

# Mainstream economics and its environmental and ecological critique

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# (Economics) institutions matter

- Environment is providing us with necessary resources and services.
- These resources and services are processed in the economy.
- Prevailing economic paradigm determines the way these sources are distributed and consumed. It explains how economies work, how economic agents behave and how resources are allocated.
- Descriptive and normative role of economics.
- Currently dominant economics thinking (neoclassical economics + some Keynesianism) is not universal recipe, it is a paradigm based on specific historical experiences, preferences, and values.

# (Economics) institutions matter

	<b>Communism/soviet command economy</b>	<b>Capitalism</b>
<b>Education</b>	Small impact on the wages.	Valued very high, providing a solid basis for later earnings.
<b>Focus of the industry</b>	To provide means for military.	To satisfy popular demand.
<b>Entrepreneurship</b>	Individual economic activity considered „selfish“ and suppressed.	Individual economic activity considered beneficial and supported.
<b>Role of the market</b>	Most efficient way to allocate resources.	Mechanism which allows the exploitation of the weak by the strong.

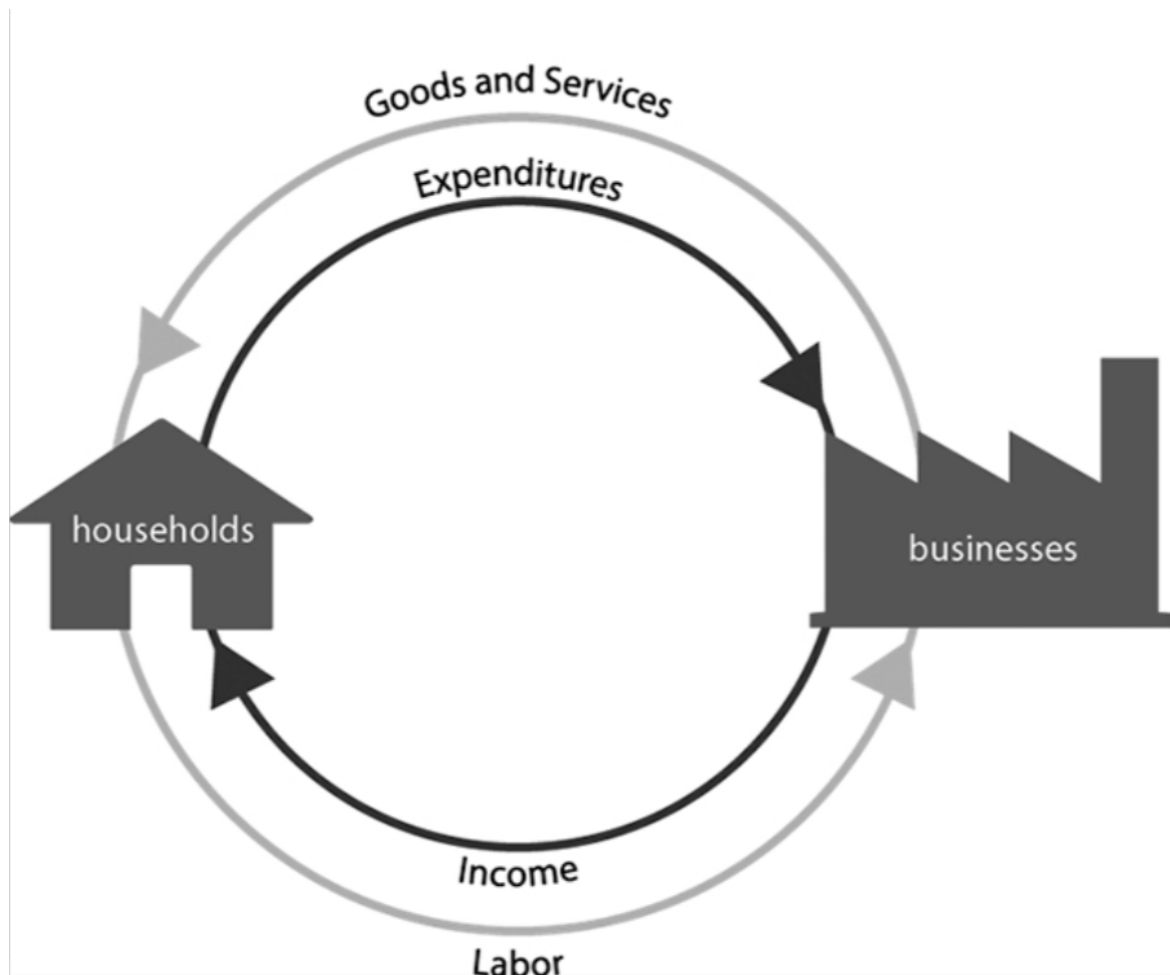
# Mainstream (neoclassical) economics

- Builds on classical economy of 18th and 19th century (A. Smith – The Wealth of the Nations 1776), D. Ricardo, T.R. Malthus, J.S. Mill). Ruler's personal interest (personal income) → national interest (national income).
- Neoclassical economy (+ Keynesian economics) = mainstream economics school.
- Economic efficiency and economic progress are maximised by ensuring that markets work freely and competitively (via supply and demand).
- Individuals maximize utility, firms profits.
- People (= rational actors) have rational preferences among outcomes, associated with a value – rational choice theory.
- People act independently on the basis of full and relevant information.

# Neoclassical economics

- Unlimited economic growth is both possible and desirable – on individual level it provides welfare and satisfies individual desires, on company level success, on state level superiority and strength.
  - Neoclassical economics assumes we are in an Empty (limitless) World, where the economics is only a small piece of the overall ecosystem picture.
  - Thus ecosystem is abstracted as an input output element.
  - Human actions are un-restrained by the ecosystem capacity simply because this element is not factored in. Services (incl. resources) are „free“ – not valued (tragedy of commons).

# Mindset of traditional economics – a circular flow of income



# Critique

- Market failures – when market fails to allocate resources to generate the greatest social welfare. Individuals following market prices, with society suffering in terms of overall environmental costs.
- Deforestation
- Overfishing
- Climate change
- Plastic pollution
- Air pollution
- ...

# Why?

## **Tragedy of commons**

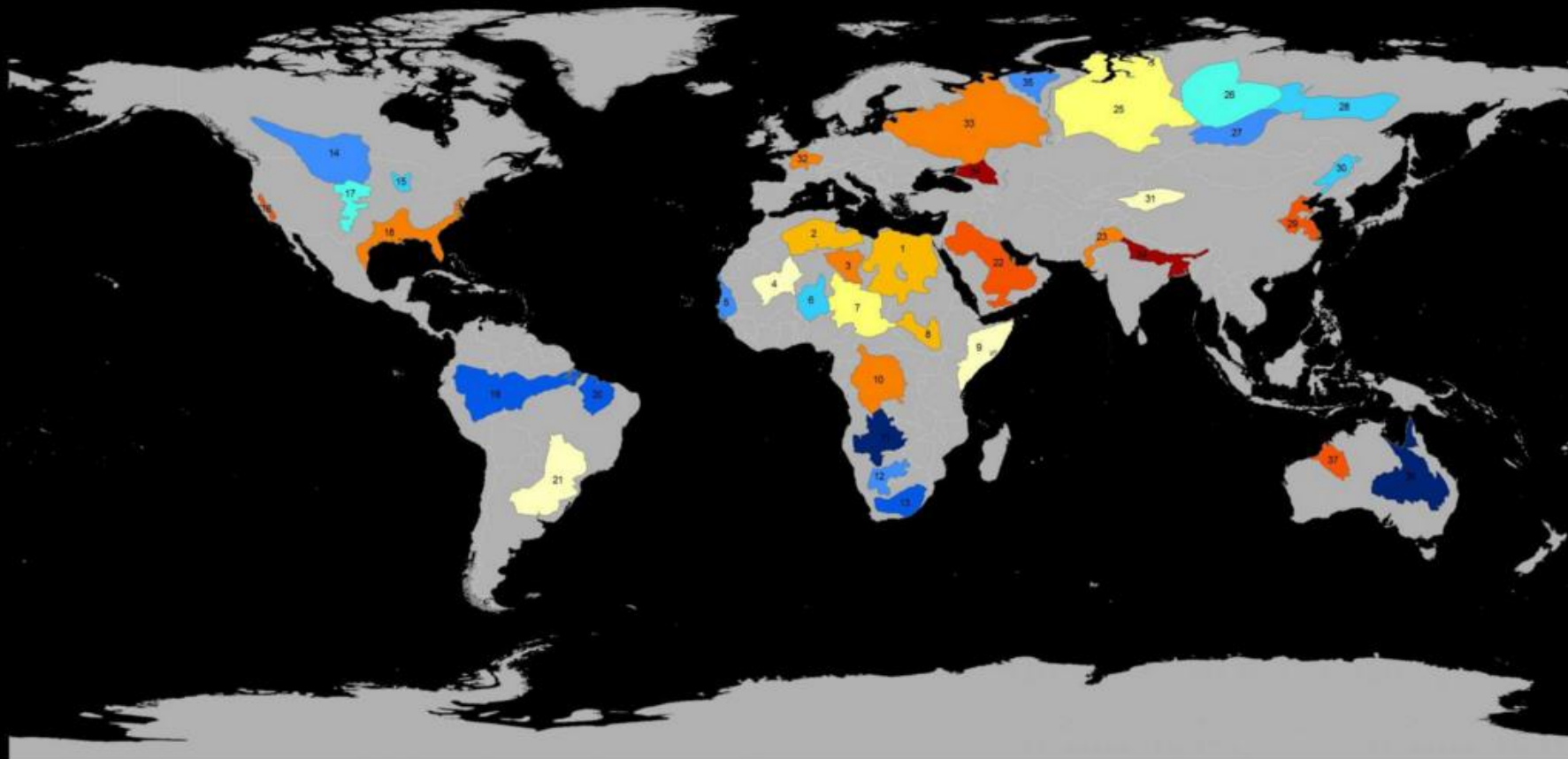
- ...a situation within a shared-resource system where individual users acting independently according to their own self-interest behave contrary to the common good of all users by depleting or spoiling that resource through their collective action.

## **Valuation of environmental services**

- Non-use value - how to assess the economic value of the environment, which is not of a direct use for humans?



Trends in Groundwater Storage from NASA GRACE Mission (2003-2013)



Richey, A.S., B.F. Thomas, M. Lo, J.T. Reager, J.S. Famiglietti, K. Voss, S. Swenson, M. Rodell (2015), Quantifying Renewable Groundwater Stress with GRACE, *Water Resour. Res.*, doi: 10.1002/2015WR017349



- |                                              |                                               |                             |                               |
|----------------------------------------------|-----------------------------------------------|-----------------------------|-------------------------------|
| 1 Nubian Aquifer System (NAS)                | 11 Upper Kalahari-Cuvelai-Upper Zambezi Basin | 20 Maranhao Basin           | 29 North China Aquifer System |
| 2 Northwestern Sahara Aquifer System (NWSAS) | 12 Lower Kalahari-Stampriet Basin             | 21 Guarani Aquifer System   | 30 Song-Liao Basin            |
| 3 Murzuk-Djado Basin                         | 13 Karoo Basin                                | 22 Arabian Aquifer System   | 31 Tarim Basin                |
| 4 Taoudeni-Tanezrouft Basin                  | 14 Northern Great Plains Aquifer              | 23 Indus Basin              | 32 Paris Basin                |
| 5 Senegalo-Mauritanian Basin                 | 15 Cambro-Ordovician Aquifer System           | 24 Ganges-Brahmaputra Basin | 33 Russian Platform Basins    |
| 6 Iullemeden-Irhazer Aquifer System          | 16 Californian Central Valley Aquifer System  | 25 West Siberian Basin      | 34 North Caucasus Basin       |
| 7 Lake Chad Basin                            | 17 Ogallala Aquifer (High Plains)             | 26 Tunguss Basin            | 35 Pechora Basin              |
| 8 Sudd Basin (Umm Ruwaba Aquifer)            | 18 Atlantic and Gulf Coastal Plains Aquifer   | 27 Angara-Lena Basin        | 36 Great Artesian Basin       |
| 9 Ogaden-Juba Basin                          | 19 Amazon Basin                               | 28 Yakut Basin              | 37 Canning Basin              |
| 10 Congo Basin                               |                                               |                             |                               |

# Ecuador – rain forest for sale

- Yasuní National Park, a hotspot of biological diversity. Two uncontacted tribes, UNESCO site.
- About 850 million barrels of oil.
- 35% of Ecuadorians below the poverty line.
- If international community pays 3.6 billion US dollars (in 2014), half of the value of oil, it will be preserved.
- 13 million gathered only.
- Drilling started in 2016.



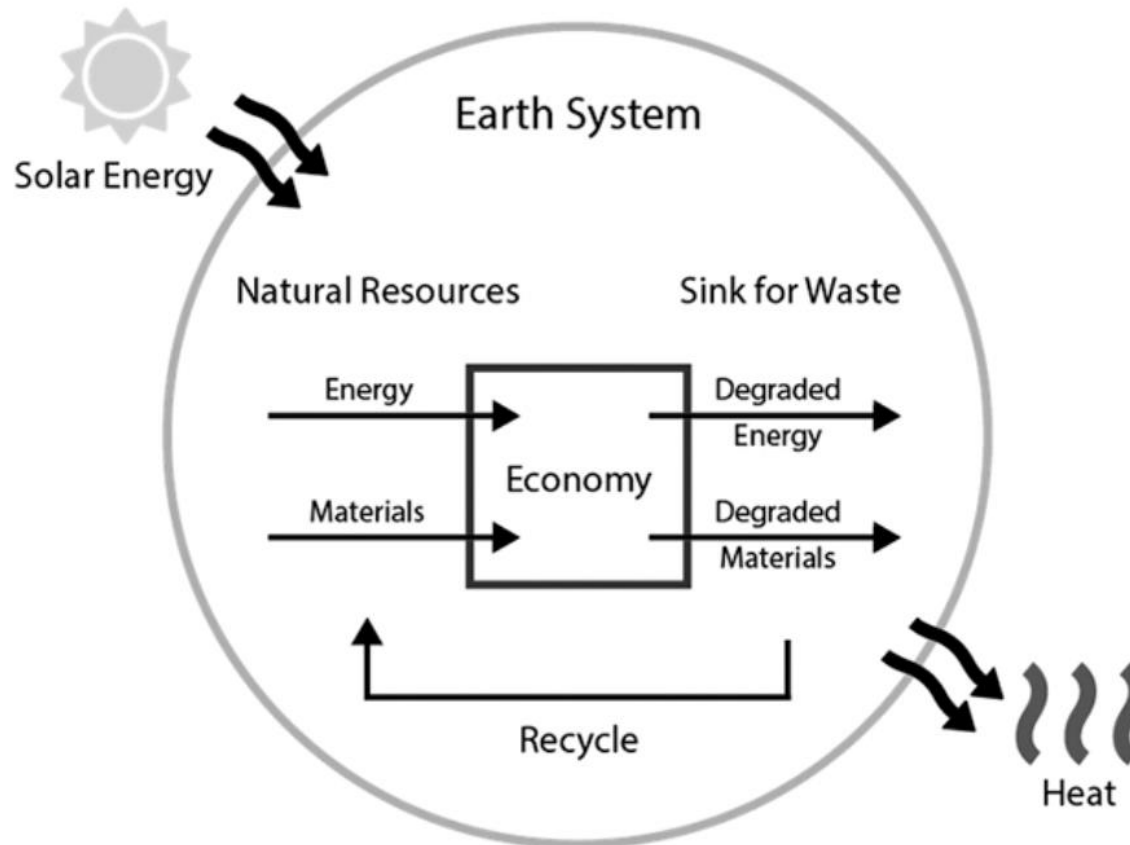
# Neoclassical approach to the environment/environmental economics

- Recognizes necessity to consume natural resources and services and pollute.
  - 1) Environment is turned into a commodities: goods and services. Once defined in commodity terms (forest offering wood, game, but also recreational services), the environment could be brought to market economy by constructing supply and demand curves.
  - 2) 'Optimal' level of environmental protection is determined based on demand (what consumer wants) and supply costs (costs of protection and opportunity costs). Using the environmental valuation methods.
  - 3) Aiming for achieving the optimal level of environmental protection in the most efficient way. By giving the environmental costs and benefits prices that can be marketed.
  - 4) Either by taxing environmental damages or by subsidizing environmental improvements (market is created).

# Ecological economics

- Emphasis on nature, justice, time (sustainability). Highly normative (prescriptive).
- Technological scepticism (vs. mainstream economists optimism).
- Economics is contained within the ecosystem of the planet; boundaries of the economy must remain within the boundaries of the ecosystem.
- Carrying capacity of the environment.
- Scarcity of resources, limited supply of environmental services. Firstly to focus on maintaining the environment, then assessing its costs in dollar terms.
- Laws of thermodynamics apply (we cannot create the matter or energy, we need to work with what is available).
- Claimed to be more appropriate framework for today's world.

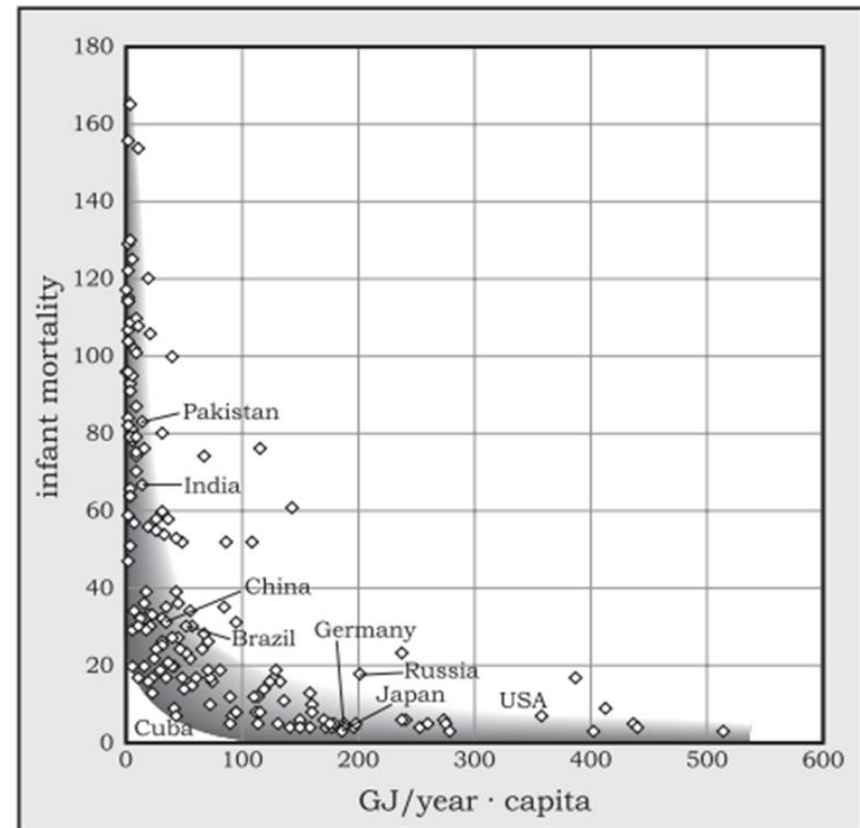
# Ecological circle – economy embedded in the nature



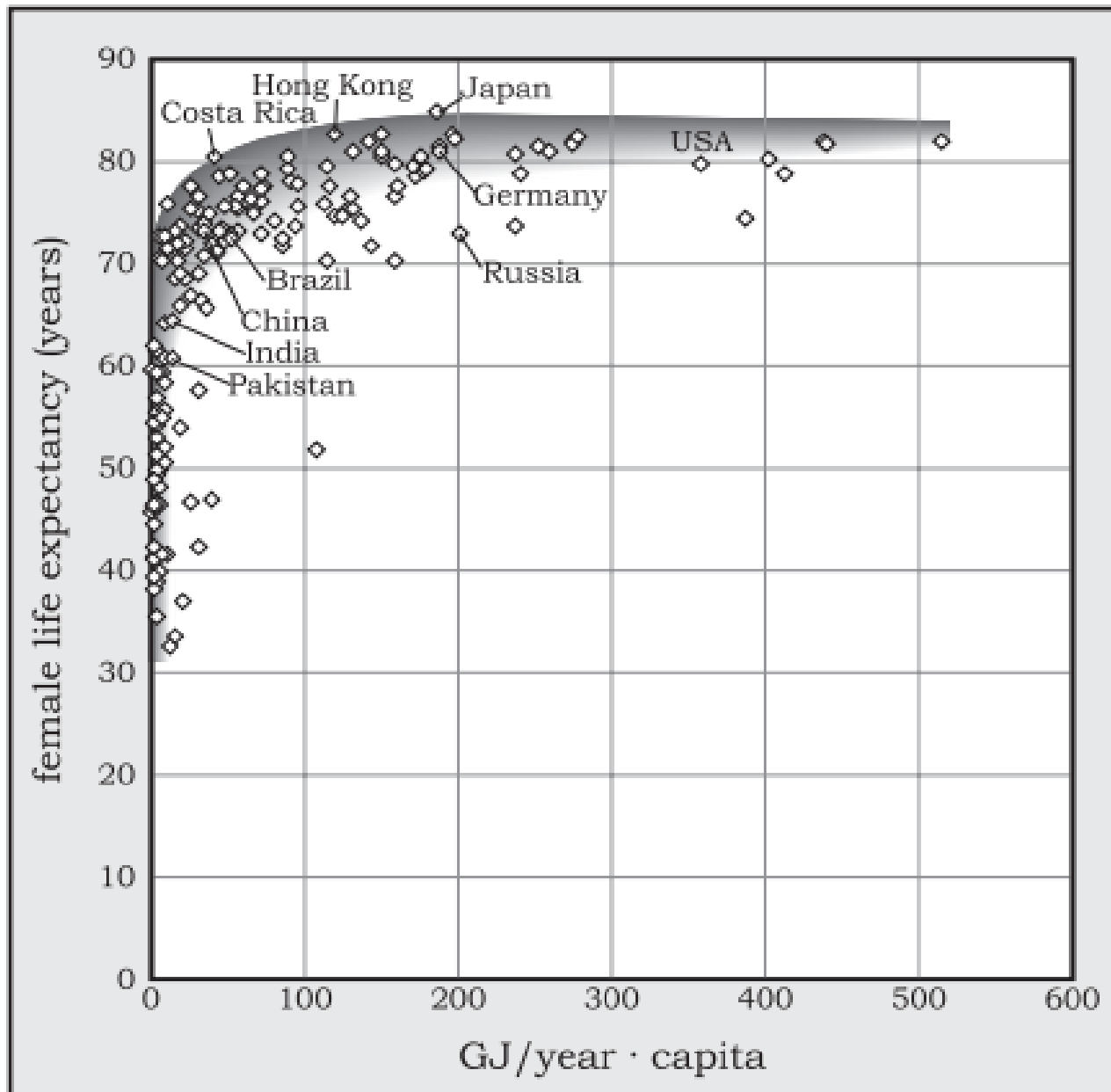


# Ecological economics

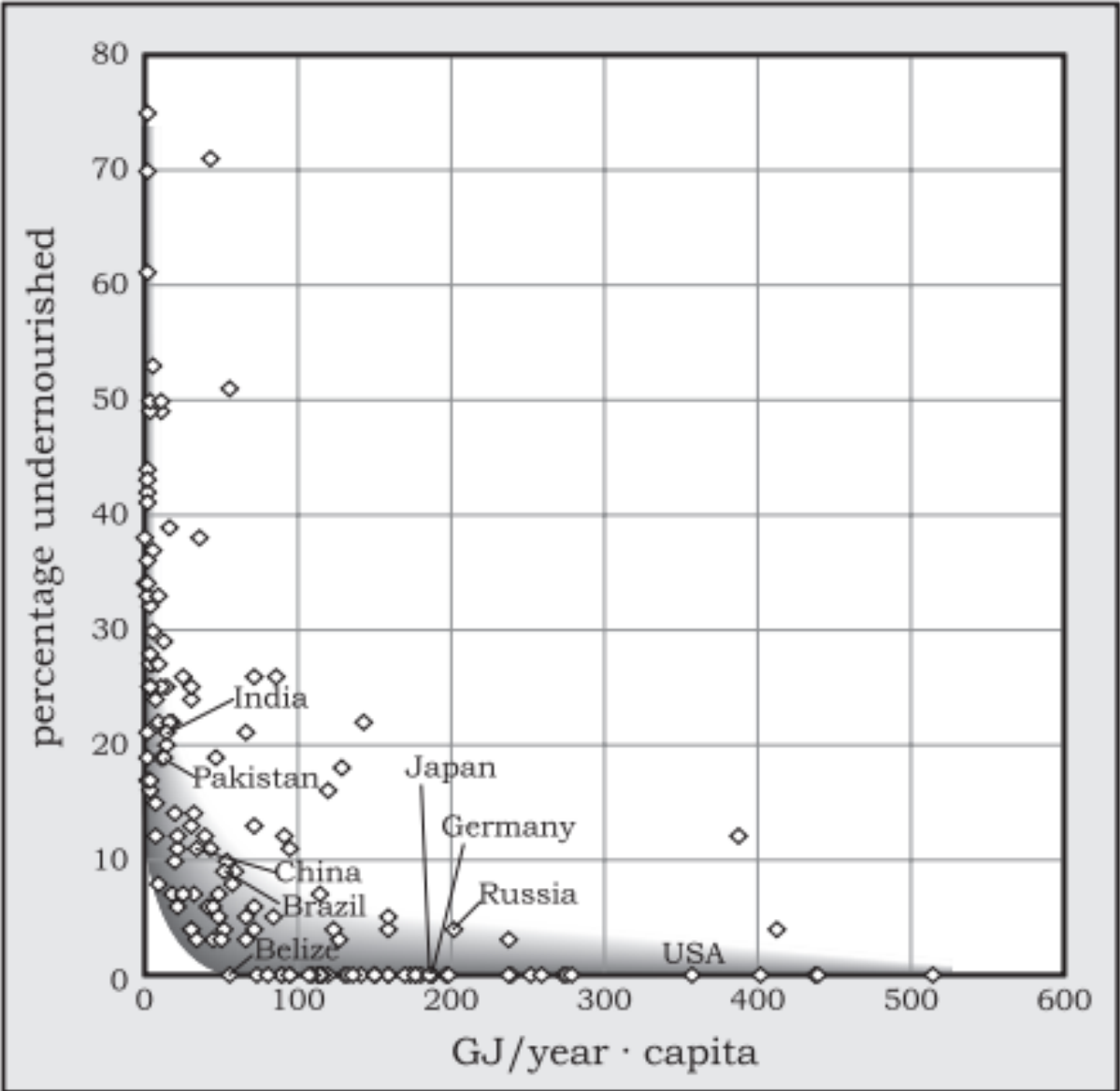
- Simple growth (increase in output, GDP) vs. development (improvement of the quality of life).



Per capita energy use and infant mortality.

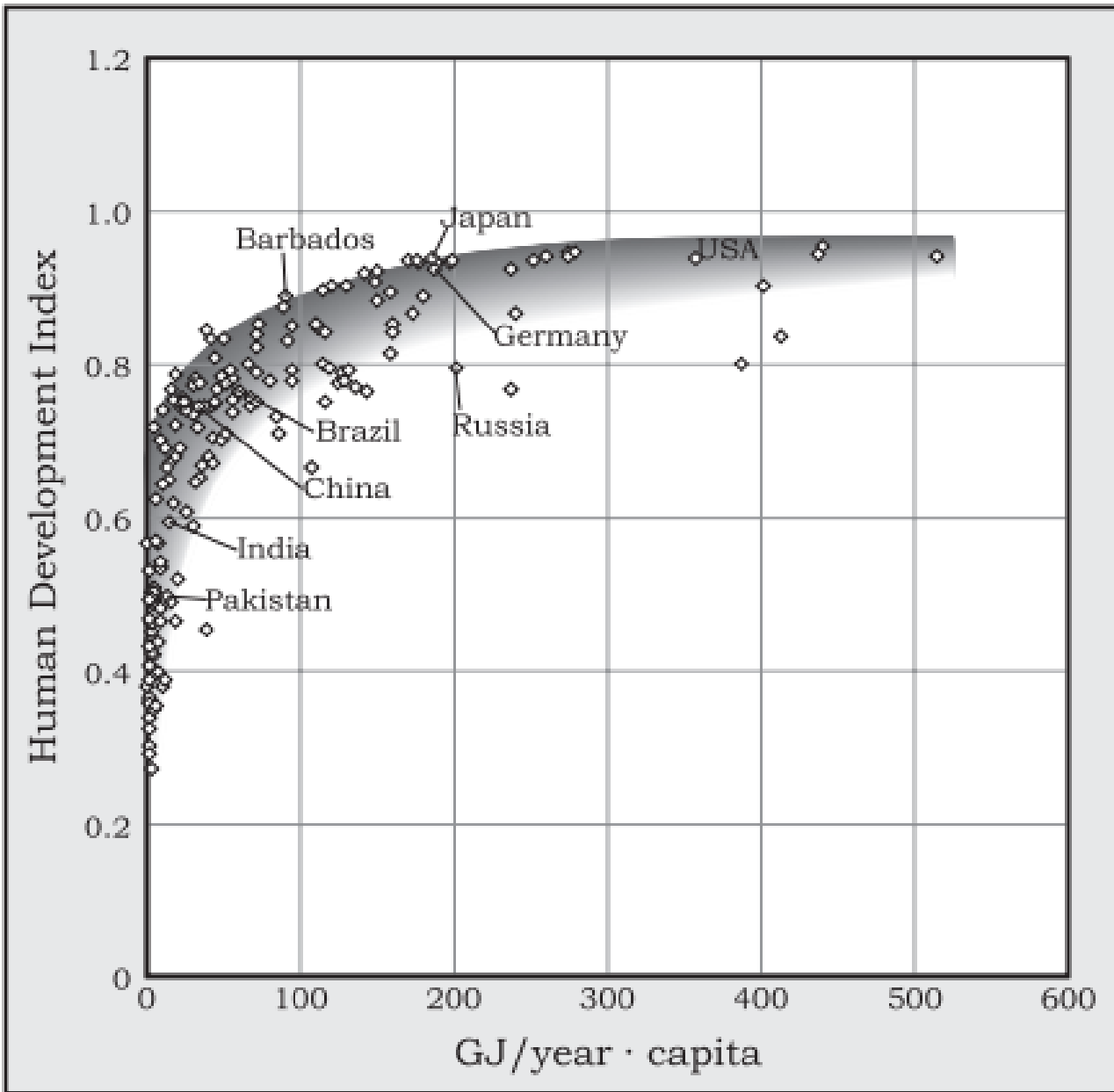


Per capita energy use and female life expectancy at birth.



Per capita energy use and malnutrition.





Per capita energy use and HDI.

# Approaches to energy resources

- Neoclassicals – man-made capital can replace all types of natural capital (weak sustainability view)
- Vs. natural resources and services are irreplaceable (strong sustainability).

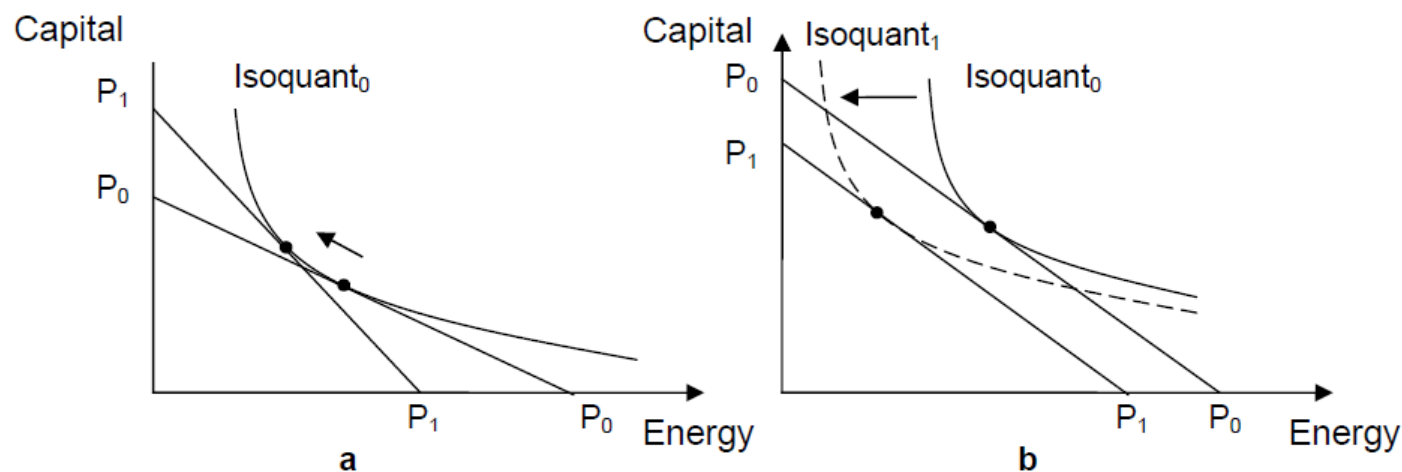


Figure 1 (a) Energy efficiency-improving substitution versus (b) energy-saving technological change.

# Approaches to energy resources (or any environmental services)

## Thermodynamics argumentation:

- Energy can neither be created nor destroyed.
- Energy transformation always losses at least a little energy in the form of diffuse heat (entropy).
- In any process some energy is always needed – full substitution of energy with technology is not possible (steam engine – from 0,5% to 55% at best).

# Approaches to energy resources

- New (unconventional) sources of energy.

vs.

- $EROEI = \text{usable energy output} / \text{energy consumed}$ .
- $\text{Net energy} = \text{energy output} - \text{energy consumed}$ .
- Global EROEI is declining (= you need to produce more gross energy to satisfy the same consumption).

# Approaches to energy resources (or any environmental services)

- New energy source

vs.

- „Are there any?“

# Tools of environmental economics

- Putting the price on the nature (market failures, externalities and 'tragedy of commons') – different valuation. Cap and trade, taxes, subsidies.
- Regulation.
- Better definition of property rights (Coase theorem).
- Change of mindset – GDP to be replaced by „index of happiness“?

VS

- „In every instance considered, natural selection will so operate as to increase the total mass of the organic system, to increase the rate of circulation of matter through the system, and to increase the total energy flux through the system so long as there is present and unutilized residue of matter and available energy“. (Alfred Lotka, 1922).

# Sources

- Andersen, P.: Environmental Science, Bozeman Science.
- Erickson, J.: Ecological Economics, GundIndistute.
- NASA: Third of Big Goundwater Basins in Distress.