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The Climate Change Endgame

By THOMAS E. LOVEJOY

WHETHER in Davos or almost anywhere else that leaders are discussing the world's problems, they are missing by far the biggest issue: the rapidly deteriorating global environment and its ability to support civilization.

The situation is pretty much an endgame. Unless pressing issues of the biology of the planet and of climate change generated by greenhouse gas emissions are addressed with immediacy and at appropriate scale, the matters that occupy Davos discussions will be seen in retrospect as largely irrelevant.

This week, in Bonn, out of sight and out of mind, international negotiators will design the **biodiversity and ecosystem equivalent** to the Intergovernmental Panel on Climate Change. A full eight years have passed since President Jacques Chirac of France acted as host at a meeting in Paris to create this "Intergovernmental Platform on Biodiversity and Ecosystem Services."

Progress has been painfully slow. Only now is the "platform" and its work program — to assess status, trends and possible solutions — being designed. In the meantime, rates of extinction and endangerment of species have soared. Ecosystem destruction is massive and accelerating. Institutional responsiveness seems lethargic to a reptilian degree.

It is abundantly clear that the target of a 2-degree Celsius limit to climate change was mostly derived from what seemed convenient and doable without any reference to what it really means environmentally. Two degrees is actually too much for ecosystems. Tropical coral reefs are extremely vulnerable to even brief periods of warming. The elevated atmospheric CO₂ also has raised the acidity of the oceans, which affects the ability of coral and mollusks such as oysters to build shells and skeletons. A 2-degree world will be one without coral reefs (**on which millions of human beings depend** for their well-being).

At current global warming of 0.8-0.9 degrees, the fingerprints of climate change can be seen virtually everywhere in nature. The coniferous forests of western North America are currently experiencing massive tree mortality because climate change has tipped the balance in favor of native bark beetles. The Amazon seems to be edging **close to dieback** in the southern and southeastern portions of the great forest.

At essentially double that current temperature increase, there undoubtedly will be massive extinctions and widespread ecosystem collapse. The difficulty of trying to buffer and manage change will increase exponentially with only small increments of warming.

In addition, the last time the planet was 2 degrees warmer, the oceans were **four to six (perhaps eight) meters higher**. We may not know how fast that will happen (although it is already occurring more rapidly than initially estimated), but the end point in sea-level rise is not in question. A major portion of humanity

lives in coastal areas and small island states that will go under water. The site of the Earth Summit and Rio+20 will disappear under water fairly early on.

More than a 2-degree increase should be unimaginable. Yet to stop at 2 degrees, global emissions have to peak in 2016. The Carbon Tracker organization has examined fossil-fuel investments around the world (including 1,200 new coal plants) and determined that they would lead to a 6-degree world. A recent World Bank report indicates the bank cannot fulfill its development mission in a 4-degree world. Given what we know about planetary biology, 2 degrees seems nightmarish as it is.

So what to do? The first thing is to recognize both the climate and biodiversity agenda as deadly important, of utmost urgency and fundamental to the future of humanity. The second is to find ways to keep temperature increase below 1.5 degrees.

One of those is to use the biology of our planet to pull about half a degree of warming potential out of the atmosphere before that potential is realized. Lag times between attaining an atmospheric CO₂ concentration and the consequent heat accumulation make this possible.

In addition, because all living things are built of carbon, restoring ecosystems (e.g., reforestation and restoration of grasslands) can recapture carbon lost to the atmosphere through past deforestation and ecosystem degradation. Ecosystem restoration has multiple benefits, including better grazing and enhanced soil fertility.

Simultaneously, we need to identify ways to pull CO₂ out of the atmosphere nonbiologically. There already are ways to burn carbon-based fuels and capture the CO₂ before it leaves chimneys. Better yet would be to find ways to pull CO₂ from the atmosphere that are economic, even with the lower atmospheric concentrations.

“Geoengineering” schemes to reduce planetary temperature rather than atmospheric CO₂ concentrations are to be avoided. They only address the symptom (temperature) to the neglect of the cause (elevated greenhouse gas levels). As a consequence they are mostly irrelevant, dangerous and do nothing to reduce ocean acidity.

Environmental change is happening rapidly and exponentially. We are out of time. Only three generations back — in the same decade as the original scientific publication of the greenhouse effect — my great-grandfather chaired the commission that designed the New York subway system. How was he to anticipate the sea-level rise that contributed in part to the impact of Hurricane Sandy?

How will things look just two or three generations ahead? Can we avoid the greatest intergenerational environmental injustice of all time?

In June the intergovernmental process of Rio+20 proved to be monumentally disappointing. Happily, the Convention on Biological Diversity is invigorated by new leadership and, among other things, has called for a “concerted effort on ecosystem restoration.”

Unfortunately, inadequate funding nips at its heels. While there is some welcome private sector interest, what is needed is a world in which governments face the environmental challenge squarely, and truly lead. The current mode of nibbling around the edges is pretty much pointless.

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