

In lead-up to climate summit, scientists issue warning of biosphere collapse

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An international group of scientists—from the US, Spain, Finland, Chile, and Canada—published a review article in the June 7 issue of *Nature*, arguing that the human impact on the Earth's biosphere could lead to an ecological disaster in as little as a few generations. The article's release comes in the run-up to a United Nations summit on June 20.

The article, “Approaching a state shift in Earth's biosphere,” compares current man-made changes on the Earth to the type of forces that, at the end of the last ice age, led to a sudden, major climate change and a mass extinction event. The authors elaborate the basics of state-shift theory, whereby the accumulation of incremental effects over time can, upon surpassing a given threshold, result in sudden, extreme changes in a biological system.

This theory posits that the Earth can, locally and globally, absorb a certain degree of alteration without causing a major “state-shift,” an unpredictable collapse of the planet's biosphere. The authors focus on two impacts of human development: the direct, local transformation of ecosystems by development such as cities, industry, and agriculture; and the indirect, global transformation of the climate by the accumulation of greenhouse gases in the atmosphere.

The authors point out that the retreat of glaciers at the end of the last ice-age led to drastic changes in the ecosystems covering about 30 percent of the Earth's land by creating open land where glacial ice had been for the previous 100,000 years. By comparison, current estimates for direct human alteration of land are as high as 43 percent. At the same time, man-made global warming as the result of increased greenhouse gases in the atmosphere is proceeding faster than global warming at the end of the last ice-age, caused by increased solar radiation in the northern hemisphere

due to variations in the Earth's orbit.

According to the authors, “The magnitudes of both local-scale direct [impacts] and emergent global-scale [impacts] are much greater than those that characterized the last global-scale state shift, and are not expected to decline any time soon. Therefore, the plausibility of a future planetary state shift seems high, even though considerable uncertainty remains about whether it is inevitable and, if so, how far in the future it may be...

“Comparison of the present extent of planetary change with that characterizing past global-scale state shifts, and the enormous global [impacts] we continue to exert, suggests that another global-scale state shift is highly plausible within decades to centuries, if it has not already been initiated...

“As a result, the biological resources we take for granted at present may be subject to rapid and unpredictable transformations within a few human generations.”

Although the authors repeatedly point out the unpredictable nature of when the threshold for a state shift could be reached and what the world might look like after such a shift, they warn that “widespread social unrest, economic instability and loss of human life could result.”

Despite the urgency conveyed by the authors, other climate scientists, and environmentalists, expectations from the upcoming UN Conference on Sustainable Development in Rio de Janeiro are low.

The UN Sustainable Development Conference (nicknamed Rio+20) is set to meet 20 years after the initial Rio de Janeiro Earth summit in 1992. At that summit, nations agreed to a series of broad pledges to address greenhouse gas emissions, protect ecosystems and biodiversity, and prevent desertification. The pledges, however, lacked specific targets or

mechanisms of enforcement, and are widely acknowledged to have gone unfulfilled.

An editorial published in *Nature* along with the review article, notes:

“[T]he collective failure to fulfill those initial pledges is all too evident. Countries have increased the rhetoric and their political commitments, but there is little to show for 20 years of work, apart from an impressive bureaucratic machine that has been set to indefinite idle. On urgent environmental issues, the world has perfected the art of incremental negotiation and redefined circular motion. Meanwhile, as documented elsewhere in this issue, pressure on the planet continues to build, greenhouse-gas emissions are still rising and species are still disappearing... It is hard to avoid a certain sense of gloom, if not doom.”

While industrialized nations decreased greenhouse gas emission by 7 percent in 2010 over 1990 levels, this decrease is attributed mainly to the economic devastation resulting from the collapse of the Soviet Union in 1991 and the financial crisis of 2008. At the same time, the decrease in emissions by industrial countries has been more than offset by increased emissions from developing nations including India and China.

The *Nature* editorial summarizes the expectations for the upcoming conference as being “so low that almost any agreement or affirmation would qualify as a success.”

A rational response to the ecological crisis is rendered impossible by the division of the world into rival nation states and the subordination of all economic activity to the profit interests of giant corporations. The United States in particular—under Bush and now Barack Obama—has rejected any serious approach to climate change.

The gulf between the scale of the potential crisis and the minimal response agreed at so-called “climate summits” would be comical if the situation were not so alarming. With 30 percent of amphibians, 21 percent of birds, and 25 percent of mammal species facing extinction, and untold suffering and catastrophe facing people across the planet, the vague goals and pledges pronounced at these conferences are tragic.



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