

The driest season: Global drought causes major worries - CNN.com

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(CNN) -- Hurricane Isaac may have inundated the parishes of Louisiana, but for thousands of American farmers, it was a blessing, a reprieve from the most torrid summer on record.

In much of North America, July was the hottest month since such a record was first taken. Crop yields have fallen sharply; thousands of livestock have been lost.

The Midwest has suffered its worst drought in 56 years, and the International Grains Council has cut its forecast for the U.S. maize harvest by 25 million tons.

The relief from last week's rain may help planting conditions for winter wheat, but it's come too late to make much difference to summer crops. And it didn't even reach Iowa and Nebraska; 71% of Nebraska is now in "exceptional drought," the highest level on the scale.

On Thursday, the Federal Reserve of St. Louis reported that drought had ravaged farmers' income expectations in seven states, including Illinois and Missouri.

Although the drought was not discussed much at either party's convention, President Obama repeated his belief that our climate is changing.

"More droughts and floods and wildfires are not a joke. They're a threat to our children's future," he told the Democratic National Convention in Charlotte, North Carolina.

The farmers and ranchers of the American heartland are not alone. According to data from the National Oceanic and Atmospheric Administration, the land surface temperature in the Northern Hemisphere was the warmest ever in July, 2.14 degrees Fahrenheit higher than the average.

From Ukraine to Yellowstone, in Pakistan and Kazakhstan, the skies have stayed clear, and the earth has been parched. And on the world's commodity exchanges, the prices of corn, soybeans, wheat and tea are surging. The World Bank's food price index rose 10% in July.

Drought in the Black Sea region -- which includes the bread baskets of Ukraine, Russia and Kazakhstan -- has led to a sharp reduction in the forecast wheat harvest and pushed up export prices, putting further strain on the budgets of North African countries that import much of Russia's grain.

Russia expects its grain surplus for export to be 5 million tons lower than last year.

The three United Nations agencies involved in promoting food security warned this week, "We need to act urgently to make sure that these price shocks do not turn into a catastrophe hurting tens of millions over the coming months."

Meager monsoon

Far from the plains, there's also anxiety about the late and lame monsoon season in India and Pakistan. Rainfall in most places has been far below average, putting the new planting season at risk.

Ali Kachelo is the fifth generation of a farming family in Mirpur Khas, a farming district of Sindh province in

Pakistan. His farm is famous for its mangoes, but drought this year has hurt his crops.

"Water being the source of all agriculture, the most valued input, we have been severely affected," he said. "Many farmers are losing money."

He recalls the devastating floods of 2010.

"This year, the agrarian economy is getting back on its feet after two years of devastating floods, and now the late monsoon has pushed us back into a terrible state."

The problem is compounded by ancient irrigation systems and corruption, with farmers often bribing local officials to be able to use more water.

But there is no "worldwide" drought threatening to wipe out crops everywhere. Indeed, 2010 and 2011 were the two wettest years on record if you measure global precipitation. The people of Bangkok and Jakarta need no reminding. Many Southeast Asian countries expect abundant rice crops.

The trouble is that rainfall is less reliable, especially in the Northern Hemisphere. Records over the past century show that peaks and troughs in rainfall, particularly north of the equator, have become sharper and bigger. It's either deluge or drought.

Years of drier weather in the U.S. plains have steadily reduced beef herds, with the number of calves down 8% since 2006 as pastures have dried out and feed costs have rocketed.

A return to food riots?

Thanks to new crop hybrids, irrigation and other technological advances, global food production has consistently risen despite the vagaries of weather patterns. But food security is skewed toward the developed world. In poorer countries, where a larger part of family income is spent on food, unpredictable harvests and volatile food prices can lead to social unrest.

A sudden increase in the price of staples in 2007 and 2008, in part due to adverse weather, led to riots in about a dozen countries.

According to Colin Chartres, who heads the **International Water Management Institute**, we can expect more extreme weather.

"In monsoon climates, we expect later onset of the monsoon, heavier rainfall, shorter monsoon duration and so on. More flooding is to be expected, as are more droughts. Forecast temperature increases due to climate change will mean higher rates of evaporation," Chartres said during a visit to Kazakhstan.

It might seem the perfect storm: the prospect of less reliable harvests, a growing world population and demand for food projected by the United Nations Food and Agriculture Organization to rise 70% by mid-century. But the experts say there are many ways we can mitigate the effects.

"More than one-fourth of all the water we use worldwide is taken to grow over 1 billion tons of food that nobody eats," said Torgny Holmgren, director of the Stockholm International Water Institute.

Most of it is wasted in developed countries where food is plentiful, some by poor storage in developing countries.

In its latest report (PDF), the institute says the focus should be on "energy efficiency in food production, including getting more 'crop per drop,' " and "how to reduce the 30-50% of food that is lost and wasted from harvest to consumption."

At least part of the answer may come from new small-scale irrigation techniques. Chartres said that low-cost sustainable techniques can double yields for small farmers.

"These systems have been based on cheap pumps that run on electricity or diesel," he said. "When coupled with drip irrigation, they can be very water-efficient."

Half a million smallholders in Ghana alone use such techniques, and in Burkina Faso they have helped almost triple vegetable production over the past 15 years.

But financing remains a problem.

"In some parts of Africa, even the \$500 needed to purchase basic equipment is beyond the means of small farmers," Chartres said. "Sometimes, entrepreneurs buy a pump and take it round to farmers on a bicycle."

Ali Kachelo in Pakistan's Sindh province knows similar problems. He says mismanagement of the antiquated irrigation system has made efficient farming much more difficult.

"The ministry of agriculture is supposed to aid in having farmers learn and implement new irrigation methods but has not been very helpful," he said.

Kachelo says that he is learning how to employ overhead sprinklers to help conserve water but that most irrigation methods have not been updated since the British ruled Pakistan.

"We rely heavily on our reservoirs (which hold meltwater from the Himalayas), but poor management has caused them to dry up."

Chartres said that 70% to 80% of fresh water the world extracts every year is used for growing food.

"We expect to see 2 billion more people on the planet by 2050. Water requirements for agriculture will also increase dramatically," he said, not least because higher consumption of meat and milk requires more water than cereals.

"We are going to have to come up with ways of making water go much further if we are going to grow 70% more food by 2050 -- on about 10% less water than we use today."

A world away from Sindh, in Marin County, north of San Francisco, David Little is reviving the old technique of "dry farming." In an area where farms must often rely on their own wells, he grows potatoes and squash without irrigation by repeated tilling in the spring and then rolling to lock moisture into the soil rather than allow it to evaporate.

The practice encourages crops to grow deeper roots, and less water means a fuller flavor. His potatoes are favored by upscale restaurants in the area.

Little says that he learns something every year and that his sandy loam is better suited than most soils to the practice.

"Dry farming" is labor intensive, but in the American West, plentiful, cheap water for irrigation is a distant

memory.

The open refrigerator

Such initiatives may be all the more important because the underlying causes of more volatile weather cannot be addressed in decades -- maybe even centuries. Climate scientists attribute that to a complex combination of long-term trends that include warming oceans and shrinking Arctic ice cover. This summer, the ice cover is at its lowest ever, declining by about 35,000 square miles a day (an area bigger than South Carolina) in August.

Walter Meier of the National Snow and Ice Data Center at the University of Colorado says that Arctic sea-ice has been shrinking since satellite observations began in 1979.

"Then it dropped off the cliff in 2007, and this year we have surpassed that level. And in addition to the extent of sea-ice, what remains is thinner than it used to be."

Measurements from submarines, drilling and satellites suggest that the ice is about one-third of its thickness 30 years ago, a change Meier describes as "remarkable." Almost all the ice that melted used to be first-year ice," he says; now, multi-year ice 10 to 12 feet thick is breaking up and melting.

The consensus among scientists is that the declining Arctic ice cover is now irreversible and accelerating. Some models predict that the North Pole will be ice-free in the summer within a decade; others project sometime between 2030 and 2050.

"It used to be -- 10 years ago -- that we spoke about 'if' rather than 'when' the Arctic would be ice-free in summer. Now, it's the other way round," Meier said.

It may seem a long way from the fields of Iowa or Ukraine, but what happens in the Arctic doesn't stay there. The region is often called the Northern Hemisphere's refrigerator.

"Sea-ice reflects much of the sun's energy back into space," Meier said. "When it's no longer there, dark ocean water absorbs the energy, which then warms the water and further melts the ice."

It's like leaving the fridge door open. The only way to restrain the process would be to moderate temperature increases, which in turn would depend on lowering carbon dioxide emissions.

Just how that affects weather patterns is only now being explored, but in 2009, the National Snow and Ice Data Center noted that "some numerical simulations indicate that the loss of the sea-ice cover may lead to changes in storm tracks and rainfall patterns over Europe or the American West."

Research this year by Jennifer Francis at the Institute of Marine and Coastal Sciences at Rutgers University shows that enhanced Arctic warming slows atmospheric jet streams, which tends to prolong weather patterns.

In other words, it entrenches drought in some areas.

Drought: the new norm?

A new study published in Nature-Geoscience suggests that drought in the western U.S. between 2000 and 2004 may have been the worst in nearly a millennium, depleting water resources and causing significant declines in river flows and crop yields.

There is yet another effect. Plants grown in North America do a good job absorbing carbon dioxide from the atmosphere, offsetting carbon emissions.

"Our study shows the turn-of-the-century drought reduced plant uptake by half in western North America," said Kevin Schaefer of the National Snow and Ice Data Center, one of the authors.

Drought in the American Northwest may "trigger a whole host of significant water resource challenges in a region already subject to frequent water shortages," Schaefer said.

From long-term imponderables back to short-term action. A further surge in commodity prices may lead the G-20 to convene its Rapid Response Forum within the next month in an effort to prevent the bottlenecks in 2007 and 2008 that led to food riots.

Buyers -- and insurance underwriters -- await the next U.S. Agriculture Department crop report due Wednesday with trepidation. The insurance bill from the subpar crops on American farms this year probably exceeds \$18 billion, according to underwriters.

There are already ominous signs: Last week, the price of soybeans was close to 1,800 cents per bushel (up from about 1,300 cents in June) as Brazilian exports sagged. And in a sign that some buyers are worried grain supplies may tighten, one Mexican buyer last month made the fourth largest single purchase of U.S. corn since 1991, according to the Financial Times.

There's also demand for corn from ethanol producers, now that U.S. gasoline is not far shy of \$4 a gallon.

If Russia were to introduce a grain export ban, as it did in 2010 to restrain prices at home, global prices would probably accelerate. In the face of market forces, the G-20 has few tools.

In the meantime, there are always silver linings amid the dark warnings. Here are two. Drought in the Midwest has sharply reduced the runoff of nitrates into the Mississippi River and down into the Gulf of Mexico. As a result, the "dead zone" of algae bloom has shrunk dramatically to an estimated 1,580 square miles, from about 3,400 square miles a year ago.

One of the photographs in a recent Atlantic gallery shows the enterprising Joseph Perazzo of Grass is Greener Lawn Painting turning a parched lawn in New Jersey into a picture of emerald green.

"Miracle Results" proclaims his sign. Maybe that's what we need.

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