

**FACULTY UPGRADATION  
PROGRAM IN  
ENVIRONMENTAL ECONOMICS**

**September 4 – 29, 2000**

**Madras School of Economics  
Chennai**

**World Bank  
Washington, DC**

**Ministry of Environment and Forests  
Government of India**

## PREFACE

In order to encourage the Indian universities and colleges engaged in teaching at post-graduate and graduate levels, the World Bank aided “Environmental Management Capacity Building” (EMCaB) project is undertaking several Faculty Upgradation Programmes. The present one being organized by Madras School of Economics is third of its kind conducted so far under this project.

As environmental problems often involve contributions from both natural and social sciences, environmental studies accordingly demand an interdisciplinary approach. The present programme emphasizes the role of environmental economics in addressing various environmental issues. The overall objective is to introduce the participants to environmental economics concepts and corresponding analytical skills. This Faculty Upgradation Programme is intended for the university teachers and researchers.

The main objective of this programme is thus to help the participants to understand the interaction between economic and environmental systems and the manner in which resource allocation decisions affect the environment. The topics covered in the reading material include economic instruments in environmental policy and regulations, alternative approaches to environmental valuation, energy environment interaction, global environmental issues, sustainable development. While the first two volumes introduce concepts and issues in various sub-fields of environmental economics, the third volume provides a collection of Indian case studies. Besides the three volumes of reading material, a text book (Hanley et al., 1997) is also being given for reference.

**Prof. Paul P. Appasamy**

**Dr. K.S. Kavi Kumar**

## COURSE OUTLINE

### **Introduction**

Introduction to Environmental Economics  
Energy, Economy, Environment – Interface  
  
Externalities and Economic Efficiency, Market Failure  
Externalities as Public Goods  
Efficient Level of Provision of Public Good  
Internalizing Externalities  
Cost-Benefit Analysis and Applications  
Econometric Analyses  
  
Taxes, Permits and Standards as Corrective Measures  
Coase's Theorem and Its Critique  
Uncertainty, Market Imperfection, Non-convexity  
Pigouvian Optimum: Standards – Charges/Permits Approach  
Case Studies

### **Valuation Methods and Approaches**

Use values, Option Values, Existence Values, and Bequest Values  
Market and Non-market Benefits  
Indirect and Direct Methods  
Physical Linkage, Abatement Cost Methods  
Contingent Valuation Method (CVM)  
Willingness to Pay, Willingness to Accept, Problems with CVM  
Case Studies relating to the Valuation of Forests, Water, Air and Biodiversity

### **Resource Economics**

Overview of Natural Resources  
Exhaustible Resource Economics – Theory and Application  
Renewable Resource Economics – Theory and Application  
Resource Use and Policy  
Common Property Resources: Concepts and Applications

### **Natural Resource Accounting**

Need for Natural Resource Accounting (NRA)  
Integrated Environmental and Economic Accounting  
Integration into the system of National Income Accounting, Green NDP  
Case Studies

### **Energy and Environment**

Energy Dynamics and Energy Modeling  
Impact of Power Consumption on the Environment  
Energy Conservation and Environmental Implications

Effects of Urbanization on Environment

Urban Environmental Issues

### **Environmental Impact Assessment**

Appraisal of Project with Environmental Impacts

Environment and Social Assessment of Projects

Developing Indicators to quantify the Environment and Implications of Project

Financial, Economic and Social Performance of Projects

Environmental Auditing for Industries

Case Studies

### **Poverty and Environment**

Poor and Resource Degradation

Rural Energy and Water Usage – Environmental Implications

### **Environmental Laws, Regulations and Institutions**

Environmental Legislations

Design and Regulation of Mechanism for Pollution Control

Setting Standards and Enforcement Issues

Instruments for Deterrence from non-compliance and Strict Liability

Evaluation of India's Environmental Policies

### **International Issues**

Links Between Trade and Environment

Trade and Environment in the WTO Regime

TRIPS and Biodiversity

Climate Change: Concepts and Impacts

GHG Emissions: Sources and Sinks

Global Negotiations

India's Response Strategies

Kyoto Protocol - Joint Implementation, Emissions Trading and Clean

Development Mechanism

### **Ecological Economics and Sustainable Development**

Elements of Ecology

Material Balance Approach

Limits to Substitution and Irreversibility

Sustainable Development - Concepts and Indicators

Operationalizing Sustainable Development – Case Study

Environment and Development Trade-off

## READING MATERIAL

**Text Book:** Hanley, Nick; Shogren, Jason, F.;White, Ben, Environmental Economics in Theory and Practice, Macmillan, 1997

### VOLUME I

#### Concepts and Issues

##### *Concepts*

1. “Externalities, Information and Alternative Collective Action” - O. A. Davis and M. I. Kamien in Dorfman and Dorfman (ed.) *Economics of Environment*, Norton Company, 1972. **1-10**
2. “The Problem of Social Cost” - Ronald Coase, in Dorfman and Dorfman (ed.) *Economics of Environment*, Norton Company, 1972. **11-25**
3. “Standards Charges and Equity” - A. V. Kneese and B. T. Bower in Dorfman and Dorfman (ed.) *Economics of Environment*, Norton Company, 1972. **26-32**
4. “Environmental Costs of Economic Growth” - B. Commoner in Dorfman and Dorfman (ed.) *Economics of Environment*, Norton Company, 1972. **33-44**
5. “Environmental Repercussions and the Economic Structure: An Input - Output Application” - W. Leontiff, in Dorfman and Dorfman (ed.) *Economics of Environment*, Norton Company, 1972. **45-55**

##### *Resource Economics*

1. “Hotelling's ‘Economics of Exhaustible Resources’: 50 Years Later” – S Devarajan and A. C. Fisher, *Journal of Economic Literature*, 19, 8 Pp.65-73 **56-60**
2. “Energy and Depletable Resources: Economics and Policy” - Charles Kolstad, *Journal of Environmental Economics and Management*, 39 (3), 2000. **61-72**
3. “Renewable Resource Economists and Policy: What Difference We Have Made” - J. E. Wilen, *Journal of Environmental Economics and Management*, 39 (3), 2000. **73-83**

##### *Environmental Valuation and Accounting*

1. “Accounting and Valuation of Environment” – Volume I, Primer, United Nations, 1997. **84-128**
2. “The Value of World's Ecosystem Services and Nature Capital” - Costanza et. al, 1998, *Ecological Economics*, 25, Pp.1-15. **129-143**
3. “WTP & WTA - How much they can differ?” – W.M. Hanemann, 1991, *American Economic Review*, 81, Pp.635-47 **144-150**

4. "Evaluating Environmental Damages and Benefits" – David Pearce and J.J. Warford, 1993, in 'World Without End: Economics, Environment and Sustainable Development', Chapter 5, Oxford University Press and World Bank, 97-144.  
**151-178**
5. "Wasting Assets: Natural Resources in National Income Accounts" – R. Repetto et.al., 1992, in Anil Markandya and Julie Richardson (eds.) 'Environmental Economics', Chapter 25, Earthscan, 364-388.  
**179-191**
6. "Net National Product & Social Well Being" – P. Dasgupta and K.G. Maler, 1999, *Environment and Development Economics*.  
**192-204**

#### ***Pollution Control – Policy Instruments***

1. "Economic Incentives for Environmental Protection: Integrating Theory and Practice" – R.W. Hahn & R. N. Stavivs, 1992, *American Economic Review*, Vol. 82, Pp.464-68.  
**205-207**
2. "Policy Instruments for Pollution Control in Developing Countries" – Gunnar S. Eskeland and E. Jimenez, 1992, *World Bank Research Observer*, 7(2), 145-69.  
**208-220**
3. "Correlated Uncertainty and Policy Instrument Choice" - R. N. Stavivs, *Journal of Environment Economics and Management*, Vol.30 (2), 1995.  
**221-236**
4. "Urban Air Pollution in Developing Countries: Problems and Policies" – Alan J. Krupnick, in P. Dasgupta and K.G. Maler (ed) *The Environment and Emerging Development Issues*, Volume 2, Oxford Univ. Press, 1997.  
**237-254**

#### ***Miscellaneous***

1. "Environmental Issues and Economic Decisions in Developing Countries" – Mohan Munasinghe, 1992, *World Development*, 21(11): 1729-48.  
**255-274**
2. "Environment and Development: Theory and International Evidence" – J.M. Antle and Heidobrink, 1995, *Economic Development and Cultural Change*, 43(3), 603-25.  
**275-285**
3. "Macroeconomic Policies, Second Best Theory and The Environment" – K.G. Maler and M. Munasinghe, 1996, *Environment and Development Economics*, 1(2), 149-63.  
**286-293**
4. "Population, Resources and Poverty" – Partha Dasgupta, 1992, *Ambio*, 21(1), 95-101.  
**294-300**
5. "Urban Environmental Sustainability: Critical Issues and Policy Measures in a Third World Context" – Peter Nijkamp and Hans Opschoor, 1997, in Manas Chatterji and Yang Kaizhong (eds.) 'Regional Science in Developing Countries', Chapter 5, Macmillan, 52-73.  
**301-311**

## VOLUME II

### *Concepts and Issues*

“*Environmental Economics: A survey*” – M.L. Cropper and W.E. Oates, *Journal of Economic Literature*, 1992, Vol. 30, Pp. 675-740. **1-33**

### *Sustainability*

1. “Interpreting Sustainability” - G. M. Heal, in *Sustainability: Dynamics & Uncertainty*, Kluwer Academic Publ., 1998. **34-44**
2. “Sustainable Energy Development: Issues and Policy” - Mohan Munasinghe in Kleindorfer P. R. et. al (ed.) *Energy, Environment and Economy: Asian Perspective*, Edward Elgar, 1996. **45-65**
3. "Towards an Ecological Economics of Sustainability" - Common and Perrings, 1992, *Ecological Economics*, Vol.7, Pp.7-34. **66-86**

### *Global Issues*

1. “Efficiency Issues and the Montreal Protocol on CFCs” – Peter Bohm in P. Dasgupta and K.G. Maler (ed) *The Environment and Emerging Development Issues*, Volume 2, Oxford Univ. Press, 1997. **87-101**
2. “Some Economics of Global Warming” – T.C. Schelling, 1992, *American Economic Review*, 82: 1-14. **102-109**
3. *Climate Change Policy – Facts, Issues and Analysis*, C.J. Jepma and M. Munasinghe, Cambridge University Press, 1998 – Chapters 1 & 8. **110-159**
4. “Free Ride Through Delay: Risks and Accountability Force” - Jyoti Parikh and Kirit Parikh, *Environment and Development Economics*, 1998. **160-162**
5. “CO<sub>2</sub> and Greenhouse Effect: A Game-Theoretic Exploration” – Michael Hoel, in P. Dasgupta and K.G. Maler (ed) *The Environment and Emerging Development Issues*, Volume 2, Oxford Univ. Press, 1997. **163-177**

### *Miscellaneous*

1. “Has Economic Research Answered the Needs of Environmental Policy?” – M.L. Cropper, *Journal of Environmental Economics and Management*, 39, 328-350, 2000. **178-189**
2. “The Impact of Economics on Environmental Policy” – R.W. Hahn, *Journal of Environmental Economics and Management*, 39, 328-350, 2000. **190-202**

## VOLUME III

### Case Studies

1. “Accounting and Valuation of Environment” – Volume II, Case Studies from ESCAP Region, United Nations, 1997. **1 - 45**
2. “Economic Valuation of Environmental Impacts: Issues and Application in Indian Context” - Anil Markandeya, 1994. **46-65**
3. “The Cost of Inaction: Valuing the Economy-wide costs of Environmental Degradation in India” - Carter Brandon and Kirsten Hommann, 1995. **66-111**
4. “WTP for Borivili National Park: Evidence from a Contingent Valuation”- Nandini Hadker et. al., *Ecological Economics*, 1997. **112-129**
5. “Economic Aspects of Wildlife Protection in DPG: A case study of Keoladeo National Park, Bharatpur, India” - M. N. Murthy and Susan M. Menkhaus, 1994. **130-159**
6. “Valuation and Pricing of NTFP - A Study for Raipur District of Madhya Pradesh” - Kanchan Chopra, 1994. **160-184**
7. “Measuring Non-user Benefits from Cleaning Ganges” – A.J. James and M. N. Murty, 1999. **185-218**
8. “Sustainable Development and Biodiversity Conservation in North East India in Context” - Clem Tisdell, 1999. **219-229**
9. “Fiscal Instruments for Pollution Abatement: A Study of Distilleries in India” – Bishwanath Goldar and Rita Pandey, 1997. **230-248**
10. “Water Pollution Abatement: A Taxes-Standards Approach for Indian Industry” - A. J. James and M. N. Murty, 1996. **249-259**
11. “Economic Analysis of Environmental Problems in Tanneries and Suggestions for Policy Action – Common Effluent Treatment Plants” - U. Sankar, 1998. **260-308**
12. “Economic Development, Poverty Reduction and Carbon Emission in India” - N. S. Murthy, M. Panda, J. Parikh, *Energy Economics*, 1997. **309-323**

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- Singh, Katar; Ballabh, Vishwa, Cooperative management of natural resources, Sage Publications, 1996

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## COURSE SCHEDULE

**September 4-29, 2000**  
**Madras School of Economics, Chennai**

### First Week

|        | 10 to 11.15 am   | 11.45 to 1 pm | 2 to 3.15 pm  | 3.45 to 5 pm   |
|--------|--|---------------|---|--|
| 4-9-2k | Inauguration by<br>Shri N.R. Krishnan, Former Secretary, MoEF, GOI<br>Lectures by Dr. Raja Chellaiih and Dr. U. Sankar |               | Overview Lecture on the Course<br>Prof. Paul Appasamy & Dr. K.S. Kavi Kumar<br>Followed by Tea with MSE faculty |  |
| 5-9-2k | Theory of Externalities<br>Prof. P. Nayak  |               | Multiple Regression Framework -<br>Overview<br>Dr. V. Brinda  | Cross-sectional and Time-series<br>Regressions - Overview<br>Dr. Shanmugam       |
| 6-9-2k | Theory of Public Goods<br>Dr. Mythili  |               | Social Cost Benefit Analysis – Theory and Applications<br>Prof. Anil Markandaya                                 |  |
| 7-9-2k | Environmental Valuation – Theory and Applications<br>Prof. Anil Markandaya   |               | Valuation – Case Study<br>Prof. Paul Appasamy   | Faculty Seminar<br>Prof. Anil Markandaya   |
| 8-9-2k | Pollution Control Instruments<br>Prof. Anil Markandaya   |               | Instruments for Pollution Control – A<br>Case Study on Taxes and Standards<br>Dr. A.J. James                    | Instruments for Pollution Control -<br>Indian Case Study on CETP<br>Ms. Anuradha |

**FACULTY UPGRADATION PROGRAM**  
**September 4-29, 2000**  
**Madras School of Economics, Chennai**

**Second Week**

|         | 10 to 11.15 am   | 11.45 to 1 pm   | 2 to 3.15 pm  | 3.45 to 5 pm                                       |
|---------|--|---|---|--|
| 11-9-2k | Pollution Abatement Cost<br>Prof. M.N. Murthy                          | Pollution Control – SSI in India<br>Dr. Smita Mishra                    | Ganga Action Plan –<br>Case Study<br>Prof. M.N. Murthy                  | Valuation: “Cost of Inaction”<br>Dr. Smita Mishra  |
| 12-9-2k | Design of Pigouvian Taxes<br>Prof. Sankar                              | Valuation of Health Impacts – Case<br>Study<br>Dr. Kalpana Balakrishnan | Indian Agriculture – Climate<br>Sensitivity<br>Dr. K.S. Kavi Kumar      | Visit to M.S. Swaminathan Research<br>Foundation   |
| 13-9-2k | Energy and Environment – Linkages and Modeling<br>Prof. R. P. Sengupta |   | Environment Impact Assessment and Environmental Auditing<br>Dr. Rambabu |  |
| 14-9-2k | Exhaustible Resource Economics<br>Prof. Rabindranath Bhattacharya      |   | Resource Use - Indian and Global Issues<br>Dr. Madduri                  |  |
| 15-9-2k | Renewable Resource Economics<br>Dr. P.G. Babu                          |   | Valuation of Water –<br>Case Study<br>Dr. Ratna Reddy                   | Environmental Damage Assessment<br>Dr. Ranganathan |

16-9-2k: Field Visit and panel discussion on ‘Coastal Resources’

## FACULTY UPGRADATION PROGRAM

September 4-29, 2000

Madras School of Economics, Chennai

### Third Week

|         | 10 to 11.15 am   | 11.45 to 1 pm                                     | 2 to 3.15 pm  | 3.45 to 5 pm                                       |
|---------|--|---|---|--|
| 18-9-2k | Climate Change – Concept and Issues<br>Prof. Jyoti Parikh          | Computers   | Global Climate Change Negotiations<br>Prof. Jyoti Parikh        | Natural Resource Accounting<br>Prof. Paul Appasamy |
| 19-9-2k | CPR – NGO Experience<br>Dr. S. Iyengar                             | Common Property Resources<br>Prof. Gopal Kadekodi | Environment and Development – Trade off<br>Prof. Gopal Kadekodi |  |
| 20-9-2k | Trade and Environment<br>Prof. Sundar Ramaswamy                    |   | TRIPS and Biodiversity<br>Dr. M.D. Nair                         | Environment and Institutions<br>Prof. Ambirajan    |
| 21-9-2k | MP and Biodiversity Convention<br>Mr. N.R. Krishnan                |   | Field Visit to Madras Refineries Limited                        |  |
| 22-9-2k | Developing Environmental Database for India<br>Mr. Ramesh Jamthani |   | Environmental Law – Indian Scenario<br>Prof. M.K. Ramesh        |  |

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**Madras School of Economics, Chennai**

**Fourth Week**

|         | 10 to 11.15 am   | 11.45 to 1 pm          | 2 to 3.15 pm   | 3.45 to 5 pm           |
|---------|--|------------------------|--|------------------------|
| 25-9-2k | Ecology and Economics – Modeling<br>Prof. Charles Perrings       |                        | Presentation – Theme 1   | Presentation – Theme 2 |
| 26-9-2k | Sustainable Development<br>Prof. Charles Perrings                |                        | Presentation – Theme 3   | Presentation – Theme 4 |
| 27-9-2k | Presentation – Theme 5   | Presentation – Theme 6 | Presentation – Theme 7   | Presentation – Theme 8 |
| 28-9-2k | Operationalizing Sustainable Development<br>Prof. Kanchan Chopra |                        | Panel Discussion<br>Has Economic Research Answered the Needs of Environmental Policy?<br>Prof. Sankar, Prof. Paul Appasamy, Prof. Kanchan Chopra,<br>Dr. Ranjeet Daniles, Dr. Nadita Krishna |                        |
| 29-9-2k | Programme Evaluation and Valedictory Session                     |                        |  |                        |

**FACULTY UPGRADATION PROGRAM**  
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**Madras School of Economics, Chennai**

**Program Evaluation**

| No. | Particulars   | No. of responses |         |        |            |
|-----|---|------------------|---------|--------|------------|
|     |   | Excellent        | Good    | Fair   | No Comment |
| 1   | Structure and Organization of the course                | 7 (32)           | 15 (68) | 0 (0)  | 0 (0)      |
| 2   | Usefulness of course in present job/research activity   | 7 (32)           | 14 (64) | 1 (5)  | 0 (0)      |
| 3   | Usefulness of course in future jobs/research activities | 8 (36)           | 14 (64) | 0 (0)  | 0 (0)      |
| 4   | Practical Orientation of the course                     | 5 (23)           | 12 (55) | 5 (23) | 0 (0)      |
| 5   | Gain from interaction with the resource persons         | 8 (36)           | 11 (50) | 3 (14) | 0 (0)      |
| 6   | Gain from interaction with the fellow participants      | 6 (27)           | 12 (55) | 4 (18) | 0 (0)      |
| 7   | Usefulness of the course material supplied              | 16 (73)          | 6 (27)  | 0 (0)  | 0 (0)      |
| 8   | Usefulness of study tours                               | 7 (32)           | 12 (55) | 1 (5)  | 2 (9)      |
| 9   | Administration  | 11 (50)          | 11 (50) | 0 (0)  | 0 (0)      |
| 10  | Overall impression                                      | 9 (41)           | 13 (59) | 0 (0)  | 0 (0)      |