

Challenges of Sustainable Development

Course number: SDEV W2300.001
Spring 2012
Mondays & Wednesdays 8:45-9:50 AM
Northwest Corner (NWC) 501

We will generally meet three times per week: Mondays and Wednesdays in lecture and once a week in Section.

Professor

Jeffrey D. Sachs sachs@columbia.edu
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Teaching Assistants

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Office Hours: Fri 12-2pm, Lehman Library group study space
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Office Hours: Fri 11am-1pm, Lehman Library group study space
Section: Fri 9-10am (303 Hamilton)

Course Description

This course provides an introduction to the interdisciplinary field of sustainable development, drawing on the most recent developments in social and physical sciences. The course describes the interactions between physical ecology and economic development, and it stresses the ways in which they impact each other. Ecological constraints (climate, disease ecology, physical resources such as soils and energy sources, topography and transport conditions) significantly shape the patterns of economic development, demography, and wealth and poverty. At the same time, anthropogenic activities (farming, resource depletion, demographic stresses, and energy use) change the physical environment. The course offers a rigorous treatment of the field and aims to provide students with an understanding of economic development and its relation to nature's processes.

Evaluation and Grading

There will be a mid-term, one final exam, three problem sets, and short exercises based on the Millennium Villages Sim.

The course grade will be based on:

Three problem sets	30%
SIM Exercises	10%
Mid-Term	25%
Final Exam	35%

Books for the Course

Diamond, Jared. Guns, Germs, and Steel: The Fates of Human Societies. W.W. Norton, 1999.

McNeill, J.R. Something New Under the Sun. W.W.Norton, 2000.

Sachs, Jeffrey D. Common Wealth. Penguin, 2008.

Angus Maddison, The World Economy (available on Google Books)

Additional readings will be posted online for download.

In addition, note that all books are on reserve at Butler Library.

Syllabus

** Readings marked with stars are optional

Topic 1: Resource Allocation

Wednesday, January 18: Lecture 1 – Economy, Ecology & Sustainable Development

Monday, January 23: Lecture 2 – The Economy

Lecture Notes 1: The Two-Sector Model

Wednesday, January 25: Lecture 3 – Globalization and Geography

Sachs, Jeffrey D. Common Wealth. Chapters 1 & 2.

Angus Maddison, The World Economy
Introduction, Summary, and Chapters 1-3 (pp. 17-167)

Easterlin, “The Worldwide Standard of Living Since 1800,” *The Journal of Economic Perspectives*, Vol. 14, No. 1, Winter 2000.

Pritchett, Lant, "Divergence Big Time," *The Journal of Economic Perspectives*, Vol. 11, No. 3, Summer 1997.

Easterlin, Richard, "Why Isn't the Whole World Developed?" *The Journal of Economic History*, Vol. 41, No. 1, March 1981.

Monday, January 30: Lecture 4 – Supply and Demand

Lecture Notes 2: Supply and Demand

Lecture Notes 3: GDP

Wednesday, February 1: Lecture 5 – Geography of Economic Life

Diamond, Jared. Guns, Germs, and Steel

Gallup, John, Andrew Mellinger and Jeffrey D. Sachs, "Climate, Coastal Proximity, and Development," Oxford Handbook of Economic Geography, edited by Gordon L. Clark, Maryann P. Feldman, and Meric S. Gertler, Oxford University Press, 2000.

Strahler and Strahler, Introducing Physical Geography, Chapter 6

** "Geography and Economic Development," with John Luke Gallup and with Andrew Mellinger, *International Regional Science Review*, Vol. 22, No. 2, pp. 179-232, August 1999. (optional for students interested in a more formal economic model)

Monday, February 6: Lecture 6 – Division of Labor & Trade

Lecture Notes 4: Capital and Growth

Wednesday, February 8: Lecture 7 – Basic Concepts of Growth & Development

Sachs, Jeffrey D. "Chapter 9: Strategy of Economic Development" in Common Wealth

World Bank. World Development Report 2007. (Only data appendix at the back)

United Nations Development Programme. Human Development Report 2007. (Only data appendix at the back)

Monday, February 13: Lecture 8 – Poverty Traps and African Development

Chapter 10 "Ending Poverty Traps" from Common Wealth

Sachs, Jeffrey D., et al., "Ending Africa's Poverty Trap," *Brookings Papers on Economic Activity*, Issue 1, 2004.

Sachs, Jeffrey and Gordon C. McCord. "Extreme Poverty." New Palgrave Dictionary of Economics.

UN Millennium Project. Investing in Development: A Practical Plan to Achieve the Millennium Development Goals

Sanchez, Pedro et al. "The African Millennium Villages." *PNAS*. October 23, 2007.

Topic 2: Economic Policy

Wednesday, February 15: Lecture 9 – Concepts of Economic Performance – Sustainability, Efficiency, Equity

Monday, February 20: Lecture 10 – How Well Do Markets Deliver the Goods? Equity, Efficiency, Sustainability

Wednesday, February 22: Lecture 11 – Externalities and Pollution Control

Zezima, Katie. "Maine Conservationists Reach Milestone in Plan to Buy 3 Dams." *The New York Times*, August 22, 2008.

The Economist, "Are You Being Served?" April 23, 2005

Jack, B. Kelsey et al. "Designing payments for ecosystem services: Lessons from previous experience with incentive-based mechanisms." *PNAS*. Vol. 15, No. 28. July 15 2008.

Liu, Jianguo et al. "Ecological and socioeconomic effects of China's policies for ecosystems services." *PNAS*. Vol. 15, No. 28. July 15 2008.

Turner, Pearce and Bateman, Environmental Economics: An Elementary Introduction. Chapter 10: "Using the market to protect the environment."

Turner, Pearce and Bateman, Environmental Economics: An Elementary Introduction. Chapter 11: "Charging for use of the environment."

Monday, February 27: Lecture 12 – Public Goods

Nelson, Richard R. "Basic Scientific Research" in The Limits of Market Organization. Richard Nelson, ed. Russell Sage Foundation: New York, 2005.

Wednesday, February 29: Lecture 13 – Merit Goods- Health & Education

Africa MDG Steering Group. Achieving the Millennium Development Goals in Africa. Summary Report. June 2008.

Monday, March 5: Lecture 14 – How Governments Finance Public Goods

Sachs, "Chapter 11: Economic Security in a Changing World," in Common Wealth

Wednesday, March 7 -- Midterm Examination

Monday, March 12 & Wednesday, March 14 – Spring Recess

Topic 3. Ecosystem Services

Monday, March 19: Lecture 15 – Will Natural Resource Depletion Limit Global Economic Growth & Development?

** Heal, Geoffrey. “Exhaustible Resources,” forthcoming in the New Palgrave Dictionary of Economics, Second Edition. (optional, involves calculus)

Wednesday, March 21: Lecture 16– Managing the Commons: Sustainable Fisheries and Forests

Sachs, “Chapter 3: The Anthropocene” in Common Wealth

Jackson, Jeremy et al., “Historical Overfishing and the Recent Collapse of Coastal Ecosystems.” *Science* Vol 293 27 July 2001.

Pikitch, Ellen K., “The Gathering Wave of Ocean Extinctions,” State of the Wild 2006, pg 195-201.

** Bjorndal, T. and G. Munro, “The Economics of Fisheries Management: A Survey,” in T. Tietenberg and H. Folmer (eds.), *The International Yearbook of Environmental and Resource Economics 1998/1999*. (optional for those interested in the economics of management, article involves some calculus)

Monday, March 26: Lecture 17 – Introduction to Ecosystem Services

J. R. McNeill, Something New Under the Sun

Chapter 2 “Our Crowded Planet” from Common Wealth

Zalasiewicz, Jan et al. “Are we now living in the Anthropocene?” *GSA Today*. Vol. 18, No. 2. February 2008.

McCarthy, James J. “Reflections On: Our Planet and Its Life, Origins, and Futures.” *Science*. Vol. 236. 18 December 2009.

Wednesday, March 28: Lecture 18 – Climate Change

Sachs, “Chapter 4: Global Solutions to Climate Change,” in Common Wealth

Wally Broecker, “A Business Executive’s Guide to Global Warming.”

S. Pacala and R. Socolow, “Stabilization Wedges: Solving the Climate Problem For the Next 50 Years with Current Technology,” *Science*, Vol. 305, August 2004.

James Hansen. "Can we defuse the global warming time bomb?" *Scientific American*, March 2004.

Stern Review: The Economics of Climate Change (Executive Summary)

Heal, Geoffrey. Nature and the Marketplace, 2000. Chapter 5

Lovins, Amory. "More Profit with Less Carbon," *Scientific American*, Volume 293, No. 3, Sept 2005

Monday, April 2: Lecture 19 – Will We Run Out of Energy?

Lackner, Klaus and Jeffrey D. Sachs, "A Robust Strategy for Sustainable Energy," *Brookings Papers on Economic Activity*, Issue 2, 2005.

Siemens. Pictures of the Future: The Magazine for Research and Innovation. Fall 2009.

Department for International Development. Energy for the Poor. May 2002.

International Energy Agency. Toward a Sustainable Energy Future. OECD, 2001.

Wednesday, April 6: Lecture 20 – Biodiversity Loss

Sachs, Jeffrey D. "Chapter 6: A Home for All Species," in Common Wealth.

Godfray, H. Charles J. et al. "Food Security: The Challenge of Feeding 9 Billion People." *Scienceexpress* 28 January 2010.

Millennium Ecosystem Assessment. Ecosystems and Human Well Being: Synthesis. 2005.

Stuart Pimm and Clinton Jenkins, "Sustaining the Variety of Life," *Scientific American*, Vol. 293, No. 3, September 2005.

Geoffrey Heal, Nature and the Marketplace, 2000. Chapter 4.

Convention on Biological Diversity. Global Biodiversity Outlook. CBD: Montreal, 2001.

Monday, April 9: Lecture 21 – Will We Run Out of Water?

Sachs, Jeffrey D. "Chapter 5: Securing our Water Needs," in Common Wealth.

Intelligence Community Assessment, "Global Water Security," February 2012

Topic 4: Human Development

Wednesday, April 11: Lecture 22 – Population and Sustainable Development

Joel Cohen, "Human Population Grows Up," *Scientific American*, Vol. 293, No. 3, September 2005.

UN Population Division, World Population to 2300

Sachs, "Chapter 7: Global Population Dynamics" in Common Wealth

Sachs, "Chapter 8: Completing the Demographic Transition" in Common Wealth

Monday, April 16: Lecture 23 – Human Development, the Life Cycle, and Human Capital Accumulation

OECD. Economic Policy Reforms: Going for Growth. Chapter 5: A Family Affair: Intergenerational Social Mobility across OECD Countries

Wednesday, April 18: Lecture 24 – From Poverty Traps to Health for All

WHO Commission on Macroeconomics and Health, Macroeconomics and Health: Investing in Health for Economic Development. Executive Summary. 2001.

Barry Bloom, “Public Health in Transition,” *Scientific American*, Vol. 293, No. 3, September 2005.

Laurie Garrett, “The Next Pandemic?” *Foreign Affairs*, Vol. 84, Issue 4, July-August 2005.

Gebbie, Kristine M. “Public Health,” in The Limits of Market Organization. Richard Nelson, ed. Russell Sage Foundation: New York, 2005.

Sachs, Jeffrey D. and Pia Malaney, “Economic Burden of Malaria,” *Nature*, Vol. 415, February 2002.

Teklehaimanot, Awash, Gordon C. McCord and Jeffrey D. Sachs. “Scaling Up Malaria Control in Africa,” *American Journal of Tropical Hygiene*, December 2007.

Monday, April 23: Lecture 25 – Sustainable Agriculture

Foley, Jonathan A. et al. “Solutions for a Cultivated Planet,” *Nature*, 2011.

Tilman, David et al. “Global food demand and sustainable intensification,” *PNAS*, 2011.

Clay, Jason, “Freeze the footprint of food,” *Nature*, 2011.

UK Government Office for Science, London, “The Future of Food and Farming: Challenges and choices for global sustainability,” Executive Summary, 2011

Cassman, Kenneth G. et al., “Meeting Cereal Demand While Protecting Natural Resources and Improving Environmental Quality,” *Agronomy - Faculty Publications*, 2003.

Wednesday, April 25: Lecture 26 – Sustainable Urbanization

Conclusion

Monday, April 30: Lecture 27 – Is Sustainable Development Feasible? The Great Challenges

Sachs, “Chapter 13: Achieving Global Goals,” in Common Wealth