

Natural Hazards and Climate Change – Risk Management and Public Policy Opportunities

What is climate change?

The earth's climate has been warming due to the emission of "greenhouse gases." These gases are primarily the result of the burning of fossil fuels (such as gasoline and diesel in our cars and trucks, as well as coal and other petrochemical products used to produce electricity and in industrial production). The processes produce emissions of carbon dioxide and other pollutants.

While the earth's climate is constantly changing, the National Atmospheric and Oceanic Administration (NOAA), notes that the 10 warmest years on record have all occurred since 1990.

For additional information, see the website of the Bay Area Air Quality Management District at <http://www.baaqmd.gov/pln/climatechange.htm>

How does climate change impact natural hazards?

Wildfires – According to analyses performed by scientists at the Lawrence Berkeley National Laboratory (LBNL), "climatic change would cause fires to spread faster and burn more intensely in most vegetation types. The biggest impacts were seen in grassland, where the fastest spread rates already occur. In forests, where fires move much more slowly, impacts would be less severe. The reason that faster fuels respond more is that fire behavior in these fuels is more sensitive to wind speed and elevated wind speed during fire season was a striking feature of the changed climate weather data. The response of chaparral and oak woodlands fell between that of grass and forest."¹



The scientists studied Santa Clara County and predict a 51% increase in the number of fires that escape, as well as a 41% increase in the amount of acres burned in the average "contained" fire.

The scientists also note: "In a feedback with potentially alarming consequences, wildfires may create conditions that set the stage for subsequent wildfires. ... More frequent or extensive fires would mean more land area covered by grass and shrub vegetation. These ecosystems show the greatest susceptibility to fire, and also the greatest response to climatic change."

¹ Torn, M.S., Mills, E., and Fried, J., 1998. "Will Climate Change Spark More Wildfire Damage?" LBNL Report No. 42592.

Flooding –

According to analyses performed by scientists at the Lawrence Berkeley National Laboratory (LBNL), peak flows on the American River will be a month earlier (in February rather than March) due to increased early-season snowmelt and a higher snowline.



In an associated press release, Dr. Norman Miller notes that "the results suggest that 50 percent of the season runoff will have occurred early in the year for many snow melt driven watersheds in the west, and the resulting early snow melt implies higher streamflow increases and an increased likelihood of more flood events in future years."²

² Miller, N., 2003. "California Climate Change, Hydrologic Response, and Flood Forecasting" presented at the International Expert Meeting on Urban Flood Management, November 2003, The World Trade Center, Rotterdam. LBNL Report No. 54041.

Sea Level Rise – Based on research conducted by scientists at the U.S. Geological Survey, a sea level rise of 20 – 80 cm over the next century will affect the shoreline of the Bay and Delta, and increase the risk of levee failures.³ While most potentially inundated areas are intertidal, other areas are not, particularly those areas along the Bay shoreline and in the inner and outer Delta areas currently protected by levees. Many of these areas are currently farmland, but key bridge and aqueduct supports, airport, and port facilities are also at risk.

³ Knowles, N., 2006. "Projecting Inundation Due to Sea Level Rise in the San Francisco Bay and Delta" presented at the Third Annual Climate Change Research Conference, September 2006, Sacramento, California.

A Review of Current Strategies –

The current multi-jurisdictional Local Hazard Mitigation Plan (MJ-LHMP) for the San Francisco Bay Area has three strategies related to climate change and climate protection. (Other strategies deal with mitigation of wildfires, flooding, and landslides.)

- 1) ENVI-a-3 – Continue to enforce and/or comply with State-mandated requirements, such as the California Environmental Quality Act and environmental regulations to ensure that urban development is conducted in a way to minimize air pollution. For example, air pollution levels can lead to global warming, and then to drought, increased vegetation susceptibility to disease (such as pine bark beetle infestations), and associated increased fire hazard.
- 2) ENVI-a-6 – Stay informed of emerging scientific information on the subject of rising sea levels, especially on additional actions that local governments can take to mitigate this hazard.
- 3) ENVI-a-7 – Monitor the science associated with global warming to be able to act promptly when data become available to warrant special design and engineering of government-owned facilities located in low-lying areas, such as wastewater treatment plants, ports, and airports.

This strategy is listed as “existing” by 54 of the 68 annexes to the MJ-LHMP. Three local governments list the priority as “moderate,” three as “not yet considered,” and 8 as “not applicable.” While some special districts may find this requirement not applicable, any city or county should, by law, be enforcing these requirements. Check your plan.

Surprisingly, 34 jurisdictions list this strategy as “n/a,” while an additional 10 list this as “not yet considered,” particularly given the actions being taken by many Bay Area cities (see below.) Hazards mitigation staff need to check with other departments before assuming that these actions are “not applicable or appropriate.” 16 local governments list this as an “existing” strategy, only three of which are on the list of cities whose mayors have signed the U.S. Mayor’s Climate Protection Agreement.

A total of 18 jurisdictions list this strategy as “not yet considered.” Given the potential long-term implications of facility construction and the mounting evidence of global warming, prompt adoption of this strategy as an existing program is appropriate. 31 jurisdictions list the strategy as “not appropriate or not applicable.” Many of these local governments need to reassess this priority. Nine local governments list this as an “existing” strategy, only three of which are on the list of cities whose mayors have signed the U.S. Mayor’s Climate Protection Agreement.

Another Step –

Given the scientific information currently available, as well as the actions of the U.S. Mayors’ Conference, it is appropriate to add another strategy to the list of environmental strategies to read:

ENVI-a-15 – Adopt the U.S. Mayor’s Climate Protection Agreement as City, County, or Special District Policy, including striving to meet or exceed Kyoto Protocol targets for reducing global warming pollution by taking actions in our own operations and communities.

As of October 26, 2006, 323 mayors had signed the U.S. Mayors’ Climate Protection Agreement. Of those mayors, 32 represent cities in the nine-county San Francisco Bay Area.

The full agreement is provided on the following page.

The 32 cities in the Bay Area whose mayors have signed this agreement are -

Albany	Pleasanton
Berkeley	Portola Valley
Cloverdale	Rohnert Park
Cotati	Richmond
Cupertino	San Bruno
Dublin	San Francisco
Fremont	San Jose
Hayward	San Leandro
Healdsburg	San Mateo
Los Altos Hills	San Rafael
Mill Valley	Santa Rosa
Morgan Hill	Sausalito
Novato	Sebastopol
Oakland	Sonoma
Palo Alto	Vallejo
Petaluma	Windsor

U.S. Mayors Climate Protection Agreement –

- A. We urge the federal government and state governments to enact policies and programs to meet or beat the target of reducing global warming pollution levels to 7 percent below 1990 levels by 2012, including efforts to reduce the United States' dependence on fossil fuels and accelerate the development of clean, economical energy resources and fuel-efficient technologies such as conservation, methane recovery for energy generation, waste to energy, wind and solar energy, fuel cells, efficient motor vehicles, and biofuels;
- B. We urge the U.S. Congress to pass bipartisan greenhouse gas reduction legislation that includes 1) clear timetables and emissions limits and 2) a flexible, market-based system of tradable allowances among emitting industries; and
- C. We will strive to meet or exceed Kyoto Protocol targets for reducing global warming pollution by taking actions in our own operations and communities such as:
1. Inventory global warming emissions in City operations and in the community, set reduction targets and create an action plan;
 2. Adopt and enforce land-use policies that reduce sprawl, preserve open space, and create compact, walkable urban communities;
 3. Promote transportation options such as bicycle trails, commute trip reduction programs, incentives for car pooling and public transit;
 4. Increase the use of clean, alternative energy by, for example, investing in "green tags", advocating for the development of renewable energy resources, recovering landfill methane for energy production, and supporting the use of waste to energy technology;
 5. Make energy efficiency a priority through building code improvements, retrofitting city facilities with energy efficient lighting and urging employees to conserve energy and save money;
 6. Purchase only Energy Star equipment and appliances for City use;
 7. Practice and promote sustainable building practices using the U.S. Green Building Council's LEED program or a similar system;
 8. Increase the average fuel efficiency of municipal fleet vehicles; reduce the number of vehicles; launch an employee education program including anti-idling messages; convert diesel vehicles to bio-diesel;
 9. Evaluate opportunities to increase pump efficiency in water and wastewater systems; recover wastewater treatment methane for energy production;
 10. Increase recycling rates in City operations and in the community;
 11. Maintain healthy urban forests; promote tree planting to increase shading and to absorb CO₂; and
 12. Help educate the public, schools, other jurisdictions, professional associations, business and industry about reducing global warming pollution.

Seattle Mayor Nichols has spearheaded this effort. The following quotes are from that Mayor's web site - <http://www.seattle.gov/mayor/climate/default.htm#what>.

"The Berkeley City Council unanimously approved supporting Mayor Nickels' efforts."

-- Mayor Tom Bates, Berkeley, CA

"The Climate Protection Agreement mirrors our own local efforts to conserve energy and non-renewable resources."

- Breene Kerr, Los Altos Hills, CA

"We congratulate Seattle on its bold programs and look forward to cooperating to build a better world...The City of Oakland has set a goal of 15% reduction by 2010, which is beyond what Kyoto calls for the US to achieve. We are looking at 70% reduction of GHGs by 2050, which is what many scientists believe is needed to protect our future. We are in support of the United States surpassing the Kyoto green house gas reduction targets."

-- Mayor Jerry Brown, Oakland, CA

"Palo Alto has a long tradition as a city committed to environmentalism, including its open space, bicycle and pedestrian-friendly policies, progressive recycling, clean water and air initiatives, green energy programs and community-wide sustainability land use and design principles. Still, we can and must do more to counter the growing threats of climate change. We are proud to join in the concerted efforts of other cities in taking specific actions to reduce the effects of global warming, beginning here in our city."

-- Mayor Judy Kleinberg, Palo Alto, CA

"We in Sonoma County are in full support of these actions and are in the forefront of adopting greenhouse gas emission reduction targets!"

-- Mayor Jake McKenzie, City of Rohnert Park, CA

"The City of Sebastopol has committed to a 30% reduction of its greenhouse gas emissions between 2000 and 2008."

-- Mayor Larry Robinson, Sebastopol, CA

CREDITS – This pamphlet was prepared by J. Perkins, Earthquake and Hazards Program Manager, Association of Bay Area Governments (ABAG).

Photos and diagrams – page 1 wildfire = California Dept. of Forestry; page 1 flooding = LBNL press release