

*Abstract*

*Special Conference on Frontiers of Environmental Economics  
February 26-27, 2007 Resources for the Future*

## **Towards a general socio-ecological theory in time and space incorporating gender and environment**

**“There is nothing more practical  
than a good theory”**

*Albert Einstein*

The starting point is: there does not exist a striking general theory of sustainability.

### **Outlining a general social theory**

Social and economic developments are based on physical fundamentals: It is well-known that in the physical world we can observe at least 2 levels: mass and energy. Newer views stress an third level: information.

When mass and energy interact heat/entropy emerges. When mass and information interact structure emerges. When energy and information interact structured energy emerges (important for electric and electronic application)<sup>1</sup>

These 3 physical levels can be reinterpreted in a socio-economic context when we add 3 additional purely socio-economic levels. Global social development then can be explained by 6 levels of interaction and exchange processes:

- information
- energy
- mass
  
- work - work time – goods: labour value
- (real) capital – value added
- financial capital.

The most general and everlasting basis of social communication seems to be the creation, flow and exchange of information.

The other actual extreme is the sphere of financial capital and financial markets without material basis. The actual position of financial capital in the globalization process is one of domination of all other spheres.

The different levels of interaction and exchange processes are connected together in many flows or changes of stocks. There are at least 2 different types of exchange processes

---

<sup>1</sup> Kotauczek Peter (1996)

- on basis of reciprocity<sup>2</sup>,
- on asymmetric fundamentals by using asymmetric power relations

An example for the second type would be the (over)exploitation of nature.

### **Central Importance of Energy**

Not only actual global developments but also the history of industrial revolution and the climate change indicate: Energy is a (maybe THE) the central (economic) question of sustainable development of mankind.

The general access and use of new energy (coal in steam engines) to substitute labour (from the 19<sup>th</sup> century until now)

- initiated the industrial revolution
- multiplied the productivity of labour
- at the same time multiplied the harmful emissions to environment
- and at the same time reduced causally the diversity of species on our planet

And remember the (physical) definition of energy: “capacity to do work”. Energy in economy is intrinsically connected with labour and has to be integrated to general social theory.

Energy is an important link between economy and ecology.

The energy question so is a most important, perhaps the central question of the future of mankind. In it actually central problems flow together:

- the environmental and climate question, and thus
- the protection of the largest wealth of mankind, the diversity of species,
- the (regional) employment question by use of regional sources of energy,
- the reinforcement of regional participation by promotion of initiatives and empowerment
- the faster development by higher productivity
- the distribution question between “north” and “south” and thus
- the question of war, terror, and peace

The energy question can be divided at least to two parts:

- more energy efficiency
- the transformation to renewable energies

### **Integrating labour, space, gender and environment**

The classical distribution of wealth can be enlarged by ecology (energy and resources, decreasing potential of resilience of ecological media, diversity of species), gender, and spatial issues.

There is a lot of fruitful literature formalizing value theory by mathematical methods especially by input-output-schemes. I do work on a world model integrating ecology.

---

<sup>2</sup> Fehr- Klaus (1999), Fehr- Klaus (2000)

Hardy Hanappi (2003)<sup>3</sup> wrote a basic paper on an input-output-based framework integrating gender and world-system approaches. I want to extend this by an ecological dimension. – Political economy can be supplemented by political ecology  
 The simple economic distribution is completed by distribution between regions (space)<sup>4</sup> and gender. This can be seen on in a geometrical system by 3 dimensions.  
 The ecological dimension then is the (dynamic) time axis and relates to the distribution between generations.

This view is based on the “world system” theory<sup>5</sup>: The historical “world system” theory is rather young and there is still much work in progress. Central threads are:

- Every social process on earth has to be seen as a part of a world system.
- For analyzing the main processes it is important to consider the historical tendencies of the last 500 or at least 200 years.
- It highlights the big and persisting gaps in development on our planet
- It enables the global vision (on the contrary eurocentric)
- The theory is dynamic with open end

Three main ideas in my intended model for integrating ecology into general social theory are

- To use some stocks of “nature capital” and “social capital”,
- To establish energy is an important link between economy and ecology, and
- To take into account impairments on these stocks from the past (e. g. by colonialism and accumulated damages on the environment) AND TO DISCOUNT impairments on these stocks from the future (e. g. expected subsequent costs by climate change caused by actual and past economical activities).

So the central ecological dimension is the time dimension. Practically this means to find a solution for appropriate (time) discount rates.

It should be noted that discount rates in usual economic investment calculation and cost-benefit-calculation is very sensible: the benchmarking with opportunity costs combined with the mechanics of compound interest calculation (by  $1/(1+r)^t$ , with  $r$  = discount rate, and  $t$  = time) depreciates future values.

If profit rates/opportunity costs/discount rates become higher – then we see also shrinking time horizons at investments;

The definition of discount rates – it is an political decision<sup>6</sup> – is central for sustainable development. If high discount rates are used then decision for short-term profits are preferred.

Practical solutions to overcome this problem are:

- Negative discount rates
- Decreasing rates of discount (instead of constant rates of discount)
- The invoicing of depreciation of a “nature capital”

---

<sup>3</sup> Hanappi H., Hanappi-Egger E. (2003)

<sup>4</sup> Amin S. (1978)

<sup>5</sup> Wallerstein Immanuel (1974,1980, 1989); Arrighi, Giovanni (1994); Amin S., (1978); Fernand Braudel Centre for the Study of Economies, Historical Systems, and Civilizations: <http://www.binghamton.edu/fbc/>

<sup>6</sup> „The discount rate to be used in economic analysis should be provided by the planning agency or donor.” European Commission (1997): Manual – Financial and economic analysis of development projects p.252.

- Institutional changes so that profit rates no longer alone are central incentives - transition to other criteria of success

In the *attached diagram* (“**SOURCES OF ‘WESTERN’ WEALTH IN TIME AND SPACE**”) there is a basic scheme of integrating ecological issues in a simplified dichotomic spatial model of “western” and “non western” countries. The gender aspect is not considered in this diagram.

I want to clarify the question: What are the sources of the actual wealth of western nations?  
The stylized answer is:

- Actual labour of western nations
- Labour of former generations of western nations having created capital, infrastructure, and social capital
- National and regional ecological resources (externalization of costs)
- Actual labour of not-western nations (by low wages)
- Labour of former generations of non-western nations (having created capital, infrastructure, and social capital) via asymmetric power relations (in markets) (“unequal exchange”)
- Actual global ecological resources
- Production and reproduction possibilities in future labour of western nations (by actual overexploitation of regional ecological resources)
- Production and reproduction possibilities in future labour of non-western nations (by actual overexploitation of global ecological resources)

The actual wealth is diminished by the “burden of the past” (Ponting, 2002<sup>7</sup>) the serious abuse of “nature capital” in the last 200 years.

The “ecological debt” (Martinez-Alier, 2002) is huge and still getting higher and higher.

In this sense sustainable development can be defined by "balanced"/"not-concentrated" development in time.

What can be the future concrete use of all this schemes?

By these schemes we can calculate a lot of parameters for the labour, for women, for “third world”/”south”/developing countries, and for the “nature”. There are trade offs between these parameters. For example actual wage rates can be decreased by increasing the exploitation rate of the nature (=diminishing the chances of future generations)

**Sensitivity analyses can show parameter constellations with viable paths in the wealth distribution between different countries, between male and female, and a sustainable relation to nature. So global coalitions possibilities for adopting a sustainable path of socio-ecological development can be identified.**

---

<sup>7</sup> Ponting Clive (2002)

## Bibliography

- Amin S., (1978), *The Law of Value and Historical Capitalism*, Monthly Review Press.
- Arrighi, Giovanni (1994). *The Long Twentieth Century. Money, Power and the Origins of Our Times*. London.
- Cedric, Philibert (2003): *Discounting the Future*;  
[http://www.ecoeco.org/publica/encyc\\_entries/philibert.pdf](http://www.ecoeco.org/publica/encyc_entries/philibert.pdf)
- European Commission (1997): *Manual – Financial and economic analysis of development projects*, Luxembourg
- Fernand Braudel Centre for the Study of Economies, Historical Systems, and Civilizations:  
<http://www.binghamton.edu/fbc/>
- Fehr, Ernst and Schmidt, M. Klaus (1999): *A Theory of Fairness, Competition and Co-operation*. *Quarterly Journal of Economics*, vol. 114, pp. 817-68
- Fehr, Ernst and Schmidt, M. Klaus (2000): *Theory of Fairness and Reciprocity – Evidence and Economic Applications*. In: Dewatripont-Hansen-Trunovsky: *Advances in Economic Theory, Eight World Congress of the Econometric Society*, Cambridge
- Hanappi H., Hanappi-Egger E., *Elements of an I-O-based Framework for Marxian, Feminist and World-System Approaches*, in: Kohler G. and Chaves E. (eds), *Globalization: Critical Perspectives*, Nova Science Publishers, New York, 2003
- Kotaucek Peter (1996): *Um welche Maße geht es?* In: Riedl Rupert/Delpos Daniela (eds): *Die Ursachen des Wachstums*. Wien (Kotaucek Peter (1996): *What are the measures?* In: Riedl Rupert/Delpos Daniela (eds): *The Origins of Growth*. Vienna)
- Martinez-Alier Joan (2002) :*The Environmentalism of the Poor, a Study of Ecological Conflicts and Valuation*. Cheltenham; UK
- O'Connor James (1988): *The Second Contradiction of Capitalism*, New York
- Wallerstein Immanuel (1974,1980, 1989): *The Modern World System*”, 3 volumes