Thematic poster exhibition – Econics: Systemics, Sustainability and Conservation

ECCB 2012 Glasgow

Econics: a new systemic framework for sustainable development and conservation

Pierre L. Ibisch[1,2] & P.R. Hobson, P.[1,3]

1. Centre for Econics and Ecosystem Management, Eberswalde, Germany.
2. Faculty of Forest and Environment, Eberswalde University of Sustainable Development, Eberswalde, Germany.
3. Writtle College, Chelmsford, Essex, UK.

www.centreforeconics.org

Introduction

Training human society to engage in 'ideal-seeking behaviour' that embraces adapting to change has a focus on patterning lifestyles in such a way as to have minimal impact on the environment. A significant element of this strategy involves learning from natural systems and processes – a form of 'ecological mimicry' - "*econics*". Econics is a transdisciplinary approach to studying the dynamics and functioning of (complex and holarchically nested) ecological systems with the aim of deriving management solutions for natural resource-dependent socio-economic systems as a gateway towards sustainable development under global change. The conceptual fundament of *econics* builds on an integration of the theories of systemics, evolution, thermodynamics, holarchy, panarchy, and ecosystems. Econics has been first suggested (in German) by Althaus in 2007, and later proposed in the context of a Radical Ecosystem Approach (Ibisch et al. 2010).

Bionics can be defined as the mimicking of biological structures and processes in order to improve the effectiveness and efficiency of modern technologies. Complementing this brand of science is "econics," which describes a transdisciplinary approach to sustainable development and existence, As its hypothesis it states that natural ecosystems provide an essential template on which to model socio-economic systems. Specifically, it focuses on the analysis and replication of ecosystem efficiency, adaptive evolution and resilience, all of which are prerequisites to surviving environmental change. Econics is a multidisciplinary scientific paradigm, adopting collaborative approaches to resolving problems. In its portfolio it includes recycling or adaptive change, approaches used in industrial ecology, and theories of close-to-nature forestry. In conservation, the application of complex systems theory is a relatively new strategy to dealing with large-scale problems and issues related to climate change. Adaptive management is central to this approach and integrates all forms of conservation-relevant "non-knowledge." For example, it factors in uncertainty and risks in strategies for sustainability. Econics also applies principles of thermodynamics as energy input, use and storage are taken to be fundamental laws governing all systems.

Examplary fields of application

Ecological economics ***Close-to-nature forestry*** ***Adaptive biodiversity conservation***
Agroecology ***Permaculture*** ***Industrial ecology*** ***Ecosystem-based adaptation***

Concepts and principles

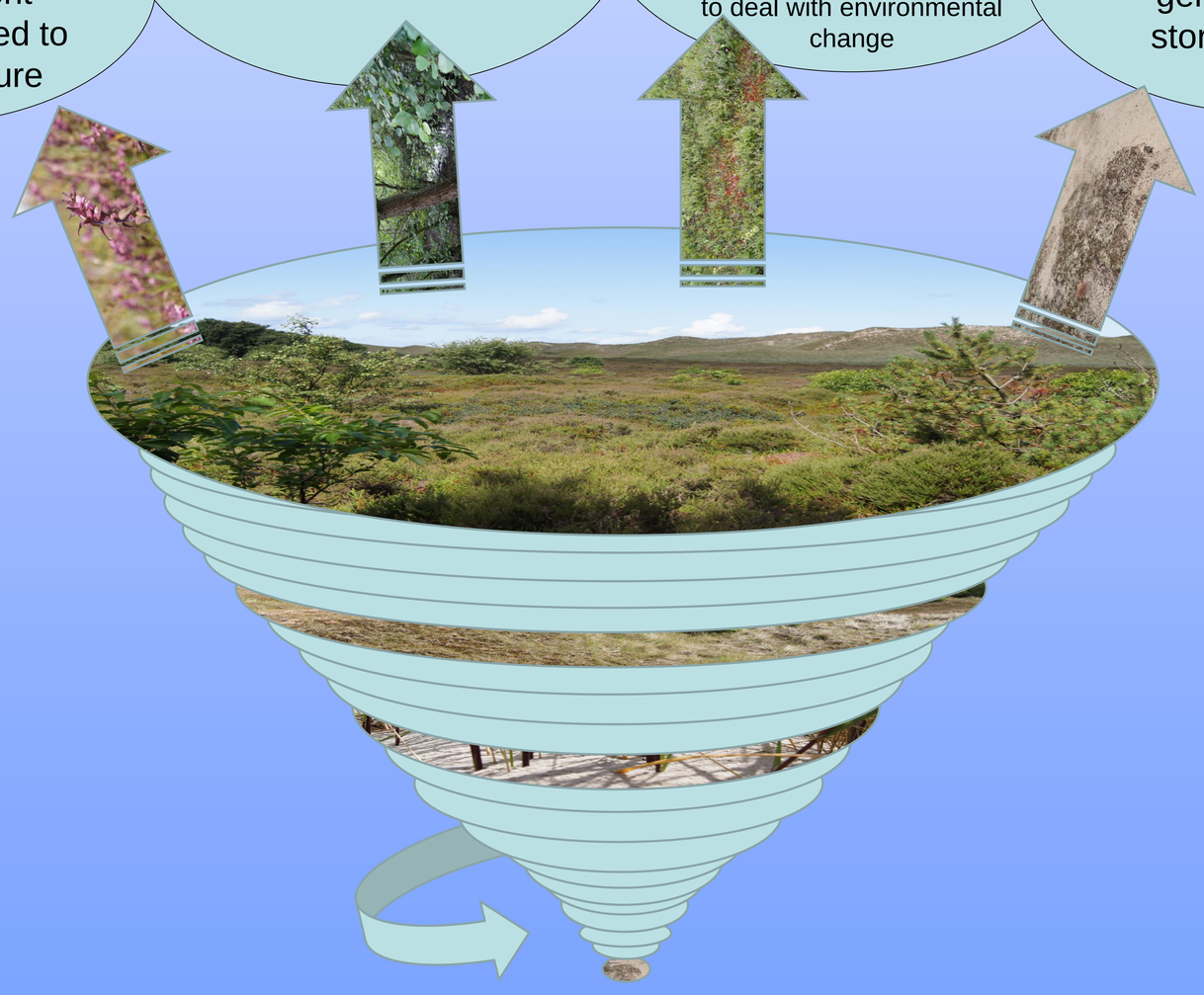
Functionality-oriented management *Recycling* *Precautionary principle* *Non-knowledge management*
Adaptive management *Metasystemic management*

Econical lessons from ecosystems

- **Developing and managing socio-economic systems within carrying capacities, and working towards maximum material and energetic efficiency / thermodynamic efficiency**
- **Conserve and develop stocks of exergy as well as diverse energy-disspating structures and pathways**
- **Eco-mimicking the nested, complex and dynamic natural systems for sustainability**
- **Establishing fully integrated and adaptive decision-making systems from local to global scale**
- **Acknowledge the importance of and competently manage non-knowledge**
- **Acknowledge the advantages of heuristic decision making in adapting to change and unknown outcomes of complex system functioning**
- **Conserve less connected and apparently redundant knowledge systems**

Emergent ecosystem properties

- Thermodynamically, hydrically and material efficient systems subjected to the laws of nature
- Complex, holarchically nested and dynamically changing systems
- Flexible systems with a certain resilience against disturbances and adaptive capacity to deal with environmental change
- Information and (non-) knowledge processing, generating and storing systems

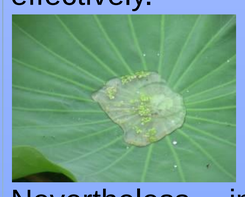


Ecological evolution

Increase of
- *usable energy (exergy)*
- *pathways of energy dissipation*
- *diversity*
- *complexity*
- *functionality incl. resilience and regulative capacity*

From bionics to econics

Bionics originated in the field of engineering and construction and described the theory and practice of learning from nature (Nachtigall 2008). The concept encompasses those functional, developmental and process-related aspects of biological systems that can be mimicked in engineering design and operations. In nearly all cases, bionics is practiced at the compositional scale from molecular to organism. Beyond this, ecological systems become too complex and dynamic for engineering to mimic effectively.



Bionics: The unwettable leave surface of the lotus flower inspired the development of artificlal surfaces (e.g., fassade colour) that imitate the so-called ‚Lotus …effect' (Barthlott et al. ????).

Nevertheless, in order to achieve any success in the sustainable management of ecosystems a complementary theoretical and practical framework is called for that provides the appropriate language and tool kit to capture higher levels of order, function and structure across all major ecosystems. The novel concept of "econics" is suggested as a distinctive paradigm of science targeted at sustainable management. The prefix "eco" has its origins in the Greek word "oikos" (translates as household), and is found in the words "ecology" and "economics". A dominant theme in econics is the study and mimicry of self-ordering complex systems and how biological dissipative structures and ecological processes affect resource household and thermodynamic regulation.

Rain forest converted to pasture in Guatemala. The anthropogenic degradation of ecosystems reduces complexity and functionality. This does not only imply the elimination of system elements, but also leads to a loss of energy-dissipating structures and thermodynamic regulation.

Econical research questions

- What makes ecological systems efficient?
- What are the drivers of system evolution in a changing world?
- How do ecological systems become resilient against disturbances?
- How do they adapt to changing framework conditions?
- How are efficiency and resilience balanced by sustainable ecological systems?
- How can the corresponding principles and mechanisms be mimicked by socio-economic systems?
- How can natural resource management make better use of or enhance regulating emergent properties of ecosystems instead of degrading them?

"The shaped is immediately reshaped, and if we want to fairly achieve a living conception of nature, we have to maintain ourselves as mobile and flexible, according to the example with which it precedes us".

Johann Wolfgang von Goethe (1817)

References: Althaus, D. (2007) *Zeitenwende. Die postfossile Epoche; weiterleben auf dem Blauen Planeten*. 1. edl. Mankau, Murnau a. Staffelsee. – Barthlott ?????? - Goethe, von, J.W. 1817. *Morphologie*. Hamburger Ausgabe Bd 13 Naturwissenschaftliche Schriften. - Hobson, P.R. & Ibisch, P.L. (2012): *Learning from nature for sustainability: an econical approach to (non-) knowledge management*. In: Ibisch, P.L., L. Geiger & F. Cybulla (eds.): *Global change management: knowledge gaps, blindspots and unknowables*. Nomos. - Ibisch, P.L., P. Hobson, & A. Vega (2010): *Mutual mainstreaming of biodiversity conservation and human development: towards a more radical Ecosystem Approach*. In: Ibisch, P.L., A. Vega E. & T.M. Herrmann (eds.): I*nterdependence of biodiversity and development under global change*. Technical Series No. 54. Secretariat of the Convention on Biological Diversity, Montreal, 224 pp. 15-34. - Nachtigall, W. (2008) *Bionik - Lernen von der Natur*. C.H.Beck.