## Module 40419 Socioenvironmental Research Methods

## Course II: Economics and Natural Resources: Methodological Issues


## Dr. Jesús Ramos Martín


Second Semestre | 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 renewable and non-renewable resources management, and 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. One session will deal with integrating information coming from different methodologies by means of multi-criteria analysis. Finally, the last session will allow an exchange among the participants on the possible application of the methodologies presented for each one's research.

### Goals of this 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 by the lecturer, followed by a short break, a group discussion based on the lecture, the readings (please make sure to read the paper before the session) and the guiding questions, and ended with a sum-up by the lecturer. Students are expected to be competent in English.

### Student's assessment

Done at the level of the Module. Check details in the Module's description sheet.

### Place

ICTA, Aula Collserola, 15.00 – 18.00

### Dates:

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| **15.05.07 Tu** | 15h – 18h | **Presentation of the course**<br>**1. Economic valuation of environmental goods and services**<br>Markets and externalities<br>Property rights: Coase theorem<br>Efficiency vs. Equity: the discount rate<br>Definitions of value: total economic value<br>Economic valuation techniques: contingent valuation, hedonic prices, etc.<br>Cost-Benefit Analysis |
| **16.05.07 We** | 15h – 18h | **2. Renewable and non-renewable resources management**<br>Non-renewable resources reserves: the case of oil (Hubbert revisited and ASPO)<br>Hotelling rule<br>El-Sarafy<br>Renewable resources management<br>Biological and economic models |

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| **17.05.07 Th** | 15h – 18h | **3. Complexity and thermodynamics and their relevance for ecological economics**<br>The Laws of thermodynamics<br>Exosomatic evolution<br>Self-organisation and complexity<br>Hierarchy theory |
| **18.05.07 Fr** | 15h – 18h | **4. Material Flow Accounting**<br>Eurostat (and IFF-Social Ecology, Vienna) and Wuppertal Institute methodologies<br>HANPP and Ecological Footprint<br>Physical Input-Output analysis |
| **21.05.07 Mo** | 15h – 18h | **5. Energy accounting**<br>eMergy<br>Exergy |
| **22.05.07 Tu** | 15h – 18h | **6. Multi-Scale Integrated Assessment of Societal Metabolism**<br>Mosaic Effect<br>Impredicative Loop Analysis<br>Main variables and relations<br>Benchmarking<br>Examples |
| **23.05.07 We** | 15h – 18h | **7. Integrating information: Multi-Criteria Analysis**<br>Methodological foundations: rationality, complexity, and post-normal science<br>Structuring of a multi-criteria problem: alternatives, criteria, weighs<br>Main aggregation methods: Electre, Promethee, Naiade<br>Interests and value conflicts: social multi-criteria and participation |
| **24.05.07 Th** | 15h – 18h | **8. Discussion: Application of the methodologies to our research**<br>**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. Which is the value of La Sagrada Familia
3. How to deal with equity issues in environmental valuation?

**Session 2:** Chapters 16 & 18 from Pearce, D.W., Turner, K.R. (1990): Economics of Natural Resources and the Environment. Baltimore: The John Hopkins University Press.

1. Do you think that El-Serafy's rule has some possible application?
2. What shall we do, according to standard theory, when oil runs up? Is it feasible?

**Session 3:** Chapters 6 & 7 from Faber, M., Manstetten, R., and Proops J. (1996): *Ecological Economics. Concepts and Methods*. Edward Elgar, Cheltenham, UK.

1. Can we consider cities as Brains or parasites of the rest of the territory?
2. Does evolution implies always more energy consumption?

**Session 4:** 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

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 5:** 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 eMergy accounting for policy?
3. Do you think Exergy is a good indicator for measuring the quality of energy or work done?

**Session 6:** Ramos-Martin, J., Giampietro, M., Mayumi, K. (forthcoming): "On China's exosomatic energy metabolism: An application of multi-scale integrated analysis of societal metabolism (MSIASM)", Ecological Economics, in press.

1. How to address multidisciplinarity 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 MSIASM framework?

**Session 7:** Munda, G. (2004): "Social multi-criteria evaluation: Methodological foundations and operational consequences", European Journal of Operational Research, Vol. 158 (3): 662-677

1. Are all interest values legitimate?
2. Is participation a Panacea?
3. How to make decisions with several variables?

**Session 8:** No paper.

1. Which is the research topic for your dissertation?
2. Have you decided the methodology you shall use? If so, which and why?
3. 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 Table*s. 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.

**Dr. Jesus Ramos Martin**
Jesus.Ramos@uab.cat