

Climate warming is cited as main habitat changer

BY GAUTAM NAIK

A new study has found that human-induced climate warming is the main cause of significant changes seen in the world's biological and physical systems, outstripping the more modest disruptions to habitats caused by human encroachment.

The latest research, published Wednesday in the journal *Nature*, also establishes a strong link between climate change and the effects seen on a narrower, continental basis—such as the earlier spring flight of butterflies in California, the earlier release of pollen in the Netherlands and the increased growth of pine trees in Mongolia. The localized focus provides more evidence confirming the impact global warming is having on the planet's ecology and terrain.

"It's not necessarily a surprise, but the studies had not previously been done on a continental scale," said Cynthia Rosenzweig of the NASA Goddard Institute for Space Studies and the Center for Climate Systems Research at Columbia University in New York, who is lead author of the *Nature* paper. "Our research shows that the signals are strong." Her co-authors included an international team of more than a dozen scientists.

It is notoriously hard to draw clear-cut links between human activity—which increases the atmospheric presence of global-warming gases such as carbon dioxide—and its role in raising planetary temperatures, and thereby affecting physical and biological systems. The

scales are vast and the time horizon stretches for decades.

Last year, the Intergovernmental Panel on Climate Change could conclude only that human-induced climate change was "likely" behind the shifts seen in biological and physical systems since 1970. The group estimated there was a 66%-to-90% probability of such a link.

The latest effort is a "study of studies" that incorporates and analyzes data from scores of on-site measurements noted in previous research papers. Dr. Rosenzweig and her colleagues used nearly 30,000 data sets to statistically establish that higher recorded temperatures—on a global and continental basis—are the result of human activity rather than any natural variation. They then statistically linked the warming trend to observed physical and biological changes, such as the faster melting of glaciers and the earlier flowering of 89 plant species in Washington. The conclusion: In about 90% of the cases, such trends were consistent with the predicted effects of warmer climes.

The paper has limitations. Because of a lack of available data, it didn't explore the continental impact of climate change in Africa and South America. Measurements in those continents are difficult anyway. While temperature variations there have an effect on physical terrain and animal life, rain and other moisture-related factors often play a bigger role. The *Nature* study also mainly relied on site data from 1970 and 2004. Many scientists ideally prefer data sets over a longer period—say, 50 or even 100 years—when drawing conclusions about climate change.