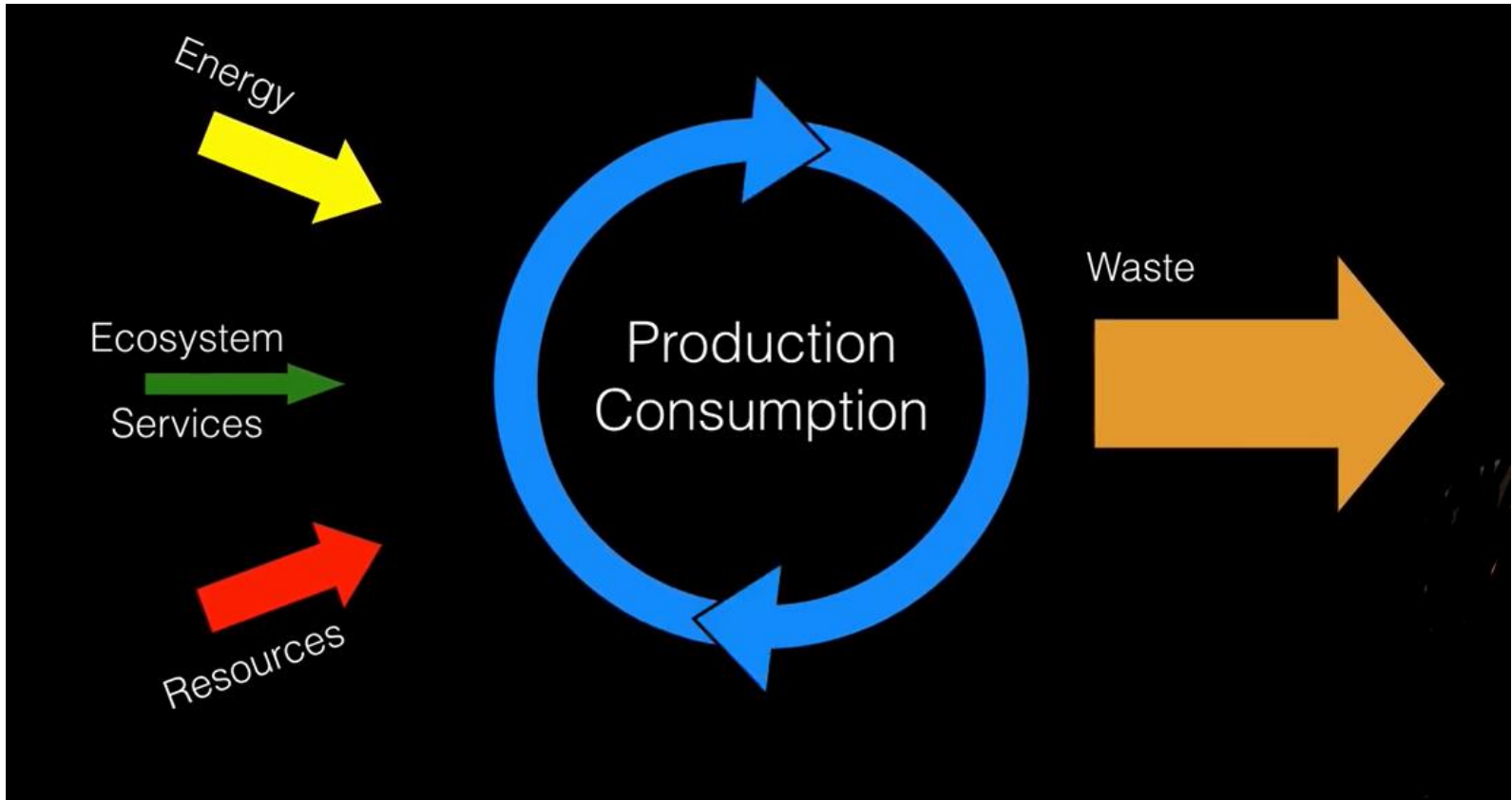


Mainstream economics and its environmental and ecological critique

Filip Černoč
cernoch@mail.muni.cz

Economics matter

- Environment provides us with necessary resources and services.
- These resources and services are processed in the economy.
- Dominant economic paradigm determines the way these sources are distributed, processed, 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

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

Mainstream (neoclassical) economics

- Builds on classical economics 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 – economic growth

- 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 – economic growth

- Reduction in poverty.
- Reduction of unemployment.
- Improved public services.
- Reduced debt/GDP ratio.
- Political aspects.

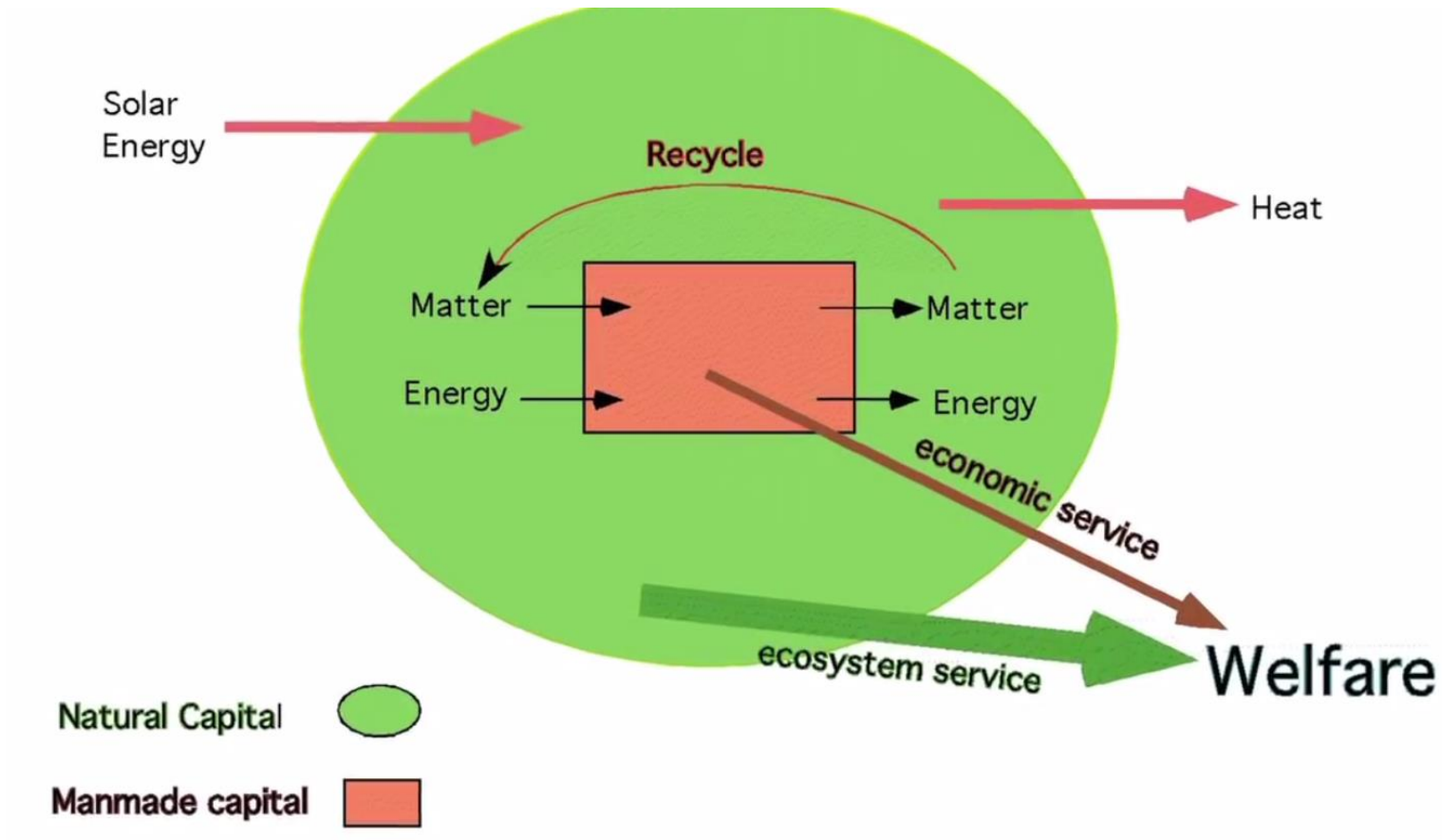
Vs.

- Inequal distribution of growth-related benefits.
- Negative externalities (no necessarily environmental).
- Impact on environment, unsustainable growth.
- What is produced?
- Does happiness really increase?

Neoclassical economics – economic growth

- Neoclassical economics assumes we are in an Empty (limitless) World, where the economy 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 valuated (tragedy of commons).

Mindset of traditional economics



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?

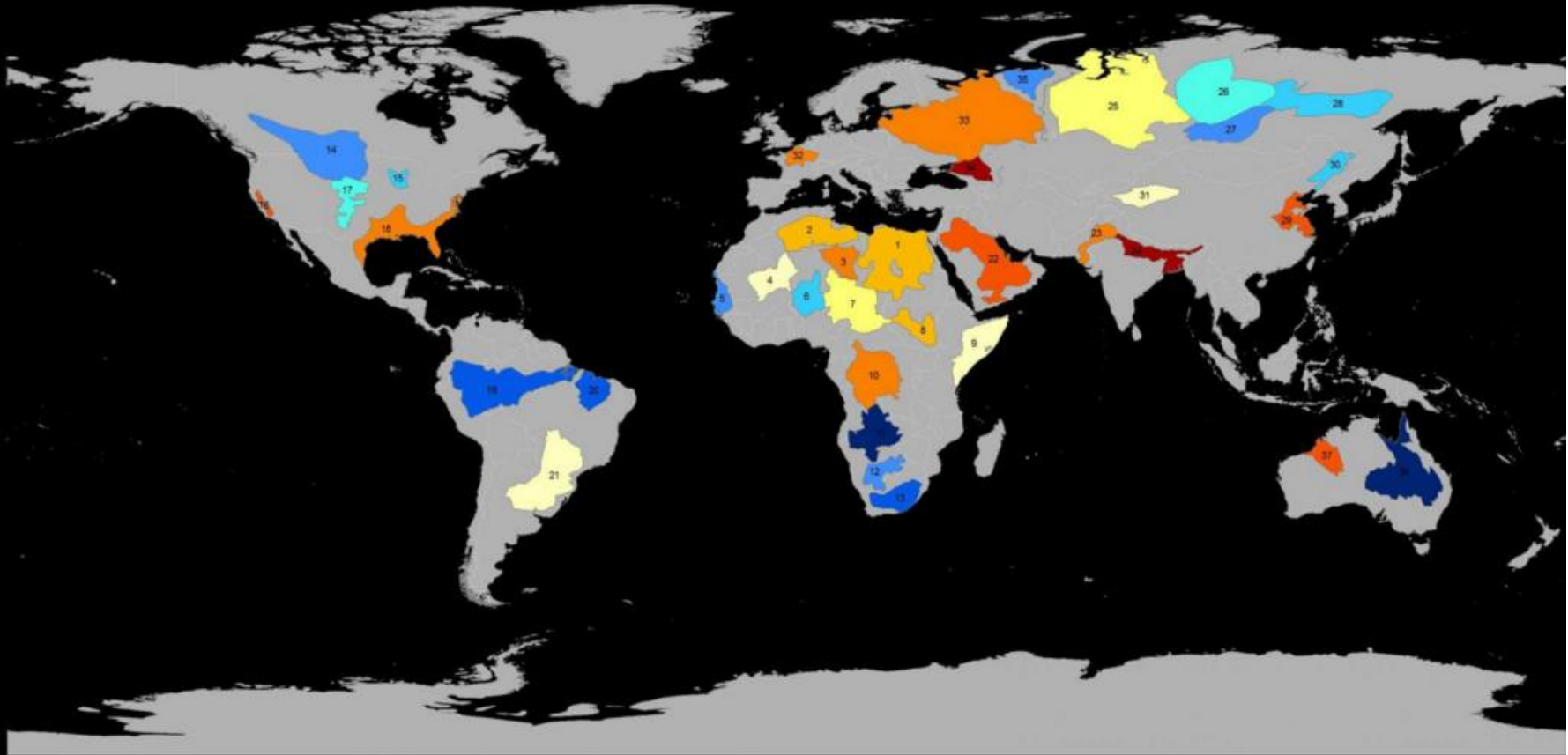
Tragedy of commons

- ...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 | | | |

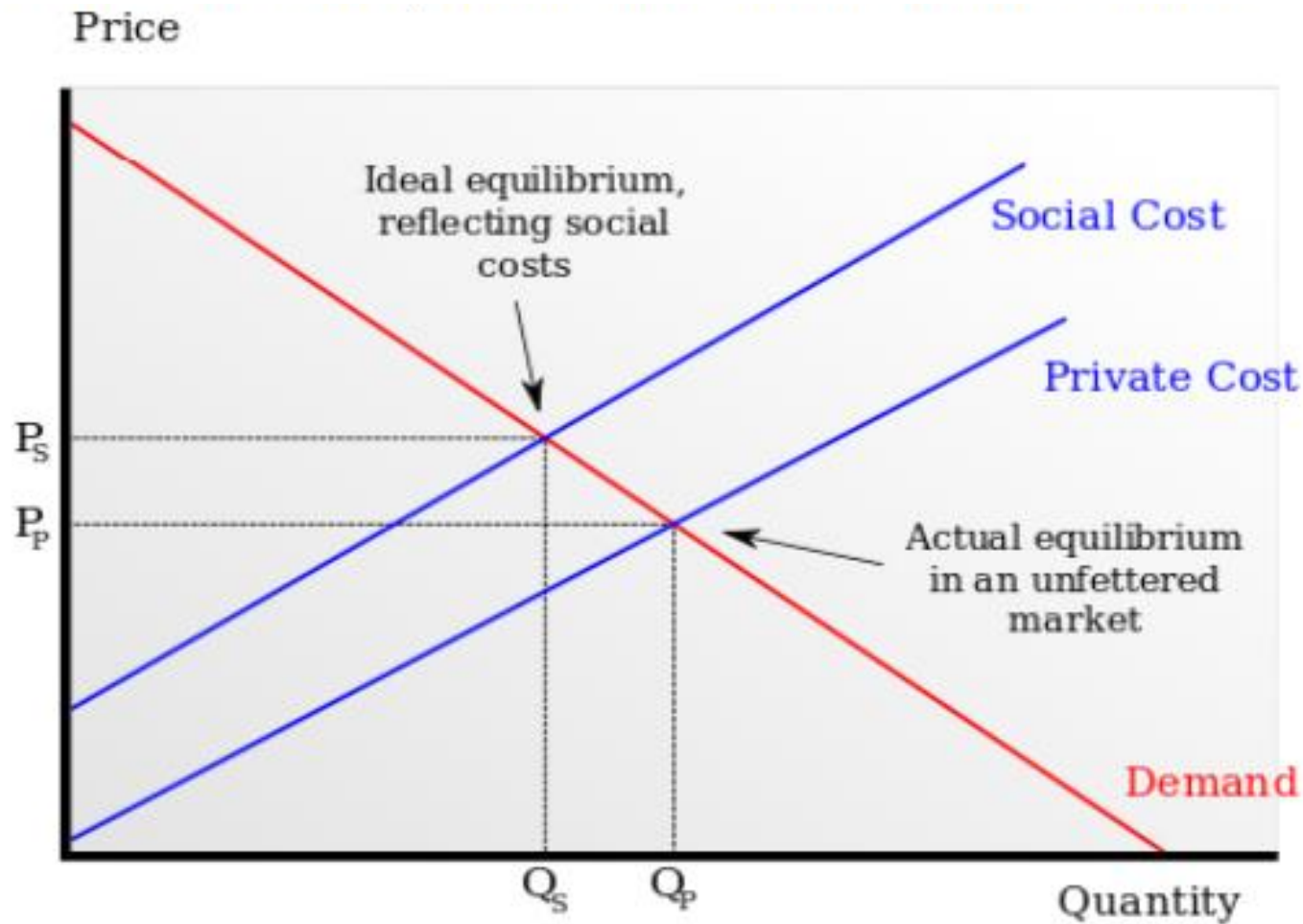
Ecuador – rain forest for sale

- 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

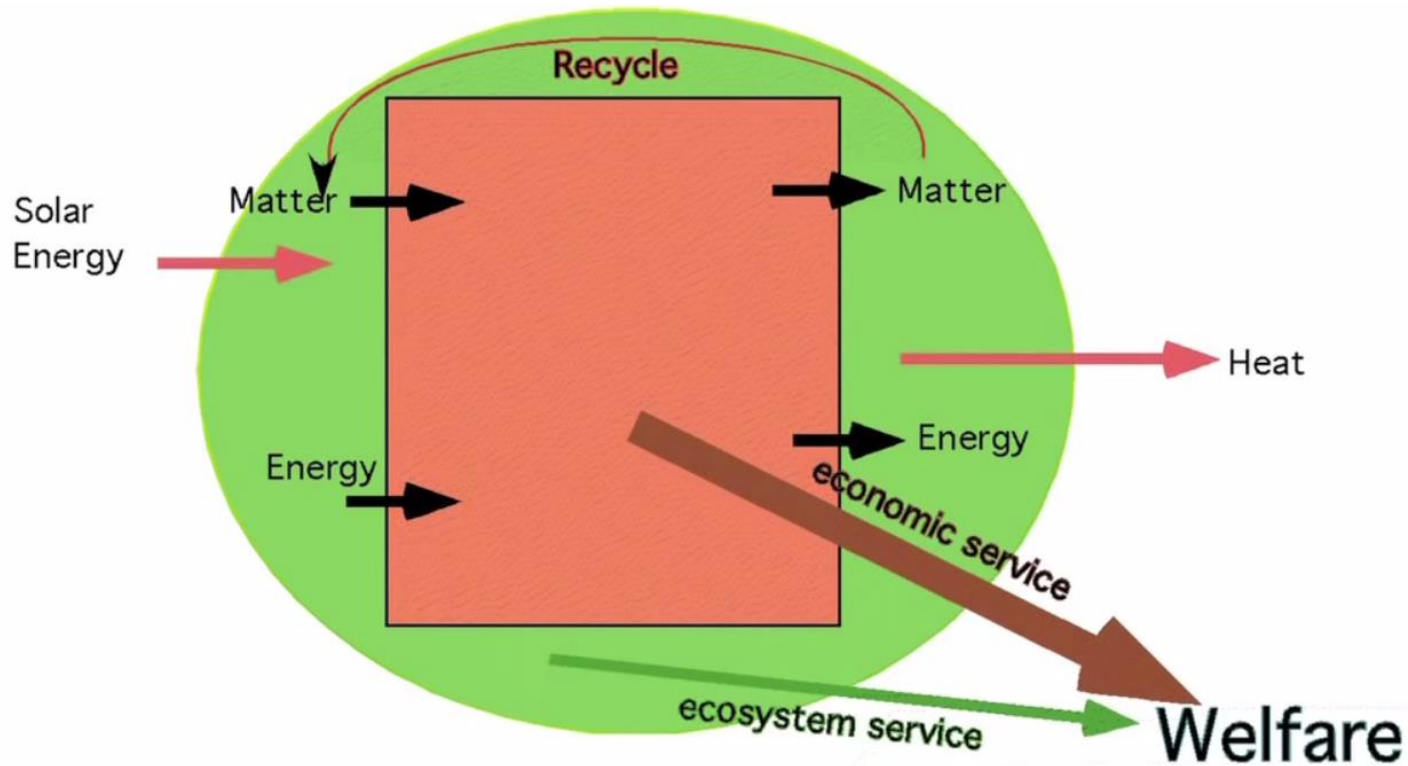
- Recognizes necessity to consume natural resources and services and pollute.
 - 1) Environment is turned into a commodities: goods and services. Once defined in commodity terms (forest offering wood, game, but also recreational services), the environment could be brought to market economy by constructing 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

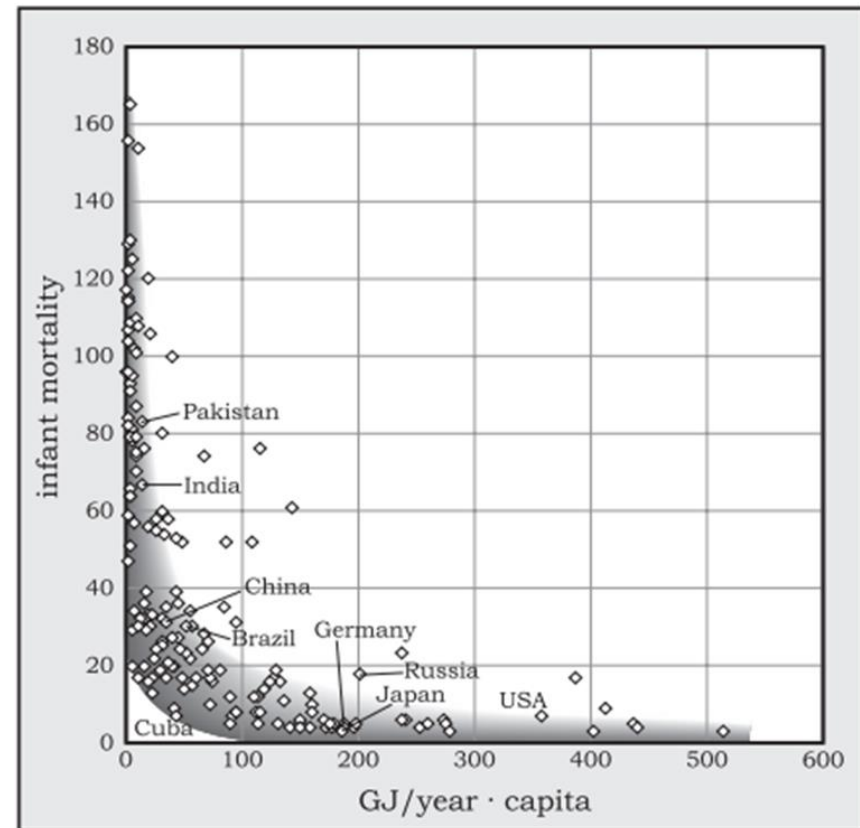
- Emphasis on nature, justice, time (sustainability). Highly normative (prescriptive).
- Technological scepticism (vs. mainstream economists optimism).
- Economics is contained within the ecosystem of the planet; boundaries of the economy must remain within the boundaries of the ecosystem.
- Carrying 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.

Modern 7bn people world

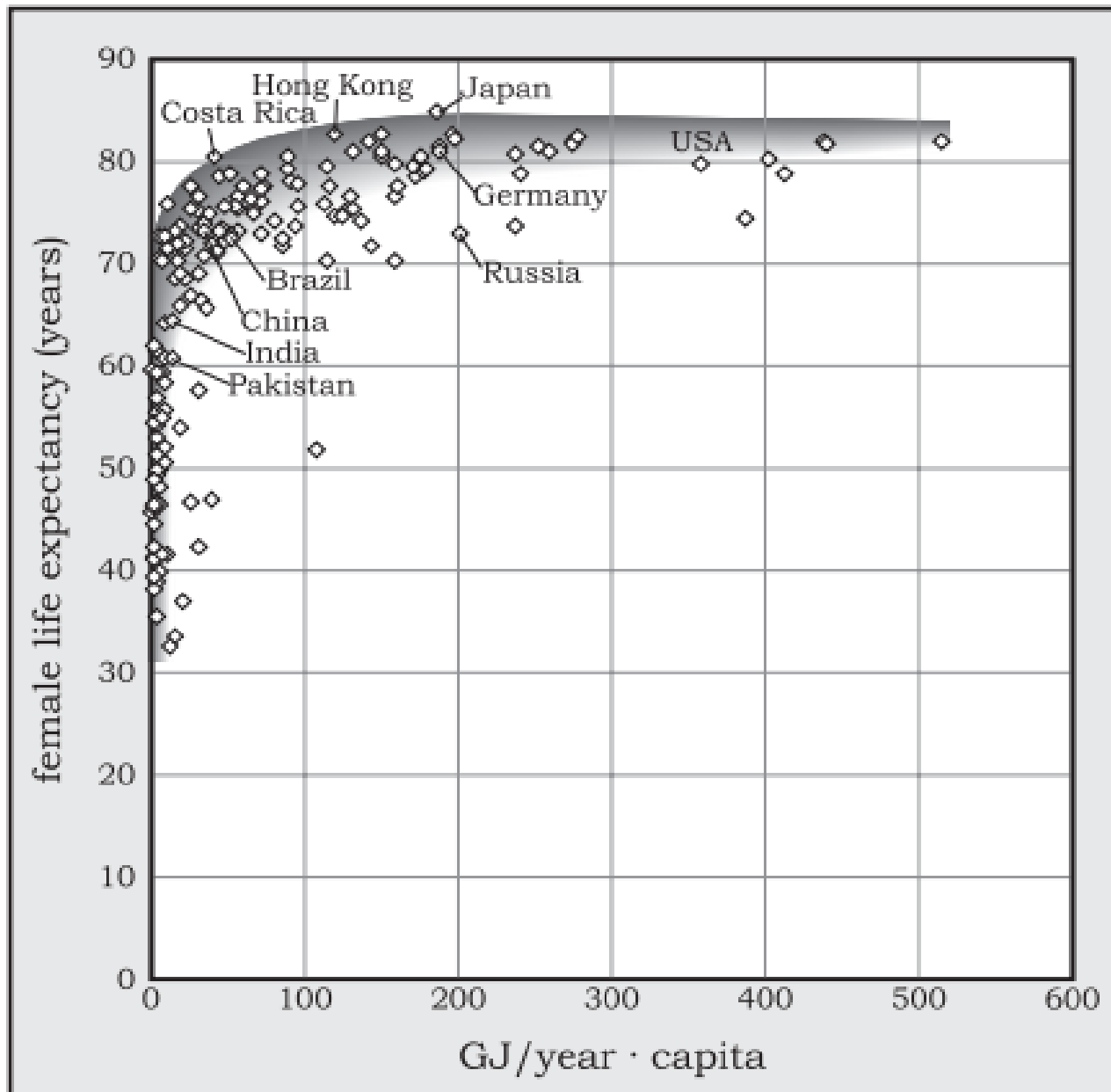


Ecological economics

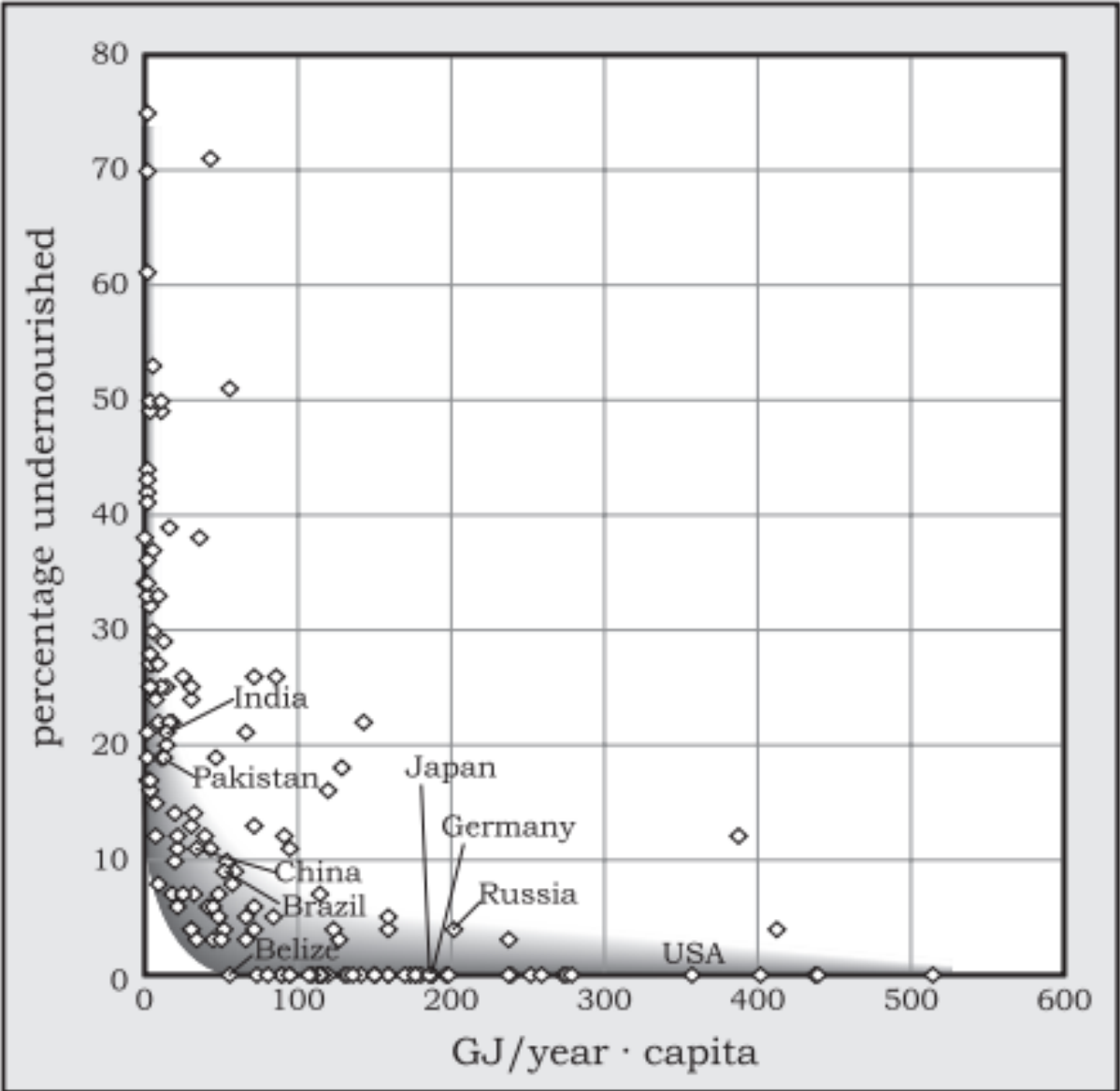
- Simple growth (increase in output, GDP) vs. development (improvement of the quality of life).



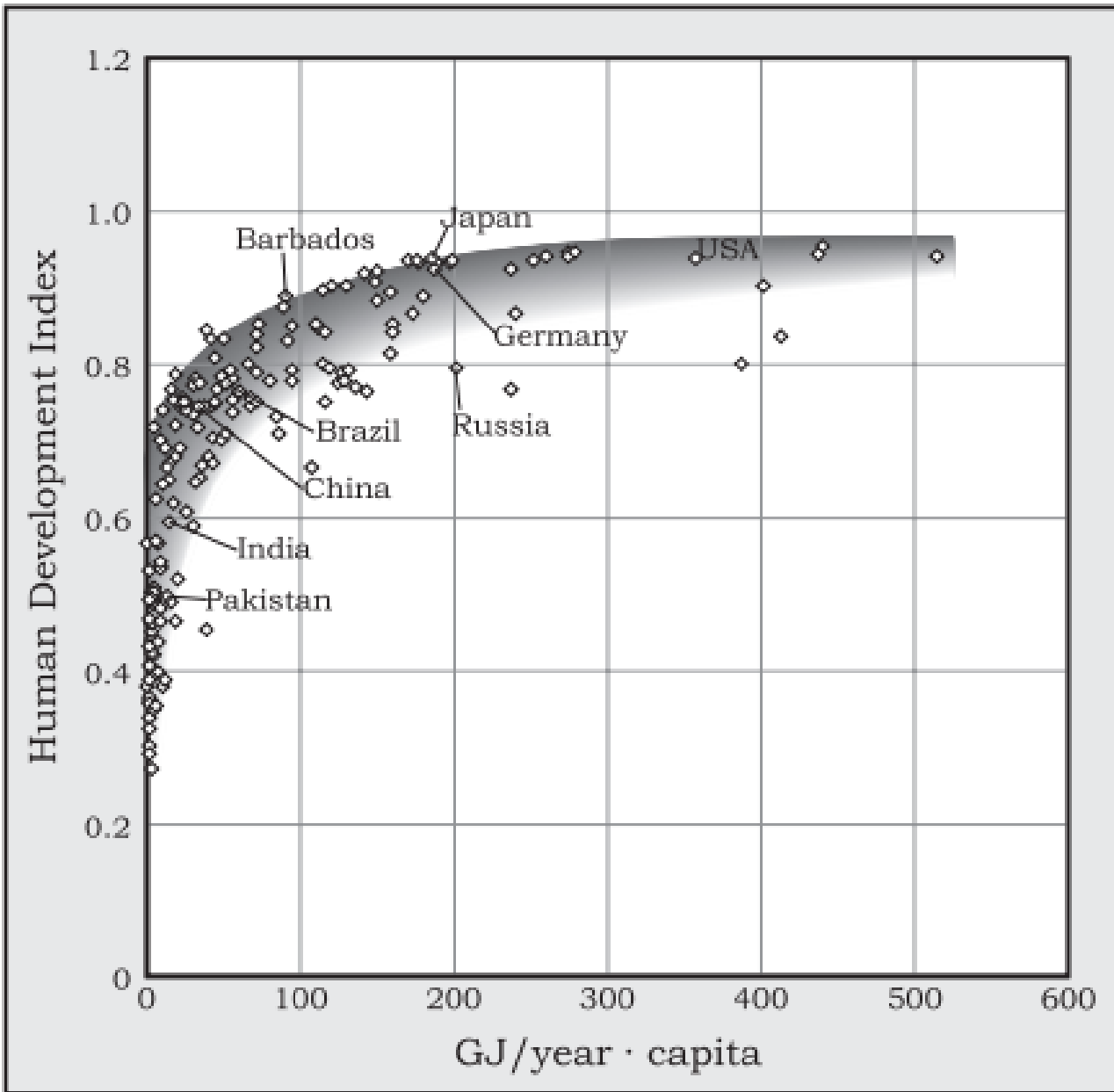
Per capita energy use and infant mortality.



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).

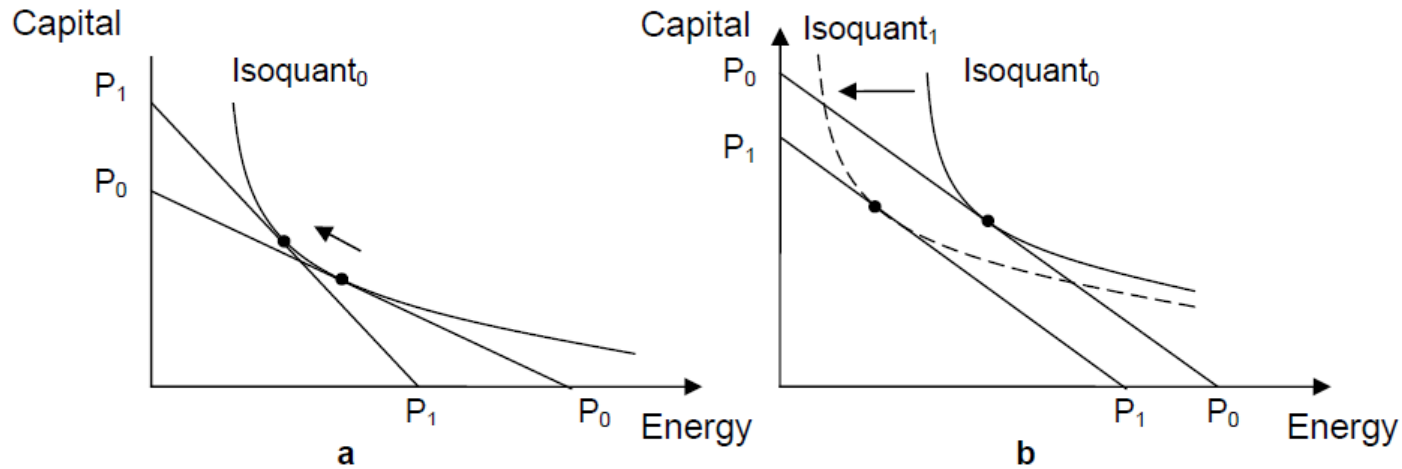


Figure 1 (a) Energy efficiency-improving substitution versus (b) energy-saving technological change.

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.

- $EROEI = \text{usable energy output} / \text{energy consumed}$. 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?“

Sources

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