Forests and Ecosystems

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Outline

1) Ecosystem models and their implications for the impacts of climate change on forests

- Review of literature on ecological impacts

Intergovernmental Panel on Climate Change. 2014. Terrestrial and Inland Water Systems. Chapter 4 in "Climate Change 2014: Impacts, Adaptation and Vulnerability."

- Review of Dynamic Global Vegetation Models

Prentice et al., 2007. "Dynamic Global Vegetation Modeling: Quantifying Terrestrial Ecosystem Responses to Large-Scale Environmental Change" Chapter 15 in Canadell, J. G., Pataki, D. E., & Pitelka, L. (eds). *Terrestrial ecosystems in a changing world*. Springer: Berlin. 336p

Gonzalez, P., Neilson, R. P., Lenihan, J. M., & Drapek, R. J. (2010). Global patterns in the vulnerability of ecosystems to vegetation shifts due to climate change. *Global Ecology and Biogeography*, *19*(6), 755-768.

2) Alternative forestry economic modeling approaches

- Structural/dynamic models
- Reduced form/static models

Sohngen, B. and R. Sedjo. 1998. "A Comparison of Timber Market Models: Static Simulation and Optimal Control Approaches." *Forest Science*. 44(1): 24-36.

3) Methods for integrating ecosystem model results into economic models

Alig, R. J., Adams, D. M., & McCarl, B. A. (2002). Projecting impacts of global climate change on the US forest and agriculture sectors and carbon budgets. Forest Ecology and Management, 169(1), 3-14.

Haim, D., Alig, R. J., Plantinga, A. J., & Sohngen, B. (2011). Climate change and future land use in the United States: an economic approach. *Climate Change Economics*, *2*(01), 27-51.

Hanewinkel, M., Cullmann, D. A., Schelhaas, M. J., Nabuurs, G. J., & Zimmermann, N. E. (2013). Climate change may cause severe loss in the economic value of European forest land. *Nature Climate Change*, *3*(3), 203-207.

Sohngen, B. 2014. Forests and Climate Change: Economic Perspectives. Chapter 15 in Kant, S., & Alavalapati, J. (Eds.). *Handbook of Forest Resource Economics*. Routledge.

Sohngen, B. and R. Mendelsohn. 1998. "Valuing the Market Impact of Large Scale Ecological Change: The Effect of Climate Change on US Timber." *American Economic Review*. 88(4): 689 - 710.

Sohngen, B., R. Mendelsohn, and R. Sedjo. 2001. " A Global Model of Climate Change Impacts on Timber Markets." *Journal of Agricultural and Resource Economics*. 26(2): 326-343.

4) Adaptation

- Forest fires
- Shifting species
- Who owns the land? (Private/public)
- Is the land managed? (managed/unmanaged/reserved/set-aside)

Guo, C., & Costello, C. (2013). The value of adaption: Climate change and timberland management. *Journal of Environmental Economics and Management*, *65*(3), 452-468.

Daigneault, A., M. Miranda, and B. Sohngen. 2010. "Optimal Forest Management With Carbon Sequestration Credits And Endogenous Fire Risk." *Land Economics*. 86(1): 155-172.

5) Role of government in adaptation

- Private land
- Public land
- Collectively managed land

6) Special issues

- Carbon sequestration/REDD policy and climate change
- Biofuels
- Managing biodiversity and reserved land

Sohngen, B. and R. Mendelsohn. 2003. "An Optimal Control Model of Forest Carbon Sequestration" *American Journal of Agricultural Economics*. 85(2): 448-457.

Favero, A., & Mendelsohn, R. (2014). Using markets for woody biomass energy to sequester carbon in forests. *Journal of the Association of Environmental and Resource Economists*, *1*(1), 75-95.

Dawson, T. P., Jackson, S. T., House, J. I., Prentice, I. C., & Mace, G. M. (2011). Beyond predictions: biodiversity conservation in a changing climate.*science*, *332*(6025), 53-58.

Wintle, B. A., Bekessy, S. A., Keith, D. A., van Wilgen, B. W., Cabeza, M., Schröder, B., ... & Possingham, H. P. (2011). Ecological-economic optimization of biodiversity conservation under climate change. *Nature Climate Change*, *1*(7), 355-359.