



Extreme Weather Events and Climate Instability: Implications for Human Health

Experts warn that events like the 2003 European heatwave, the six-year drought in the western U.S. and the current series of large hurricanes may be more likely and more severe in the future due to global warming. Recent extreme events around the world have had major impacts on human health and food supplies.

“We’re facing more climate shocks and surprises - events that are even beyond the extreme weather already associated with global warming,” says associate director of Harvard Medical School’s Center for Health and the Global Environment. **“As the rate of warming increases, the climate system may be becoming more sensitive to large-scale and damaging episodes.”**

Some climate models project more intense hurricanes with higher peak winds (Knutson et al. 1998; 2001; Tuleya and Knutson 2002). **“The current series of storms in both the Atlantic and Pacific is tied to a number of factors aligning favorably,”** says Ruth Curry of the Woods Hole Oceanographic Institution. **“Warming of the world oceans and associated increases in evaporation rates are likely to fuel more frequent and larger tropical storms as the global thermometer continues to rise in this century.”**

Other studies show that over the last half century weather patterns have become more variable, with more frequent and more intense rainfall events (>2”/day) (Karl et al.1995; Easterling et al. 2000), more very extreme precipitation events (>4”/day) (Groisman et al. 2004), changes in the timing and location of precipitation (Houghton et al. 2001), and more frequent and more intense heatwaves with prolonged droughts. More and more of these events are major “outliers,” i.e., lying far outside two standard deviations from the mean (Schar et al. 2004). For example, five feet of rain fell on Haiti over 36 hours at the end of May, with extensive loss of life and widespread damages.

The prolonged drought in the western United States has left markedly reduced snowpack in the Rockies and in California, reductions in water tables, and changes in soil quality. Researchers have found dramatic increases in the amount and severity of precipitation across the U.S., but with great differences among regions. While average annual precipitation has increased by 7% over the past century, annual “heavy rain events” (>2”/day) have increased by 14%, and annual “very heavy rain events” (>4”/day) have increased by over 20%. Meanwhile, the West is in its sixth year of prolonged drought, perhaps the most intense in 500 years.

“Adverse health conditions cluster around extreme events,” says Epstein. **“Flooding can lead to the spread of water-borne, mosquito-borne and rodent-borne disease, while droughts can accompany heat waves and sustain wildfires. The current series of mega-storms in the Gulf of Mexico have killed scores of people and have caused extensive crop losses.”**

“The heat wave in Europe in the summer of 2003, that killed tens of thousands of people, serves as a warning of what might be anticipated if climate change proceeds as expected over the next century,” says University of Delaware Senior Research Fellow Laurence S. Kalkstein. **“Those responsible for emergency services were totally unprepared for the magnitude of this event.”**

Recent studies show that the rate of climate change is faster than originally anticipated, suggesting the climate system is increasingly vulnerable to abrupt change. For example, in 2000, measurements showed that Greenland was melting at a rate of 1 meter per year. Those current measurements are now up to 10 meters per year. Epstein says: **“These type of change may be setting the stage for more major events like the 2003 heat wave, persistent US drought and large storms, and indicate the increasing potential for an abrupt climate change.”**

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