Course title: Natural Resource Economics			
Course code: MPE 153	**No. of credits:** 4	**L-T-P:** 54-0-12	**Learning hours:** 60
Pre-requisite course code and title (if any): Microeconomics, and Environment and Economic Development at Post Graduate level or equivalent			
Department: Department of Policy and Management Studies			
Course coordinator(s): Dr Sukanya Das	**Course instructor(s):**		
Contact details: sukanya.das@terisas.ac.in			
Course type: Core	**Course offered in:** Semester 3		

Course description

The course lies in the intersection of disciplines of economics and environment within which economic system operates. This interlinkage can be expressed through the (a) inputs from environment to the economic system and (b) by-products of economic system to the environment. The former, or „source" function is covered in this course. Latter, or, the „sink" function of the environment, is covered in the Environmental Economics course that complements it.

Over the years, with the rise in the scale of economic system, its dependence on the environment for a sustained supply of inputs to sustain its own functioning have increased. There have been many conceptualisations and associated theoretical frameworks on managing and/or governing an array of natural resources, such as forests, fossil fuel aquifers, fisheries etc. to attain stated goals like efficiency in use, equity in allocation, etc. A variety of instruments have been proposed in the literature and practiced. This course covers these aspects and attempts to connect them.

Course objectives

1. To appreciate the conceptual foundations and theoretical formulations in natural resource economics
2. To gain knowledge on the principles of governing and managing natural resources, with a focus on Indiancontext

Course content

Module	Topic	L	T	P
1.	**Conceptual foundations in Natural Resource Economics** Biological growth functions Biological yield and production functions Optimal investment in a biotic resource Rate of depletion of a abiotic resource Social rate of discount and policy challenges Non-convexities, irreversibilities and uncertainties in ecological processes and its impact on policy making	8		
2.	**Economics of Forests and Wetlands** Growth functions and rotations Optimal stock and maximum sustainable yield Principles for Governing and Managing Forests Bioeconomic models involving forests, wetlands and wildlife Value and payment of ecosystem services Economics of conversion of land use from forests to non-forests	12		
3.	**Economics of Fisheries** Yield-effort function Models of Open and regulated Access Regulatory frameworks in governing and managing fisheries	6		
4.	**Economics of Exhaustible Resources** Optimal extraction Depletion, capital accumulation and backstop Economics of managing and governing mineral extraction	8		
5.	**Some issues in policy making**	6		

	Safe Minimum Standard Decisions on preservation, conservation and use/extraction under irreversibility and uncertainty			
6.	**Institutions for Governing Natural Resources** Understanding and categorising institutions Institutional Economics: variations across schools of thought Property rights and resource regimes Institutions in Action: typology and functioning Institutions in Action: evaluation Institutions in Action: outcomes	14		
7	**Presentations**			12
	Total	**54**	**0**	**12**

Evaluation

1. **Test 1:** Written test (on 1-3 modules): 25%
2. **Test 2:** Presentation of a seminal paper in Natural Resource Economics: 15%

Choice: from the list supplied by the course coordinator

Structure: No presentation can exceed 20 minutes. No more than 8 slides (excluding title and references) will be used. No more than 10 minutes per presentation on Q&A. No more than two pages of handout distribution.

Criteria: Introduction; Identification of Research Question/Problem/Issue; Relevance-- either theoretically or in empirical terms or both; Clarity - Audible and comprehensible; Sequence and pace; Pronunciation and oratory skills; Organization and layout of visual presentation; Responses during Q&A session -- Clarity and sufficiency [each with equal weight]

3. **Test 3:** Written test (on 4-6 modules): 25%
4. **Test 4:** Submission of an original essay of 5,000 words: 35%

Structure: (a) which one you think is the best answer to the question pursued by you addressed in the literature survey and why, (b) what are the strongest objections to your choice; (c) briefly outline what further work would be needed to provide a better answer.

Criteria: Indicators: (a) Logical consistency, (b) Academic Rigour, (c) Originality [each with equal weight]

Learning Outcomes

a. To appreciate the „sink" function of environment, its impact on the economic system and its valuation in monetary terms (test 1)
b. To understand and assess applicability of a range of valuation methods, tools and techniques in the context of several environmental issues at local and national levels (test 1).
c. To be exposed to and learn in the process skills for making effective presentations (test 2).
d. To gain an understanding on a varietyof economic instruments for addressing environmental problems (test 3)
e. To be exposed to and learn in the process skills for preparing original works (test 4)

Pedagogical Approach

- Lectures will provide an overview besides emphasizing on a few matters in each area. Students are expected to read the materials listed above but not marked compulsory to gain a better understanding. Presentations will provide opportunities for co-learning. They will complement the lectures.

Course Reading Materials

All readings are available here.

CORE

Module 1: Conceptual foundations in Natural Resource Economics

Partha Dasgupta. 2019. "Ramsey and Intergenerational Welfare Economics" in *The Stanford Encyclopedia of Philosophy* (Summer 2019 Edition), edited by Edward N. Zalta, Accessed at https://plato.stanford.edu/archives/sum2019/entries/ramsey-economics/.

J M Conrad. 2010. "Chapter 1: Basic Concepts" in *Resource Economics* Second Edition, 1-34, New Delhi: Cambridge University Press.

Partha Dasgupta and Karl-Göran Mäler. 2009. “Environmental and Resource Economics: some recent developments” in *Handbook of Environmental Economics in India* Edited by Kanchan Chopra and Vikram Dayal. 17-66. Delhi: OUP.

Martin S. Feldstein. 1964. “The Social Time Preference Discount Rate in Cost Benefit Analysis,” *Economic Journal*, 74: 360–79

Module 2: Economics of Forests and Wetlands

J M Conrad. 2010. “Chapter 4: The Economics of Forestry” in *Resource Economics* Second Edition, 132-152, New Delhi: Cambridge University Press

K Chopra and S K Adhikari. 2004. "Environment Development Linkages: modeling a wetland system for ecological and economic value," *Environment and Development Economics* 9: 19-45

Sharachchandra Lele and Veena Srinivasan. 2013. "Disaggregated economic impact analysis incorporating ecological and social trade-offs and techno-institutional context: A case from the Western Ghats of India" *Ecological Economics* 91: 98–112

S Lele, Oliver Springate-Baginski, Roan Lakerveld, Debal Deb, Prasad Dash. 2013. “Ecosystem Services: Origins, Contributions, Pitfalls, and Alternatives," *Conservation & Society*11 (4): 343-358

Erik Gómez-Baggethun, Rudolf de Groot, Pedro L. Lomas and Carlos Montes. 2010. "The history of ecosystem services in economic theory and practice: From early notions to markets and payment schemes," *Ecological Economics* 69: 1209–1218

Module 3: Economics of Fisheries

J M Conrad. 2010. “Chapter 3: The Economics of Fisheries” in *Resource Economics* Second Edition, 75-131, New Delhi: Cambridge University Press

Mohammad Mojibul Hoque Mozumder, Md. Abdul Wahab, Simo Sarkki, Petra Schneider and Mohammad Mahmudul Islam. 2018. "Enhancing Social Resilience of the Coastal Fishing Communities: A Case Study of Hilsa (Tenualosa Ilisha H.) Fishery in Bangladesh". *Sustainability* 10, 3501, Accessed online at https://www.mdpi.com/2071-1050/10/10/3501/pdf

van Brakel, M. L., M. Nahiduzzaman, A. Mahfuzul Haque, M. Golam Mustafa, M. Jalilur Rahman, and M. Abdul Wahab. 2018. "Reimagining large-scale open-water fisheries governance through adaptive comanagement in hilsa shad sanctuaries." *Ecology and Society* 23 (1): 26. Accessed online at https://digitalarchive.worldfishcenter.org/bitstream/handle/20.500.12348/693/4235.pdf?sequence=1&isAllowed=y

Module 4: Economics of Exhaustible Resources

James L. Sweeney. 1993. “Economic Theory of Depletable Resources: an Introduction” in *Handbook of Natural Resource and Energy Economics*, vol**.** III, edited by A. K Kneese and J.L. Sweeney, 759-854Cheltenham: Elsevier [selected sections]

J M Conrad. 2010. “Chapter 5: The Economics of Nonrenewable Resources” in *Resource Economics* Second Edition, 153-199, New Delhi: Cambridge University Press

Partha Dasgupta and Geoffrey Heal. 1974. "The Optimal Depletion of Exhaustible Resources," *The Review of Economic Studies* 41: 3-28

Module 5: Some issues in policy making

Alan Randall and M C Farmer. 1995. "Benefits, Costs and Safe Minimum Standard for Conversation" in *Handbook of Environmental* Economics edited by Daniel W Bromley, 27-44, Oxford and Cambridge: Blackwell

Anthony C. Fisher and John V. Krutilla, 1985, “Economics of Nature Preservation” in *Handbook of Natural Resource and Energy Economics*, vol. 1, edited by A. V. Kneese and J.L. Sweeney 165-189, Cheltenham: Elsevier

Kenneth J. Arrow and Anthony C. Fisher (1974), “Environmental Preservation, Uncertainty and Irreversibility,” *Quarterly Journal of Economics*, 88: 312–19.

Module 6: Institutions for Governing Natural Resources

Arild Vatn. 2005. "Institutions: the individual and the society", "Institutions: coordination and conflict", "Institutional Economics: different positions", "Resource Regimes" and "Evaluating Institutional change: the normative aspect of institutions" in *Institutions and the Environment*, 25-107, 252-298. Cheltenham: Edward Elgar

John R Wood. 2016. "CNRM in India: the problem and the context” in *Community Natural Resource Management And Poverty In India: Evidence From Gujarat And Madhya Pradesh* by Shashidharan Enarth, Jharna Pathak, Amita

Shah, Madhu Verma, and John R Wood, 1-16, New Delhi: Sage

Partha Dasgupta. 2007. “Common Property Resources: Economic Analysis” in *Promise, Trust, and Evolution: Managing the Commons of South Asia* edited by R Ghate, N S Jodha, and P Mukhopadhyay, 19-50, Delhi: OUP

S Lele, 2014. “What is wrong with Joint Forest Management” in *Democratizing Forest Governance in India* edited by S Lele and A Menon, 25-62, New Delhi: OUP

OTHER

Module 1: Conceptual foundations in Natural Resource Economics

Robert M. Solow. 1974. “The Economics of Resources or the Resources of Economics,” *American Economic Review*, 64: 1–15

Kenneth Arrow, Partha Dasgupta, Lawrence Goulder, Gretchen Daily, Paul Ehrlich, Geoffrey Heal, Simon Levin, Karl-Göran Mäler, Stephen Schneider, David Starrett and Brian Walker. 2004. "Are We Consuming Too Much?," *Journal of Economic Perspectives*, 18 (3): 147–172

Kenneth J. Arrow, Maureen L. Cropper, Christian Gollier, Ben Groom, Geoffrey M. Heal, Richard G. Newell, William D. Nordhaus, Robert S. Pindyck, William A. Pizer, Paul R. Portney, Thomas Sterner, Richard S. J. Tol, and Martin L. Weitzman. 2014. "Should Governments Use a Declining Discount Rate in Project Analysis?," *Review of Environmental Economics and Policy* 8 (2): 145–163

Paul A. Samuelson. 1971. "Generalized Predator-Prey Oscillations in Ecological and Economic Equilibrium," *Proceedings of the National Academy of Sciences of the United States of America* 68 (5): 980-83

Arlindo Kamimura, Geraldo F. Burani and Humberto M. França. 2011. "The Economic System seen as A Living System: A Lotka-Volterra Framework," *Emergence: Complexity & Organization* 13 (3): 80-93

Karl-Göran Mäler, Anastasios Xepapadeas and Aart de Zeeuw. 2003. “The Economics of Shallow Lakes” *Environmental and Resource Economics* 26: 603–624

Supplementary reading:

Kenneth J. Arrow, Maureen L. Cropper, Christian Gollier, Ben Groom, Geoffrey M. Heal, Richard G. Newell, William D. Nordhaus, Robert S. Pindyck, William A. Pizer, Paul R. Portney, Thomas Sterner, Richard S.J. Tol, and Martin L. Weitzman. 2012. „How Should Benefits and Costs Be Discounted in an Intergenerational Context? The Views of an Expert Panel“. Discussion paper. No. RFF DP 12-53. Washington DC: Resources for the Future.

Module 2: Economics of Forests and Wetlands

V Dayal. 2007. "Social diversity and ecological complexity: how an invasive tree could affect diverse agents in the land of the tiger,"*Environment and Development Economics* 12 (4): 553-71

Michael D. Bowes and John V. Krutilla. 1985. “Multiple Use Management of Public Forestlands” in *Handbook of Natural Resource and Energy Economics,* vol. II, edited by A. V. Kneese and J. L. Sweeney, 531-569 Cheltenham: Elsevier

Nicolás Kosoy and Esteve Corbera. 2010. "Payments for ecosystem services as commodity fetishism" *Ecological Economics* 69: 1228–1236

K Chopra, and P Dasgupta. 2008. „Assessing the Economic and Ecosystem Services Contribution of Forests: Issues in Modelling, and an Illustration,“ *International Forestry Review* 10 (2): 376-386

Report of the Expert Committee on Net Present Value [Chair: K Chopra] submitted to Hon“ble SC of India

M Verma, D Negandhi D, A K Wahal, R Kumar, G A Kinhal, and A Kumar. 2014. “Revision of rates of NPV applicable for different class/category of forests”. Bhopal: Indian Institute of Forest Management. [selected sections]

Paul A. Samuelson. 1976. “Economics of Forestry in an Evolving Society,” *Economic Inquiry* 14: 466–92

Vernon L. Smith. 1968. “Economics of Production from Natural Resources,” *American Economic Review* 58: 409–32

Module 3: Economics of Fisheries

H. Scott Gordon. 1954. “The Economic Theory of a Common Property Resource: The Fishery,” *Journal of Political Economy*, 62: 124–42

K Fuller, D Kling, K Kroetz, N Ross and JN Sanchirico. 2013. “Economics and Ecology of Open-Access Fisheries” in Encyclopedia of Energy, Natural Resource, and Environmental economics edited by J F Shorgen [Shorgen

hereafter]. Volume 2, 39-49, Cheltenham: Edward Elgar.
MN Reimer and JE Wilen. 2013. “Regulated Open Access and Regulated Restricted Access Fisheries” in edited by Shorgen. Volume 2, 215-223, Cheltenham: Edward Elgar

Module 4: Economics of Exhaustible Resources

Harold M. Hotelling. 1931. “The Economics of Exhaustible Resources,” *Journal of Political Economy* 39: 137–75
Shantayanan Devarajan and Anthony C Fisher. 1981. "Hotellings "Economics of Exhaustible Resources: fifty years later," *Journal of Economic Literature* 19 (1): 65-73
Geoffrey M. Heal. 1993. The optimal use of Exhaustible Resources” in *Handbook of Natural Resource and Energy Economics*, vol. III, edited by A. K Kneese and J.L. Sweeney, 855-880, Cheltenham: Edward Elgar.
J Swierzbinski. 2013. “Economics of Exploration for and Production of Exhaustible Resources” in Shorgen. Volume 2. 1-9, Cheltenham: Edward Elgar
P Mukhopadhyay and G Kadekodi. 2011. "Missing the Woods for the Ore: Goa‟s Development Myopia," *Economic and Political Weekly* 66 (46): 61-67
Government of India. 2019. *National Mineral Policy*. Available online at https://mines.gov.in/writereaddata/UploadFile/NMP12032019.pdf
Lekha Chakraborty, Shatakshi Garg, Gurpreet Singh. 2016. "Cashing in on Mining: The Political Economy of Mining Regulations and Fiscal Policy Practices in India." Working paper No. 161. New Delhi: National Institute of Public Finance and Policy

Module 5: Some issues in policy making

John V. Krutilla. 1967. “Conservation Reconsidered” *The American Economic Review* 57 (4): 777-786

Module 6: Institutions for Governing Natural Resources

Frances Cleaver. 2012. "Getting Institutions Right: Interrogating Theory and Policy" in *Development through Bricolage: rethinking institutions for natural resource management*. London and New York: Routledge
Gopal Kadekodi. 2004. "Chapter 6: Existing Institutions to Manage CPRs in India" in *Common Property Resource Management: reflections on theory and the Indian experience*, OUP, Delhi
K Chopra, G K Kadekodi and M N Murty. 1989. "Peoples' Participation and Common Property Resources," *Economic and Political Weekly* 24 (51 & 52): A-175-A-189
K Chopra and G K Kadekodi. 1991. "Participatory institutions: The context of common and private property resources," *Environmental and Resource Economics* 1 (4): 353-372
B Agarwal. 2001. "Participatory Exclusions, Community Forestry and Gender: an Analysis for South Asia and a conceptual framework," *World Development* 29 (10): 1623-48
Kanchi Kohli and Manju Menon. 2014. "The Making of Forest (Re)Publics: Popular Engagement with Official Decision-making on Forest Conversions," in *Democratizing Forest Governance in India* edited by S Lele and A Menon, New Delhi: OUP
Shomona Khanna. 2014. "Boundaries of Forest Lands: The Godavarman Case and Beyond," in *Democratizing Forest Governance in India* edited by S Lele and A Menon, New Delhi: OUP
A Menon, V Lobo and S Lele. 2014. “The Commons and Rural Livelihoods: shifting dependencies and supra-local pressures” in *Democratizing Forest Governance in India* edited by S Lele and A Menon, 376-401, New Delhi: OUP
E Ostrom. 2009. "Beyond markets and states: polycentric governance of complex economic systems", Nobel Prize Lecture
HJ Albers and EJZ Robinson. “Reducing Emissions from Deforestation and Forest Degradation” in Shorgen, vol 2, 78-85, Cheltenham: Edward Elgar
Harold Demsetz. 1967. "Toward a Theory of Property Rights," *American Economic Review* 57: 347–59

Journals: *Environmental and Development Economics, Ecological Economics*

Advanced Reading Material: see above

Additional information (if any) : none

Student responsibilities

The students are expected to submit assignments in time and come prepared with readings when provided.

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Course reviewers:

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