



UNIVERSITÀ DEGLI STUDI DI NAPOLI
FEDERICO II

liphe⁴

UAB
Universitat Autònoma
de Barcelona



**LIPHE4 Summer School
2017 Edition**

**A Critical Appraisal of
Current Narratives of Sustainability
through Quantitative Storytelling**

10-14 July 2017

Botanical Garden, Via Foria 223, Naples, Italy

Organized by:

LIPHE4

Department of Biology of the University of Naples Federico II

ICTA – Universitat Autònoma de Barcelona

PROGRAM



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WELCOME

The LIPHE4 Summer School is a reference point for young researchers and students who are eager to learn about novel approaches in the field of Sustainability Studies. The Summer School offers a critical picture, both theoretical and practical, of recently developed analytical approaches towards sustainable development. It shows how to integrate quantitative methodologies that analyze and characterize complex social-ecological systems and their evolution with qualitative methodologies that help structure the decision process in a social context. With these purposes in mind, both lectures and hands-on case studies form an integral part of the program. LIPHE4 has run eight regular (open) editions of the summer school since 2004, and three special editions on specific request of hosting institutions.

The LIPHE4 resource team is composed of post-doctoral researchers, professors, and PhD students from the Institute of Environmental Science and Technology (ICTA) of the Universitat Autònoma de Barcelona (Spain). This year we count with Mario Giampietro, Zora Kovacic, Tarik Serrano Tovar, Maddalena Ripa, Rosaria Chifari, Raúl Velasco Fernández, Ansel Renner, and Louisa di Felice, as well as academic staff from the Department of Biology and the Department of Industrial Engineering of the University of Naples Federico II (Angelo Fierro, Michele Staiano, Roberta Siciliano). The 2017 edition of the LIPHE4 Summer School has been co-organized by our colleagues Angelo Fierro (Eco-indicators Laboratory for Environmental Sustainability) and Ezio Ricca from the Department of Biology of the University of Naples Federico II (UNINA), and we are honoured to be able to offer the course in the UNINA facilities in the beautiful Botanical Garden of Naples.

In this specific 2017 edition of the summer school we illustrate the use of MuSIASEM to carry out relational analysis of the metabolic pattern of social-ecological systems across different dimensions and scales of analysis (also known as 'MuSIASEM 2.0'). To this purpose, we will critically examine selected case studies referring to popular narratives, such as circular economy, bio-economy, low-carbon economy, green growth, and 100% renewable energy cities. A large part of the material presented draws on the preliminary results from the Horizon2020 project "Moving Towards Adaptive Governance in Complexity: Informing Nexus Security" (MAGIC – <https://magic-nexus.eu/>).

Mario Giampietro

President, LIPHE4

ICREA Research Professor, ICTA, Universitat Autònoma de Barcelona



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DAY 1 - MONDAY 10 JULY 2016

09:00-09:15 Welcome (Mario Giampietro, ICTA-UAB; Angelo Fierro, UNINA)

Welcome and brief explanation of the organization of the Summer School

09.15–10.00 Session 1A (Mario Giampietro, ICTA-UAB)

Are we using valid narratives to frame the discussion of sustainability policies?

TOPICS: (i) Do our governments understand the systems they wish to regulate? (For instance, is the import of oil an intolerable fact for our economies? If we had to produce the same energy domestically, would the economy become richer?); (ii) How circular is our economy? Where and how much can we increase the circularity of the metabolism of society?; (iii) Can 'bioeconomy' be a solution to obtain perpetual growth? (Or should we rather consider that the concept of bioeconomy was proposed by Georgescu-Roegen exactly to make the opposite point...?); (iv) Are intermittent sources of electricity a positive addition to our electric grids?

10.00–11.00 Session 1B (Mario Giampietro, ICTA-UAB)

Acknowledging the implications of complexity: Stop throwing around sloppy numbers!

TOPICS: When dealing with the quantitative representation of complex systems it is impossible to assess "the right" quantity to be measured. Metabolic systems are open systems operating across different levels of organization and scales, therefore quantitative assessment make sense only within the narrative used to frame the analysis: (i) WHY - what is the purpose of the analysis, (ii) HOW - what is the narrative we are using to explain events; and (iii) WHAT - what is the resulting dimension and scale of analysis to be used. A few examples of sloppy indicators will be used to illustrate these points.

11.00-11.30 Coffee break (you will need it)

11.30–12.30 Session 2A (Rosaria Chifari, ICTA-UAB)

Examples of MuSIASEM in action – generating useful information for tackling specific problems

TOPICS: Participatory integrated assessment of the performance of the solid waste management system of Naples. Organizing and interfacing the quantitative analysis of biophysical flows with socio-economic analysis to generate a decision support tool in the form of an integrated package of indicators selected "à la carte" by social actors through participatory processes.

12.30–13.30 Session 2B (Mario Giampietro, ICTA-UAB)

Applications of MuSIASEM to explore the Nexus between water, food, energy, land use and population

TOPICS: The relational analysis of the metabolic pattern of socio-ecological systems makes it possible to establish a relation between the internal and external view of metabolic processes and to establish a bridge across different hierarchical levels of analysis. This makes it possible to check three key aspects of sustainability: (i) *feasibility* - compatibility with processes outside human control; (ii) *viability* - compatibility with processes under human control); (iii) *desirability* - compatibility with normative values and institutions. Describing how pre-industrial economies became industrial economies, then how did they move to post-industrial economies in the first stage of globalization to finally arrive to the stage of Ponzi-scheme economics. The “politically correct” framing of sustainability associated with the stage of Ponzi scheme economics can be better defined as the delirium of urban elites.

13:30-15:00 Lunch break

15.00-15.30 Presentation of participants

15.30-16.15 Introduction and discussion of possible case studies

16:15-16:45 The BIOCA Project as a Case Study for the application of the MuSIASEM approach (Martino Nieddu, Franck-Dominique Vivien & Jean-Daniel Houeto, Université de Reims Champagne-Ardenne)

16:45-17.30 Formation of working groups

DAY 2 - TUESDAY 11 JULY 2016

09.00–10.00 Session 3A (Mario Giampietro, ICTA-UAB)

Integrated multi-scale analysis of the metabolic pattern of social-ecological systems

TOPICS: What are the expected characteristics of the class of metabolic systems (type vs individuals). Back to Schroedinger and Prigogine to explain the relational nature of nested metabolic systems (direct vs mutual information). The usefulness of information, models and controls can only be checked within a semiotic process: if they result useful in relation to a final cause. Relational analysis of metabolic systems: the concept of ‘processor’ and the scaling from structural to functional components in metabolic networks. How to use the four Aristotelian causes to identify functional and structural elements within a metabolic system.

10.00-11.00 Session 3B (Mario Giampietro, ICTA-UAB)

Conceptual building blocks of MuSIASEM: using grammars for accounting food and energy flows

TOPICS: The flow-fund model of Georgescu-Roegen can be used to implement the quantitative analysis of metabolic flows within metabolic systems. Examples of how to represent the production (Primary Sources → Energy Carriers) and consumption (Energy Carriers → End Uses) of “energy” in a society.

Examples of how to represent the production (Primary Sources → Nutrient Carriers) and consumption (Nutrient Carriers → End Uses) of “food” in a society.

11.00-11.30 Coffee break

11.30-12.30 Session 4A (Maddalena Ripa, ICTA-UAB)

Time Use Analysis: How to organize quantitative information about human time allocation

TOPICS: (i) The constraints imposed by the profile of time use on the organization of societal activities; (ii) The implications of demographic variables (physiological overhead); (iii) The implications of the definition of “desirability” (level of services); (iv) A grammar to handle the analysis of the profile of human activities.

12.30–13.30 Session 4B (Raúl Velasco and Maddalena Ripa, ICTA-UAB)

Conceptual building blocks of MuSIASEM: the mosaic effect generated by an end-use matrix

TOPICS: The results of an integrated analysis of the metabolic pattern of energy in EU countries (outcome of the EU project EUFORIE) are used to illustrate an important feature of MuSIASEM: the possibility of establishing relations over the quantitative (defined by extensive variables) and qualitative characteristics (defined by intensive variables) of sectors, subsector and sub-subsectors of the economy. This analysis flags the existence of a serious problem: using existing statistics we do not know where energy carriers are used to do what in the economy. This issue must be addressed if we want to have meaningful talk of de-carbonization of the economy.

13:30-15:00 Lunch break

15:00–17.30 Work in groups

DAY 3 - WEDNESDAY 12 JULY 2016

09.00–10.00 Session 5A (Mario Giampietro, ICTA-UAB)

Conceptual building blocks of MuSIASEM: Sudoku effect generated by impredicative loop analysis

TOPICS: The metabolic pattern of modern societies is based on a dynamic equilibrium between the surplus of flow-inputs made available by the catabolic part (primary sectors) and the requirement of flow-inputs by the anabolic part (the secondary and tertiary sectors plus the household sector) - in the jargon of MuSIASEM the surplus is determined by “strength of the energy hypercycle” and the requirement is determined by “bio-economic pressure”. When applying this impredicative relation on the constraints

imposed by the characteristics of the end use matrix we can use the resulting “sudoku effect” for diagnostic analysis and for discussing of scenarios. These concepts are illustrated with practical examples.

10.00-11.00 Session 5B (Tarik Serrano, ICTA-UAB)

Land Use Analysis: How to organize quantitative information in GIS

TOPICS: (i) The importance of GIS and remote sensing in sustainability science; (ii) Scaling metabolic pattern of land uses; (iii) Participatory mapping; (iv) Spatial analysis of the metabolic pattern of socio-ecological systems.

11.00-11.30 Coffee break

11.30-12.30 Session 6A (Zora Kovacic, ICTA-UAB)

Examples of MuSIASEM in action – generating useful information for tackling specific problems

TOPICS: Examples of integrated assessment in chanty towns in South Africa and Brazil

12.30–13.30 Session 6B (Mario Giampietro, ICTA-UAB)

The worrisome implications of existing trends: *the future of agriculture*

TOPICS: There is a clear problem of sustainability both in developed and developing countries. This problem is especially evident in relation to the future of agriculture: (i) This is due to the change of final cause of agriculture: from “a driver of rural development” to “a societal organ needed to feed the cities” to arrive to the last entry in EU countries “manufacturing based on imports of food commodities to reduce the cost of feeding the cities”; (ii) The lock-in of technical progress in the paradigm of industrial agriculture entails marching on an unsustainable path;

13:30-15:00 Lunch break

15:00–16.00 Discussion of questions from the previous day of working groups

16.00-17.30 Work in groups

20:30 Social Dinner

[Pizzeria Palazzo Petrucci](#), Piazza San Domenico Maggiore, 5-7, Napoli

DAY 4 - THURSDAY 13 JULY 2016

09.00–10.00 Session 7A (Roberta Siciliano and Michele Staiano, Università di Napoli Federico II)

How to use statistics in MuSIASEM

TOPICS: How to collect, curate and statistically analyze data complying to a Total Quality approach. The journey from data to knowledge: a couple of case studies related to MuSIASEM. Some notes about the mathematical formalization of MuSIASEM entities and their representation in the Computer Science realm.

10.00-11.00 Session 7B (Ansel Renner, ICTA-UAB)

Examples of MuSIASEM in action – An integrated assessment of animal production in Scotland

TOPICS: A study carried out by Juan Cadillo Benalcazar in collaboration with the Hutton Institute will be presented to illustrate how MuSIASEM can be used to organize quantitative information in a decision support tool.

11.00-11.30 Coffee break

11.30–12.30: Session 8A (Mario Giampietro, ICTA-UAB)

The worrisome implications of existing trends: the future of the energy supply

TOPICS: There is a clear problem of sustainability both in developed and developing countries. This problem is especially evident in relation to the future of the energy supply: (i) In spite of all the bombastic claims about a take-over of alternative energy sources at the moment the metabolic pattern of energy of modern societies is still based on fossil energy; (ii) The problem of liquid fuels is particularly serious, no alternatives are in view; (iii) Intermittent electricity sources (PV and wind) have not been “tamed” yet. To make the situation more worrisome, there is a total lack of understanding of the sustainability challenges we are facing. As a consequence at the moment, both discussions about policies and policy making itself are based on wishful thinking.

12.30–13.30 Session 8B (Zora Kovacic, Mario Giampietro, ICTA-UAB)

Time for something new in science for governance: Quantitative Story-Telling

TOPICS: (i) When dealing with quantitative analysis of complex self-reproducing and self-maintaining systems the usefulness of models depends on the usefulness of the pre-analytical choice of a narrative [* a narrative is the result of a series of scaling operations associated with the perception of a given event used for individuating: (a) relevant agents, (b) a given scale, and (c) a direction of causality providing an explanation for the event]; (ii) In turn the usefulness of a narrative depends **on the purpose** of the story-teller. Therefore, the use of scientific models to generate evidence for guiding action is never neutral; (iii) How to guarantee a systemic quality check on the process of production and use of quantitative information for governance? This goal requires moving away from the technocratic approach of “evidence

based policy” to participatory processes based on quantitative story-telling. In this way, one can control the quality of: (a) the pre-analytical choice of story-telling/narratives; (b) the analytical choice of models and data within the chosen narratives; (c) the fairness of the process of deliberation based on the information gathered after acknowledging the unavoidable presence of uncertainty and power asymmetries.

13:30-15:00 Lunch break

15:00–16.00 Discussion of questions from the previous day from the working groups

16.00-17.30 Work in groups

DAY 5 - FRIDAY 14 JULY 2016

9.00–11.00 Presentation of the results of working groups and discussion

11.00-11.30 Coffee break

11.30–12.30 Presentation of the results of working groups and discussion

12.30-13.30 Feed-back from participants, joint evaluation of the summer school

Lessons learned, what to do next . . .

13:30-15:00 Lunch & farewell