Introduction to Theoretical Ecological Economics: Analytical Study of Scale

Conference Tutorial, INSEE 2009

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1 Introduction

This tutorial will introduce academic researchers and practitioners to key analytical tools in modern ecological economics. The emphasis will be on development of a toolbox to study the economy that is conceived as an open subsystem of the larger ecosystem that contains and sustains the economy. Perhaps the biggest achievement of ecological economics has been to provide reasonable evidence that the "preanalytic vision" of orthodox economics is incapable of explaining certain well-established biophysical facts that have a bearing on the human economic predicament. If the economy is conceived as an open subsystem of the larger ecosystem, the physical size of the economy relative to the ecosystem becomes a salient feature of economic analysis. This key question of scale, or the proportional relationship between the economy and the ecosystem is therefore one of the central organising principles of ecological economics. However, scale has mostly been used a pedagogical device or a heuristic rather than as an empirical tool for environmental policy. The primary bottleneck has been the lack of well-defined theoretical frameworks to empirically measure scale and to interpret measured values of scale.

This tutorial will present the broad contours of the programme for the analytical study of scale, and describe the central tools and methods involved. The overarching goal is to introduce participants to a variety of analytical tools from theoretical ecological economics. While scale analysis will form the central thread, the tutorial will highlight how the tools developed as part of scale analysis can be applied to other areas like ecological macroeconomics, contingent valuation, and resource economics.

The tutorial will consist of three 90 minutes sessions for a total of four and half hours. The first session will present a broad non-technical overview. The next two sessions will consist of a more technical introduction to tools of analytical

ecological economics. The first session will be accessible to both academic researchers and practitioners. The next two sessions assume some familiarity with microeconomics, resource economics, and elementary ecology.

2 Outline

2.1 Session -1

No prior exposure to economics is assumed. An interest in environmental policy, natural resource policy, energy policy, or more broadly in the biophysical sustainability discourse is the only requirement. No mathematics beyond high-school level is assumed. The primary goal of this segment is to understand how ecological economics differs significantly from mainstream environmental and resource economics in conceiving the economy-ecosystem interaction problem. We will present an elementary introduction to theoretical ecological economics. Topics covered in this segment will include:

1. *Preanalytic Visions in Economics* An introduction to ontological features of embedded economies. The differing conceptions of the relationship between economy, biophysical environment, and society is shown to be related to our more fundamental beliefs about the relationship between means and ends. In particular, I will focus on the differences between ecological economics and neoclassical economics.

2. *The Ecological Economics Vision* Analytical possibilities that follow from the preanalytic vision of ecological economics will be discussed.

3. *Introduction to Tools* Introduction to Stock-Flow and Fund-Flux spaces.

4. *Theories of Biophysical Sustainability* Will introduce to diffring conceptions of sustainability, and present ecological economics' conception of biophysical sustainability in detail.

5. Natural Capital and Natural Income Introduction to analytical modelling of natural capital and natural income.

6. Introduction to Scale Elementary introduction to one of the central concepts in ecological economics. Definitions, and an overview of the programme for analytical study of scale.

2.2 Sessions 2,3

This segment is targeted at active ecological economics researchers and other

academics with an interest in ecological economics. Prior exposure to microeconomics, resource economics, and elementary concepts in ecology will prove useful. Topics that I plan to cover include:

1. *Analytical Representation of the Economy – Ecosystem Interactions* An introduction to modelling stocks, flows, funds, and fluxes. Several empirical examples will be presented to illustrate the theory.

2. *Resource Economics in the Fund-Flux Space* An elementary theory of resource economics that takes into account the fund-flux aspect of natural capital is presented.

3. *Development of Scale Metrics* Topics to be covered include taxonomy of scale metrics, flow and stock measures of scale, modelling temporal dimension.

4. *Benchmark Scale Measures* Introductions to the concepts of Maximum Scale, Maximum Sustainable Scale, Optimal Scale, and the relationship between the three benchmarks. Policy deliberations on sustainability revolve around comparing measured values of scale with these benchmarks.

5. Biophysical Assessments Introduction to analyzing three commonly used biophysical metrics – Material Flow Index, Ecological Footprint, and Human Appropriation of Net Primary Productivity.

6. *Scale, Allocation, and Distribution* The normative and positive aspects of the relationship between scale, allocation and distribution will be discussed.

3 Textbooks

I will assign several articles from a variety of sources. The primary texts for the tutorial will be Daly and Farley (2004) and Malghan (2006). Selections from the classic, Georgescu-Roegen (1971) will be used in segment-2. The relevant chapters from these three sources along with other papers will be distributed electronically to tutorial participants at least four weeks before the tutorial date.

4 Logistical Details

This tutorial will be conducted on 20th January 2008, one day before the start of the main conference. The tutorial will be held at Gujarat Vidyapeeth, Ahmedabad which is also the venue for the main conference. The tutorial will

begin at 9:45 in the morning and follow the schedule below:
08:00 to 9:00 Breakfast
09:45 to 10:00 Introductory remarks
10:00 to 11:00 Session-1
11:00 to 11:05 Tea
11:15 to 13:15 Session-2
13:15 to 14:30 Lunch
14:30 to 16:00 Session-3
16:00 to 16:15 Tea
16:15 to 17:00 Open Discussion

4.1 Costs

The cost of this pre-conference tutorial will be Rs.200 for students at any recognised Indian institution and Rs.300 for everybody else. This fee will cover breakfast, lunch, and tea listed above as well as all tutorial material, thanks to a generous subsidy from INSEE, Gujarat Vidyapeeth, and GIDR.

The fee for pre-conference should be sent in the form of a demand draft drawn in favour of Gujarat Vidyapeeth and payable at Ahmedabad and sent to: Dr Sudarshan Iyengar

Gujarat Vidyapeeth
Ashram Road
Ahmedabad 380 014
E-mail:- vc@gujaratVidyapeeth.org

4.2 Accommodation

Tutorial participants are encouraged to arrive at Ahmedabad the previous evening (January 19th 2008).The host institutions, Gujarat Vidyapeeth and GIDR will provide free accommodation for the night of 19th for all tutorial participants whose papers have been accepted for the main conference. Gujarat Vidyapeeth will make stay arrangements for all tutorial participants but those who do not have an accepted paper at the main conference will not get any accommodation subsidy.

4.3 Travel Costs

INSEE will cover travel costs for all tutorial participants whose papers have been accepted for the main conference. There is no travel subsidy available to attend the tutorial if you do not have an accepted paper at INSEE-2009.

5 Acknowledgements

I would like to thank David Batker, Herman Daly, Joshua Farley, Matthias Ruth, Jack Santa-Barbara, Mathis Wackernagel, and the participants of USSEE 2005 for comments and suggestions on an earlier version of this tutorial presented at the Scale Workshop organised by USSEE. The usual disclaimer applies. I would also like to thank Jayanta Bandyopadhyay and Sudarshan Iyengar for their enthusiasm and support.

References

Herman E.Daly and Joshua Farley. Ecological Economics. Principles and Applications. Island Press, 1st edition, 2004.

NicholasGeorgescu-Roegen. The Entropy Law and the Economic Process. Harvard University Press, 2nd reprint, 1999 edition, 1971.

Deepak Malghan. On Being the Right Size: A Framework for the Analytical Study of Scale, Economy, and Ecosystem. PhD thesis, University of Maryland, 2006.