

Module 40963 Socioenvironmental Research Methods

Course II: Economics and Natural Resources: Methodological Issues

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First Semester | ICTA: Aula Collserola

Contents

The course will introduce some of the most frequent methods used to analyse the relationship between economies and their environment. In particular, the course will start with a discussion of methods applied by traditional environmental economists such as environmental valuation methods. This will be followed by a session on general issues regarding complexity and thermodynamics. After this bridge session, the course will present some methodologies aimed at grasping the biophysical reality behind (or beside) economic development. These will include Material Flow Accounting, Virtual Water, eMergy, or MuSIASEM. Finally, during the last session, an exchange among the participants on the possible application of the methodologies presented for each one's research will take place.

Goals of the Seminar

At the end of the course the student is expected to have a clearer idea on:

- i) The basic literature regarding the methods presented;
- ii) The relationship between the economic process and the environment and the different approaches used for analysis in standard economics and Ecological Economics;
- iii) The traditional tools that economics is using for environmental management;
- iv) New approaches that are applied within ecological economics;

Methodology

Lectures, reading of key literature, discussions

Each session will start with a 1.30h lecture, followed by a short break, then a group discussion based on the lecture, the readings (please make sure to read the paper before the session) and the guiding questions will take place, closing with a sum-up by the lecturer. Students are expected to be competent in English.

Student's assessment

Written essay of no more than 3,000 words (about 6 pages Times New Roman 12pt, single space) including references, to be sent by email no later than December 17th, 2008. The papers must explain, including pros and cons, how one of the methodologies presented in the course could help in analysing one of the following issues:

- a) Development of the Tourism sector in an island or an environmental hotspot
- b) Transition towards a low-carbon economy
- c) Biofuel crops vs. food sovereignty in a Southern country

Place

ICTA, Aula Collserola, 15.00 – 18.00

Dates:

17.11.08 Mo	15h – 18h	Presentation of the course 1. Economic valuation of environmental goods and services Markets and externalities Property rights: Coase theorem Efficiency vs. Equity: the discount rate Definitions of value: total economic value Economic valuation techniques: contingent valuation, hedonic prices, etc. Cost-Benefit Analysis
19.11.08 We	15h – 18h	2. Complexity and thermodynamics and their relevance for ecological economics The Laws of thermodynamics Exosomatic evolution

		Self-organisation and complexity Hierarchy theory
24.11.08 Mo	15h – 18h	3. Material Flow Accounting Eurostat (and IFF-Social Ecology, Vienna) and Wuppertal Institute methodologies HANPP and Ecological Footprint
26.11.08 We	15h – 18h	4. Physical Input-Output Tables (PIOTs) Monetary Input-Output tables Structure and Compilation Applications Limitations
01.12.08 We	15h – 18h	5. Virtual Water The origin of the concept Calculation Limitations Applications
03.12.08 Mo	15h – 18h	6. Energy accounting eMergy Exergy Ayres' power and labour approach
10.12.08 We	15h – 18h	7. Multi-Scale Integrated Assessment of Societal and Ecosystem Metabolism Mosaic Effect Impredicative Loop Analysis Main variables and relations Benchmarking Examples Discussion: Application of the methodologies to our research Summary and feedback

Compulsory readings and questions for guiding discussion

Session 1: Munda, G. (1996): "Cost-benefit analysis in integrated environmental assessment: some methodological issues", *Ecological Economics*, Vol. 19 (2): 157-168

1. Do you discount the (your) future?
2. How to calculate the value of a Natural Park?
3. How to deal with equity issues in environmental valuation?
4. What shall we do, according to standard theory, when oil runs up? Is it feasible?

Session 2: Schneider, D.D., and Kay, J. (1994): "Life as a manifestation of the Second Law of Thermodynamics", *Mathematical and Computer Modelling*, Vol. 19 (6-8): 25-48.

Ramos-Martin, J. (2003): "Empiricism in ecological economics: a perspective from complex systems theory", *Ecological Economics*, Vol. 46 (3): 387-398.

1. Can we consider cities as Brains or parasites of the rest of the territory?
2. Are social systems analogues to natural ones in terms of their metabolism?
3. Does evolution implies always more energy consumption?

Session 3: Weisz, H., Krausmann, F., Amann, C., Eisenmenger, N., Erb, K.H., Hubacek, K., Fischer-Kowalski, M: (2006): "The physical economy of the European Union: Cross-country comparison and determinants of material consumption", *Ecological Economics*, Vol. 58 (4): 676-698

Or González-Martínez, A.C., Schandl, H. (2008): "The biophysical perspective of a middle income economy: Material flows in Mexico", *Ecological Economics*, forthcoming.

1. How would you use MFA indicators for policy?
2. What do you think about summing up the mass or energy contents of shit, oranges and natural gas?
3. Is HANPP reflecting the impact humans beings cause upon the environment?

Session 4: Hoekstra, R., van den Bergh, C.J.M. (2006): "Constructing physical input-output tables for environmental modeling and accounting: Framework and illustrations", *Ecological Economics* Vol. 59 (3): 375-393.

Or Giljum, S., and Hubacek, K. (2008): "Conceptual foundations and applications of physical input-output tables (PIOTs)", in Suh, S., *Handbook on Input-Output Economics for Industrial Ecology*, Springer.

1. How do PIOTs complement MFA?
2. How to deal with the dynamic structure of economies?
3. From an environmental policy perspective, Which are the main insights we can get from PIOTs?

Session 5: Hoekstra, A.Y., and Hung, P.Q. (2005): "Globalisation of water resources: international virtual water flows in relation to crop trade", *Global Environmental Change* 15 (1): 45-56.

1. Can we link virtual water with any measure of "the value of water"?
2. Which is the link between virtual water and unequal ecological exchange?
3. How can we use, in policy terms, the information provided by virtual water?

Session 6: Ulgiati, S., Odum, H.T., Bastianoni, S. (1994): "Emergy use, environmental loading and sustainability an emergy analysis of Italy", *Ecological Modelling*, Vol. 73 (3-4): 215-268

1. What about an energetic theory of value? Would it be useful?
2. Which are the main problems you see in using eEmergy accounting for policy?
3. Do you think Exergy is a good indicator for measuring the quality of energy or work done?

Session 7: Ramos-Martin, J., Giampietro, M., Mayumi, K. (2007): "On China's exosomatic energy metabolism: An application of multi-scale integrated analysis of societal metabolism (MSIASM)", *Ecological Economics*, Vol. 63 (1): 174-191.

1. How to address multidisciplinary in environmental research?
2. How can we deal with different hierarchical levels in our analysis?
3. Give an example of the importance of hierarchical structures in your planned research
4. How would you include trade under MuSIASEM framework?
5. Which is the research topic for your dissertation?
6. Have you decided the methodology you shall use? If so, which and why?
7. Do you think any of the methods presented along the course are useful to you? How?

General Readings

- Ayres, R.U., Ayres, L.W., Warr, B. (2002): "Exergy, power and work in the US economy, 1900-1998", *Energy*, Vol. 28 (3): 219-272.
- Common, M. and Stagl, S. (2005): *Ecological Economics*. Cambridge University Press, Cambridge.
- Costanza, R. (ed.)(1991): *Ecological economics : the science and management of sustainability*. New York: Columbia University Press.
- EUROSTAT. 2001. *Economy-wide material flow accounts and derived indicators. A methodological guide*. Statistical Office of the European Union, Luxembourg.
- Giampietro, M. (2003): *Multi-Scale Integrated Analysis of Agroecosystems*. CRC Press.
- Haberl, H., Wackernagel, M., Krausmann, F., Erb, K.H., Monfreda, C. (2004): "Ecological footprints and human appropriation of net primary production: a comparison", *Land Use Policy*, Vol. 21 (3): 279-288.
- Hoekstra, R. (2005): *Economic Growth, Material Flows and the Environment: New Applications of Structural Decomposition Analysis and Physical Input-Output Tables*. Edward Elgar, Cheltenham, UK.
- Martinez Alier, J. (with Klaus Schlüpmann) (1987): *Ecological economics : energy, environment and society*. Oxford: Basil Blackwell.
- Martínez Alier, J., y Roca Jusmet, J. (2000): *Economía ecológica y política ambiental*. PNUD, Mexico.
- Munda, G. (1995): *Multicriteria evaluation in a fuzzy environment theory and applications in ecological economics*. Physica-Verlag, Heidelberg.
- Odum, H.T. (1971): *Environment, Power and Society*. John Wiley & Sons.
- Odum, H.T. (2004): *Environmental Accounting: Emergy and Environmental Decision Making*. John Wiley & Sons.
- Pearce, D.W., and Turner, K. (1990): *Economics of natural resources and the environment*. New York ; London : Harvester Wheatsheaf.
- Props., J., and Faber, M. (1996): *Ecological economics : concepts and methods*. Cheltenham: Edward Elgar.
- Romero, C. (1997): *Economía de los recursos ambientales y naturales*. Alianza Economía, Madrid.

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