

Neoclassical economics and environment

Economics matter

- Environment provides us with necessary resources and services.
- These resources and services are processed in the economy.
- Economics explains how economies work, how economic agents behave, and how resources are allocated.
- Descriptive and prescriptive 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 (part of broader social, cultural, and religious system of society).

Economics matter

- So...is neoclassical economics right in how resources (incl. energy resources) should be used by society?

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 (value of goods and services based on perceived value for buyers, not on production costs), 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.

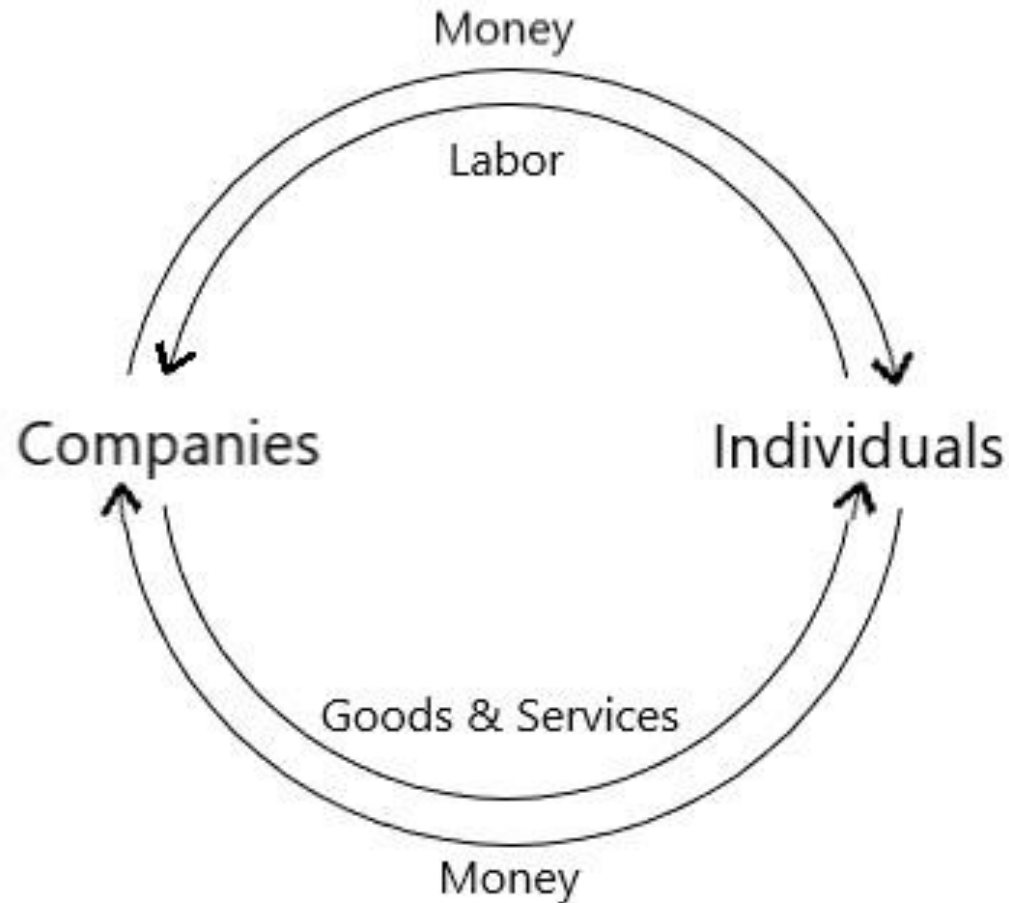
Vs.

- Inequal distribution of growth-related benefits.
- Negative externalities (not only environmental).
- Impact on environment, unsustainable growth.
- What is produced?
- Does happiness really increase? (Theory of hedonistic relativism)

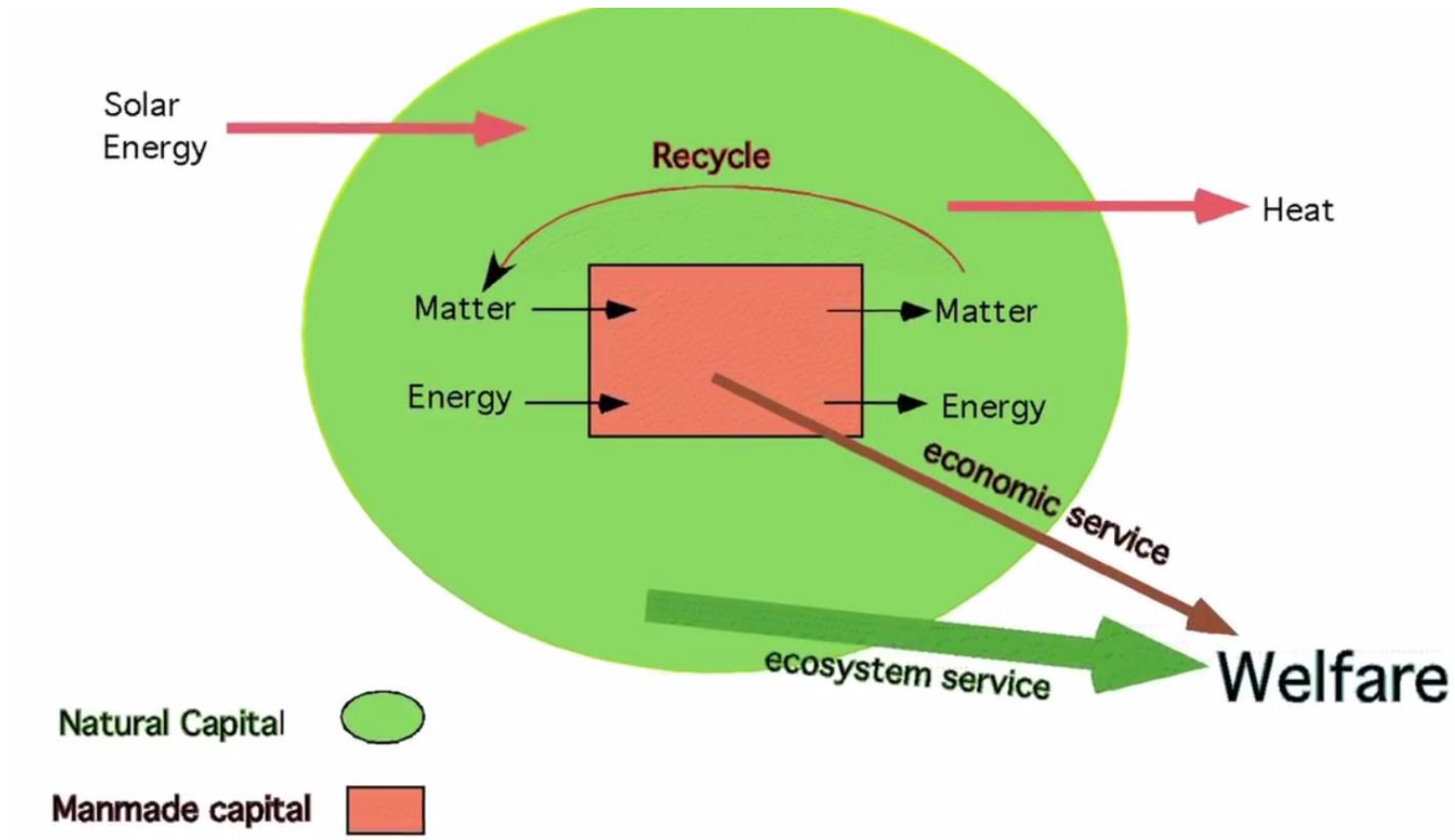
Neoclassical economics – economic growth

- 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 neoclassical economics



Mindset of traditional economics



Environment in neoclassical economics

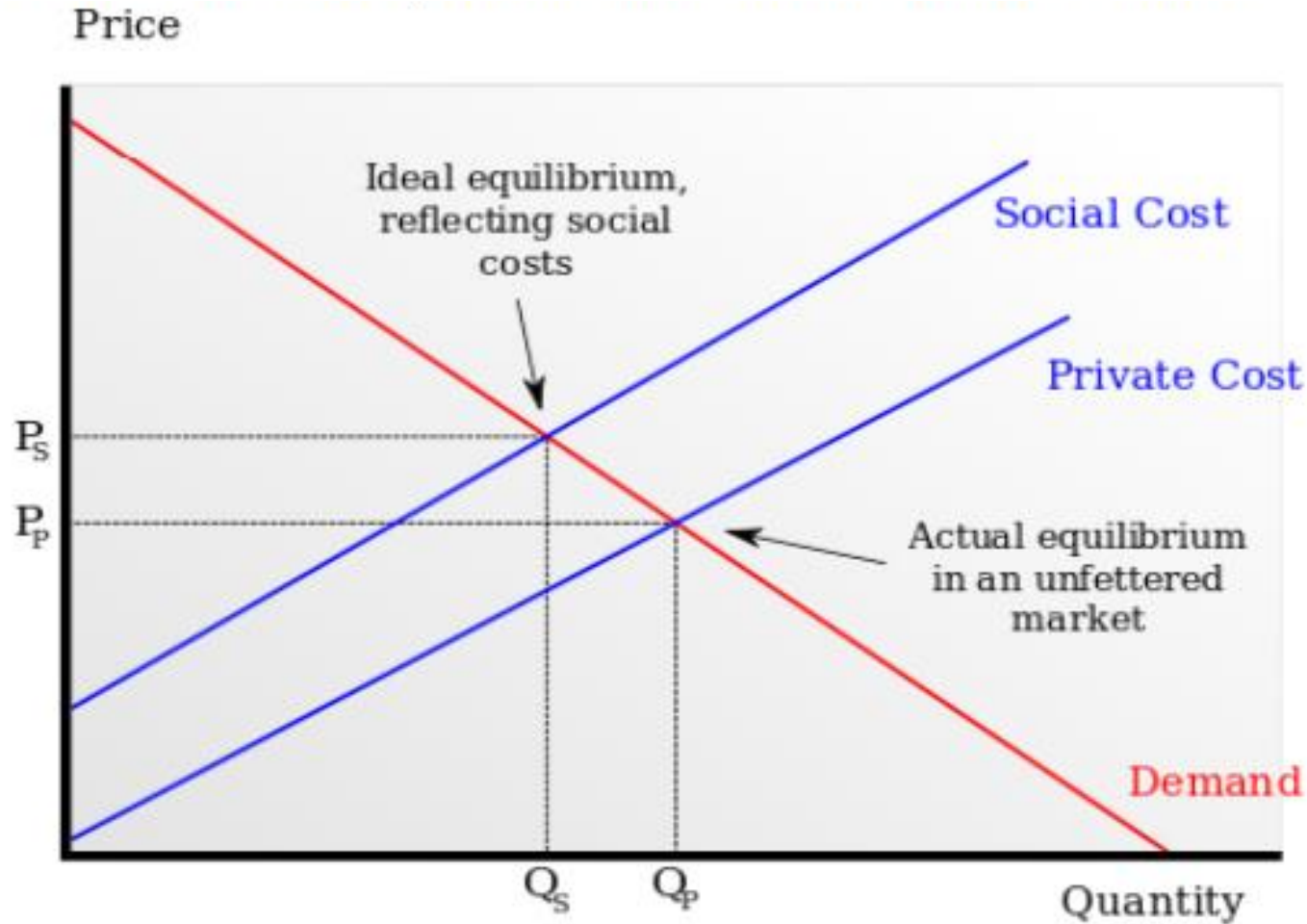
- Quite often market seems fail to allocate resources to generate the greatest social welfare. Individuals follow market prices and society suffers in terms of overall (environmental) costs.
- Deforestation
- Overfishing
- Climate change
- Plastic pollution
- Air pollution
- ...

=> Environmental economics as a sub-field of mainstream economics, using economical tools to address environmental issues.

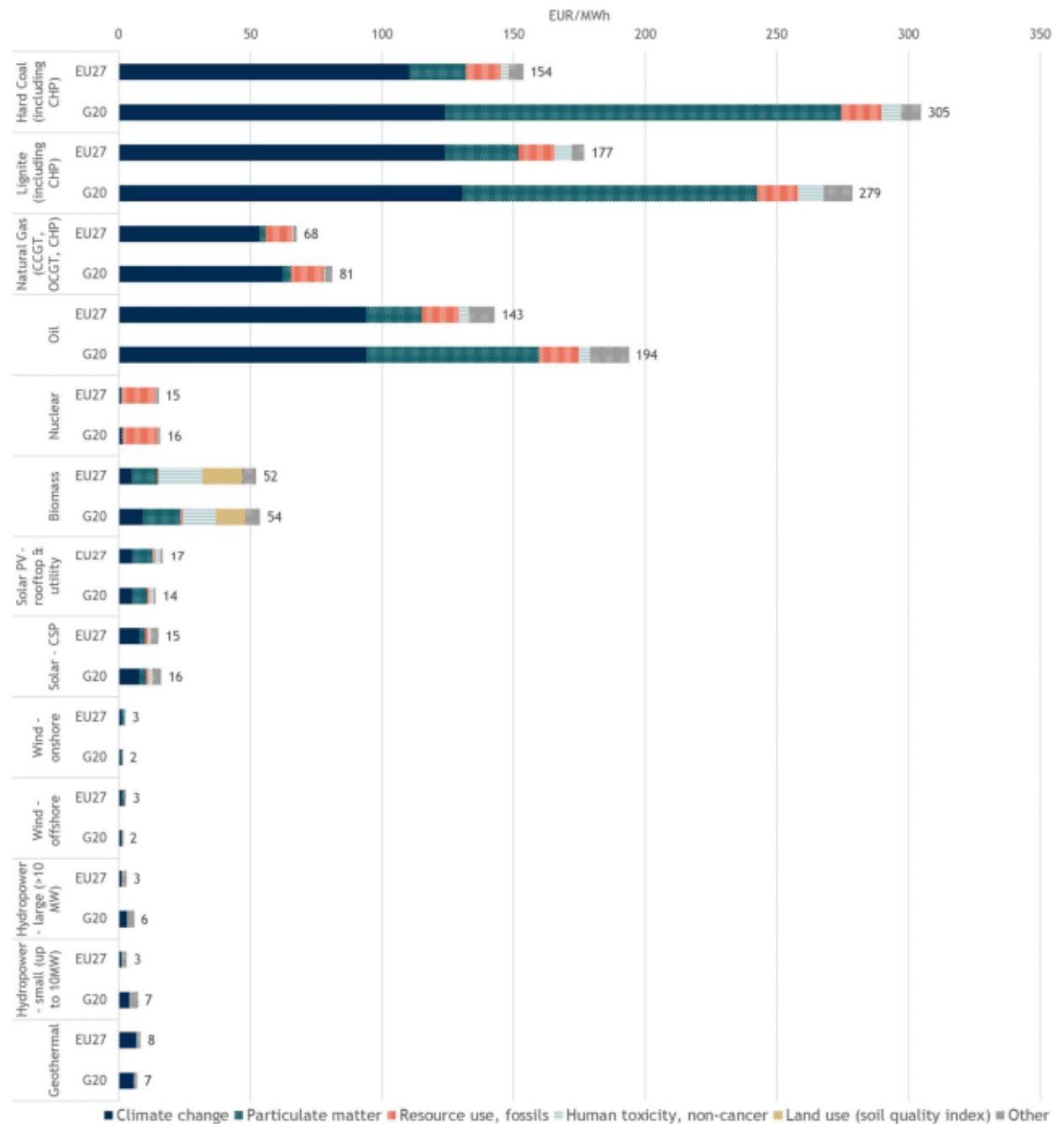
Problem No. 1 – Environmental externalities

- A consequence of an economic activity that is experienced by unrelated third parties. An externality can be either positive or negative.
 - (Pigouvian) taxes/subsidies.
 - Command and control solution.
 - Properly allocated ownership rights.

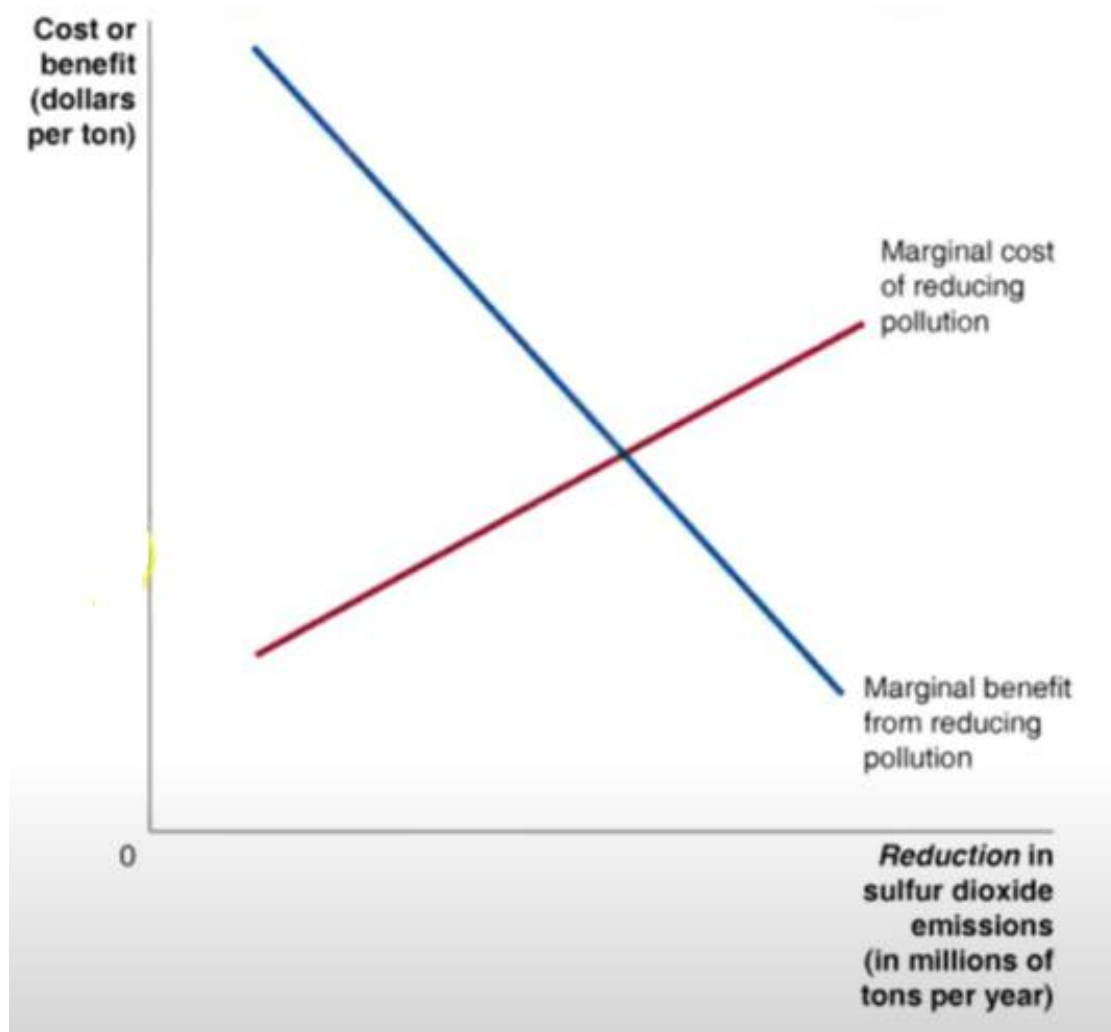
Externalities



External costs of electricity technologies - production weighted average of EU27 and G20 countries



Zero pollution?



Problem No. 2 - Common properties

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.

Coase theorem (Allocation of property rights)

- „...under the right conditions parties to a dispute over property rights will be able to negotiate an economically optimal solution, regardless of the initial distribution of the property rights“.
- Uneffective if:
 - there are too many affected parties, so it is expensive to coordinate the necessary contracts for the sale of property rights,
 - one person can block the sale, regardless of the costs actually imposed on them,
 - enforcement of the contract is too expensive, such as the costs of court proceedings if there is a breach of contract,
 - the costs of monitoring the offending behavior are high.

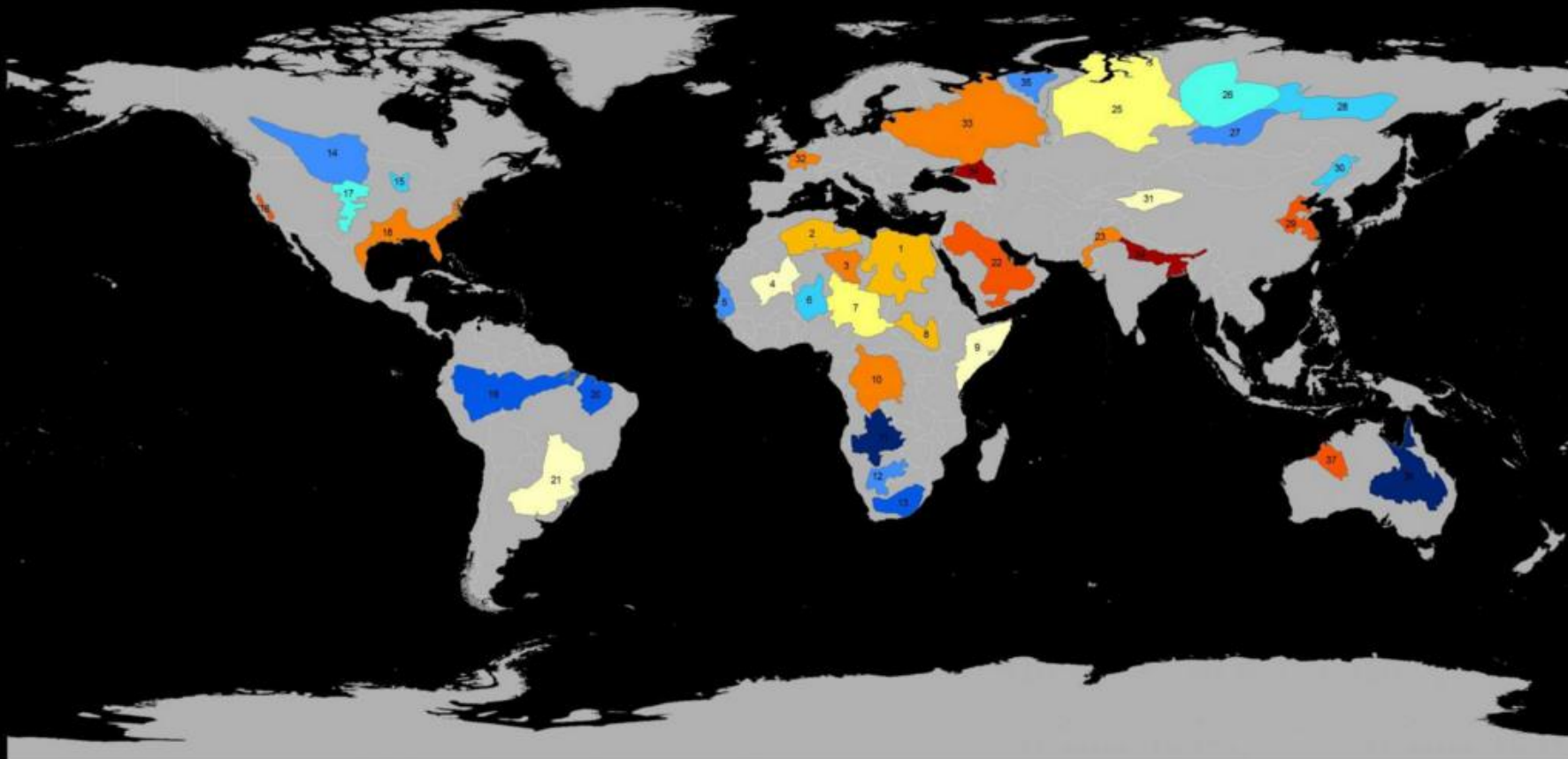
Problem No. 3 – Consumption of natural resources over time

- While (properly managed) renewable resources last indefinitely, non-renewable sources get consumed over time – maybe too fast?
- Consumption is based on prices of given commodity. Future (financial) value is translated into the present (financial) value – using discount rate.
 - In shorter periods of time expected prices motivate owner to save for future.

Problem No. 3 – Consumption of natural resources over time

- It works poorly for the long term, no incentive to save for future generations, no intergenerational solidarity.
 - Resource depletion tax.
 - Direct government control over resource exploitation.
 - Do we have an imperative to leave untouched resources to future generations? (Vs. Hartwick rule).

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



[mm H₂O yr⁻¹]



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

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|----------------------------------------------|-----------------------------------------------|-----------------------------|-------------------------------|
| 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 | | | |

Problem No. 4 – Economic valuation of environmental goods and services

- Non-use value - how to assess the economic value of the environment, which is not of a direct use for humans?
- In standard economic theory, nature has value only because humans ascribe some value to it (no inherent right of environment „to exist“).
- Economists try to value non-market benefits using different methods.
- Does a monetary valuation of the environment provide a good basis for policy decisions?

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).

Neoclassical approach to the environment (Environmental economics)

- In a practical terms, main tools of the governments to deal with the environmental problems are 1) regulation and 2) financial tools (subsidies and taxation).

Sources

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