

Goodbye cruel world

We live in a world that has become so desensitised by watching calamities unfold on global television — both natural and human-induced — that it takes something really spectacular even to get our attention. And it usually has to be visually dramatic to register, much less elicit a deep emotional response — such as the tragic events of September 11.

Recently, I came across a frightening report published by the US National Academy of Sciences (NAS) — the nation's most august scientific body. Yet, because there was no visually provocative content, the report had received only a couple of short paragraphs tucked away inside a few newspapers.

Here is what the academy had to say: it is possible that the global warming trend projected over the course of the next 100 years could, all of a sudden and without warning, dramatically accelerate in just a handful of years — forcing a qualitative new climatic regime which could undermine ecosystems and human settlements throughout the world, leaving little or no time for plants, animals and humans to adjust. The new climate could result in a wholesale change in the earth's environ-

ment, with effects that would be felt for thousands of years. If the projections and warnings in this study turn out to be prophetic, no other catastrophic event in all of recorded history will have had as damaging an impact on the future of human civilisation and the life of the planet.

A year ago the UN intergovernmental panel on climate change (IPCC) issued a voluminous report forecasting that global average surface temperature is likely to rise by 1.4 to 5.8½ degrees centigrade between now and 2100. If that projection holds up, we were told, the change in temperature forecast for the next 100 years will be larger than any climate change on earth in more than 10,000 years. The impacts on the earth's biosphere are going to be of a qualitative kind. To understand how significant this rise in temperature is likely to be, we need to keep in mind that a 5½ degrees centigrade increase in temperature between the last ice age and today resulted in much of the northern hemisphere of the planet going from being buried under thousands of feet of ice to being ice-free.

The UN study predicts that a temperature rise of 1.4-5.8½ degrees centigrade over the course of the coming century could include the melting of glaciers

and the Arctic polar cap, sea water rise, increased precipitation and storms and more violent weather patterns, destabilisation and loss of habitats, migration northward of ecosystems, contamination of fresh water by salt water, massive forest dieback, accelerated species extinction and increased droughts.

The IPCC report also warns of adverse impacts on human settlements, including the submerging of island nations

in the UN report are based on the assumption of a steady upward climb in temperatures, more or less evenly distributed over the course of the 21st century. But that assumption, they say, may be faulty — there is a possibility that temperatures could rise suddenly in just a few years' time, creating a new climatic regime virtually overnight.

They also point out that abrupt changes in climate, whose effects are

Jeremy Rifkin A report by top US scientists on climate change suggests that catastrophe could be imminent

and low-lying countries, diminishing crop yields, especially in the southern hemisphere, and the spread of tropical disease northward into previously temperate zones.

The newly released NAS report begins by noting that the current projections about global warming and its ecological, economic and social impacts cited

long lasting, have occurred repeatedly in the past 100,000 years. For example, at the end of the Younger-Dryas interval about 11,500 years ago, "global climate shifted dramatically, in many regions by about one-third to one-half the difference between ice age and modern conditions, with much of the change occurring over a few years".

According to the study: "An abrupt climate change occurs when the climate system is forced to cross some threshold, triggering a transition to a new state at a rate determined by the climate system itself and faster than the cause." Moreover, the paleoclimatic record shows that "the most dramatic shifts in climate have occurred when factors controlling the climate system were changing". Given the fact that human activity — especially the burning of fossil fuels — is expected to double the CO₂ content emitted into the atmosphere in the current century, the conditions could be ripe for an abrupt change in climate around the world, perhaps in only a few years.

What is really unnerving is that it may take only a slight deviation in boundary conditions or a small random fluctuation somewhere in the system "to excite large changes ... when the system is close to a threshold", says the NAS committee.

An abrupt change in climate, of the kind that occurred during the Younger-Dryas interval, could prove catastrophic for ecosystems and species around the world. During that particular period, for instance, spruce, fir and paper birch trees experienced mass extinction in southern New England in less than 50 years. The extinction of horses, mastodons, mammoths, and sabre-toothed tigers in North America were greater at that time than in any other extinction event in millions of years.

The committee lays out a potentially nightmarish scenario in which random triggering events take the climate across the threshold into a new regime, causing widespread havoc and destruction. Ecosystems could collapse suddenly with forests decimated in vast fires and grasslands drying out and turning into dust bowls. Wildlife could disappear and waterborne diseases such as cholera and vector-borne diseases such as malaria, dengue and yellow fever, could spread uncontrollably beyond host ranges, threatening human health around the world.

Global warming represents the dark side of the commercial ledger for the industrial age

The NAS concludes its report with a dire warning: "On the basis of the inference from the paleoclimatic record, it is possible that the projected change will occur not through gradual evolution, proportional to greenhouse gas concentrations, but through abrupt and persistent regime shifts affecting sub-continental or larger regions — denying the likelihood or downplaying the relevance of past abrupt changes could be costly."

Global warming represents the dark side of the commercial ledger for the industrial age. For the past several hundred years, and especially in the 20th century, human beings burned massive amounts of "stored sun" in the form of coal, oil and natural gas, to produce the energy that made an industrial way of life possible. That spent energy has accumulated in the atmosphere and has begun to adversely affect the climate of the planet and the workings of its many ecosystems.

If we were to measure human accomplishments in terms of the sheer impact our activities have had on the life of the planet, then we would sadly have to conclude that global warming is our most significant accomplishment to date, albeit a negative one. We have affected the biochemistry of the earth and we have done it in less than a century. If a qualitative climate change were to occur suddenly in the coming century — within less than 10 years — as has happened many times before in geological history, we may already have written our epitaph. When future generations look back at this period, tens of thousands of years from now, it is possible that the only historical legacy we will have left them in the geologic record is a great change in the earth's climate and its impact on the biosphere.

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