

Global warming: coming ready or not!

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Climate change from human influences is a real problem today and could have major consequences beyond those already seen. In fact rather than slowing down, the problem is accelerating. Carbon dioxide emissions are increasing and raise the specter that future climate changes could be much larger and come much sooner than IPCC suggests.

The problem is that carbon dioxide has a long lifetime in the atmosphere and so it builds up and is at present over 36% above pre-industrial levels, with over half of that increase since 1970. The climate system (especially the ocean and ice sheets) has a lot of inertia and responds slowly, so at least another 1°F warming globally is already guaranteed. There is also inertia in the infrastructure. *This means long lead times are essential for actions to address climate change.*

To paraphrase the IPCC report **“Warming of the climate system is unequivocal”** and it is **“very likely” due to human activities**. Also, observed changes in recent decades are reproduced in climate models and are projected to increase in future with substantial impacts. Nature continues to provide evidence that it is under duress and the impacts are affecting people and animals.

As a medical analogy, what we have done is to carry out a detailed diagnosis of the vital signs of the planet Earth. The results show that the planet is running a “fever” and the prognosis is not good, with much more of what we already see happening. The treatment is adaptation and mitigation. A budgetary analogy is that we are running an environmental deficit and building debt for future generations.

My interpretation of recent events is in the context of IPCC findings and includes:

- The last decade is the warmest on record.
- A very dramatic climate event was the huge loss of Arctic sea ice in 2007 which affects permafrost in surrounding areas, as well as polar bears and other native species. 2010 could break that record. Sea ice in September is 40% down from the 1970s.
- Sea level rise is perhaps the best single indicator of a warming planet, and continues at a rate of over a foot a century. Changes in ocean acidity accompany the buildup in carbon dioxide in the atmosphere with consequences for sea creatures, and bleaching of corals occurs in association with warming oceans.
- In 2010, record heavy snows in Washington DC, heavy rains and flooding in New England, and Tennessee etc point to the increases in intensity of rains associated with more water vapor in the atmosphere: *a direct consequence of warming*. Large increases in intensity are clear throughout the United States since the 1970s in particular.
- The record breaking numbers of tornadoes and deaths in the U.S. in 2008 probably also has a global warming component from the warm moist air coming out of the Gulf of Mexico adding to instability of the atmosphere.
- Longer dry spells also accompany warming. As heat goes into evaporating moisture, drying and wilting vegetation, the risk of wild fire increases enormously. Wild fires in California and elsewhere are evidence of the impacts. Heat waves are also increasing: witness the East Coast in July 2010.
- Atlantic hurricanes are predicted to be at high levels this year and the 2005 year holds the all time records in many categories (Katrina, Rita, Wilma... beyond the alphabet.)
- We should not be misled by short-term natural variations such as El Niño over past year and the La Niña that has dominated weather patterns over the previous 2 years.
- Past climate is no longer a good guide for the future, but that is the way most planning has traditionally been done.
- I believe the biggest impacts will be on water resources, in part because of other pressures from a growing population but also because of increased evaporation and drying, and greater extremes of heavy rains, runoff and flooding. Water is the air conditioner of the planet and it is especially in short supply in the West.
- Associated with the water shortages will be times of drought, heat waves and wild fires.

Global warming is not just a threat for the future, it is already happening. It is affecting people and ecosystems and public health. Our predictions are for substantial climate changes into the future to the point where Earth could become a different planet by 2050. I believe there is a crisis of inaction in addressing and preparing for climate change. Global warming is happening and, as I often say in my talks: **“Coming ready or not”**.