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Pielke's Perspective

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# Making Sense of Trends in Disaster Losses

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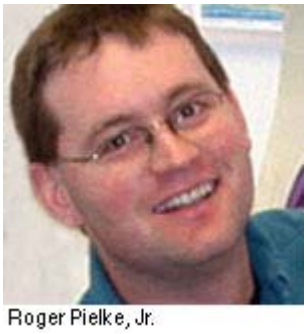
Roger Pielke, Jr.

Record rainfall and over a thousand dead in Mumbai. Devastating floods in central Europe. A record hurricane season in the Atlantic, including more than $100 billion dollars in damage from Hurricane Katrina. The summer of 2005 seems to have witnessed more than its fair share of weather-related disasters. And, perhaps understandably, no weather-related disaster occurs without someone linking it to the issue of global warming. For example, Klaus Töpfer, director of the United Nations Environment Programme, made such a connection in an interview with the *Financial Times Deutschland*. “We live already in climate change. The worldwide increase in strong rains, droughts and (wind)storms are indications that the greenhouse effect is having an influence …”

But as logical and enticing as it may seem to connect the ever-growing toll of disasters with global warming, the current state of science simply does not support making such a connection. While politicians and political advocates might be expected to stretch the bounds of scientific accuracy, it is particularly troubling to see leading scientists join them. For instance, the former head of the UN’s Intergovernmental Panel on Climate Change (IPCC), Sir John Houghton, testified before the US Senate last July that increasing disaster losses could be attributed to increased storminess. And Rajendra Pachuri, the current head of the IPCC, suggested last February that the escalating costs of disasters could be attributed in part to climate change. Yet such claims are simply not supported by scientific research.

It is true that weather-related disaster losses have increased dramatically in recent decades. A figure (http://www.grida.no/climate/ipcc_tar/wg2/fig8-1.htm) published in 2001 by the IPCC shows how dramatically disaster costs have escalated.

If we hypothesize that changes in weather patterns are responsible for some part of the trend of increasing disaster losses, then it is logical that the first place we might look is for changes in the behavior of weather extremes. The most recent IPCC took a close look at research on extreme weather events and found little evidence for changes over time:

Over recent decades, the IPCC found no long-term global trends in tropical or extra-tropical cyclones (i.e. hurricanes or winter storms), in "droughts or wet spells," or in "tornados, hail, and other severe weather." In the absence of trends in these weather events, they cannot be responsible for any part of the growing economic toll. More recently Kerry Emanuel published a study in Nature that described a increase in the intensity of hurricanes in the North Atlantic and North Pacific, but this trend is not related to increasing damage. Emanuel writes on his website, “There is a huge upward trend in hurricane damage in the U.S., but all or almost all of this is due to increasing coastal population and building in hurricane-prone areas. When this increase in population and wealth is accounted for, there is no discernible trend left in the hurricane damage data.”

The IPCC did find "a widespread increase in heavy and extreme precipitation events in regions where total precipitation has increased, e.g. the mid- and high latitudes of the Northern Hemisphere." But at the same time the IPCC warned that "an increase (or decrease) in heavy precipitation events may not necessarily translate into annual peak (or low) river levels." Indeed, while the IPCC found some changes in streamflow, it did not identify changes in streamflow extremes (i.e. floods), and concluded on a regional basis that: "Even if a trend is identified, it may be difficult to attribute it to global warming because of other changes that are continuing in a catchment." A recent study by the International Ad Hoc Detection and Attribution Group, published in the May 2005 *Journal of Climate*, was unable to detect an anthropogenic signal in global precipitation.

These findings are consistent with research seeking to document a climate signal in a long-term record of flood damage, which has concluded that an increase in precipitation does indeed contribute to increasing flood damage, but the precise amount of this increase is small and difficult to identify in the context of the much larger effects of policy and the ever-growing societal vulnerability to flood damage.

While it is understandable why some advocacy groups might stretch the bounds of present scientific understandings to link recent disasters and climate change to advance a political agenda, why is it that many scientists, who should know better, make the same claims?

One important reason for some confusion among scientists stems from a claim made by the 2001 IPCC (by Working Group II) attributing some part of the trend of increasing disaster losses to changes in climate. Upon a closer look however the claim seems unfounded. The IPCC relies on a report published in 2000 by Munich Re that found that global disasters resulted in $636 billion in losses in the 1990s compared with $315 billion in the 1970s, after adjusting for changes in population and wealth. The Munich Re report concludes that disaster costs have increased by a factor of two (i.e. 636/315), independent of societal changes, and the IPCC suggests that climate change is responsible for the difference.

Methodologically, the calculation is suspect for a number of reasons. First, Munich Re provides neither their methods nor data. Second, Munich Re admits that data on changes in wealth are not available around the world and changes in GDP are not always a good proxy for data on wealth. Third, Munich Re's data apparently includes weather and non-weather events (e.g. it appears to also include earthquake damages).

But let's assume that all of the issues raised above can be overcome, and in the end there remains a 2-to-1 ratio. The fact is that the large decadal variability in disaster losses makes it quite dodgy to assert a trend by comparing two different ten-year periods over a period of 30 years. Let me illustrate this with an example from our database of hurricane losses. If we adjust the hurricane loss data, accounting for trends in population, wealth, and inflation, to 2004 values and then compare decades, we see some interesting things. First, the ratio of the 1990s: 1970s is quite similar to the Munich Re analysis, 2.1 ($91B/$43B). But if we look at other decadal comparisons, the picture looks quite different, 1990s:1940s = 1.0 ($91B/$90B) and 1990s:1920s = 0.6 ($91B/$154B). The bottom line is that the 2000 Munich Re analysis tells us nothing about attribution of the causes for increasing disasters, yet its results were used by the IPCC to suggest otherwise.

Our group at the University of Colorado has partnered with Munich Re to hold a workshop in 2006 which will discuss and debate the attribution of recent trends in disaster losses, and work towards a rigorous, scientific consensus on this subject. I am quite impressed by Munich Re's commitment to rigorous research. With further research we may yet identify a climate change signal in disaster losses.

As Hans von Storch and Nico Stehr wrote earlier this year in *Der Spiegel*, when scientists invoke unsubstantiated claims to support a political agenda, it creates fodder for obstructionists to action on climate, and misleads the public and policy makers. There are good reasons for more substantial action on energy policies, particularly in the United States; and there are good reasons for concern about the growing toll of disaster losses around the world. But suggestions that the escalating disaster losses should motivate action on energy policy are not grounded in science, and cannot be an effective approach to disaster management. If you think that the recent trend of increasing disasters is a result of climate change, take a closer look at the available science because the connection has yet to be proved.

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**Links**

- Klaus Töpfer interview with FTD (in German):

http://www.ftd.de/pw/in/19623.html
English summary:
http://www.euractiv.com/Article?tcmuri=tcm:29-143409-16&type=News

- Sir John Houghton Congressional testimony:
http://energy.senate.gov/public/index.cfm?FuseAction=Hearings.Testimony&Hearing

- Rajendra Pachauri presentation:
http://www.stabilisation2005.com/day1/Pachauri.pdf

- Munich Re report:
http://www.munichre.com/publications/302-02354_en.pdf?rdm=80335

- Kerry Emanuel's statement on hurricanes and climate change:
http://wind.mit.edu/~emanuel/anthro2.htm

- *Detecting and Attributing External Influences on the Climate System: A Review of Recent Advances*. The International Ad Hoc Detection and Attribution Group, pages 1291–1314.
http://ams.allenpress.com/amsonline/

- von Storch, H., and N. Stehr, 2005: Klima inszenierter Angst. *Der Spiegel*, 24 January. [Available online at www.spiegel.de/spiegel/0,1518,338080,00.html; English translation available online at http://sciencepolicy.colorado.edu/prometheus/archives/climate_change/]