

Climate change increases California flood, drought risk

[Rhett A. Butler](#), [mongabay.com](#)

February 7, 2006

Climate change may increase the risk of winter floods and summer water shortages—even within the same year—says new research by scientists Lawrence Livermore National Laboratory (LLNL).

The study, which appeared in the January 27 edition of the journal *Geophysical Research Letters* shows that global warming is likely to change river flows in ways that may result in both increased flood risk and water shortages.

As temperatures warm as a result of global carbon emissions, more rain than snow falls at higher elevations. In areas that do receive snow, melt occurs sooner increasing wintertime river flows while reducing the availability of water for spring and summer flows. Further, this scenario could be more severe in El Niño years, which generally feature warmer winters and produce much higher amounts of precipitation.

According to the scientists, since rainfall in California occurs over a short seasonal interval, California's water infrastructure is dependent on the build up of snow in the mountains of the Sierra Nevadas. Snow acts as a natural reservoir by releasing water into streams and man-made reservoirs after winter and early spring rains and snowfall have ceased.

Warmer temperatures may cause California's rivers to carry a heavier flow during wet months, possibly triggering floods like those seen this past winter in Napa, Marin, and the Sacramento Central Valley. During summer months, river flows would be much reduced, resulting in water shortages that could affect California's rich agricultural areas. The net effect of climate change could be extreme shifts in California's water supply.

“Even if total flows over the whole year are the same, these changes could jeopardize water supplies, because it may not be possible for reservoirs to capture the increased winter flows,” said Edwin Maurer, a professor at Santa Clara University and lead author of the research. “This problem would be compounded by an increased risk of wintertime flooding resulting from higher river flow rates,” he said.