Environmental Economics vs. Ecological Economics

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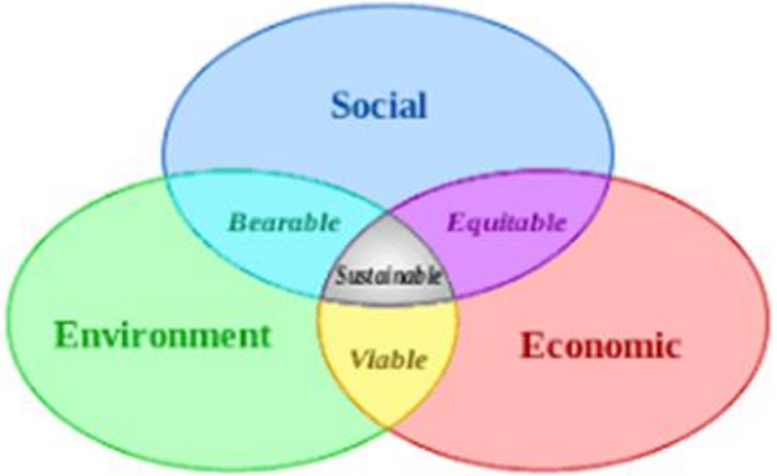
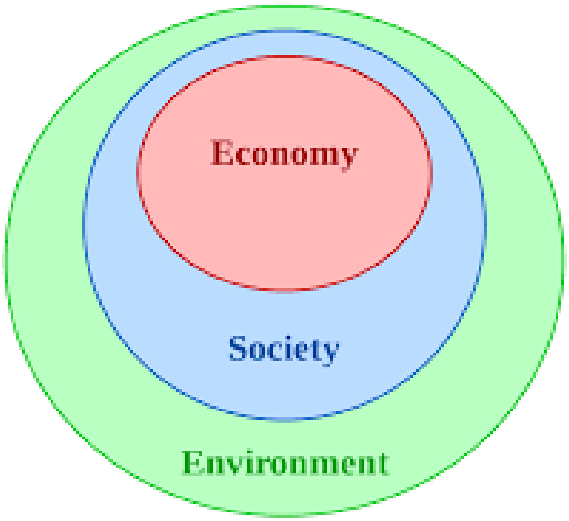
Basic features





- Same aim: understanding socio-economic-environmental systems

and transformation towards sustainability

- Differences:

Incompatible basic postulates about relationship of socio-economic-environmental system

systemic neo-classical narrow modeling **vs.** (too) diversified approach

analytical rigor **vs.** lack of concrete theoretical framework

Microeconomics **vs.** macroeconomics focus

Utilitarian **vs.** biocentric conception of value

mainstream postulates challenged by behavioral and experimental economics **vs.** issues with ID research (and ideological positions)

Environmental economics

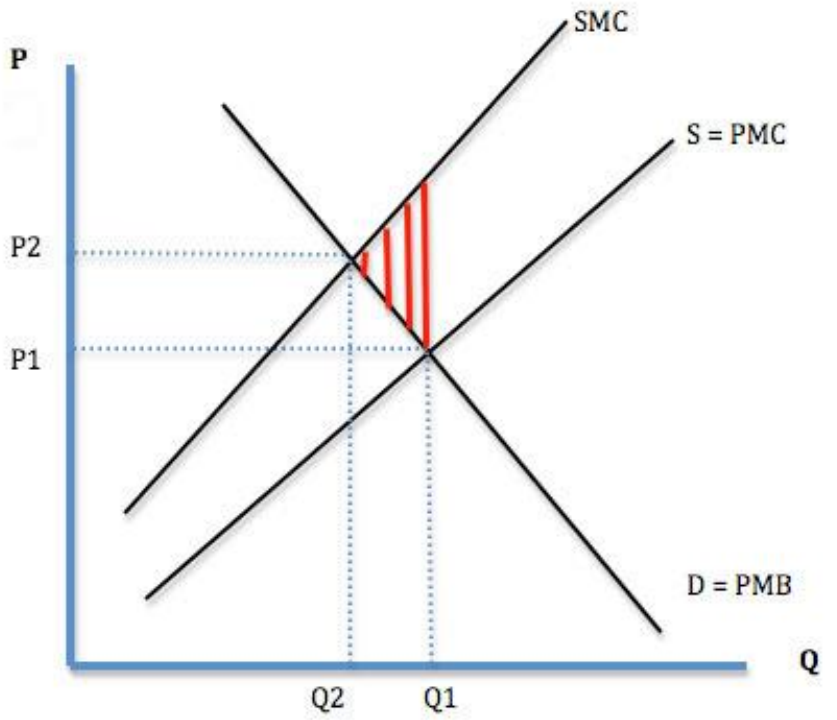
- Research focus: the economic effects of environmental policies
- Important topics:
  - **inefficient market allocation** (failure) related to environment: cost-benefit analysis of environmental policies
  - **Valuation**: Assessing the economic value of the environment
- 2 key (related) issues:
  - Environmental resource use
  - Externalities (spillover effect)
- 3 basic approaches:
  1. **Market-based** or Pigouvian approach (tax/subsidy schemes, auctioned permits)
  2. Prescriptive or **Regulatory** approaches – “command & control” (ambient, emission or technology standards)
  3. **Legal** or Property rights approach (common law/torts, Ronald Coase)

Two key problems with mainstream approaches to the environment

1) "Efficiency is not a value maximization problem, but individual goal-seeking problem" (Roy Cordato 2007)

Point: government should not try to compare different uses of a resource (e.g. value of waterway for fishing vs. dumping waste)

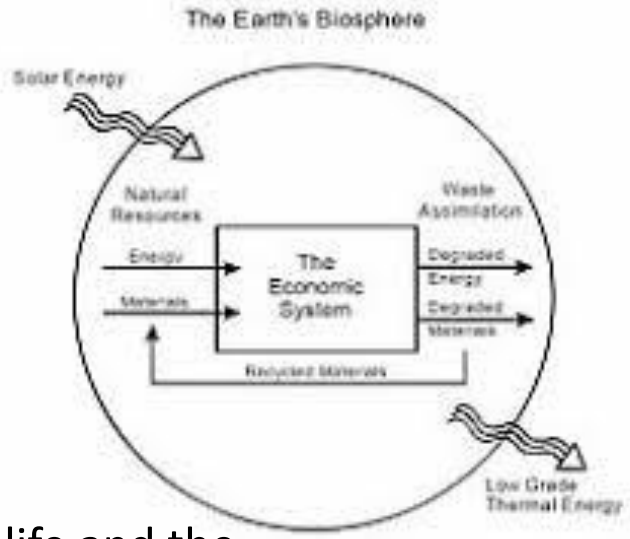
2) Costs are subjective: marginal private benefit (MPB) and marginal social cost (MSC) are not measurable



Calculation problem

- ‘overuse’ depends on the idea of optimal rate of use (where MSC=MPB)
- Therefore, Pigouvian approach and Command & control require governments to calculate the impossible (and if is wrongly assessed it can do more damage that inaction)
  - **Trial and error does not work** because we don’t have a measure of success and failure (Timothy Terrell); also no a priori solutions (e.g. enclosure act)
- Policy continuity problem (Even if we magically know optimal rate of pollution) : lack of state’s incentives for continuity (due to constituent groups bias)
  - Dynamic market vs. static polices
- how this trumps property (implicit or explicit) rights?
  - Property rights approach requires owners to have perfect information and it devalues transaction costs and efficient operation of legal frameworks e.g. train/orchard Coase theorem
- **Conclusion**: **pollution is human conflict about the use of physical resources,** not about harming the environment – competition for air, water, species (Cordato)
- It’s an ethical issue: Pollution is a change in a resource preventing others who plan to use it for conflicting purposes (e.g. CO_2 in the Earth’s early atmosphere)
- Efficiency vs. ethics: public policy can not be determined on the basis of efficiencies or minimizing costs (Murray Rothbard)

Ecological economics



- Understanding of socio-economic-environmental systems grounded in physical reality and ethical considerations
  - embedded within laws of physics and biology (energy and matter transactions of life and the Earth) – economy as an open subsystem of a larger ecosystem that is finite, non growing, and materially closed (though open with respect to solar energy)
  - Plural system of value/conception of welfare
- EE tries to tackle this broader framework of factors affecting economic limits
  - **Focus on macroeconomics:** Standard economics focuses primarily on the allocation issue, but pays secondary attention to distribution,
- Allocation of resources, fair distribution, optimal scale
  - "distributive justice to the world's inhabitants and the optimal scale of the human economy within the planet's economy are not considered by neoclassical economics. In other words, the issues of who benefits from an economic system and whether the planet can bear the system's burden are not part of neoclassical economics." (Daly 2003)
  - The scale issue has become a distinguishing feature of ecological economics (i.e. preanalytical vision immediately suggests several analytical questions regarding scale)

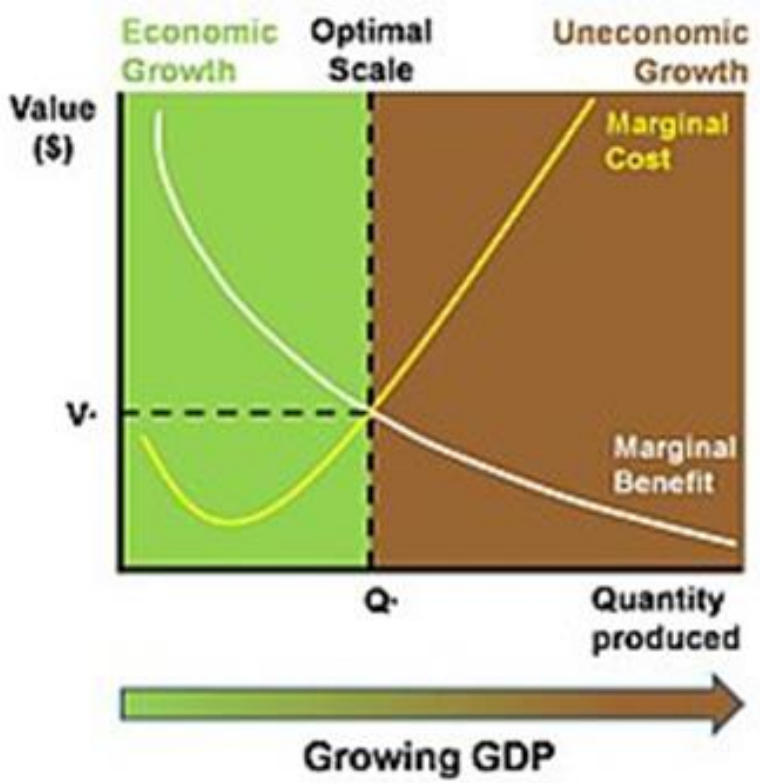
Scale of the economy

- optimal scale (less than the biophysical maximum) def= scale beyond which physical growth of the economic subsystem (even if possible) begins to cost more at the margin than it is worth, in terms of human welfare?

- Uneconomic growth: Difference with this graph is that it contains an environmental clause – optimal scale must at least preserve the current state of natural resources and ecosystem functions

Bio-conception of economy: Since the economy in fact grows into and encroaches upon the finite and non growing ecosystem, there is an opportunity cost to growth in scale, as well as a benefit. The costs arise from the fact that the physical economy, like an animal, is a "dissipative structure" sustained by a metabolic flow from and back to the environment. This flow, called "throughput", begins with the depletion of low entropy, useful resources from the environment and ends with the return of high-entropy polluting wastes.

- Spatial and quantitative growth and qualitative degradation of environmental metabolic throughput
- Ecological footprint analysis – includes both resources and wastes



- The scale of the economy has two measures:
  (1) the **throughput flow** of physical resources that constitute the material component of the annual flow of goods and bads, and
  (2) the **accumulated stock** of goods in the form of wealth, and of bads in the form of "illth" (the opposite of wealth).
- **the scale of the economy is ecologically "sustainable" i**f we keep the throughput within the natural capacity of the ecosystem to absorb wastes and regenerate depleted resources
  - There are many sustainable scales. Scale that maximizes the difference between wealth and illth (i.e., equates marginal goods produced with marginal bads), is the optimal scale.
- **Ecosystem complexity problem**: the natural systems that encroach the economy are not linear. They are complex interdependent systems coupled with economy and we cannot possibly know how individual incremental changes in economy will precisely influence them (e.g. apex predator/tree relation)
  - complexity creates unpredictability and disables humans to govern economies to be precisely on the edge of MSB/MSC
  - Hence, **we cannot precisely determine the optimal scale**: economy must stay safely within sustainable limits, enough behind the optimum scale to avoid negative feedback loops

Empty/full world economics

(Ecological economics do not challenge the standard analysis of allocative efficiency, given prior social determination of the distribution and scale questions)

- **Fair distribution issues:** focus on two often neglected/discounted dimensions of distribution:
  - (1) intergenerational distribution of the resource base, and
  - (2) distribution of places in the sun between humans and all other species (biodiversity – irreversible and poorly understood). (! unparalleled call for redistribution)

- **Limiting factor:** As growth pushes us from an empty world to a full world the limiting factor in production will increasingly become natural capital, not manmade capital (e.g. fish stocks/fishing boats)
- As we move from the empty world into a full world, **economic logic remains the same**, namely to economize on and invest in the limiting factor. But the identity of the limiting factor changes from manmade capital to remaining natural capital
- Why it wasn't noticed by classical economist?
  - **a) it happened to fast** – in a lifetime during 20th century (from 2 billion in 1930 to 6 billion in 2000) (Constanza 2014, 95)
  - **b) assumption of complementarity vs. substitutability of capital**
  - **c) extremely controversial topics**

a) Population, Consumption, And Carrying Capacity

- A primary question becomes: Are there limits to the carrying capacity of the Earth system for human populations?
  - Priority research questions: precise number of people; standard of living; how food production will breach the limit.
  - Various estimates depending on the criteria used, from 7.5 billion (Bernard Gilliand 1988) to 40 billion (Revelle 1976).
  - Cultural evolution disables talk about the "carrying capacity" of humans in the same way as the "carrying capacity" of other species – it depends on technology

  (e.g. 300mil Indus without electricity)
  - This complicates population policy enormously because one cannot simply state a maximum population but rather must state a maximum number of impact units.
- EE usually avoids discussing how to divide existing capacity between the people (and leaves to societies to decide on it) and instead talks about **total impact of human population**

b) assumption of complementarity vs. substitutability of capital

- Major change in the pattern of scarcity was not noticed because of substitutability assumption
  - No limiting factor (the one in short supply), hence no new era (full world)
  - **limiting factor reduces the value of complementary capital** (Daly 2003): The complementary nature of natural and human-made capital is made obvious by asking: **What good is a sawmill without a forest? (**Costa Rica and Peninsular Malaysia, for example, now must import logs to keep their sawmills employed)
  - The demands of complementarity between human-made and natural capital **can be evaded within a nation** only if another country does it to a lesser extent
- the very **accumulation of human-made capital puts pressure on natural capital stocks** to supply an increasing flow of natural resources.
  - When that flow reaches a size that can no longer be maintained, there is a **big temptation to supply the annual flow unsustainably** by liquidation of natural capital stocks, thus postponing the collapse in the value of the complementary human-made capital.
- **In the era of full-world economics, this threat is already executed** by liquidating stocks of natural capital to temporarily keep up the flows of natural resources that support the value of human-made capital
  - hence, the problem of sustainability.

Summary

- Environmental economics := cost benefit analysis of environmental policies
- calculation problem – how do we now MSC (marginal social costs)
- property rights problem: ‘overuse’ depends on ‘optimal rate of use’ what is a socio-political issue, i.e. competition for resources
- Ecological economics broadens the discussion from allocation of resources to fair distribution and optimal scale
- In these alternative futures, instead of building up expectations and furthering ungrounded optimism in progress, the economy of the world would be downsized to the extent that its resource use and waste does not exceed the regenerative and assimilative capacities of the planetary ecosystem
- Major problems with precise solutions

- **Policy Implications of the Turning Point:** In this new full-world era, investment must shift from human-made capital accumulation toward natural capital preservation and restoration.

Differences

- Economy as a planetary subsystem vs. related independent system
- Complementarity vs. substitutability assumption
- coupling between physical throughput and GNP: is it flexible? Can "information economy" save growth economics by reducing material intensity of GNP?
- coupling between GNP and welfare

(In sum, ecological economists see GNP as tightly coupled to throughput and loosely coupled to welfare, while neoclassicals believe that GNP is only loosely coupled to throughput but tightly coupled to welfare) There is clearly room for empirical work here!

- Anthropocentric (utilitarian) vs. biocentric (plural) conception of value
- **Additional issues**:
- monetary issues: Fractional reserve money is not neutral with respect to the scale of the physical economy—it requires growth of GDP to keep the money supply from declining
- Internationalism vs globalization (simultaneous breach of the limits, little opportunity to learn)
- Controversial topics: restrictions on private choices, e.g. dietary habits (animal products) (due to GHG emissions in their production) or number of children?
- For various research topics and potential solutions see Constanza et al, 2014, *An Introduction to Ecological Economics*.