

## CURRICULUM VITAE

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**Date of Birth:** October 21, 1942 (Citizenship: United States)

**Marital Status:** Married (October 28, 1967), two children

**Current Positions:** Board of Trustees, Maine Efficiency Trust, 2009-  
Mitchell Family Professor of Economics, Colby College Emeritus 2008-

**Previous Positions:** Trustee, Maine Energy and Carbon Savings Trust, 2008-2010  
Member, Maine Energy Conservation Board, 2008-2010  
Mitchell Family Professor of Economics, Colby College 1993-2008  
Director, Environmental Studies Program, Colby College 1999-2004  
C. A. Johnson Distinguished Teaching Prof. Colby College, 1990-93  
Chairman, Department of Economics, Colby College, 1986-88, 1993-5  
Professor, Colby College, 1984-  
Associate Professor, Colby College, 1977-84  
Director, Macroeconomic Impact Division,  
Federal Energy Administration, 1974-75  
Assistant Professor, Williams College, 1971-77

**Educational Background:** B. S. (International Affairs), USAF Academy, June, 1964  
M. A. (Economics), University of the East (Philippines), August, 1965  
M. S. (Economics), University of Wisconsin, June, 1970  
Ph.D. (Economics), University of Wisconsin, August, 1971  
Dissertation Topic: *Pollution Control and the Price System: A General Equilibrium Analysis*

### **Awards and**

**Honors:** “Outstanding Public Service Through Economics” award from the Northeastern Agricultural and Resource Economics Association, 2010; Fellow of the Association of Environmental and Natural Resource Economics 2006. Named “1990 Maine Professor of the Year” by the Council for Advancement and Support of Education, Washington, D. C.; Selected “Best Professor at Colby” by Colby Students, 1989; Danforth Associate, 1981-7; Colby College Exceptional Merit Awards every year eligible; Federal Energy Administration's Special Achievement Award for Outstanding Research Contribution, 1975; National Institute of Mental Health Fellow, 1970-1; Air Force Commendation Medal for Outstanding Research Contribution, 1968; Distinguished Graduate (Class Rank: 9/452), USAF Academy, 1964.

### **Fellowships and**

**National Offices:** President 1987-8, President-Elect 1986, Association of Environmental and Resource Economists; Member of the Environmental Economics Advisory Committee (1993-1998) and the Clean Air Compliance Committee (1993-1998) of U.S. Environmental Protection Agency's Science Advisory Board; Member, National Academy of Sciences Study on America's Climate choices, 2008-10; Co-editor of the International Yearbook of Environmental and Resource Economics,

1997-2007; Co-editor of the International Yearbook of Environmental and Resource Economics, 2007-; Senior Research Fellow, Woods Hole Oceanographic Institution, 1990-91; Member, National Research Council's Committee to Review Individual Fishing Quotas, 1997- , Member, American Economics Association (AEA) Committee on Economic Education, 1994-6, AEA Representative to the AAAS, 1992-1995; Series Editor for the Ashgate Studies in Environmental and Natural Resource Economics (1997-2006); Series Co-editor, *International Yearbook of Environmental and Resource Economics* (1997-2007); Series Co-editor *International Review of Environmental and Resource Economics* (2007-2110); Editorial Board, *Land Economics* 1981-Present; Editorial Council, *Journal of Environmental Economics and Management*, 1992-6; Editorial Board, *Environmental and Resource Economics*, 1997-; Editorial Board, *Resource and Energy Economics*, 1993- Present; Editorial Board, *Ecological Economics*, 1995-; Editorial Board for Environmental Economics for *Social Science Electronic Publishing, Inc.*; Editorial Board, *Northeastern Environmental Science* 1982-1986; Gilbert T. White Fellow, Resources for the Future, Inc.(Washington D. C.), 1983-4; Economic Policy Fellow, The Brookings Institution (Washington D. C.), 1974-5; Fulbright Scholar (Philippines), 1964-5.

### ***Research Supported By:***

World Bank (Washington), National Science Foundation, National Research Council, Organization for Economic Co-operation and Development (Paris), United Nations Conference on Trade and Development (Geneva), Swedish Government, California Energy Commission, Resources for the Future, Inc., Woods Hole Oceanographic Institution, National Institute for Mental Health, Brookings Institution, U. S. Department of Energy, U. S. Environmental Protection Agency, German Marshall Fund, Maine State Office of Energy Resources, Maine State Department of Environmental Protection, Maine Office of the Public Advocate, Great Northern Paper Company, Central Maine Power Company, Maine Development Foundation and internal funds from Colby and Williams College.

### ***Teaching Experience:***

**Academic Institutions:** Over thirty years of teaching experience at Colby College, Williams College, and the University of Wisconsin at Madison. The courses taught include Microeconomics, Energy Economics, Econometrics, Urban and Regional Economics, Environmental Economics, Natural Resource Economics, Advanced Topics in Environmental Economics, Economics of Poverty, Law and Economics, the Senior Research Workshops in Economics and Public Policy and an interdisciplinary First-Year Seminar on Environment and Society.

**Non-academic Institutions:** Organized, moderated and participated in a training seminar for professional staff on the use of economic incentive policies in a developing nations setting, World Bank, Washington, D. C; Participated in several training workshops on economic incentive policies and sustainable development for scholars from developing countries, under the auspices of the Coolidge Center, Boston, MA. Member of a team conducting training seminars on environmental economics for the professional staff of the U. S. Agency for International Development. Conducted a training seminar on economic incentives for the Air and Waste Management Association.

### ***Publications:***

Books:

*Limiting the Magnitude of Future Climate Change* (Washington, DC: The National Academies Press, 2010) co-authored with the other members of the Panel on Limiting

the Magnitude of Climate Change in the National Research Council's study America's Climate Choices.

***Emissions Trading: Principles and Practice 2<sup>nd</sup> ed.*** (Washington, DC: Resources for the Future, 2006)

***Environmental and Natural Resource Economics:***

1st ed. (Glenview, IL: Scott, Foresman and Co., 1984).

2nd ed. (Glenview, IL: Scott, Foresman and Co., 1987).

3rd ed. (New York: HarperCollins, 1992).

4th ed. (New York: HarperCollins, 1996)

5th ed. (Reading, MA: Addison-Wesley Longman, 1999)

6th ed. (Reading, MA: Addison-Wesley, 2003)

7th ed. (Reading, MA: Addison-Wesley, 2005)

8th ed. (Reading, MA: Addison-Wesley, 2008)

9<sup>th</sup> ed. (Reading, MA: Addison-Wesley, 2011)

A Chinese version of this text was published in 2005.

***Environmental Economics and Policy***

1st ed (New York: HarperCollins, 1994)

2nd ed. (Reading, MA: Addison-Wesley, 1997)

3<sup>rd</sup> ed. (Reading, MA: Addison-Wesley, 2000)

4<sup>th</sup> ed. (Reading, MA: Addison Wesley, 2004)

5<sup>th</sup> ed. (Reading, MA: Addison Wesley, 2006)

6<sup>th</sup> ed. (Reading, MA: Addison Wesley, 2009)

An Italian version of this text "Economia dell'ambiente" was published in 2006.

A Greek version was published in 2008.

Editor, ***Emissions Trading Programs*** (Aldershot, UK: Ashgate, 2001)

Volume I: Implementation and Evolution

Volume II: Theory and Design

Co-Editor, ***International Yearbook of Environmental and Resource Economics***  
(Cheltenham, UK: Edward Elgar)

Volume I (1997/1998)

Volume II (1998/1999)

Volume III (1999/2000)

Volume IV (2000/2001)

Volume V (2001/2002)

Volume VI (2002/2003)

Volume VII (2003/2004)

Volume VIII (2004/2005)

Volume IX (2005/2006)

Volume X (2006/2007)

The yearbook became the International Review of Environmental and Resource Economics in 2007

Co-editor, ***International Review of Environmental and Resource Economics*** (New York: Now Publishers) the successor to ***International Yearbook of Environmental and Resource Economics***

Volume 1 (2007)

Volume II (2008)

Volume III (2009)

Retired from co-editorship in 2010

***Sharing the Fish: Toward a National Policy on Individual Fishing Quotas*** (Washington, DC: National Academy Press, 1999) co-authored with the other members of the Committee to Review Individual Fishing Quotas.

Editor, ***The Economics of Global Warming*** (Cheltenham, UK: Edward Elgar, 1997)

Co-Editor, ***Environmental Instruments and Institutions*** (Cheltenham, UK: Edward Elgar, 1999)

***Economics and Environmental Policy*** (Cheltenham, UK: Edward Elgar Publishing, 1994)

Editor, ***Innovation in Environmental Policy: Economic and Legal Aspects of Recent Developments in Liability and Enforcement*** (Cheltenham, England: Edward Elgar Publishing, 1992)

***Emissions Trading: An Exercise in Reforming Pollution Policy*** (Washington, DC: Resources for the Future, Inc., 1985).

***Energy Planning and Policy: The Political Economy of Project Independence*** (Lexington, MA: Lexington Books, 1976).

***The Automobile and the Regulation of Its Impact on the Environment*** (Norman: University of Oklahoma Press, 1975). Co-authored with J. Kain, et. al.

Articles Selected for Reprinting:

“The Tradable-Permits Approach To Protecting The Commons: Lessons For Climate Change” ***Oxford Review Of Economic Policy***, Vol. 19, No. 3 (2003): 400-419. A revised version of this article was subsequently published as "The Tradable Permits Approach to Protecting the Commons: Lessons for Climate Change" in Dieter Helm, (ed.) ***Climate Change Policy*** (New York: Oxford University Press, 2005):167-193.

"The Structure of Penalties in Environmental Enforcement: An Economic Analysis." ***Journal of Environmental Economics and Management*** 23(2): 179-200 (coauthored with Kathleen Segerson) and "Indivisible Toxic Torts: The Economics of Joint and Several Liability." ***Land Economics*** 65: 305-319 in Kathleen Segerson, ed. ***Economics and Liability for Environmental Problems*** (Cheltenham, UK: Ashgate, 2002)

“Using Economic Incentives to Maintain our Environment” ***Challenge*** (March April, 1990): 45-49. Reprinted in Herman E. Daly and Kenneth N. Townsend, ***Valuing the Earth: Economics, Ecology, Ethics*** 2nd ed. (Cambridge, MA: The MIT Press, 1993): 315-324

“Economic Instruments for Environmental Regulation” ***Oxford Review of Economic Policy*** Vol. 6, No. 1(Spring,1990): 17-33.Reprinted in Dieter Helm, ed. ***Economic Policy Towards the Environment*** (Oxford, UK: Blackwell 1991): 86-110 and in Anil Markandya and Julie Richardson, eds. ***Environmental Economics: A Reader*** (New York: St. Martin’s Press, 1993): 267-286, and in ***Environmental Management: Readings and Case Studies***, edited by Lewis Owen and Tim Unwin and published by

Blackwell Publishers (1997): 386-399 and in David Campbell and Robert Lee, eds. *Environmental Law and Economics*, a volume in the *International Library of Essays in Environmental Law* (Aldershot: Ashgate Publishing Limited, 2005) and in Robert Stavins *Economics of the Environment: Selected Readings*, 5th ed. (New York: W. W. Norton & CO., 2005): 277-301.

“The Poverty Connection to Environmental Policy” *Challenge* (Sept/Oct, 1990): 26-32. Reprinted in *Annual Editions 92/93: International Business* (Guilford CT: The Dushkin Publishing Group, 1992): 230-235

“Transferable Discharge Permits and the Control of Stationary Source Air Pollution: A Survey and Synthesis,” *Land Economics*, Vol. 56 (November, 1980), 391-416. Reprinted in (1) Anthony I. Opos, ed, Regulation, Economics and the Law (Part of the International Library of Critical Writings in Economics) Aldershot, UK: Edward Elgar, (2) Nancy Dorfman and Robert Dorfman, eds. *Economics of the Environment*, 3rd ed. (New York: W. W. Norton & Co., 1992): 241-270, (3) Wallace E. Oates, ed., *The Economics of the Environment* (Cheltenham, UK: Edward Elgar, 1992): 212-237, (4) Petr Sauer and Marie Livingston, eds. *Ekonomie Zivotního Prostředí A Ekologická Politika* (Praha-Minneapolis-Greeley-Bratislava, 1996): 134-159 and (5) Sauer, P., Livingston, M. (eds.): Environmental Economics and Policy: Selected Classical readings, Nakladatelství litomyšelského semináře, Praha 1996: 144-175. An earlier European version of this paper was published in *Zeitschrift für Umweltpolitik* (March, 1980), 477-508.

“The Price of Survival: Regulatory Reform in Air Pollution Control” *Colby Alumnus*, Vol. 74, No. 2 (March, 1985): 11-16. Reprinted in *Resources*, No. 79 (Winter, 1985): 17-and in Wallace Oates ed., The RFF Reader in Environmental and Resource Management (Washington. DC: Resources for the Future, Inc., 1999).

“Spatially Differentiated Air Pollutant Emission Charges: An Economic and Legal Analysis,” *Land Economics*, Vol. 54 (August, 1978), 265-277. Reprinted in *Policy Studies Review Annual*, III (1979).

#### Refereed Articles and Essays:

“Reflections-In Praise of Consilience” *Review of Environmental Economics and Policy* (Summer, 2011)

“Cap-and-Trade: the Evolution of an Economic Idea” *Agricultural and Resource Economics Review* 39(3):359-367 (October 2010)

“Reflections-Energy Efficiency Policy: Pipedream or Pipeline to the Future?” *Review of Environmental Economics and Policy* (Summer, 2009)

“The Evolution of Emissions Trading” Chapter 1 in *Better Living Through Economics*, John Siegfried, editor. (Boston, MA: Harvard University Press, 2009).

"Do Differences in Attitudes Explain Differences in National Climate Change Policies?" *Ecological Economics* 65(2): 315-324 (co-authored with Emila Tjernström, Colby '07)

"Tradable Permits in Principle and Practice". *Moving to Markets: Lessons from Twenty Years of Experience*. J. Freeman and C. Kolstad. New York, Oxford University Press, 2007: 63-94.

- “Environmental Programs: Liberal Arts Colleges and Interdisciplinary Education” *Environmental Science & Technology* 39 (10): 221A-224A. (co-authored with Stephanie Pfirman, Columbia University and Sharon Hall, Colorado College).
- “Research-based Learning in an Introductory Environmental Studies Course” *Council on Undergraduate Research Quarterly* 25(4): 191-200. (co-authored with David Firmage and F. Russell Cole)
- “Tradable Permits in Principle and Practice” *Penn State Environmental Law Review* Vol. 14 No. 2 (2006): 251-281.
- “The Tradable Permits Approach to Protecting the Commons: What Have We Learned? In National Research Council, *The Drama of the Commons*. Committee on the Human Dimensions of Global Change. E. Ostrom et al, eds. (Washington: National Academy Press, 2002): 197-232.
- Empowering the Community: Information Strategies for Pollution Control. *Frontiers of Environmental Economics*. H. Folmer, H. L. Gabel, S. Gerking and A. Rose. (Cheltenham, UK, Edward Elgar, 2001): 85-120. (with David Wheeler).
- “Managing Ecosystem Services” *Environmental Science and Technology* Vol. 34, No. 8 (2000) 1401-1406 (with Kenneth Arrow, Gretchen Daily, Partha Dasgupta, Simon Levin, Karl-Goran Maler, Eric Maskin, David Starrett and Thomas Sterner).
- “Tradable Permit Approaches to Pollution Control: Faustian Bargain or Paradise Regained?” Kaplowitz, M.D., ed. 1999. *Property Rights, Economics, and the Environment*. Stamford, CT: JAI Press Inc.: 175-199.
- Disclosure Strategies for Pollution Control. in T. Sterner, ed. *The Market and the Environment: The Effectiveness of Market-Based Policy Instruments for Environmental Reform* Cheltenham, UK, Edward Elgar: 14-49.
- “Lessons from Using Transferable Permits to Control Air Pollution in the United States” in Jeroen C.J.M van den Bergh, ed. *Handbook of Environmental and Resource Economics* (Cheltenham, UK: Edward Elgar, 1999): 275-292
- “Economic Analysis and Climate Change.” *Environment and Development Economics* 3(3,1998): 402-405.
- “Disclosure Strategies for Pollution Control” *Environmental and Resource Economics* 11 (3-4, 1998): 587-602.
- “Tradable Permits and the Control of Air Pollution-Lessons from the United States” *Zeitschrift für Angewandte Umweltforschung* Sonderheft (9,1998):11-31.
- “Ethical Influences on the Evolution of the US Tradable Permit Approach to Pollution Control.” *Ecological Economics* 24(Feb/Mar, 1998): 241-257.
- “Tradable Permits for Pollution Control When Emission Location Matters: What Have We Learned?” *Environmental and Resource Economics* 5(1995): 95-113.

- "Transferable Discharge Permits and Global Warming" in Daniel Bromley., ed *Handbook of Environmental Economics* (London: Basil Blackwell, 1993): 317-352.
- "Economic Incentives, Technological Choices, and the Quest for Sustainable Development" in James R. Fleming and Henry A. Gemery, eds. *Science, Technology and the Environment: Multidisciplinary Perspectives* (Akron, OH: University of Akron Press, 1994): 199-216.
- "Differential Environmental Regulation: The Effects on Electric Utility Capital Turnover and Emissions" *Review of Economics and Statistics*, Vol. 75, No. 2 (May, 1993): 368-73. Co-authored with Randy Nelson and Michael R. Donihue, Colby College.
- "An International System of Tradable CO<sub>2</sub> Entitlements: Implications for Economic Development" *Journal of Environment and Development*, Vol. 2, No. 1 (Winter, 1993): 1-36. Coauthored with Adam Rose, Penn State University.
- "The Structure of Penalties in Environmental Enforcement: An Economic Analysis" *Journal of Environmental Economics and Management*" Vol. 23, No. 2 (September, 1992): 179-200. Co-authored with Kathleen Segerson, University of Connecticut.
- "Private Enforcement of Federal Environmental Law" *Land Economics* Vol. 68, No. 1 (February, 1992): 28-48. Co-authored with Wendy Naysnerski, Industrial Economics, Inc.
- "The Economics Major: Can and Should We Do Better than a B-?" *The American Economic Review* Vol. 81, No. 2 (May, 1991): 20-25. Co-authored with Robin Bartlett, W. Lee Hansen, Allen C. Kelley, Donald J. McCloskey and John J. Siegfried.
- "Market Failure in Incentive-Based Regulation: The Case of Emissions Trading" *Journal of Environmental Economics and Management* Vol. 21, No. 1 (July, 1991): 17-31. Co-authored with Scott Atkinson, University of Georgia.
- "The Status and Prospects of the Economics Major" *Journal of Economic Education*, Vol. 22, No. 3 (Summer, 1991): 197-224. Co-authored with Robin Bartlett, W. Lee Hansen, Allen C. Kelley, Donald J. McCloskey and John J. Siegfried.
- "Managing the Transition: The Potential Role for Economic Policies", in Jessica Tuchman Mathews, ed., *Preserving the Global Environment: The Challenge of Shared Leadership* (New York: W. W. Norton & Company, 1991):187-226.
- "Economic Instruments for Environmental Regulation" *Oxford Review of Economic Policy* Vol. 6, No. 1(Spring,1990): 17-33.
- \*"Indivisible Toxic Torts: The Economics of Joint and Several Liability" *Land Economics* Vol. 65, No. 1 (November, 1989): 305-319.
- "Economic Implications of Emissions Trading Rules for Local and Regional Pollutants" *Canadian Journal of Economics* Vol. 20, No. 2 (May, 1986): 370-386 Co-authored with Scott Atkinson, University of Georgia
- "Distributional and Macroeconomic Aspects of Environmental Policy," in Allen V. Kneese and James L. Sweeney, eds. *Handbook of Resource and Energy Economics*,

Vol. 1 (Amsterdam: North Holland, 1985). Co-authored with Greg Christiansen, Colby College.

“Approaches for Reaching Compliance in Nonattainment Areas: Financial Burden and Efficiency Considerations” *Land Economics*, Vol. 60, No.2 (May, 1984): 148-59. Co-authored with Scott Atkinson, University of Wyoming.

“The Empirical Properties of Two Classes of Designs for Transferable Discharge Permit Markets” *Journal of Environmental Economics and Management*, Vol. 9, No.2 (June, 1982): 101-121. Coauthored with Scott Atkinson, University of Wyoming.

“Transferable Discharge Permits and the Control of Stationary Source Air Pollution: A Survey and Synthesis,” *Land Economics*, Vol. 56 (November, 1980), 391-416.

“Spatially Differentiated Air Pollutant Emission Charges: An Economic and Legal Analysis,” *Land Economics*, Vol. 54 (August, 1978), 265-277.

“The Design of Property Rights for Air Pollution Control,” *Public Policy*, Vol. 27 (Summer, 1974), 275-292.

“Derived Decision Rules for Pollution Control in a General Equilibrium Space Economy,” *Journal of Environmental Economics and Management*, Vol. 1 (May, 1974), 3-16.

“Controlling Pollution by Price and Standard Systems: A General Equilibrium Analysis,” *Swedish Journal of Economics*, Vol. 75 (1973), 193-203.

“Specific Taxes and the Control of Pollution: A General Equilibrium Analysis,” *Quarterly Journal of Economics*, Vol. 86 (November, 1973): 503-522.

“Problems of Public Capital Formation in the Philippines,” *Economic Research Journal*, (March, 1966).

“Philippine Foreign Exchange Policy and the Sources of Investment Capital,” *Economic Research Journal*, (June, 1965): 68-75.

#### Other Articles or Essays:

“Ex Post Evaluation of Tradable Permits: Methodological Issues and Literature Review”. *Tradable Permits: Policy Evaluation, Design and Reform*. T. Tietenberg and N. Johnstone. Paris, Organization for Economic Co-operation and Development (2004) 9-44.

“The Management of Ex Post Public Policy Evaluations”. *Tradable Permits: Policy Evaluation, Design and Reform*. T. Tietenberg and N. Johnstone. Paris, Organization for Economic Co-operation and Development (2004): 173-189.

“Introduction” in T.Tietenberg, ed. *Emissions Trading Programs Volume I: Implementation and Evolution* (Aldershot, UK: Ashgate, 2001): xi-xxvii.

“Introduction” in T.Tietenberg, ed. *Emissions Trading Programs Volume II: Theory and Design* (Aldershot, UK: Ashgate, 2001): xv-xxxiv.

- "Greenhouse Gas Trading; Design Issues Seeking Research Answers" *Understanding the Design and Performance of Emissions Trading Systems for Greenhouse Gas Emissions: Proceedings of an Experts' Workshop to Identify Research Needs and Priorities* (Washington, DC: Resources for the Future, Inc., 2000) published at <http://www.weathervane.rff.org/>
- "Editor's Introduction" in T. H. Tietenberg, ed. *The Economics of Global Warming* (Cheltenham, UK: Edward Elgar, 1997):xiii-xxii.
- "Managing the Transition to Sustainable Development: The Role for Economic Incentives" in P. May and R. S. da Motta. eds. *Pricing the Planet: Economic Analysis for Sustainable Development*. (New York, Columbia University Press, 1996): 123-138.
- "Control de la Contaminación Atmosférica en Santiago: Aplicación del Sistema de Emisiones Transables" *Estudios Públicos* 61 (Verano, 1996):39-76. (Article commissioned and translated by the journal editor).
- "Design Lessons From Existing Air Pollution Control Systems: United States" in Susan Hanna and Mohan Munasinghe, eds. *Property Rights in a Social and Ecological Context: Case Studies and Design Applications* (Washington: The World Bank, 1995):15-32.
- "Enlisting Economic Incentives for Environmental Protection" *The Natural Environment: Interdisciplinary Views*, Kevin L. Hickey and Demetri Kantarelis, eds. Proceeding of the Interdisciplinary Environmental Association's Interdisciplinary Conference on the Environment, June 21-24, 1995:336-346.
- "Possible Administrative Structures and Procedures for Implementing a Tradeable Entitlement Approach to Global Warming", United Nations Conference on Trade and Development, *Combatting Global Warming: Possible Rules, Regulations and Administrative Arrangements for a Global Market in CO<sub>2</sub> Emission Entitlements* (New York: United Nations,1994):1-60. (Co-authored with David Victor).
- "Implementation Issues for Global Tradable Carbon Entitlements" in Ekko C. Van Ierland, ed., *International Environmental Economics: Theories and Applications to Climatic Change, International Trade and Acidification* (Amsterdam: Elsevier Science Publishers, 1994): 119-149.
- "Land Based Marine Pollution: The Gulf of Mexico and the Black Sea", "Hazardous Materials Transport" and "Radioactivity in the Oceans" in James M. Broadus and Raphael V. Vatanov, eds. *The Oceans and Environmental Security: Shared US and Russian Perspectives* (Washington, DC; Island Press, 1994). Co-authored with several US and Russian authors.
- "Market-Based Mechanisms for Controlling Pollution: Lessons from the U. S." in Thomas Sterner, ed. *Economic Policies for Sustainable Development* (Boston, MA: Kluwer Academic Publishers, 1994): 20-45.
- "Administrando A Transição Para Um Desenvolvimento Sustentavel: O Papel Dos Incentivos Econômicos" in Peter May and Ronaldo Serôa da Motta, eds. *Valorando A Natureza* (Brazil: Editor Campus Ltd., 1994): 93-109.

- “Strategies for Harmonizing Short-term and Long-term Development Objectives by Preserving Natural Capital” in Richard Barringer, ed. *Toward a Sustainable Maine: The Politics, Economics and Ethics of Sustainability* (Portland, ME: Edmund S. Muskie Institute of Public Affairs, University of Southern Maine, 1993): 117-146.
- “Implementation Issues: A General Survey” in United Nations Conference on Trade and Development ed. *Combating Global Warming: Study on a Global System of Tradable Carbon Emission Entitlements* (New York: United Nations, 1992): 127-149.
- “Relevant Experience with Tradable Permits” in United Nations Conference on Trade and Development ed. *Combating Global Warming: Study on a Global System of Tradable Carbon Emission Entitlements* (New York: United Nations, 1992): 37-54.
- “Monitoring and Enforcing Greenhouse Gas Trading” in *Climate Change: Designing a Tradable Permit System* (Paris: Organization for Economic Co-operation and Development, 1992): 251-277. Co-authored with Dan Dudek of the Environmental Defence Fund.
- “The Role of Economic Incentives Policy” in Joseph S. Tulchin with Andrew I. Rudman, eds., *Economic Development and Environmental Protection in Latin America* (Boulder: Lynne Rienner Publishers for the Woodrow Wilson Center of the Smithsonian Institution, 1991):17-25.
- “Private Enforcement” in T. H. Tietenberg, ed. *Innovation in Environmental Policy: Economic and Legal Aspects of Recent Developments in Liability and Enforcement* (Cheltenham, England: Edward Elgar Publishing, 1992): 109-136. Co-authored with Wendy Naysnerski, Industrial Economics, Inc.
- “Defining Efficient Sanctions” in T. H. Tietenberg, ed. *Innovation in Environmental Policy: Economic and Legal Aspects of Recent Developments in Liability and Enforcement* (Cheltenham, England: Edward Elgar Publishing, 1992): 53-73. Co-authored with Kathy Segerson, University of Connecticut.
- “Introduction and Overview” in T. H. Tietenberg, ed. *Innovation in Environmental Policy: Economic and Legal Aspects of Recent Developments in Liability and Enforcement* (Cheltenham, England: Edward Elgar Publishing, 1992): 1-17.
- “Economics” in Association of American Colleges, *Liberal Learning and the Arts and Sciences Major Vol. 2 Reports from the Fields* (Washington: Association of American Colleges, 1991): 25-42. Co-authored with Robin Bartlett, W. Lee Hansen, Allen C. Kelley, Donald J. McCloskey and John J. Siegfried.
- “Economic Incentive Policies and Sustainability” in Britt Aniansson and Uno Svedin, *Towards an Economically Sustainable Economy* (Stockholm: Swedish Council for Planning and Coordination of Research, 1990): 71-80.
- “Balancing Economic Development and Environmental Protection Through Economic Incentives” in John Fitch, ed. *Maine's Progress Toward a Sustainable Future: 1990* (Hallowell, ME: Mainewatch Institute, 1990): 32-36.
- “Using Economic Incentives to Maintain our Environment” *Challenge* (March April, 1990): 45-49.

“The Poverty Connection to Environmental Policy” *Challenge* (Sept/Oct, 1990): 26-32.

“Marketable Permits in the U.S.: A Decade of Experience” in Karl W. Roskamp, ed. *Public Finance and the Performance of Enterprises* (Detroit, MI: Wayne State University Press, 1989): 263-279

“Acid Rain Reduction Credits” *Challenge* Vol. 32., No. 2 (March/April, 1989): 25-29.

“Uncommon Sense: The Program to Reform Pollution Control Policy,” in Leonard W. Weiss and Michael W. Klass, eds. *Regulatory Reform: What Actually Happened* (Boston: Little, Brown and Company, 1986).

“Market Approaches to Environmental Protection,” in Herbert Giersch, ed. *Reassessing the Role of Government in the Mixed Economy* (Tubingen: J.C.B. Mohr (Paul Siebeck). 1983).

“Regulatory Reform in Air Pollution Control: The Role of Economic Analysis,” in Julius Margolis and Robert Haveman, (eds.) *Public Expenditure and Policy Analysis*, 3rd edition (New York: Houghton Mifflin, 1983).

“Economic Analysis and Air Pollution Control Policy: Recent Developments” in Maurice Ballabon, ed., *Economic Perspectives: An Annual Survey of Economics* (New York: Harwood Academic Publishers, 1981).

“Substitution Bias in a Depletable Resource Model with Administered Prices,” *Erschopfbare Ressourcen* (Berlin: Duncker and Humblot, 1980).

“On the Efficient Allocation of Pollution Control Responsibility,” in Ingo Walter, et. al., eds. *Regional Environmental Policy: The Economic Issues* (New York: New York University Press, 1979).

“Teaching Intermediate Microeconomics Using the Personalized System of Instruction,” in James M. Johnston, ed., *Behavior Research and Technology in Higher Education* (Springfield, IL: Charles C. Thomas Publishers, 1975).

#### Shorter Works:

“Climate Change: Maine Makes the Case for Federal Action Now” *Policy Choices* Vol XI, No. 5 (June 7, 2010): 1-4.

"Elasticity" in The Dictionary of Energy, Cutler Cleveland and Christopher Morris, eds. (Amsterdam, Netherlands: Elsevier, 2005)

"Tradable Permit Approaches to Pollution Control: Faustian Bargain or Paradise Regained?" *The Colby Reader* (Holiday Edition, 1999): 6-12

“Reflections on Kyoto” *Colby* (Winter, 1998): 64.

"Key Concepts of Sustainability: Discussion" in *Proceedings of the Collquium on Economics, Ecology, and Sustainability Policies* (Washington, DC: Environmental Law Institute, 1995): 30-35.

- “Emissions Offset Trading Programs: Discussion” in Richard F. Kosobud, William A. Testa, and Donald A. Hanson, eds., *Cost-Effective Control of Urban Smog* (Chicago: Federal Reserve Bank of Chicago, 1993):158-165.
- “Private Enforcement of Environmental Law: Reply” *Land Economics* Vol. 69, No. 2(May, 1993): 197-198. (Co-authored with Wendy Naysnerski, Colby ‘90).
- “Reflections on the Earth Summit” *Colby* (August, 1992): 10-13.
- “Fighting for a Foothold on the Future” *Maine Sunday Telegram* (June 21, 1992): 1C, 8C.
- “International Efforts to Control Global Pollution” *The World Book Year Book: 1992* (Chicago: World Book Publishing, 1992): 220-231
- “Comment on Smith and Russell” in Ernst R. Berndt and Jack E. Triplett, eds. *Fifty Years of Economic Measurement: The Jubilee of the Conference on Research on Income and Wealth* (Chicago: University of Chicago Press for National Bureau of Economic Research, Inc., 1991): 336-341.
- “Harnessing the Power of the Market to Enhance Environmental Protection” *The Senior Economist* Vol. 6, No. 1 (September, 1991): 3-5.
- “Emissionsverrechnung uber die Schadstoffbank” *Neue Zurcher Zeitung* (16 September 1987): 73. Commissioned article translated from English for publication in this the largest German-language financial daily in Europe.
- “Comments on Markets and Externalities” in Daniel Bromley, ed. *Natural Resource Economics: Policy Problems and Contemporary Analysis* (Hingham, MA; Klumer Academic Publishers, 1986).
- “Comments on The Valuation of Environmental Risks Using Hedonic Wage Models by V. Kerry Smith” in Martin David and Tim Smeeding, eds. *Horizontal Equity, Uncertainty and Economic Well-Being* (New York: National Bureau of Economic Research, 1985): 385-391.
- “Transferable Discharge Permits and the Control of Stationary Source Air Pollution: Reply” *Land Economics*, Vol. 59 (February, 1983): 128-130.
- “Transferable Discharge Permits: Reply” *Land Economics*, Vol. 57 (November, 1981): 642-644.
- “On Taxation and the Control of Externalities: Comment,” *The American Economic Review*, LXIC (June, 1974): 462-466.
- “The Quasi-Optimal Price of Undepletable Externalities: Comment,” *The Bell Journal of Economics*, (Spring, 1978): 287-291.
- “Is Teaching the Best Way to Learn: Comments,” *Resources in Education*, Vol. 12, No. 2 ED 130-952.

Numerous book reviews.

**Published Syllabi:**

- “Environment and Society” in *Environment and History* Vol. 16, No. 1 (Spring, 1992): 99-113. Coauthored with Professors Cole, Firmage, Fleming, and Shattuck (Colby College).
- “Topics in Law and Economics” in Edward Tower, ed. *Political Economy, Radical Economics, Law and War*, Vol. 20 (Durham, N.C.: Eno River Press, 1985): 167-183.
- “Introduction to Environmental and Natural Resource Economics” in Edward Tower, ed. *Environmental and Natural Resource Economics*, Vol. 21 (Durham, N. C.: Eno River Press, 1985): 173-183.
- “Urban and Regional Economics” in Edward Tower, ed. *Urban and Regional Economics*, Vol. 25 (Durham, N. C.: Eno River Press, 1985): 139-153.

**Invited Papers at Foreign Assemblies:**

- “Preparing the US for Carbon Trading” Stockholm, Sweden“(October, 2009)
- “The Tradable Permits Approach to Protecting the Commons: What Have We Learned?” Concerted Action on Tradable Emission Permits Workshop on Trading Scales: Linking Industry, Local/Regional, National and International Emissions Trading Schemes, Fondazione Eni Enrico Mattei, Venice, Italy. December 3, 2001
- "Implementing Article 17 of the Kyoto Protocol: The UNCTAD Report", The Fourth Meeting of the Conference of the Parties to the UN Framework Convention on Climate Change (COP-4), Buenos Aires, Argentina, November 6, 1998.
- “Disclosure Strategies for Pollution Control”, Keynote Address at Conference on Environmental Implications of Market-based Policy Instruments”, Göteborg, Sweden, November 20, 1997.
- “Information Strategies for Pollution Control” Keynote address at the Annual conference of the European Association of Environmental and Resource Economists, Tilburg, Netherlands, June 27, 1996.
- “Transferable Permits as an Ethical Strategy for Protecting the Environment” presented at the “Economics, Ethics and Environment” workshop, sponsored by the Swedish Colloquium for Advanced Study in the Social Sciences, Uppsala, Sweden, August, 1995.
- “Marketable Permits for Controlling Pollution: Applying the Concept to Chile” Institute for Policy Studies, Santiago, Chile, May 31, 1995.
- “Implementation Issues for a Tradable Permit Approach to Controlling Global Warming” Intergovernmental Panel on Climate Change Workshop on Policy Instruments and Their Implications, Tsukuba, Japan, 18 January 1994.
- Keynote Address, “Designing Economic Instruments for Pollution Control When Emission Location Matters: What Have We Learned?” Conference on Economic

Instruments for Pollution Control sponsored by the International Institute for Applied Systems Analysis, Salzburg, Austria, October 18, 1993.

“Market-Based Pollution Control: What Have We Learned?” International Workshop on Alternative Solutions to the Air Pollution Problem, Santiago, Chile, December 2-5, 1992.

“Economic Incentives and the Quest for Sustainable Development” an invited talk at ECOTECH, a symposium sponsored by the State of Rio de Janeiro, Brazil, June, 1992.

“Implementation Issues in A Global Warming Treaty Based Upon Transferable Carbon Entitlements” an invited talk at the United Nations Conference on Environment and Development (the Earth Summit), Rio de Janeiro, Brazil, June, 1992.

“Learning from Existing Programs” and “Implementing a Workable Tradable Carbon Emission Entitlement Program” United Nations Conference on Trade and Development Expert Workshop on Tradable Carbon Emission Entitlements, Geneva, Switzerland, October 30-31, 1991.

“Reductions in Emissions: Command and Control or Market Based Mechanisms” International Conference on the Economy and the Environment in the 1990s, Neuchatal, Switzerland, August 27, 1991.

“Monitoring and Enforcement Issues in Designing Policies to Control Global Warming” OECD Conference on Global Warming, Paris, France, June 26, 1991.

Keynote Address, “Managing the Transition: The Role for Economic Incentive Policies in Achieving Sustainable Development” Annual Meeting of the European Association of Environmental and Resource Economists, Stockholm, Sweden, June 14, 1991.

“Economic Instruments for Environmental Regulation” a paper presented at the Oxford Conference on Economic Policy Toward the Environment, Chatham House, Royal Institute for International Affairs, London, March 12, 1990.

“Economic Incentive Policies in Environmental Protection: Practical Lessons from the U.S. and Europe” A Policy Seminar on The Interplay Between Economics and Ecology, at the Grand Hotel, Stockholm, Sweden, January 3, 1990.

“Economic Incentive Policies and Sustainability: Some Success Stories and Some Future Opportunities” A Policy Seminar on the Interplay Between Economics and Ecology, at the Grand Hotel, Stockholm, Sweden, January 4, 1990.

“Marketable Emission Permits: Lessons from the U. S. Experience” Stockholm School of Economics International Conference on the Application of Economic Instruments in Environmental Protection Policies June 12-14, 1989, Stockholm, Sweden.

“Marketable Permits in the United States: A Decade of Experience” presented at the 43rd Congress of International Institute for Public Finance, August, 1987, Paris, France.

- “Marketable Emission Permits in Principle and Practice” presented at the 75th Anniversary Conference of Stockholm School of Economics, Stockholm, Sweden, August, 1984.
- “Market Approaches to Environmental Protection,” presented to the Symposium on Reassessing the Role of Government in the Mixed Economy,” Kiel Institute of World Economics, Kiel, West Germany. June, 1982.
- “Price Controls and the Allocation of Depletable Resources,” presented at the International Meeting of the Atlantic Economics Society, Freeport/Lucaya. Bahamas, February, 1980.
- “The Design of Transferable Discharge Permit Systems to Control Pollution: A Survey and Synthesis,” presented to the International Institute for Environment and Society, Berlin, West Germany, 27 September 1979.
- “Substitution Bias in a Depletable Resource Model with Administered Prices,” presented to the Gesellschaft für Wirtschafts - Und Sozialwissenschaften conference on depletable resources at Mannheim, West Germany, 25 September 1979.
- “On the Efficient Allocation of Pollution Control Responsibility,” presented at the International Symposium on the Regional Dimensions of Environmental Policy held in Berlin, West Germany, 14 November 1978.

#### ***Government Reports:***

- “PROJECT 88: Harnessing Market Forces to Protect Our Environment”, Sponsored by Senators Timothy E. Wirth and John Heinz, Washington, DC, October, 1988. Principal responsibility for acid rain section.
- “Electricity Demand in the Central Maine Marketing Area: An Econometric Forecast,” published as a technical report by the Office of Energy Resources, Executive Office of the Governor, Augusta, Maine, April, 1979. A second report containing my updated forecast was published by the same office during January, 1981.
- “Energy Conservation in the Utilities Sector: A Critique,” in *Foresight -Vol. III: The Economic Impact of Energy Conservation*. Prepared for the Research, Development and Demonstration Subcommittee of the Committee on Science and Technology, U. S. House of Representatives (Washington: Government Printing Office, 1978).
- “Economic and Social Impacts,” Chapter VI in *Project Independence Report* (Washington: Government Printing Office, 1974).

#### ***Invited Seminars:***

John F. Kennedy School of Government, Harvard University, Woods Hole Oceanographic Institution, Stockholm School of Economics, World Bank, Royal Institute for International Affairs (Oxford), John F. Kennedy School of Government - Harvard University, United Nations (Geneva), OECD (Paris), International Institute of Applied Systems Analysis (Austria), Tufts University, Woodrow Wilson International Center for Scholars (Smithsonian Institution), Claremont-McKenna College, Yale University, University of Chicago, New York University Law School, University of Wisconsin, Penn

State University, Maxwell School of Public Affairs- Syracuse University, Vanderbilt University, Georgia State University, Air Force Academy, Laval University, Bowdoin College, Bates College, Middlebury College, Resources for the Future, Inc., State University of New York at Binghamton, University of Maine, Whittemore School, University of New Hampshire.