

STORMY WEATHER: HOW EXTREME WILL IT GET? CAN WE ADAPT?

The scientific jury may still be out on the causes of global warming (though most polls suggest roughly 11 of 12 climatologists see fossil fuel consumption as the literal smoking gun), but for non-experts, the large number of record-breaking high temperatures, floods, and other extreme weather events in 2010 has shifted the debate from asking is the weather changing to what will happen next.

Last summer, Russia suffered what the country's chief meteorologist said may have been its worst heat wave in 1,000 years. Temperatures in Moscow topped 37.8C (100 degrees Fahrenheit) for the first time ever, and stayed there for weeks, killing about 300 people a day, choked by smog from wildfires. The country lost much of its wheat crop in a drought, and President Medvedev cut off all grain exports, sending global grain prices soaring. To the south, Pakistan received 12 inches of rain in one 36-hour monsoon, killing more than 1,200 people and leaving as many as 20 million homeless.

Climatologists caution against drawing conclusions from one bad summer. Weather varies not only day to day but year to year and decade to decade, they say. But if the summer turmoil does turn out to be part of a new norm, it suggests a more dramatic turn toward extreme weather than many models predicted. "It's occurring much faster and much stronger than we expected from our model simulations," says Grigory Nikulin of the Swedish Meteorological and Hydrological Institute in Norrkoping, Sweden.

How bad could it get? What will happen to society if the weather keeps growing more extreme – paradoxically both hotter and cooler, and wetter and drier, than we’ve ever known before?

Home Sweat Home

When we think of extreme weather, it tends to be in the future tense – [the desert world of “Mad Max”](#) or [the perpetually rainy Los Angeles of “Blade Runner”](#).

But experts note that there have always been isolated instances of extreme weather – and that such events are happening more often now, increasing their punishing toll on life and property.

One European Central Bank climate study found that the number of large-scale extreme weather events has nearly doubled during the past 20-plus years. Last year, the World Health Organization estimated that around 150,000 deaths now occur annually due to changes in the weather. Many of those who die are children and the elderly in the world’s poorer countries, which are affected disproportionately by flooding and by the rise in malaria brought on by the warm and wet conditions mosquitoes love. However, weather mortality is not entirely a phenomenon of the poorer world: in 2003, for instance, a heat wave in Europe, *la Canicule*, killed between 30,000 and 70,000 people, [depending on whose estimate you read](#).

In the short run, scientists are far from sure about how bad the weather might get. It’s difficult, they say, to draw any conclusions about next summer, let alone the next decade or two.

Longer-term, however, the trends grow clearer, and suggest to many higher temperatures and greater precipitation. “If global warming is continuing, we’ll get more and more unstable weather conditions, and more and more extremes,” Nikulin says.

“At a longer time scale, for the mid-century and even more for the end of this century, our simulations are showing that we should experience some extreme change,” agrees Serge Planton, director of the research team on climate at Meteo France, the French national weather service. All over Europe, he says, the models predict longer and more intense heat waves and, in the middle and northern latitudes, greater precipitation in the winter.

Offshore, too, many climatologists believe conditions are likely to worsen in the long run. Using the mean results of 18 different climate models, scientists from the U.S. National Oceanic and Atmospheric Administration recently forecast (*Science*, January 22, 2010) that although the overall number of major storms in the Atlantic will decrease by the end of this century, the number of extremely intense Category 4 and 5 hurricanes will double.

When it comes to short-run predictions, only economists rush in where climatologists fear to tread. Some are already venturing predictions about what changing weather might mean economically. For instance, Nick Robins, an analyst at HSBC, the global banking company, estimated in a recent research note that extreme weather and high temperatures could crimp grain production by up to 8.7 percent by 2020. Given that the population is increasing, Robins’s forecast means that per-capita grain production could drop anywhere from 11.9 to 16.1 percent.

A 2009 working paper of the European Central Bank estimated that an extreme weather event – which the analysts define as one that affects no less than 100,000 people, costs no less than \$1 billion (in constant 2000 dollars), kills no less than 1,000 people, or results in major economic damage – can shave between 0.23 percent to 1.1 percent of GDP, [depending on the country](#).

Battening Down the Hatches

The scientists' professional reticence should not be construed as meaning there is no need to worry yet. [Patrick Lagadec](#), a specialist in crisis management and a senior research scientist in the econometrics laboratory at the École Polytechnique department of economics, [cautions against drawing comfort from the fact that most projections are long range.](#)

“Every discussion about climate change generally deals with what happens in the next century if there's a real warming,” he says. “My point of view is that we don't have to wait for the whole sea being one meter higher. It could take just one wave to reach the coast, one heat wave to disrupt the cooling of a nuclear power plant, to cause a major disaster.”

Such near-term disasters are precisely what we're seeing now, Lagadec says. Forget low probability, high consequence, he says. “This is rubbish. It's very high probability, it's very high consequences.”

Unfortunately, even scientists seem unprepared to think about this kind of short-term threat, Lagadec says. Many prefer the smooth upward line of a temperature chart to the near-term mess of volatility, which requires accepting a certain lack of control over events.

While various authorities and NGOs have called on countries to beef up their ability to cope with disasters, particularly through insurance mechanisms, Lagadec believes that the more crucial work is to learn how to respond when disasters occur. Governments have a tendency to perpetually plan for the last crisis, he says – to take a Maginot Line mentality and assume that the next disaster will be like the last one – when in fact the next challenge is likely to be completely different.

Perceiving the reality of what is happening is the key. “If you have barriers in the mind, you have disasters on the ground,” Lagadec says. For example, he says, it ultimately wasn’t Hurricane Katrina that made that storm such a disaster but the Bush Administration’s response to it.

His prescription for government agencies: “Instead of trying to have tools to avoid the surprise, they should be prepared for surprise — trained to write on a white page.”

Happily Never After

Can humanity adapt?

While no societies have had any experience in slowing or reversing a planet-wide climate change, some have faced dramatic shifts in the past. Two frequently cited cases are the Norse colonies in Iceland and Greenland, which each encountered tremendous ecological pressures.

The Icelanders were thoughtful people. A few decades after settling in the ninth century, they realized that the thin volcanic soil was being depleted by overgrazing of pigs, goats, and sheep. To survive, the Icelanders gradually learned to measure how many sheep particular pastures could support and beginning in the 12th century, fined anyone who tried to put too many of his own sheep out to graze on the common land. They also learned how to fish. They suffered during the ice and cold of the Little Ice Age of the 15th century. But they survived.

The Norse Greenlanders, on the other hand, chopped down too many trees and raised too much livestock, depleting the soil. When the Little Ice Age hit and temperatures cooled, the native Inuit adapted to the harsh new environment, but the inflexible Norse died out. That’s the story. In fact, the reality turns out to be

more complex – and more challenging — for someone looking for an easy grasshopper/ant fable, according to a recent study by Andrew Dugmore, a professor of geography at the University of Edinburgh, and others:

“The Norse Greenlanders did not perish because they were foolishly unwilling to adapt to Arctic conditions or because of irrational economic choices. Their real lesson may be far broader and far more frightening in the modern context. It is possible to creatively adapt to new environments, build up centuries of community-based managerial expertise, wisely conserve fragile resources for communal benefit, codify the results, maintain century-scale sustainable patterns of life and society – and yet still face ultimate collapse and extinction.” (“Norse Greenland settlement and limits to adaptation”, Andrew Dugmore, in “Adapting to Climate Change: Thresholds, Values, Governance”, Cambridge University Press, 2009)

Source : <http://www.paristechreview.com/2010/11/12/stormy-weather-extreme-adapt/>