

**AFRICAN ECONOMIC RESEARCH CONSORTIUM
THE COLLABORATIVE PHD DEGREE PROGRAMME
IN ECONOMICS FOR SUB-SAHARAN AFRICA**

JOINT FACILITY FOR ELECTIVES



ENVIRONMENTAL ECONOMICS

COURSE OUTLINE

(Revised: July, 2020)



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ENVIRONMENTAL ECONOMICS

Course Objectives

The overall objective of this course is to provide graduate students with an understanding of environmental economics such that at the end of the course they will be thoroughly familiar with the frontier of science in this special area of Economics so that they can make original contributions to science through their PhD. The specific objectives are to:

- (i) Expose students to advanced theories and models of Environmental Economics.
- (ii) Enable students understand and appreciate the environment-economic linkages.
- (iii) Help students acquire the capacity to apply environmental models to research and policy issues in the area of environmental economics with specific reference to Sub-Saharan Africa
- (iv) Acquaint students with the dynamics of global environment and the implications for development in Sub-Saharan Africa

Pre-requisites

The core courses in the Collaborative PhD programme or their equivalent.

Assessment

The final course mark in each part will comprise of continuous assessments- 40%; and a final examination - 60%.

Group Work/Class Presentations (By Students)	10 Marks
Class Test	15 Marks
Term Paper/Literature Review	15 Marks
<u>Final Examination</u>	<u>60 Marks</u>
Total	100 Marks



TOPICS COVERED

ECON 636: ENVIRONMENTAL ECONOMICS I(60HOURS)

- 1. Introduction (10 Hours)**
 - 1.1 Basic concepts in Environmental Economics
 - 1.2 Market Failures: Public Goods, Externalities, Property Rights, Imperfect Information and Non-Convexity
 - 1.3 Environment, Economic Growth, Poverty and Population Linkages
 - 1.4 Ethics, Discounting, Sustainable Development, Green Economy

- 2. Optimal Exploitation and Management of Natural Resources (34 Hours)**
 - 2.1 Exhaustible (Non-Renewable) Resources
 - 2.1.1 Optimal Extraction
 - 2.1.2 Effects of Uncertainty, Imperfect competition , Recycling, and Strategic Behaviour
 - 2.2 Renewable Resources
 - 2.2.1 Fishery
 - 2.2.2 Forestry
 - 2.2.3 Agricultural Land and Soil
 - 2.2.4 Water
 - 2.2.5 Wildlife and National Parks
 - 2.3 Economics of Biodiversity
Applications/case studies with focus on Africa

- 3. Pollution: Theory, Policy and Case Studies (16 Hours)**
 - 3.1 Efficient Level of Pollution
 - 3.2 Least Cost Theorem: Derivation of Efficiency Conditions of Market Based Policy Instruments
 - 3.3 Derivation of Policy Instruments from Pareto-Optimality with Externality
 - 3.4 Environmental Policy Instruments
 - 3.4.1 Typology of Policy Instruments: Market-Based, Command and Control, Mixed Instruments, Property Rights, Information Disclosure, Voluntary Agreements, Negotiation, Institutions and Traditions
 - 3.4.2 Choice of Policy Instruments
 - 3.4.3 Evaluation of Policy InstrumentsApplications/case studies with focus on Africa: air, water, soil, energy and waste



ECON 637: ENVIRONMENTAL ECONOMICS II(60HOURS)

1. Environmental Valuation (18 Hours)

- 1.1 Types of Economic Values
- 1.2 Welfare Foundations of Environmental Valuation
- 1.3 Revealed Preference (RP) Methods
 - 1.3.1 Travel Cost Method
 - 1.3.2 Hedonic Price Method
 - 1.3.3 Production Function-Based and Avoided Cost Approaches (Damage cost, Replacement cost, Averted cost, etc)
- 1.4 Stated Preference (SP) Methods
 - 1.4.1 Contingent Valuation Method
 - 1.4.2 Choice Modelling: Choice Experiments, Contingent Ranking, Contingent Rating, Paired Comparison
 - 1.4.3 Contingency Valuation Method versus Choice Experiment
- 1.5 Combined RP and SP Methods
- 1.6 Benefit Transfer Method

Applications/case studies with focus on Africa

2. Environmental Evaluation (8 Hours)

- 2.1 Environmental Cost-Benefit Analysis (Methods for Environmental CBA, Discounting and the future, Equity and CBA, Uncertainty and irreversibility, Criticisms of CBA)
 - 2.2 Cost-Effectiveness Analysis
 - 2.3 Environmental Impact Assessment and Analysis
 - 2.4 Multiple Criteria Analysis
- Applications/case studies with focus on Africa

3. Environmental Accounting (14 Hours)

- 3.1 Theory of Environmental Accounting
 - 3.1.1 Sustainable Resource use in a competitive world
 - 3.1.2 Consumption, income and wealth
 - 3.2 Environmental accounting in Practice
 - 3.2.1 The System of National Accounts
 - 3.2.2 System of Environmental and Economic Accounting
 - 3.2.3 Modified National Income Accounts
 - 3.2.4 Accounting for Mineral Resources
- Applications/case studies with focus on Africa

4. International Environmental Issues (20 Hours)

- 4.1 Trade and Environment
 - 4.1.1 The Environment-Trade Interrelations in the Classical Trade Model
 - 4.1.2 Links Between Trade, Economics and the Environment



4.2 International Environmental Externalities

4.2.1 Unidirectional and Regional Reciprocal externalities

4.2.2 Global externalities: Strategic Approaches, Cooperation Mechanisms and Institutional Arrangements

4.3 International Environmental Convention

4.3.1 Convention on International Trade in Endangered Species (CITES)

4.3.2 Other Conventions

4.4 The Economics of Climate Change

4.4.1 Science of climate Change-Definitions, explanation and causes

4.4.2 Nature of the economics and the issues of climate change

4.4.3 Climate Change Models

4.4.4 The Impacts of Climate Change, Mitigation and Adaptation Policies

4.4.5 Global challenges, climate change negotiations and agreements

Applications/case studies with focus on Africa

Basic Textbooks¹

1. Bromley, Daniel, ed. (1995) **The Handbook of Environmental Economics**. Blackwell Publishers. Cambridge, M.A.
2. Perman R., Ma Y., McGilvray J. and Common M. (2012). **Natural Resource and Environmental Economics**, 4th Edition, Edinburgh, Longman
3. Hanley, N, J.F.Shogren and B. White (2006) **Environmental Economics in Theory and Practice**. London, MacMillan University.
4. Hacket, S.C. (2006). **Environmental and Natural Resources Economics: theory, policy, and the sustainable society**. 3rd edition. M.E. Sharpe, Inc.
5. Hanley, N., J.F. Shorgen and B. White (2001). **Introduction to Environmental Economics**. Oxford University Press.
6. Harris, J. (2006). **Environmental and Natural Resource Economics: A contemporary approach**. 2nd edition. Houghton Mifflin Company.
7. Hussen, A. (2005). **Principles of Environmental Economics: Economics, ecology and public policy**. Routledge. 2nd edition.
8. Khan, J.R. (2005). **The Economic Approach to Environmental and Natural Resources**. Thomson Corporation.
9. Kolstad, Charles (2000) **Environmental Economics**, Oxford University Press.
10. Prato, T. (1998). **Natural Resources and Environmental Economics**. Iowa State University Press.
11. Stavins, Robert, ed. (2000) **Economics of the Environment: Selected Readings** 4th Edition W.W. Norton & Co.
12. Tietenberg, T. and L. Lewis (2012). **Environmental and Natural Resource Economics**. 9th Edition. Pearson Education. Inc.
13. Pearce, David, Giles Atkinson, and Susana Mourato (2006). **Cost-Benefit Analysis and the**

¹There is no single textbook that is sufficient to cover all the topics in this course. Students are required to consult specialized texts and relevant journal articles cited under each topic and all other relevant journals.



Environment: Recent Developments. Publication of the Organisation for Economic Co-operation and Development (OECD).

Supplementary Texts

1. Folmer, H and H. Gabel (2001) **Principles of Environmental and Resource Economics**. Cheltenham: Edward Elgar
2. Folmer, H, H. Gabel, S. Gerking and A. Rose (2001) **Frontiers of Environmental Economics**. Cheltenham: Edward Elgar
3. Johansson, P.O., B. Kristom and K.-G. Maler eds., (1995) **Current Issues in Environmental Economics**. Manchester: Manchester University Press.
4. Kristrom B, P. Dasgupta and K-G Lofgren (2002) **Economic Theory for the Environment**, Cheltenham: Edward Elgar Publishing.
5. Newton, A. C and Elena Cantarello (2014) **An Introduction to the Green Economy: Science, System and Sustainability**. Routledge
6. Pearce D. and R. Turner [2004]. *Economics of Natural Resources and the Environment*. Harvester Wheatsheaf, London.
7. Siebert, H. (2008). *Economics of the Environment: Theory and Policy*. 7th edition. Springer-Verlag.
8. Tietenberg, T. and H. Folmer, eds., **The International Yearbook of Environmental and Resource Economics 1998/1999, 1999/2000 2001/2002**. Cheltenham: Edward Elgar Publishing.
9. Stern, N. (2007). *The Economics of Climate Change: The Stern Review* (Cambridge Univ. Press.
10. Fankhauser S. and T.K.J. McDermott (eds) (2016). *The Economics of Climate-Resilient Development*, Edward Elgar Publishing, Cheltenham, UK.
11. Pearce, David, Giles Atkinson, and Susana Mourato. 2006. *Cost-Benefit Analysis and the Environment: Recent Developments*. Publication of the Organisation for Economic Co-operation and Development (OECD).
12. Louviere, J, Hensher, D. and Swait, J. (2000) *Stated Choice Methods: Analysis and Application*, Cambridge: Cambridge University Press



ECON636:ENVIRONMENTAL ECONOMICS I (60 HOURS)

1 Introduction (10 Hours)

1.1 Basic concepts in Environmental Economics

1.2 Market Failures: Public Goods, Externalities, Property Rights, Imperfect Information and Non-convexity

Readings:

- (i) *Baland, J-M and J-P Platteau (2003). "Economics of common property management regimes", in Mäler and Vincent, eds., Ch. 4, pp. 127-190.
- (ii) Barzel, Y. (1989) **Economic Analysis of Property Rights**. Cambridge University Press, Cambridge.
- (iii) *Coase, R. (1960), "The Problem of Social Cost", **Journal of Law and Economics**, (October) 3, 1-44.
- (iv) Eggertsson, Thrainn 1996, "The Economics of Control and The Cost of Property Rights" in Hanna, SS, Folke, C and Maler, K-G (eds). **Rights to Nature Ecological Economic, Cultural and Political and Principles of Institutions for the Environment**. Washington, DC, Island Press. 157-175.
- (v) Kopnina, H., Washington, H., Taylor, B., & Piccolo, J. J. (2018). Anthropocentrism: More than just a misunderstood problem. *Journal of Agricultural and Environmental Ethics*, 31(1), 109-127.
- (vi) Kolstad, Charles D. (2000), "Environmental Economics", Oxford University Press, New York. Pages 72-74.
- (vii) Williamson, O. E. (2000). The new institutional economics: taking stock, looking ahead. *Journal of economic literature*, 38(3), 595-613.
- (viii) Prato, T. (1998). *Natural resource and environmental economics*. Iowa State University Press.
- (ix) *Hammond, PJ (1998) "The Efficiency Theorems and Market Failure", in Kirkman, A (ed.) (1998), **Elements of General Equilibrium Analysis**, Blackwell Publishers.
- (x) Bromely, D. W. (1991). Property rights as authority systems. *Journal of business administration*, 2.
- (xi) Coase, R. H. (1960). The problem of social cost. In *Classic papers in natural resource economics* (pp. 87-137). Palgrave Macmillan, London.
- (xii) Hardin, G. 1998 [1968]. *The Tragedy of the Commons*. *Managing the Commons*.
- (xiii) Khan, B. (2005). Learning features in an open, flexible and distributed environment. *AACE journal*, 13(2), 137-153.
- (xiv) Ostrom, E., & Schlager, E. (1996). The formation of property rights. *Rights to nature: Ecological, economic, cultural, and political principles of institutions for the environment*, 127156.



- (xv) Myles, G. D. (1995). Public economics. Cambridge university press.
- (xvi) Newbery, D. (1989) "Missing Markets: Consequences and Remedies", in F. Hahn, ed. (1989) **The Economics of Missing Markets: Games and Information**. Clarendon Press.

1.3 Environment, Poverty and Population Linkages

Read

- (i) Cole, M. A., Rayner, A. J., & Bates, J. M. (1997). The environmental Kuznets curve: an empirical analysis. *Environment and development economics*, 401-416.
- (ii) Kuznets, S. (1955). Economic growth and income inequality. *The American economic review*, 45(1), 1-28.
- (iii) Panayotou, T. (1995). Environmental degradation at different stages of economic development. *Beyond Rio: The environmental crisis and sustainable livelihoods in the third world*, 13-36.
- (iv) Horvath, A. (2004). Construction materials and the environment. *Annu. Rev. Environ. Resour.*, 29, 181-204.
- (v) Solow, R. M. (1992). Siena lectures on endogenous growth theory (Vol. 6). *UniversitadegliStudi di Siena*.
- (vi) Solow, R. M. (1974). The economics of resources or the resources of economics. In *Classic papers in natural resource economics* (pp. 257-276). Palgrave Macmillan, London.
- (vii) Maler, Karl-Goran (1998) *Environment, Poverty and Economic Growth, Annual World Bank Conference on Development Economics 1997*, The International Bank of Reconstruction and Development/The World Bank, pp. 251-270.
- (viii) *Dasgupta, P. (1995) *Poverty, Institutions, and the Environmental Resource Base.*" In J. Behrman and T.N. Srinivasan, eds. **Handbook of Development Economics**. Amsterdam: Elsevier.
- (ix) *Dasgupta, P. (1995) "**Population Problem: Theory and Evidence,**" *Journal of Economic Literature*, vol. 33, No. 4, pp. 1879-1902
- (x) *Dasgupta, P. C. Folke and Karl-Goran Maler.(1994) *The Environmental Resource Base and Human Welfare*, In Lindahl-Kressling, K. and Landberg, H (eds), **Population, Economic Development, and the Environment**. Oxford University Press, p. 25-50.
- (xi) Panayotou, T. (1994) "The Population, Environment and Development Nexus." In R. Casses ed. **Population and Development: Old Debates, New Conclusions**. New Brunswick, N.J.: transaction Publishers.

1.4 Ethics, Discounting, Sustainable Development, Green Economy



Readings:

- (i) *Grossman, GM and AB Krueger (1995). "Economic Growth and the Environment". **Quarterly Journal of Economics** 110(2): 353-378.
- (ii) Heal, G.M. (1998) **Valuing the Future: Economic Theory and Sustainability**, New York: Columbia University Press.
- (iii) Munasinghe, M, O. Sunkel and C de Miguel (2001) eds. **The Sustainability of Long Term Growth. Socioeconomic and Ecological Perspectives**. Cheltenham: Edward Elgar Publishing.
- (iv) Pearce D. W. (1993). "Sustainable Development and Developing Country Economies", Ch. 3 in R. K. Turner ed.(1993)., **Sustainable Environmental Economics and Management Principles and Practice**. Bellhaven Press London and New York
- (v) Pearce, D.W., E. Babier and A. Markandya (1990) **Sustainable Development: Economic and Environment in the Third World**, Aldershot: Edward Elgar.
- (vi) Radetzki, M. (2001) **The Green Myth – Economic Growth and the Quality of the Environment**. Essex: Multi-Science Publishing Company.
- (vii) Griggs, D. J., & Noguera, M. (2002). Climate change 2001: the scientific basis. Contribution of working group I to the third assessment report of the intergovernmental panel on climate change. *Weather*, 57(8), 267-269.
- (viii) Hepburn, Cameron (2006), "Discounting climate change damages: Working note for the Stern review".
- (ix) Hartwick, J. M. (1977). Intergenerational equity and the investing of rents from exhaustible resources. *The American Economic Review*, 67(5), 972-974.
- (x) Hartwick, J. M. (1978). Substitution among exhaustible resources and intergenerational equity. *The Review of Economic Studies*, 45(2), 347-354.
- (xi) Asumadu-Sarkodie, S., Owusu, P. A. and Jayaweera, H. M. (2015). Impact analysis of flooding in Accra, Ghana. *Advances in Applied Science Research* 6 (9): 53-78.
- (xii) Meadows, D. H., Meadows, D. L., Randers, J., & Behrens, W. W. (1972). The limits to growth. *New York*, 102(1972), 27.
- (xiii) Meadows, P. S., & Campbell, J. I. (1972). Habitat selection by aquatic invertebrates. In *Advances in marine biology* (Vol. 10, pp. 271-382). Academic Press.
- (xiv) Solow, R. M. (1986). On the intergenerational allocation of natural resources. *The Scandinavian Journal of Economics*, 141-149.
- (xv) Manning, Russ. "Environmental ethics and Rawls' theory of justice." *Environmental Ethics* 3, no. 2 (1981): 155-165.
- (xvi) Rawls, J. (2009). *A theory of justice*. Harvard university press.
- (xvii) Tietenberg, T., & Lewis, L. (2009). Regional and global air pollutants: acid rain and atmospheric modification. *Environmental & natural resource economics* (8th ed.) pp, 425-437.
- (xviii) Rockström, J., Sachs, J. D., Öhman, M. C., & Schmidt-Traub, G. (2013). Sustainable



development and planetary boundaries (pp. 1-3). Sustainable Development Solutions Network..

- (xix) Whitmarsh, L. (2008). Are flood victims more concerned about climate change than other people? The role of direct experience in risk perception and behavioural response. *Journal of risk research*, 11(3), 351-374.
- (xx) Munich, Re. (2002). Topics annual review: natural catastrophes. Annual Report, Munich Reinsurance Group, *Geoscience Research*, Munich, Germany.
- (xxi) Re, M. (2002). Topics annual review: natural catastrophes 2002. Munich Reinsurance Group, *Geoscience Research*, Munich, Germany.
- (xxii) **Twerefou, D. K.**, Chinowsky, P., Adjei-Mantey, K. and Strzepek, N. L. (2015). The Economic Impact of Climate Change on Road Infrastructure in Ghana. *Sustainability*, 7, 11949-11966.

2 Optimal Exploitation and Management of Natural Resources: Theory, Case Studies, Policy. (34 Hours)

2.1 Exhaustible Resources: Minerals and Fossil Fuel

Readings:

- (i) *Arrow K.J and Sheldon S.L Chang (1980) "Optimal Pricing, Use, and Exploration of Uncertain Natural Resource Stocks" in Liu, Pan-Tai (ed) (1980) **Dynamic Optimization and Mathematical Economics**, Plenum Press.
- (ii) Conrad, Jon M. and Colin W. Clark (1987) *Natural Resource Economics: Notes and Problems* New York: **Cambridge University Press**
- (iii) Conrad, R.F. and B. Hool, (1981), "Resource Taxation with Heterogeneous Quality and Endogenous Reserves", **Journal of Public Economics**, 16, 17-33.
- (iv) Dasgupta, P. (1982), **The Control of Resources**, Harvard University Press, Cambridge.
- (v) *Dasgupta P. and G. M. Heal, (1979), **Economic Theory and Exhaustible Resources**, Cambridge University Press.
- (vi) Dasgupta, P. and Stiglitz, J.E., (1976), "Uncertainty and Resource Extraction under Alternative Institutional Arrangements", **IMSSS Technical Report 1979**, Stanford University.
- (vii) Devarajan, S. and A.C. Fisher, (1981), "Hotelling's Economics of Exhaustible Resources: Fifty Years Later," **Journal of Economics of Economic Literature**, 19, 65-73.
- (viii) Hartwick, J.M., and N.D. Olewiler. (1986) **The Economics of Natural Resource Use**. Harper & Row, Publishers, New York
- (ix) Heal, G. (1985) **Optimal Resource Depletion Policies** Chapter 18 in Kneese and Sweeny op. cit.



- (x) *Hotelling, H.C., (1931), "The Economics of Exhaustible Resource", **Journal of Political Economy**, **39**, 137-175.
- (xi) HSW Ch. 9
- (xii) Iwayemi A. (2001) **Nigeria's Fractured Development: The Energy Connection**. Inaugural Lecture, University of Ibadan. Ibadan.
- (xiii) Salant S.W. (1995) The Economics of Natural resource Extraction: A Primer for development Economists". **World Bank Research Observer** Vol. 10, No. 1 February, pp. 93-111.
- (xiv) *Solow, R.M., (1974), "The Economics of Resources or the Resources of Economics," **American Economic Review**, **64**, 1-14.
- (xv) Stiglitz, J.E. and P. Dasgupta, (1982), "Market Structure and Resource Depletion: A Contribution to the Theory of Inter-temporal Monopolistic Competition", **Journal of Economic Theory**, **28**, 128-64.
- (xvi) Stiglitz, J.E., (1976), "Monopoly and the Rate of Extraction of Exhaustible Resources", **American Economic Review**, **66**, 655-61.
- (xvii) *Sutinen, Jon G. (1980) "Royalties and Extraction Rate of an Exhaustible Resource" in Liu, Pan-Tai (ed) (1980) **Dynamic Optimization and Mathematical Economics**, Plenum Press.
- (xviii) *Vincent, J.R., Panayotou, T., and J.M. Hartwick, (1997), "Resource Depletion and Sustainability in Small Open Economies," **Journal of Environmental of Environmental Economics and Management**, **33**, 274-286.

2.2 Renewable Resources

2.2.1 Fishery

Readings:

- (i) Boyce, William E. and Richard DiPrima. (2001) **Elementary Differential Equations**, 7th edition, John Wiley and Sons, New York. (Chapter 2.5 and 9.1)
- (ii) *Brown, Gardner Jr., (1974), "An Optimal Program for Managing Common Property Resources with Congestion Externalities", **Journal of Political Economy**, **82**, 163-74.
- (iii) *Clark, Colin W., (1990), **Mathematical Bioeconomics: Optimal Management of Renewable Resources**, John Wiley and Sons.
- (iv) *Clark, C.W., and Munro, G.R. "Economics of Fishing and Modern Capital Theory," **Journal of Environmental Economics and Management**, Vol. 2, No. 2 (1975), pp. 92-106.
- (v) Conrad, Jon M. and Colin W. Clark **Natural Resource Economics: Notes and Problems** (New York: Cambridge University Press, 1987), Ch. 2.
- (vi) Dasgupta, P., (1982), **The Control of Resources**, Harvard University Press.
- (vii) Dasgupta P. and G. M. Heal, (1979), **Economic Theory and Exhaustible Resources**,



Cambridge University Press.

- (viii) Flaaten, O., (1991) "Bioeconomics of Sustainable Harvest of Competing Species," **Journal of Environmental Economics and Management**, Vol. 20, pp.163-180.
- (ix) *Gordon, H.S., (1954), "The Economic Theory of a Common Property Resources", **The Journal of Political Economy**, 62, 124-142.
- (x) Grafton, R.Q., (1996), "Individual Transferable Quotas: Theory and Practice", **Reviews in Fish Biology and Fisheries**, 6, 5-20.
- (xi) Hanley Nick, Shogren Jason F, and Ben White, (2006), **Environmental Economics in Theory and Practice**, Macmillan Press.
- (xii) Hanna, S and M Monasinghe 1995.eds. **Property Rights and the Environment, Social and Ecological Issues**. Beijer International Institute of Ecological Economics and the World Bank.
- (xiii) *Hannesson, R., (1993), **Bioeconomic Analysis of Fisheries**, Fishing News Books.
- (xiv) HSW Chapter 7 and 10.
- (xv) Mirman, L.J. and D.F. Spulber (eds.), **Essays in the Economics of Renewable Resources**, North Holland, Amsterdam.
- (xvi) Mkenda, Adolf (2001) *Fishery Resources and Welfare in Rural Zanzibar*, PhD Thesis, University of Gothenburg.
- (xvii) Mkenda, A.F and H. Folmer (2001) "The Maximum Sustainable Yield of Artisanal Fishery in Zanzibar: A Cointegration Approach" *Environmental and Resource Economics* Vol. 19 No.4 pp 311-328.
- (xviii) Munro, G.R and A. Scott "The Economics of Fisheries Management Chapter 14 in Kneese and Sweeney (eds.) **Handbook of Natural Resource and Energy Economics**. North Holland.
- (xix) Scott Anthony, (1955), "The Fishery: The Objective of Sole Ownership", **The Journal of Political Economy**, LXIII (1), 116-124.
- (xx) Smith, V.L., (1968), "Economics of Production from Natural Resources", **American Economic Review**, 58, 409-431.
- (xxi) Spence, A.M. and A.D. Starret, (1975), Most Rapid Approach Paths in Accumulation Problems, **International Economic Review**, 16, 388-403.
- (xxii) Spence, A.M., (1974), "Blue Whales and Optimal Control Theory", in H. Gottinger (ed), **Systems Approaches and Environmental Problems**, Vandenhoeck and Ruprecht, Gottingen.
- (xxiii) Wilson, J.A., (1982), "The Economic Management of Multispecies Fisheries", **Land Economics**, 58, 417-34.

2.2.2 Forestry

Readings:



- (i) Anderson, D. (1987) **The Economics of Afforestation: A case Study in Africa.** Baltimore, MD.: The Johns Hopkins University Press.
- (ii) Barbier, E.B. (1997) "The Economic Analysis of Tropical Forest Land Use Options." **Land Economics** 73: 174-95.
- (iii) Barbier, E. and Michael Rauscher. (1995) Policies to Control Tropical Deforestation: Trade Interventions Versus Transfers Ch 9 in Perrings, C.A. Maler, K.G., Folke, C. Holling, C.S. and Jansson, B.O. (eds) **Biodiversity Conservation**, Kluwer, pp. 195-214.
- (iv) *Bowes, M.D. and J.V. Krutilla, (1985), "Multiple Use Management of Public Forest Lands", in A.V. Kneese and J.L. Sweeney (eds), **Handbook of Natural Resource and Energy Economics**, Vol. II, Amsterdam: North-Holland.
- (v) Brown, K, and D.W. Pearce, eds. (1994) **The Causes of Tropical Deforestation: The Economic and Statistical Analysis of Factors Giving Rise to the Loss of the Tropical Forests.** London: University College London Press.
- (vi) *Clark, C.W. (1990) **Mathematical Bioeconomics: The Optimal Management of Renewable Resources.** 2nd ed. John Wiley & Sons, New York, pp. 267-75.
- (vii) Cleaver, K. M. Munasinghe, M. Dyson, N. Egli, A. Peuker and F. Wencelius, eds. (1992) **Conservation of West and Central African Rainforests.** World Bank Environment Paper Number 1.
- (viii) Ehui, S.K. and T.W. Hertel, (1989), "Deforestation and Agricultural Productivity in the Côte d'Ivoire", **American Journal of Agricultural Economics**, **71**, 703-11.
- (ix) Ehui, S.K., T.W. Hertel and P.V. Preckel (1990) "Forest Resource Depletion, Soil Dynamics and Agricultural Productivity in the Tropics", **Journal of Environmental Economics and Management**, **18**: 136-154
- (x) *Englin, J.E. and M.S., Klan, "Optimal Taxation: Timber and Externalities," **Journal of Environmental Economics and Management**, **18**: 263-275.
- (xi) *Faustmann, G., (1849), "On the Determination of the Value Which Forest Land and Immature Stands Posses for Forestry", reprinted in English in **Oxford Institute Papers** (1968), **42**.
- (xii) *Hartwick, J.M and N.G. Long, (2000), "Deforestation and Development in a Small Open Economy", **Journal of Environmental Economics and Management**, **1**, 1-17.
- (xiii) HSW Chapter 7 and 11.
- (xiv) Hartwick, J.M., and N.D. Olewiler. (1986) **The Economics of Natural Resource Use.** Harper & Row, Publishers, New York, Ch.11.
- (xv) *Heaps, T., (1984) "The Forestry Maximum Principle," **Journal of Economics and Control**, Vol. 2. No. 2 (May), pp. 131-152.
- (xvi) Heaps T. and P. Neher, The Economics of Forests when the Role of Harvest is Constrained, **Journal of Environmental Economics and Management** **6**, 297-317.
- (xvii) Pachauri R.K. and R.S. Kanetkar. (1997) "Deforestation and Desertification in Developing Countries" Ch. 6 in **Environment, Energy, and Economy** eds. Yoichi Kaya and



Keiichi Yokobori. United Nations University Press. Tokyo, New York, Paris.

- (xviii) *Samuelson, P.A., (1976), "Economics of Forestry in an Evolving Society", **Economic Inquiry**, **14**, 466-492.
- (xix) *Sandler, T. (1993) "Tropical Deforestation: Markets and Market Failure", **Land Economics** Vol. 69, pp.225-33.
- (xx) Sharma, N. (ed.) (1992) **Managing the World's Forests** (Forest Valuation) by Kramer, R.D., R. Hearty and R. Mendelsohn.
- (xxi) Shepherd, H. (1991) "Communal Management of Forests in Semi-Arid and Sub-Humid Regions of Africa: Past Practices and Prospects for the Future." **Development Policy Review** 9 (June): 151-76.

2.2.3 Agricultural Land and Soil (Erosion, Tenure)

Readings:

- (i) Alemu, T. 1999. **Land Tenure and Soil Conservation: Evidence from Ethiopia**. PhD Thesis, University of Gothenburg.
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ECON 637: ENVIRONMENTAL ECONOMICS II (60 HOURS)

1 Environmental Valuation

(18 Hours)

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1.6 Benefit Transfer Method

Reading:

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