Mitigation and Adaptation for Ecosystem Protection

All tools and energies should be put into climate change mitigation and adaptation

by Thomas Lovejoy

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The Barack Obama Administration will take office at a moment when the world, and this country in particular, has lagged way behind in tackling the greatest environmental problem of all time: climate change. Global emissions now exceed the worst-case scenario of the Intergovernmental Panel of Climate Change, and annual emissions of developing nations have begun to exceed those of the industrialized ones. The time is long overdue for U.S. leadership. Meaningful steps need to take place at home with cap and trade or some other form of legislation that elevates the price of carbon while cushioning the impacts for the less advantaged sectors of society. Such legislation needs to be coupled with serious investment in energy research and incentives for clean energy, including energy conservation and efficiency.

Climate change needs to be accorded an urgency and priority hitherto lacking. Ecosystem considerations support James Hansen's conclusion that greenhouse gas (GHG) concentrations above 350 parts per million (ppm) are not safe.[1] Current concentrations are 389 ppm. It is important to peak at as low a concentration as possible and then return rapidly to 350 ppm. In the United Nations Framework Convention on Climate Change (UNFCCC)[2] this is referred to as mitigation, or reducing the amount of future climate change. The convention also references adaptation, which means enhancing the resilience of natural and human systems in the face of the climate change that is taking place and will take place.

A little-appreciated part of the mitigation agenda seeks to address the loss of carbon from ecosystems. Current estimates are that 20% of global CO_2 emissions emanate from tropical deforestation. As a consequence, Indonesia is the third largest emitter (after China and the United States) and Brazil is fourth. While reforestation and afforestation are eligible for carbon trading under the convention, avoided deforestation (now known technically as Reduced Emissions From Degradation and Deforestation (REDD)) is not yet included. Were avoided deforestation to be added and addressed with the priority it deserves, it would make a meaningful reduction to the rate of increase of GHG concentrations. It would also contribute to conservation of forests and biodiversity plus poverty reduction by providing financial reward for those who make a living in the forest without destroying it.

It is time to explore beyond tropical forests to what ecosystems as a whole could contribute to removing carbon from the atmosphere. Approximately 200 to 250 billion tons of carbon have been lost from ecosystems in the last 300 years and each billion tons restored to ecosystems is roughly equivalent to reducing atmospheric concentration by 1 ppm. Obviously, there cannot be complete and universal return to the higher carbon natural ecosystems, but we can manage our ecosystems and landscapes for higher carbon and concomitant increase in biodiversity. Restoring degraded grazing lands could add significant carbon but still serve grazing—and better. Agriculture can be managed in ways that retain and increase soil carbon. Restoring riparian vegetation, good for streams and rivers in its own right, will increase carbon as well. The ecosystem carbon potential needs to be addressed systematically and on a planetary scale.

Obviously, competing interests need to be taken into account nationally and internationally. One segment includes economic activity that essentially needs to be phased out, or at least have its carbon offset. There is substantial interest among corporate leaders in the economic opportunity involved, but a need for government to set the appropriate incentives both positive and negative. When, for example, there are substantial sunk costs in coal-fired power plants, how can they be addressed in ways that either provide CO_2 geological sequestration, or address impediments like high initial cost of conversion to new technology?

Other competing interests include production of biofuel for clean energy and food for a world with increasing population. With the rush to corn ethanol, we have already seen the need to approach these matters holistically. Substantial areas in the U.S. Conservation Reserve were converted to corn with both natural vegetation (and biodiversity) being reduced and carbon released in the form of CO_2. Nationally and internationally, we need to eschew piece-by-piece solutions that unintentionally

1. *See* James Hansen et al., Target Atmospheric CO2: Where Should Humanity Aim? 11 (2008).
2. UNFCCC, *opened for signature* June 4, 1992, S. Treaty Doc. No. 102-38 (1992), *reprinted in* 31 I.L.M. 849 (1992) (entered into force Mar. 21, 1994).

can affect ecosystem carbon. In the end, food, biofuels, ecosystem carbon, and biodiversity depend on the same ecological base. They come, as it were, from the same basic account.

The adaptation part of the climate change agenda is only just beginning to get attention, and needs much more right away. With one-half meter of sea-level rise, 1.8 billion people will be displaced. Plant and animal species are blocked by human-dominated landscapes from tracking their required conditions in the changing climate. We need to fundamentally redesign how nature is accommodated in our landscapes. We need a new generation of finer-scale climate projections to provide managers and decisionmakers with an understanding of the kinds of changes they need to make to adapt to climate change.

Much as with the current crisis in the global economic system, the national and international investments needed for mitigation and adaptation are considerable, but modest in contrast to the costs of not addressing the problem. There are inevitably aspects of competing interests, and real issues of equity. All those need to be addressed, but with a sense of the enormous urgency of the climate change problem. Undoubtedly, there is insufficient time to approach many things in a linear fashion, and we must be prepared for some learning by doing—with the great caveat that when experiments are on a planetary scale, huge caution should be urged. There is one overwhelming truth, however, namely that planetary-scale problems require a planetary response. This is not business as usual.