Oral Testimony of Brent Sohngen, Environmental Economist, Ohio State University
US House of Representatives, Committee on Agriculture
Subcomittee on Conservation, Credit, Energy and Research.
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Mr Chairman, members of the Subcommittee, thank you for the opportunity to testify before you on the benefits and costs forest carbon sequestration as a climate mitigation tool.

The global forest estate currently stands at 3.9 billion hectares, with 1 trillion tons of CO_2.[1] More than half of this total forest area is located in temperate regions, including the United States, Canada, Europe, Russia, and China. For the most part, the carbon in these forests is increasing or is relatively stable.

Well more than half of the total carbon in forests is located in tropical countries. Due to human activity, this carbon is not as stable as that in temperate regions. Annually, 10-14 million hectares of forestland are lost as deforestation occurs, causing an estimated 4 billion tons of CO_2 emissions per year. This emission amounts to about 17% of total carbon dioxide emissions into our atmosphere.[2]

Forests have always been recognized for the benefits they provide to humans, including wood for consumption, habitat for wildlife, stores of biodiversity, water regulation services, and stream stabilization. More recently, society has recognized the role forests play in mitigating the potential damages from climate change. My research along with that of my colleagues has shown that forests are a low cost option for reducing net carbon emissions to the atmosphere.

In particular, our research has shown that the international supply of carbon credits from forestland could be as large as 6 billion tons of CO_2 abatement per year by 2030 at carbon prices of \$10-\$20 per ton CO_2.[3] By far the largest share of credits that could be generated globally arise from reductions in emissions from avoided deforestation, followed by improvements in forest management practices, and finally by planting of forests on old agricultural land.

The carbon credits generated by forestry actions, both within the United States and outside of it, could provide immense benefits to US consumers. Our estimates indicate that international offsets from forestry in particular, could reduce carbon prices in US compliance markets by 25-50%, depending on the size of the cap implemented, and how many offsets are allowed to be imported.[4]

In the context of a cap and trade system with a fixed target for emissions, this cost reduction function would leave literally billions of dollars each year in the hands of small businesses, who will have more resources to invest in productive capital, and consumers, who will pay lower energy prices as a consequence.

Beyond these cost savings, an international carbon sequestration program will also make a US carbon sequestration program more effective. If the US only allows domestic offsets, commodity price increases will cause carbon emissions, or leakage, elsewhere. An international offsets program, however, can help to limit these losses in other countries. By helping to stabilize land use in other countries, an international offsets program will also limit agricultural commodity supply responses in competitor countries.

The economic evidence is clearly in favor of international offsets. They reduce costs, and they ensure the integrity of a US-based offset system. But are they also feasible? Many questions and concerns have been raised academically and in the public discourse about land-based offsets. In particular, questions have been raised about international offsets. I would like to address several of those concerns here.

First, many parties are worried that there is no way to measure, monitor, and verify large expanses of forest carbon in other countries. There is little doubt from a physical and scientific standpoint that we can measure, monitor and verify carbon in forests. We already do this in many locations around the globe. The more important question is "what are the costs?" Current studies place costs at \$1-\$2 per ton CO_2 to measure and monitor carbon in forests.[5] If carbon prices are in the range of \$15-\$20 per ton CO_2, and rising, measuring, monitoring and verifying will turn out to be a relatively small part of the transaction.

Of course we do not yet have precise and accurate measurements of forest carbon in most tropical countries to date. The reasons are clear: Society has never valued forest carbon as a marketable commodity. The European Trading System declined to fully integrate forests, and voluntary systems that do include forests systematically under-value carbon. However, with global carbon reductions on the order suggested by the current Waxman-Markey bill, the world's forests could be worth as much as \$2 trillion in carbon abatement services, or \$500 per hectare.[3] Commodities worth this much are worth measuring and monitoring.

Second, there are vast concerns that forest carbon is volatile and impermanent – i.e., that it will be sold off to the highest bidder or burnt up when lightening strikes. Permanence is a legitimate issue, but it can be handled by markets. The fact is that carbon markets do not need forest carbon to be permanent at all. Temporary storage would be valuable, could be priced, and should be traded on a market.

The best way to think about permanence is to begin by asking whether we hold any assets to the same standard in the modern economy. The answer is no. Economic actors recognize that all assets depreciate and that there are risks associated with holding them. Automobiles are not meant to be driven forever. Few of us end up living in the same house or apartment forever, and many of us rent.

To handle permanence, either the buyers or the sellers need to be contractually liable for the carbon. Then the risks associated with the particular location (e.g., fire, illegal logging) can be considered, and permanence is worked into the price: Shorter term storage of carbon, or more risky storage of carbon will be worth less than longer term or less risky storage.

Third, can we handle the land ownership and tenure issues that often plague the developing countries? Clearly, carbon purchased from individuals in regions where land tenure is under question should be devalued. The US should limit forest carbon contracts to those countries that have clearly established tenure rights, regardless of whether the land is publicly, privately, or communally managed. Countries that do not satisfy these criteria should be encouraged to develop equitable tenure arrangements so they can enter into carbon contracts in the future.

In conclusion, international carbon credits generated from forestry are a cost-effective means of reducing carbon emissions. Further, they enhance the efficiency of a domestic offset program. Some of the concerns that have been raised with international carbon offsets are important and should not be diminished, but they also should not be oversold.

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[2] Intergovernmental Panel on Climate Change. 2007. "Mitigation of Climate Change." Report of Working Group III. Cambridge: Cambridge University Press.

[3] Sohngen, Brent. 2009. An Analysis of Forestry Carbon Sequestration as a Response to Climate Change. Assessment Report. Copenhagen Consensus on Climate. (http://fixtheclimate.com/)

[4] Murray, B., R. Lubowski, and B. Sohngen. 2009. Including International Forest Carbon Incentives in Climate Policy: Understanding the Economics. Nicholas Institute Report 09-03. Nicholas Institute for Environmental Policy Solutions. Duke University. (http://www.nicholas.duke.edu/institute/)

[5] Antle, J.M. and Capalbo, S.M., Mooney, S., Elliot E.T., and Paustian, K.H., 2003 "Spatial heterogeneity, contract design, and the efficiency of carbon sequestration policies for agriculture" Journal of Environmental Economics and Management 46:231-250

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Biographical Sketch

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Education

D.F. Natural Resource and Environmental Economics, Yale School of Forestry and Environmental Studies, 1996.

B.S. Applied Economics and Business Management, Cornell University, 1991

Employment

The Ohio State University, Dept. of Agricultural, Environmental, and Development Economics. Professor, 2006 – present; Associate Professor, 2001 – 2006; Assistant Professor, 1996 - 2001.

Resources For the Future, Gilbert White Postdoctoral Fellow, 1995 – 1996

Honors

Faculty Fellow, Resources For the Future.

Publications (selected)

Sohngen, B. and S. Brown. 2008. "Extending Timber Rotations: Carbon and Cost Implications." *Climate Policy*, 8: 435–451.

Kindermann, G., M. Obersteiner, B. Sohngen J. Sathaye, K. Andrasko, E. Rametsteiner, B. Schlamadinger, S. Wunder, R. Beach. 2008. "Global cost estimates of reducing carbon emissions through avoided deforestation." *Proceedings of the National Academy of Sciences*. 105(30): 10302–10307.

Murray, B.C., B. Sohngen, M.T. Ross. 2007. "Economic Consequences of Consideration of Permanence, Leakage and Additionality for Soil Carbon Sequestration Projects." *Climatic Change*. 80(1-2): 127-143.

Tavoni, M., B Sohngen, and V. Bosetti. 2007. " Forestry and the carbon market response to stabilize climate." *Energy Policy* 35(11): 5346-5353.

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Recent Federal Grants for Brent Sohngen (Obtained after October 1, 2006)

Agency	Title of Project	Amount
US Environmental Protection Agency	Climate economic model development and analysis of global forestry and agriculture	$78,750
USDA Forest Service, PNW Research Station	Measuring the potential impacts of climate change on land use in the U.S.	$25,000
US Department of Agriculture, Economic Research Service	Land competition between agriculture and forestry in climate change mitigation policies	$125,000
US Environmental Protection Agency	Global forestry and agriculture climate economic model development and analysis	$94,520