

Research Seminar (also STP-502y)
Science, Technology, and Innovation for Sustainable Prosperity
John F. Kennedy School of Government
Harvard University

Meetings: Mondays, 10:10-11:30 AM, alternating between the BCSIA Library (3rd floor of Littauer) and Perkins Room (Eliot 415).

Leaders: Bill Clark (L360, x53981), John Holdren (L370, x51464), Calestous Juma (L362, x68127) and Kelly Sims Gallagher (L333, x51960)

Sponsors: Science, Technology, and Public Policy Program, Belfer Center for Science & International Affairs; Science, Environment, and Development (SED) Group, Center for International Development.

Objectives: This seminar addresses the role of science, technology, and innovation in economic development in general, and with respect to the challenges of sustainable development in particular. The seminar employs a three-pronged strategy:

- (1) Conduct a critical survey of the classic research literature and theory in the field of science, technology, innovation, and public policy in order to provide all participants with a common intellectual foundation.
- (2) Identify and discuss the big unresolved questions in the field, gaps in our collective understanding, new controversies that are emerging, and methods that can be productively employed to contribute to the field.
- (3) Discuss work in progress of selected seminar participants, with a view toward honing skills of presenting and ongoing research, and of giving and receiving constructive peer review.

Format: We will try to provide adequate time for discussion through the following guidelines. After the initial two orientation sessions of the seminar, when Seminar Leaders lecture, they will do so for <20 minutes, followed by commentary from one discussant for <10 min., followed by general discussion. When participants or outside guests present, they will get 35 min., with a <10 min. discussant commentary, and then general discussion.

Readings: Readings will be made available in electronic copies on the web site or distributed in paper copy (at the preceding session of the seminar, or on the table outside Bill Clark's office at L-360). The default form is electronic. If the reading is available only in paper copy, this will be noted on the syllabus and web site.

In order to boost the quality and relevance of discussions, participants in the seminar (including leaders) are asked to make the commitment to read the material for each session beforehand. Those who have not been able to complete the reading for a particular session should let others do the talking and questioning.

Course credit: PhD students may take the seminar for credit. Masters students with exceptional preparation (normally including research experience and an advanced degree) may apply to the seminar leaders in writing for permission to take the seminar for credit. Credit for one normal semester class, ie. 1.0 credit, will be given for the entire year's work, ie. fall plus spring term. Grades will be assigned on the basis of seminar participation, plus a substantial (eg. 5000 word) paper relevant to the seminar's focus. Specific topics should be negotiated with one of the seminar leaders. Regardless of topic, each participant taking the seminar for credit will be required to submit a one-page paper proposal by 30 October 2004, and a full proposal by 29 November 2004. A presentation and defense of the research proposal before a faculty panel will be scheduled for mid-December. The final paper will be due 4 April 2005.

Communication: Communication -- including news, schedules, readings, and discussions -- will be primarily through the seminar web site. This is set up using the KSG "Classpage" software under the course number STP-502y, and can be accessed via the KSG Intranet under "Courses." (If you do not have access to the KSG Intranet, go to the KSG home page, click 'Login' in the upper right corner, and follow the directions for a 'cross registered or auditing student'). Participants are expected to review the Classpage weekly.

SEMINARS SCHEDULE (SUBJECT TO CHANGE; SEE WEB SITE FOR UPDATES)

September 13, 2004

Location: Perkins Room

Chair: All instructors

Topic: "Self-Introductions and Overview of Seminar"

Required Readings: none

September 20, 2004

Location: BCSIA Library

Chair/Lecturer: Holdren

Discussants: Clark, Juma, and Gallagher

Topic: "Overview: Science, Technology, and Innovation: Why and How it Matters"

Required Readings:

UNDP Human Development Report for 2001, "Making New Technologies Work for Human Development", Overview and Chapter 2.

"Environmental Change and the Human Condition", John P. Holdren, Bulletin of the American Academy of Arts and Sciences, Fall 2003, pp 24-31.

2004 Update of the World Energy Assessment of the UN Development Programme, UN Dept of Economic and Social Affairs, and World Energy Council. Executive Summary.

Supplemental Readings:

UNDP Human Development Report for 2001, "Making New Technologies Work for Human Development" [Chapter 1 is valuable background material.]
2004 Update of the World Energy Assessment of the UN Development Programme, UN Dept of Economic and Social Affairs, and World Energy Council. [Body of the report]

September 27, 2004

Location: Perkins Room

Chair/Lecturer: Holdren

Discussant: Clark, Bob Frosch

Topic: "Overview 2: What is Sustainable Prosperity?"

Required Readings:

Brundtland Commission, 1987. *Our Common Future*, Oxford University Press, [Chapter 1].

Holdren, John P, Daily, Gretchen C, and Paul R. Erlich, 1995. "The Meaning of Sustainability: Biogeophysical Aspects," in Munasinghe, Mohan and Walter Shearer (eds) *Defining and Measuring Sustainability: The Biogeophysical Foundations*, United Nations University and World Bank.

National Research Council. 1999. "Our common journey: A transition toward sustainability." National Academy Press, Washington, DC, [Chapter 1].

Solow, Robert, 1992. An Almost Practical Step Toward Sustainability (Resources for the Future lecture of October 8, 1992). Reprinted here from National Research Council, 1994. "Assigning economic value to natural resources." National Academy Press, Washington, DC.

October 4, 2004

Location: BCSIA Library

Chair: Clark

Lecturer: Gallagher

Discussant: Ambuj Sagar

Topic: "Where Did Our Understanding of the Importance of Innovation Come From?"

Required Readings:

Schumpeter J, 1934. *The Theory of Economic Development: An Inquiry into Profits, Capital, Credit, Interest, and the Business Cycle*, Cambridge, MA, 57-66.

Solow R, 1957. "Technical Change and the Aggregate Production Function," *Review of Economics and Statistics* 39 (3): 312-320.

Arrow, K, 1962. "The Economic Implications of Learning by Doing," *The Review of Economic Studies* 29 (3): (read pages 155-157, 172).

Arrow, K, 1969, "Classificatory Notes on the Production and Transmission of Technological Knowledge," *American Economic Review*, Vol. 59, No. 2, pg. 29-35.

Nathan Rosenberg, *Exploring the Black Box: Technology, Economics, and History* (New York: Cambridge University Press, 1994), pp. 87-108.

October 11, 2004 – Columbus Day (no school)

October 18, 2004

Location: Perkins Room

Chair: Clark

Speaker: Lorrae van Kerkhoff

Topic: Change From the Inside Out: Investigating Innovative Environmental Research Organizations

Readings:

Gibbons, Michael, "Science's New Social Contract With Society," *Nature*, Vol. 402 (Supp), 2 December 1999: C81-C84.

Wenger, E., "Communities of Practice and Social Learning Systems," *Organization* 7(2), 2000: 225-246

October 25, 2004

Location: BCSIA Library

Chair: Clark

Speaker: Darby Jack

Topic: When do Poor Households Adopt New Technologies?

Required Readings

Besley, Timothy, Anne Case. 1993. "Modeling Technology Adoption in Developing Countries." *The American Economic Review* 83(2): 396-402.

Foster, Andrew D., Mark R. Rosenzweig. 1995. "Learning by Doing and Learning from Others: Human Capital and Technical Change in Agriculture." *The Journal of Political Economy* 103(6): 1176-1209.

November 1, 2004

Location: Perkins Room

Chair: Gallagher

Speaker: Richard Nelson, Columbia University

Topic: On the Uneven Evolution of Human Know-How

Required Readings: (

Nelson, Richard, "On the Uneven Evolution of Human Know-How," *Research Policy* 32 (2003), pg. 909-922.

November 8, 2004

Location: BCSIA Library

Chair: Juma

Speaker: Alice Amsden

Topic: Innovation and Economic Development

Required Readings:

Dahlman, Carl, Ross-Larson, Bruce, and Larry Westphal 1987. "Managing Technological Development: Lessons from Newly Industrializing Countries," *World Development* 15 (6): 759-775.

Lall, Sanjaya, 2000. "Technological Change and Industrialization in the Asian Newly Industrializing Economies: Achievements and Challenges," in *Technology, Learning, and Innovation*, edited by Linsui Kim and Richard Nelson, Cambridge University Press.

Amsden, Alice 2001, *The Rise of the Rest: Challenges to the West from Late Industrializing Economies*, Oxford University Press, Chapter 1.

UNDP 2001, *Making New Technologies Work for Human Development*, Human Development Report, UN Human Development Program, Overview and Chapters 3 & 4.

November 15, 2004

Location: Perkins Room

Chair: Holdren

Speaker: Bill Rosenberg, CBG-ENRP-ETIP Fellow and Jennie Stephens, ETIP Fellow

Topic: "Integrating IGCC and Carbon Sequestration: Economic and Technical Challenges"

Readings:

Rosenberg, W.G. 2004 The Other Gas Crunch: How coal can help reduce soaring natural gas prices -- and satisfy environmentalists, *Forbes Magazine*, November 1.

Service, R.F. 2004, "The Carbon Conundrum," *Science*. Vol. 305.

Rosenberg, W.G., D.C. Alpern, and M.R. Walker 2004. Financing IGCC - 3 Party Covenant. BCSIA Working Paper 2004-07, Executive Summary, Full report at http://bcsia.ksg.harvard.edu/BCSIA_content/documents/FinancingIGCC.pdf

November 22, 2004

Location: BCSIA Library

Chair: Clark

Speaker: Marleen von der Kerkhof

Topic: Joint Problem Solving

Required Readings:

Funtowicz, S. and J. Ravetz 1993, "Science for the Post-Normal Age. Futures: The Journal of Policy, Planning and Future Studies, 50 (7), 739-755.

Laird, F. 1993, "Participatory Analysis, Democracy, and Technological Decision-Making," Science, Technology & Human Values, 18 (3), 341-361.

Van Asselt, M., N. Rijkens-Klomp, 2002. "A Look in the Mirror: Reflection on Participation in Integrated Assessment from a Methodological Perspective," Global Environmental Change, 12, 167-184.

November 29, 2004

Location: BCSIA Library

Chair: Clark

Speaker: Gene Skolnikoff

Topic: Science & Technology in Foreign Policy

Readings:

National Research Council 1999, "The Pervasive Role of Science, Technology and Health in Foreign Policy: Imperatives for the Department of State," National Academy Press, 1999.

National Research Council. 2002, a) "Ch. 1 The Rise of Advisory Systems for Science and Technology (pp. 5-12)" and b) Ch 2. "Elements of Science and Advice" (pp. 13-20) in Knowledge and Diplomacy: Science Advice in the United Nations System, National Academy Press, 2002.

Neureiter, Norman P. 2004. "Science and technology in the Department Of State" Technology in Society 26: 303-320.

Supplementary readings (not required):

Juma, C. (in press) 'Biotechnology and international relations: forging new strategic partnerships', Int. J. Biotechnology

House of Commons, Science and Technology Committee 2004, "The Use of Science in UK International Development Policy." (Thirteenth Report of Session 2003-04). Volume I.

December 6, 2004

Location: BCSIA Library

Chair: Clark

Speaker: Arnulf Grubler, IIASA and Yale

Topic: What Can Science and Technology for Sustainability Learn from New Growth Theory?

Required Readings:

Cortright, J., 2001, "New Growth Theory, Technology, and Learning: A Practitioner's Guide," U.S. EDA, Washington DC. Available at: http://www.eda.gov/ImageCache/EDAPublic/documents/pdfdocs/1g3lr_5f7_5fcortright_2epdf/v1/1g3lr_5f7_5fcortright.pdf.

Grubler, A. 1998. *Technology and Global Change*, Chapters 1-2, Cambridge University Press (nice overview defining technology, technological change, stages of innovation, S Curves, learning curves).

December 13, 2004

Location: Perkins Room

Chair: Gallagher

Speaker: Guodong Sun, ETIP Fellow

Topic: Success and Failure in Adopting and Demonstrating Complex Foreign Technologies: Two Cases in China

SEMESTER BREAK

SPRING SEMESTER TOPICS:

(See initial handout on tentative topics and readings, now posted on the web page under 'On-line materials'. This is still our basic plan, but remains open to suggestions as to topics, readings and speakers. We will produce a formal version with dates later in the semester.)