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Ecological
Economics
studies the
Metabolic Flow in
the economy.

Political Ecology
is the Study of
Ecological
Distribution
Conflicts.



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Economics, 2006 and 2007

Summary

- **The Metabolism of Society:** This is a concept that was used in 19th c. (Marx's "Stoffwechsel"), and again in the 20th c. – N. Georgescu-Roegen: "The metabolic flow of materials and energy in the economy", Robert U. Ayres: "Industrial Metabolism".
- **As the economy grows, it uses the environment as a source of materials and energy, as a sink for waste (such as excessive amounts of carbon dioxide).**
- **Hence, Ecological Distribution Conflicts.**
- **Which are the Languages of Valuation used in such conflicts? Should the language of Economics prevail? Should we not abandon Cost-Benefit analyses in favor of Multi-Criteria assessments, able to cope with incommensurability of values?**

THE METABOLIC FLOW

- The economy is not based on a circular flow of energy and materials. There might be a certain amount of reuse and recycling of materials but the economy is characterized by the unidirectional flow of energy and materials into dissipated heat and material waste such as heavy metals, nuclear waste, mine tailings and waste-water, and the carbon dioxide accumulating in the atmosphere.
- Therefore, the economy is not a self-sufficient system but a system embedded in social and physical systems, thus we emphasize the metabolic flow of energy and materials in the economy. [Podolinsky's energy accounts 1880 calculating the EROI of agriculture: Engels' letters to Marx on Podolinsky 1882]
- “Metabolic flow” was used in *The Entropy Law and the Economic Process*, the 1971 book by Nicholas Georgescu-Roegen, and by other authors (before and after NGR).

From ECOLOGICAL ECONOMICS to POLITICAL ECOLOGY

Chinese ecological economists use the words “circular economy” as an official slogan, expressing a desire for efficiency in the use of materials and energy. Something might be lost in translation from Chinese to English. In any case, the “circular economy” is a misleading description.

- Some energy and materials are taken from Nature out of current production. For instance, the biomass produced by current processes of photosynthesis. Other forms of energy and other materials (the fossil fuels, the metals, and building materials) are taken from stocks formed through ancient biochemical processes. We deplete stocks both of exhaustible resources (like oil and gas) and of renewable resources (forests, soils, aquifers, fisheries). We also produce waste such as carbon dioxide at rates higher than Nature can resiliently assimilate. We require Nature to grow at the rate of growth of the economy but Nature has its own rhythms of growth. In the industrialized economy there is, if you allow the metaphor, a great consumption of time.

THE COMMODITY FRONTIERS

The industrialized economy not only “consumes” time. It also occupies new spaces. Raw materials and the fossil fuels are taken from the “commodity frontiers”, while the waste is sometimes exported far away. Chemical waste sent to Ivory Coast caused a change of government a few months ago (“Poisonous Days”, *The Economist*, 16 Sept. 2006).

There are complaints from the South, in an international movement of Environmental Justice.

Innovations are needed at the socio-political level to turn Environmental Justice into a strong global movement for sustainability.

Conflicts on the extraction of materials and energy



•The ecological economist K. W. Kapp said that capitalism must be seen as an economy of unpaid costs. Following Kapp, Martin O'Connor and I have written that “externalities are not so much market failures as cost-shifting successes”.

Political Ecology: Study of conflicts on the access to natural resources and services and on the burdens of pollution that arise because of unequal property rights and inequalities of power and income among humans (both international and internal to each state).

There are links between each society's metabolic profile and ecological conflicts

Conflicts:

- at different scales
- at different points of the “commodity chains”

Classifying ecological conflicts

From metabolic flows to ecological distribution conflicts

Identity Politics or Structural Conflicts?

Ecologically unequal exchange

Relations between Ecological Economics and Political Ecology

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1. Mining and Oil extraction conflicts

- Complaints because of water and air pollution, and land occupation by open-cast mining and slag
- Conflicts on oil and gas extraction
- Conflicts on the extraction of building materials

2. Biopiracy (Pat Mooney, RAFI, 1993)

Appropriation of genetic resources ("wild" or agricultural) without adequate payment or recognition of peasant or indigenous ownership

3. Land Degradation

Soil erosion caused by unequal land distribution, or by pressure of export production.

Ashio, Japan (Tanaka Shozo) or Rio Tinto, Southern Spain, 1900

Networks: Mines and Communities, Oilwatch

India, mining of coal, iron ore, uranium, bauxite (e.g. bauxite projects in Orissa).

Ayahuasca, uña de gato, sangre de drago, quinua, and also basmati rice, neem, turmeric

Pressure of population vs pressure of production (Blaikie and Brookfield (1987))

More extraction conflicts

- **4. Plantations are not Forests (Carrere and Lohman, 1996)**
- Link between the use of the biomass material flows and the growth of such conflicts -- Eucalyptus, pine, acacia plantations for wood or paper pulp or cellulose production (www.wrm.org.uy). (This is a conflict on HANPP).
- **5. Mangroves vs shrimp**
- Movement to preserve the mangroves for livelihood, against the shrimp export industry -- Thailand, Honduras, Ecuador, Brazil, India, Philippines, Bangladesh, Sri Lanka, Indonesia... (Environmental Justice Foundation's reports, www.ejfoundation.org). (This is also a conflict over the HANPP).
- **6. National / local fishing rights**
- Attempts to stop open access by imposing exclusive fishing areas – Peru, 1948
- Defence (or introduction) of local communitarian fishing rights against industrial fishing.

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7. Complaints over oil spills from tankers or pipelines, over new motorways, harbours and airports, also over “hidrovías”

Physical indicators for transport (tons-km) grow faster than GDP, and than the material and energy throughput

8. Bioinvasions

Introduction and establishment of alien species, deliberately or accidentally, by increased trade or human travel

Social asymmetries in the burdens and benefits

Hidrovía Paraguay-Paraná

Sethusamundram Ship Canal Project between Tamil Nadu and Sri Lanka

Val di Susa, 2005, new train line from Turin to Lyon

European pathogens and animals (sheep), havoc in the Americas and Australia in colonial times (Melville, 1994).

Black wattle in South Africa, diminish local water availability

Conflicts on waste and pollution

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9. Toxic struggles (Gibbs, 1981, Hofrichter, 1993)

Fights against hazards from heavy metals or dioxins

10. Waste dumping

Ship breaking yards or e-waste illegally exported to developing countries → Toxic Imperialism (Greenpeace, 1988)

11. Transboundary pollution

Sulphur dioxide crossing borders and producing acid rain

12. Equal rights to carbon sinks

Proposal for equal per capita use of oceans, new vegetation, soils and atmosphere as sinks or temporary reservoirs for carbon dioxide (Agarwal and Narain, 1991).

13. Consumers' and citizens' safety

Struggles over the definition and the burden of uncertain risks from new technologies (nuclear, GMO, etc.)

Regulatory authorities failed to apply the "precautionary principle"

Minamata mercury poisoning in Kumamoto Prefecture, Japan caused by the chemical manufacturer Chisso Corporation, 1950s - 1960s

Alang (Gujarat), ship-breaking (Clemenceau case, 2005)

E-waste to Asian countries: India, Pakistan, and China

1970s-1980s Europe, U.S.A. (New England polluted by western winds), and from China to Japan

Disproportionate emissions of carbon dioxide: "carbon debt" (Andrew Simms; www.deudaecologica.org)

BSE, Chernobyl, asbestos, DDT, CFC...

Nuclear power: Europe, Creys-Malville; Japan, Monju project in Fukui Prefecture; China and India, ?

Ecological conflicts under different headings

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Workers' actions for occupational health and safety

Struggles to prevent damages to workers in mines, plantations or factories ("red" outside and "green" inside)

Urban activism for clean air, green spaces, sanitation, cyclists' and pedestrian rights

Struggles outside the market in order to improve conditions of livelihood or to gain access to recreational amenities.

Neither the social actors nor the analysts of such urban ecological conflicts used an explicitly environmental vocabulary.

Social ecofeminism or environmental feminism (Bina Agarwal, 1992)

Environmental activism of women, motivated by their social situation. The idiom is not necessarily that of feminism and/or environmentalism.

From metabolic flows to ecological distribution conflicts

A tentative classification of some ecological distribution conflicts.

<i>Geographical scope</i> ----- <i>Stage</i>	Local	National and Regional	Global
Extraction	Resource conflicts in tribal areas, such as bauxite mining in Orissa or Andhra Pradesh	Mangrove uprooting. Tree planting for export Collapses of fisheries	Worldwide search for minerals and fossil fuels, and bio-piracy by MNCs Regulation of "corporate accountability"
Transport and Trade	Complaints on urban motorways because of noise, pollution, landscape loss	Inter-basin water transport Oil/gas pipelines (e.g. Burma to Thailand, Chad-Cameroon)	Oil spills at sea "Ecologically unequal exchange" because of large South to North material flows
Waste and pollution, post-consumption	Conflicts on incinerators (dioxins) or ozone in urban areas	Acid rain from sulphur dioxide. Nuclear waste, Yucca Mountain, Nevada, USA	CO ₂ , CFC as causes of climate change/ ozone layer destruction POPs even in remote pristine areas Claims for a "carbon debt"

A third axis: the temporal dimension

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Water is excluded from Material Flow Accounting (Eurostat statistics, Weisz et al, 2006)

The political ecology of water focuses on:

conflicts on dams (Mc Cully, 1996, Khagram, 2005)

Narmada Bachao Andolan, Polavaram in Andhra Pradesh, complaints against the “interlinking of the rivers” ***atingidos por barragens (Brazil), water transfer from the Sao Francisco river (2005)*** (www.irn.org).

conflicts on the use and pollution of aquifers

Plachimada conflict in Kerala between farmers and the Coca-Cola company;

dumping of waste into water, or the energy and environmental impacts of new **desalination** projects, or the **use and prices** of water.

“**virtual water**” (Hoekstra, A.Y. and P.Q. Hung, 2002).

Virtual water trade: a quantification of virtual water flows between nations in relation to international crop trade (www.waterfootprint.org)

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Human Appropriation of Net Primary Production, HANPP

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In contrast to Material Flows, the HANPP is not yet an official statistic. It is calculated in three steps. First, the potential net primary production (in the natural ecosystems of a given region), NPP, is calculated. Then, the actual net primary production (normally, less than potential NPP, because of agricultural simplification, soil sealing) is calculated. The part of actual NPP used by humans and associate beings (cattle, etc.) relative to potential NPP is the **HANPP, meant to be an index of loss of biodiversity (because the higher the HANPP, less biomass available for "wild" species)** (Haberl et al, 2005).

Relations between such variables, e.g., in India more use of kerosene or LPG for domestic cooking and heating might lead to a decrease in HANPP, and therefore, to less pressure on wild biodiversity (so that kerosene and LPG would be good for the tigers).

In the European Union, HANPP decreased after the 1950s, it will now perhaps grow again: **substitution of biofuels (or imported ethanol) for fossil fuels, reduces net emissions of carbon dioxide but it increases HANPP.**

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Waste disposal and pollution have given rise to the notion of Environmental racism in the United States, meaning the disproportionate environmental load in terms of pollution or resource extraction in areas mainly inhabited by African Americans, Latinos, Native Americans. **Environmental Justice is the social movement against environmental racism, also in South Africa and in Brazil.** (Bullard, 1993, Bond, 2002, Acselrad et al, 2004).

In resource extraction conflicts, some actors deploy the **language of indigenous environmentalism**, that is, the use of territorial rights and ethnic resistance against external exploitation. Convention 169 of ILO is used in some countries (as in 2005 against gold mining in Sipakapa, Guatemala but not in Pascua-Lama, Chile, 2007), or in India the protection of adivasi peoples by the Constitution (Fifth Schedule) and by court decisions.

The **universal language of human rights may also be used since livelihoods are threatened** (W. Sachs).

Identity Politics or Structural Conflicts?

- Cross-cultural similarities in resistance movements.
- Oil wells stopped – Ecuador and Niger Delta – Oilwatch network
- Shrimp ponds opened and destroyed, activists are local people, Ecuador and Tamil Nadu

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The trade pattern consisting in specialization in the export of raw materials has given rise to the notion of Ecologically Unequal Exchange. Such plunder economy was called Raubwirtschaft by German and French geographers one hundred years ago.

In an ecological-economics theory of unequal exchange, attention is drawn to physical measurements, focusing on the unequal amounts of energy (or exergy, i.e. available energy), or materials (in tons), or land used up.

Then, the more of the original exergy and materials have been dissipated in producing the final products or services (in the metropolis), the higher the prices of these final products or services will have to be (Hornborg, 1998, Naredo and Valero, 1999, Naredo, 2001). Thus, “market prices are the means by which world system centres extract exergy from the peripheries” (Hornborg, 1998), helped sometimes by military power.

Think also of Internal Trade between regions in India, and China –e.g. exploitation of Orissa

ORISSA, INDIA

THE FIGHT IN THE BAUXITE MOUNTAINS

- *How much for your God?*

Sacredness, the destruction of local cultures, and biodiversity are not commensurate with monetary values. In Orissa in India the bauxite mountain of Niyamgiri is the seat of the truth god of the Dongria Kondhs and is sacred to them. The mountain is covered by a forest of rich biological diversity. On one side you can see the Lanjigarh refinery, its chimney rising 275 m. On the other, you can barely make out the thatched huts of the Dongria Kondh villagers, whose way of life is inextricably tied to the mountain. At the planned rate of extraction (three million tonnes of bauxite per annum) the Vedanta mine will last 26 years.

The poorest sections of society are fighting here to protect the environment, this is an “environmentalism of the poor.”

VALUE SYSTEM CONTESTS

How many tons of bauxite is a tribe or a species on the edge of extinction worth? How can you express the value of such things in terms that a minister of finance or a Supreme Court judge will understand?

In decision-making processes, economics becomes a tool of power in the hands of those who know how to wield it. Against the economic logic of dollars and cents, the languages of valuation used by the peasants and tribal peoples go unheeded.

These may include the language of indigenous environmentalism, the use of territorial rights and ethnic resistance against external exploitation, international human rights law, or in India the protection of adivasi peoples by the Constitution and by court decisions. Other appeals could be made to livelihood, to ecological and aesthetic values, or to sacredness.

Ecological Debt

- **There are then claims for repayment of the so-called Ecological Debt from North to South, bringing together the “carbon debt”, i.e. damages from rich countries on account of past and present excessive per capita emissions of carbon dioxide, and claims because of biopiracy, ecologically unequal exchange, and environmental liabilities by private or public companies.**
- **When resource exports are produced by MNCs, local and international demands for Corporate Accountability arise, e.g. the court cases under the ATCA legislation (Alien Tort Claims Act) against Chevron-Texaco, Freeport McMoRan, Southern Peru Copper Corporation, Dow Chemical and other companies, claiming compensation for damages.**
- **Another term used in the context of international inequalities is that of the ecological footprint. The ecological footprint adds up the per capita use of food and other biomass, plus fossil fuels, plus the built environment, translating everything into space. It has merit as a communication device, it thrives politically (Wackernagel and Rees, 1995).**

Conclusions: Relations between Ecological Economics and Political Ecology

Three main currents of environmentalism:

- 1) "Cult of Wilderness" (John Muir in the USA).
- 2) "Gospel of Eco-Efficiency" (Gifford Pinchot in the USA, and nowadays the movement for industrial ecology, ecological modernization, sustainable development, dematerialization).
- 3) Environmental Justice movement or the Environmentalism of the Poor (Guha and Martinez-Alier, 1997, Martinez-Alier, 2005). We focus on this.

Ecological Economics is relevant to Political Ecology because:

- it **studies the metabolism of society**, that is, the relations between the economy, and materials and energy flows
- the **conflicts** regarding the use of the **environment may be expressed in different languages of valuation**. Who has the power to impose the economic language of valuation?

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