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Climate Change Threatens Unique Species 'Hotspots,' UA Climate Expert Says

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by **Melanie Lenart**

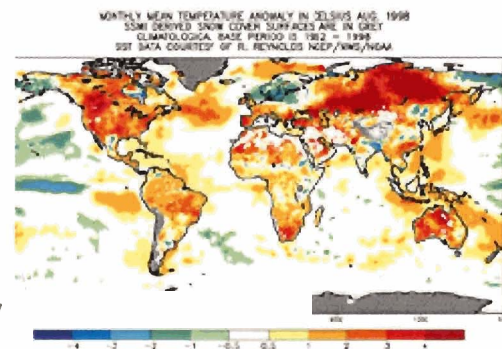
Global warming could disrupt the plan by some prominent ecologists to save species by conserving "hotspots" of biodiversity, warns Jonathan Overpeck, director of the University of Arizona Institute for the Study of Planet Earth.

The ISPE director gave a UA Speaker Series talk last week responding to the "silver bullet" approach outlined in the Feb. 24 issue of the journal *Nature* by ecologist Norman Myers and his colleagues.

The authors pinpointed 25 "hotspots" containing many species found nowhere else on the planet and concluded that protecting these regions "would go far to stem the mass extinction of species that is now underway."

"Unfortunately, they're not considering climate change," said Overpeck. "Islands might likely be submerged. Coastal areas will be more susceptible to storms and flooding."

There is no mention in the six-page article of the additional threats posed by climate change, but Overpeck adapted the published map of hotspots to show where threats exist. The result shows a myriad of potential problems including sea level rise, decadal droughts, abrupt warming of mountain tops and a suspected increase



Global map showing how temperatures deviated from the long-term average during August of 1998, deemed the hottest month in 119 years. (MAP: R. Reynolds NCEP/NWS/NOAA)

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in tropical cyclones.

"We're talking about an amount of warming that is equal or greater than we've seen since the last glaciation. But we're going to do it in one hundred years rather than in thousands of years," Overpeck said. "All bets are off - except we know that this climate change will be large and it will be faster than the animals have ever seen before."

He and many other scientists worry that the planet faces a mass extinction event if species continue to disappear at an accelerating rate. Fossil records indicate that it typically takes millions of years for species diversity to recover following a mass extinction event.

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Their fears grew around Halloween following the release to the press of revised estimates of the projected warming. The Intergovernmental Panel on Climate Change now estimates average global temperature will be from 3 to 11 degrees Fahrenheit higher by the year 2100 than it was this past century. This is double the warming that had been predicted by the IPCC in 1995.

Overpeck suspects it won't be long before the IPCC updates its predictions on the projected sea level rise that could result from a warming of this magnitude. In the report released in 1995, the panel predicted that by the end of this century global sea level would rise perhaps 60 centimeters, or about 2 feet.

"The last interglacial was only about 1 degree (Celsius) warmer than today.

Probably less. Yet we have firm evidence that sea level was 4 to 5 meters higher than today. Not 60 centimeters," Overpeck told the group.

Related Links

http://www.geo.arizona.edu/Faculty_Pages/Overpeck.J.html

<http://ispe.arizona.edu>

<http://www.ncdc.noaa.gov/ol/climate/research/1998/aug/aug98.html>

Five meters is 500 centimeters, more than 16 feet. Also, 1 degree Celsius is roughly 2 degrees Fahrenheit, whereas the amended IPCC work predicts a minimum of a 3-degree-Fahrenheit increase.

Overpeck reiterated his point by displaying a newly available global map showing how temperatures deviated from the long-term average during August of 1998, deemed the hottest month in 119 years by the National Oceanic and Atmospheric Administration. Overpeck headed NOAA's Paleoclimatology program before joining ISPE and the university's geosciences department last year.

"It appears that the high latitudes are warming up at an unprecedented rate. Any way you look at it, the temperature record looks the same. The temperature of the earth has warmed up dramatically," Overpeck said.



Jonathan Overpeck

He displayed an image showing where records of tree-ring growth, coral reef chemistry, ice core composition and historical documents had been used to create proxy records of paleoclimate. "Proxy" records must match modern-day instrumental records reasonably well before they can be used to illustrate climatic patterns extending before the instrumental records were in place.

A trio of scientists including UA tree-ring researcher Malcolm Hughes made news in 1998 when they compiled hundreds of these proxy records to conclude that the 1990s was the hottest decade in at least 600 years.

The conclusions hold even when the record is extended back a full 1,000 years, said Overpeck, who joined Hughes and their colleagues in interpreting the paleoclimatic records for last millennium.

With all the uncertainties involved in predicting what will happen in a world warmer than humans have experienced since civilization evolved, Overpeck worries that confining species to a small area could make them sitting ducks for disaster.

Even the Serengeti rangelands of Africa might be too small to permit many species to survive an extended regional drought, which was fairly common in many earlier proxy records, he said. Compounding climate change is the presence of humans and farms between the Serengeti and the nearest refuge from drought, such as Kilimanjaro.

Mountains, and volcanoes like Kilimanjaro, tend to receive more rain and snow than typical nearby valleys and so can serve as refuges to plant and animal species that need water. But that only works if the animals or plants can make it there alive.

"The trick is to ensure that populations of each endangered species are protected in at least two preserves, so if one population gets wiped out by a climate disaster, the species will still survive," Overpeck said. Vegetation corridors that would permit dispersal of wildlife have also been proposed.

Already about half of the hotspots have lost 90 percent or more of their primary vegetation, according to the analysis by the ecologists. However, about 38 percent of the identified areas are protected, at least on paper. Only time will tell whether humans can avoid pushing the world's species into mass extinction in reality.