of wildlife and sensitive natural areas: The plan mandates the creation of a new environmental conservation program that includes development standards and proactive conservation programs for sensitive wildlife and plant communities.

- *Implementation Measure 11-4a1: The County will implement a Mariposa County Environmental Conservation Program. The program shall include development standards and programs conserving, protecting and mitigating the impacts on:*



Blue oaks and Collinsia, Mariposa County

- *Significant and sensitive habitat including wildlife migration corridors;*
- *Breeding and nesting areas (as seasonally appropriate);*
- *Known occurrences of special status animal species;*
- *Riparian habitat around bodies of water and along watercourses and seasonal drainages;*
- *Known occurrences of special status plant species; and*
- *Significant and sensitive plant communities.*

Discouraging big-box sprawl: The plan mandates that commercial, financial, healthcare and other service businesses above a certain size must be located within towns.

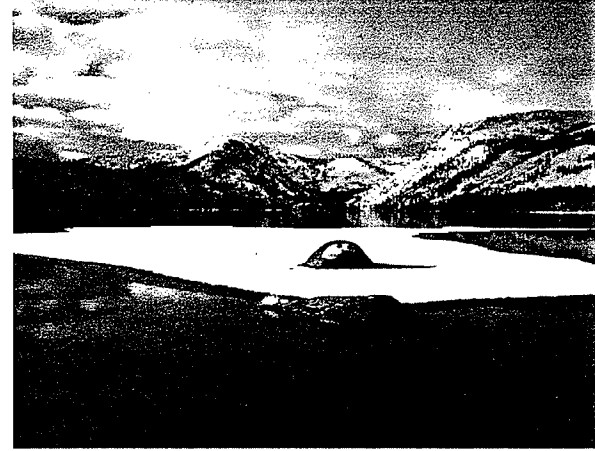
- *Implementation Measure 5-4a1: Commercial, healthcare, financial and other service businesses intended to serve the greater County population shall be located only within Town Planning Areas.*

SIERRA NEVADA ALLIANCE

Water & Climate Change Campaign

Background on Climate Change and Sierra Water

Climate Change is impacting the Sierra now and future impacts could be catastrophic. The Sierra Nevada supplies 65% of California's developed water, as well as almost all the water to Northwestern Nevada. California and Northwestern Nevada have organized a vast water delivery system for agriculture and urban residents that is highly dependent on the Sierra and particularly on the Sierra snow pack. There are two major water delivery systems in California—the Central Valley Project and the State Water Project. Thirteen Sierra watersheds supply the Central Valley Water Project, while the State Water Project is highly dependent on the Sierra's Feather and Kern River watersheds. In addition, many local water projects supply other parts of the California, such as the Tuolumne River supplying San Francisco, the Truckee River supplying Reno and the Mokelumne River supplying the East Bay.



Climate change will significantly change the way California and Nevada's water supply systems are operated because the largest reservoirs of water in both states are the Sierra snow pack which feeds all of the watersheds mentioned above.

Leading scientists agree that a rise in temperature will occur even under the best emission reduction scenarios. This warmer temperature will result in a 36% reduction of Sierra snow in fifty years and nearly half of its current amount by 2090. Looked at another way, the State of California predicts that there will be a 1500-foot rise in the snow level over the next 90 years.

Snow stores water over the winter and then melts and flows down from April through July to refill storage reservoirs. There is further evidence that the raising of the snow level will increase the incidence of "rain on snow" events at critical mid-elevation

Sierra forests, increasing the peak flows and flooding associated with storms in the winter when we have no excess storage capacity. Furthermore, the increase in winter peak flows combined with the compounding effects of the planned clear-cutting in the region will make it difficult to gauge the timing of water releases from reservoirs.

Climate Change Impacts are Already Seen

The fact is these climate change impacts are already underway. Over the past 100 years, there has been a 25% reduction in runoff from April – July in the Central Sierra-Sacramento Region and a 10% reduction in runoff in the Southern Sierra.

For more information, read our report "Troubled Waters of the Sierra: California and Nevada's Threatened Water Supply."

Continued on back



SIERRA NEVADA ALLIANCE

Keeping light in the range.

PO Box 7989

South Lake Tahoe, CA 96158

(530) 542-4546 Fax (530) 542-4570

www.sierranevadaalliance.org





How we Adapt to Climate Change Can Protect or Further Destroy the Sierra

A quick reaction by some members of the public when they hear this news is to call for more dams to create surface storage reservoirs. Dams come at a high price—both economically and environmentally. Dams block fish passage, reduce water flow increasing water temperatures below the dam which impact fish reproduction and survival, and dramatically alter the natural ecosystem of the river and riparian communities. Ninety percent of the original salmon in the Sierra are gone because of a curtain of Sierra dams.

In fact, Sierra watersheds have already been significantly impaired and polluted over the last century and a half from a range of human activities. In 1996, the Sierra Nevada Ecosystem Project identified that the river, lake and stream systems of the Sierra are the most impaired habitats of the range. One-hundred fifty years of dams and diversions, mining, grazing, roads, pipelines, timber harvesting, and recreational activities among other human activities have damaged our Sierra waterways. The Sierra cannot afford solutions to climate change which further damage our natural resources.

Exacerbating climate change, California's population is doubling and the Sierra is the third fastest growing region of the state. This population explosion is increasing demand for water throughout the state—and increasing the demand for new roads, dams, development and other urbanization which further threatens the health of our waterways and surrounding lands and habitat. The Sierra regional population is forecast to more than triple from just over 600,000 in 1990 to nearly

2 million people by 2040. Some Sierra towns are projected to quintuple in the next 30 years.

Our current water management strategies will not accommodate these pressures. In the past, when major water decisions have been made, natural resources and our Sierra values have lost. We need to get ahead of the curve to ensure that we protect and restore our Sierra waters while supplying water to the state.

The Sierra Nevada Alliance's Strategic Course of Action

Thanks to the planning grant from the Goldman Fund, over the course of 1993 and 1994 the Sierra Nevada Alliance interviewed over 40 conservationists, academics, scientists, agency staff, local districts and rural leaders on this issue. We also convened a series of meetings to discuss different strategies to protect our natural resources, recreation, and rural communities while supplying water to the state. The result of this extensive consultation is that there are two levels in which the Sierra Nevada Alliance must play a leading role: influencing local planning in the region and shaping state water management policy.

In the Sierra Nevada in the next ten years there will be numerous planning efforts that determine how our natural resources will be used, protected or restored. There are 45 hydropower relicensing efforts that are scheduled to occur in the region from now through 2015. Over 50 watershed groups are planning how to protect and restore Sierra watersheds, and new groups are forming every year. Fifteen counties are scheduled to update their general plans in the Sierra in the next ten years, and numerous community plans and specific developments will come before the county and city planning commissions.

It is vital that conservation representatives be actively involved in conservation planning, prepared and informed to shape these plans, and have the most cutting-edge tools to engage and ensure smart plans are adopted for the future.

Likewise, over the next ten years, California will be preparing another state water plan, considering hundreds of pieces of legislation, and plotting the course of how to address climate change. In 2003, Assembly Member John Laird convened a select committee on climate change to review the science on climate change. Now the legislature, new governor of California and other decision makers have the opportunity to begin to develop smart policies on this issue or ignore the issue and leave California in the position to address a crisis of epic proportions.

Over the course of the 1993 and 1994, every conservation leader we spoke with encouraged the Sierra Nevada Alliance to lead a Sierra effort to protect the Range of Light and ensure smart local and state level water plans are plotted for the state to address climate change.

The Sierra Nevada Alliance Sierra Water and Climate Change Campaign is an ambitious effort to tap the rocket. If you tap a rocket when it first takes off, the course of the rocket is drastically changed with minimum effort. However, if you try to change the rocket's course long after take off, the amount of energy required is exponentially greater. At the Alliance, we believe the next three years are our opportunity to tap the rocket of climate change and water issues. If we engage now we have the best opportunity to ensure natural resource protection is highly valued when planning how to adapt California's water delivery system for climate change.



Attachment 12

Board of Directors Foothill Collaborative for Sustainability (FoCuS)

President: **Eric Taylor** - Table Mountain Garden

Eric Taylor, together with his wife, formed Table Mountain Garden, a successful market garden, in 1993. His knowledge of farming and love of food go back to his childhood when he traveled extensively in Europe at age 5, 10 and again at age 13. Eric's desire to want to do something useful, and create positive social and environmental outcomes provided the platform for the creation of Table Mountain Garden. His interest in issues surrounding access to healthy food and community connection to the land, hold important insights for community sustainability.

Secretary: **Shaun Michael, Ph.D., CBS**

Shaun is one of the founders of FoCuS and a resident of Calaveras County for 24 years. She spent 23 years in international and domestic research, development, sales and management in the adventure travel industry. She received her doctorate in Natural Health and currently works as a Naturopath specializing in Quantum Biofeedback, Energy Balancing and Inner Clarity. Her vision is to see people connect with themselves and the community.

Treasurer: **Jakob Jaggy, M.D.**

Jakob is a Swiss-trained physician with fourteen years of experience in Family Practice. He has dedicated his practice for the last seven years to a holistic/blended approach to medicine. Dr. Jaggy is a founding member of the American Board of Holistic Medicine.

Christine Taylor - Table Mountain Garden

Born in New Zealand with a background passion for climbing mountains and the outdoors. She graduated from Victoria University with a BA in Social Anthropology. After marrying Eric in 1990, she immigrated to California. Christine and her husband farm and manage Table Mountain Garden, a successful small farm in the foothills of the Sierra.

Randy Crutcher, Ed.D - Quantum Leap Coaching

Randy lived for 29 years on the North coast of California in a region dubbed "Ecotopia" by author Ernest Callenbach. As a college student he became involved with Earth Day, solid waste education and the state's first non-profit recycling center. Through the 1970s, 80s, and 90s, he continued to activate a vision of sustainability through living more lightly in cooperative households and working in the non-profit and state sectors focused on education and conservation. His passion now is community and leadership development based on spiritual and ecological principles.

John Adams, Ph.D. - Saybrook Graduate School & Earthheart Enterprises

John is a professor, speaker, author, consultant, and seminar leader and has been at the forefront of the Organization Development and Transformation profession since 1969. He serves in several administrative roles and teaches at the Saybrook Graduate School (San Francisco), and is also a guest faculty member at The Bainbridge Graduate Institute in the MBA in Sustainability program. He was among the first to work with "wellness in the workplace" – beginning that work in 1976.

Josh Bridges - UCSC Community Studies

A 25-year resident of Calaveras County, Josh is currently a student at U.C. Santa Cruz in the Community Studies department (theory and practice of social change and organization). He came to FoCuS as an intern. When he graduates in June 2007, he plans to continue working with FoCuS.

Karen Kallen - SMC Business Management

Born in Honolulu, raised in Houston, Karen took root in the Sierras of Northern California by way of summer employment at Calaveras Big Trees State Park. A resident of Calaveras County for twenty-five years, she traveled extensively during her work with Sobek Expeditions, OARS and World Heritage Travel. Currently she is living in Sonoma County with her husband and is completing a degree in business at St. Mary's College of California, however she continues to be drawn to the area's increasingly precious natural beauty and the "curiously strong" character of its inhabitants.

Rhoda Nussbaum, M.D. - Kaiser Permanente

Obstetrician/Gynecologist with Kaiser Permanente San Francisco will retire and become a full time Calaveras County resident in the summer of 2007. In addition to the practice of medicine, Rhoda has served in various leadership roles in Kaiser Permanente including Assistant Physician in Chief of the SF medical center and creating "Women's Health-Kaiser Permanente", an organization wide effort to maximize health care outcomes and quality of service to women and their families. She volunteers at a free women's clinic in San Francisco and at a hospital in rural India. She is excited to use her analytic and organizational skills in sustaining the beauty and grace of Calaveras County.

The following members of FoCuS contributed to this report:

Board Members:

John Adams
Randy Crutcher
Rhoda Nussbaum

Other members:

Mickey Williamson, Murphys
Steve Lauterbach, Camp Connell
Sandy Kasten, Arnold