National Geographic Daily News

# Climate Patterns to Help Predict the Next Big Flood?



Pakistani villagers try to catch trees float in the flooded Nelum river in Muzaffarabad, the capital of Pakistani Kashmir on Friday, July 30, 2010.

*Photograph by Aftab Ahmed, AP*

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**Published December 28, 2010**

*This article is part of a special* **National Geographic News** *series about the global water crisis.*

Large flooding events, like the deadly Pakistan flood last summer, will be predictable with the next generation of climate-forecasting models, according to scientists.

Flood risk can be predicted by studying climate patterns, Columbia University hydroclimatologist Upmanu Lall

said this month at the American Geophysical Union (AGU) conference in San Francisco.

(See flood photos.)

According to Lall, climate scientists should be able to refine their models to be able to issue long-term predictions of impending flood seasons, similar to those made each year for the intensity of the upcoming hurricane season.

"I'm not claiming that it's possible to predict individual floods at individual locations," Lall added of these long-term predictions. "What I'm claiming is that we may be able to identify the patterns that lead to more northerly floods in certain years, and more southerly foods in others."

### The Ocean Connection

Lall has examined the geographic distribution of hundreds of severe floods this decade, and the data show that damaging floods such as those that struck China and Pakistan in 2010 did not occur at random, but were tied to ocean conditions.

Each year, seasonal climate factors, such as the jet stream, tropical storms, or long-lived high-pressure zones, conspire to direct water out of these areas in a focused way, producing "atmospheric rivers" of water vapor capable of carrying more moisture than the Amazon River.

Floods can result where these, and other high-moisture streams, hit land.

That's why the 2010 floods and the moisture that caused them were concentrated in a narrower than usual band of latitudes that included Pakistan and Southern China, Lall said.

In general, it is believed that climate change will bring more precipitation to northern regions, while more southerly ones, like the American Southwest and parts of the Mediterranean, will become drier, Lall said.

"We're at the point where timely reversal of climate change is unlikely," he said, "so we need a strategy in terms of impact."

Julia Slingo, chief scientist at MET, Great Britain's weather-forecasting agency, agrees. "I would argue that being resilient today will help us adapt as our climate changes," she said.

Using local weather data, Slingo was able to predict record flooding in Britain's Lake District in 2009 with remarkable accuracy. She may be more optimistic than Lall, saying she thinks scientists may be able to predict floods the magnitude of the 2010 Pakistan floods about a week in advance.

### 2010 Not a Watershed Year for Floods

One surprising find was that despite well-publicized disasters in Pakistan, China, and a few other places, 2010 wasn't actually a bad year for floods. Instead, Lall found that there were relatively few severe events compared to such flood-ravaged years as 2002, 2003, and 2007.

At the same time, human vulnerability to floods may be on the rise.

Despite leaving at least 1,500 dead, tens of millions displaced, and millions of acres of agricultural land in ruin, this year's Pakistan flood, for example, wasn't unprecedented. As recently as 1929, the same region experienced an even bigger flood, Slingo said at the AGU conference.

(See photos: "Pakistan Flood Pictures: Millions Flee Rising Rivers.")

The population in 2010 was more vulnerable, though. Not only is Pakistan, founded in 1947, now a nation of 170 million residents, but "we have a much larger population living along river banks," she said.

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