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**Green, blue, sustainable or de-growth – where are we in
the debate?**

Overview

- **Overview on terms and their background**
 - **Sustainability/Sustainable development**
 - **Economic growth/Sustainable growth**
 - **Blue/Green growth (a bit provocative...)**
 - **Environmental Kuznets Curve**
 - **Decoupling of growth and resource use**
 - **Degrowth**
- **Strong sustainability and the flow/fund concept**
 - **Georgescu-Roegens basic concept**
 - **Application to fisheries**

Overview on terms – Sustainability/Sustainable development

- **Sustainability concept first used in forest management (Carlowitz 1713) – due to an extreme shortage of strong timber**
- **Sustainability = don`t exceed growth rate of a forest with your harvest rate**
 - > **preserve harvest potentials for the future (ethical, ecological requirements) but harvest what`s possible (economic considerations)**

Overview on terms – Sustainability/Sustainable development

- **Sustainable development: UN definition and Rio conference**
 - > **Compromise between the right for ‚development‘ in the ‚global south‘ and the environmental concerns of the ‚industrialized north‘**
 - > **Bad compromise as there seems to be no real improvement with regard to environmental concerns and still many countries see no economic development**

Overview on terms – Sustainability/Sustainable development

- **This year Rio+20 conference. Yet:**
 - **Highest level of CO₂ emissions in 2010 after decrease in 2009**
 - **Decreasing ph-levels in the marine environment due to absorption of CO₂**
 - **Biodiversity loss ongoing**
- **The term Sustainable Development after getting very popular seems now to be changed into ,Green Growth‘**
- **Having improvements in resource efficiency is the only strategy and that will not be sufficient**

Overview on terms – Growth/Sustainable growth

- **Economic growth = increase of market transactions (valued with market prices) and summed up in e.g. GDP**
- **The concept of growth is not new in economic theory – Yet: before neoclassical economics constrains due to the shortage of land were considered**
- **With the assumption that agriculture is just an economic activity as everything else (capital investment, return on investment) land was eliminated as a production factor and subsumed under ‚capital‘**
- **After 1972 (Club of Rome report) a new discussion on shortages started**

Overview on terms – Growth/Sustainable growth

- **Sustainable growth has two meanings**
 - **Growth with a constant growth rate**
 - **Growth only possible in the longterm by staying inside the limits of the ecosystems (-> Carlowitz)**
- **Is green growth a different concept?**

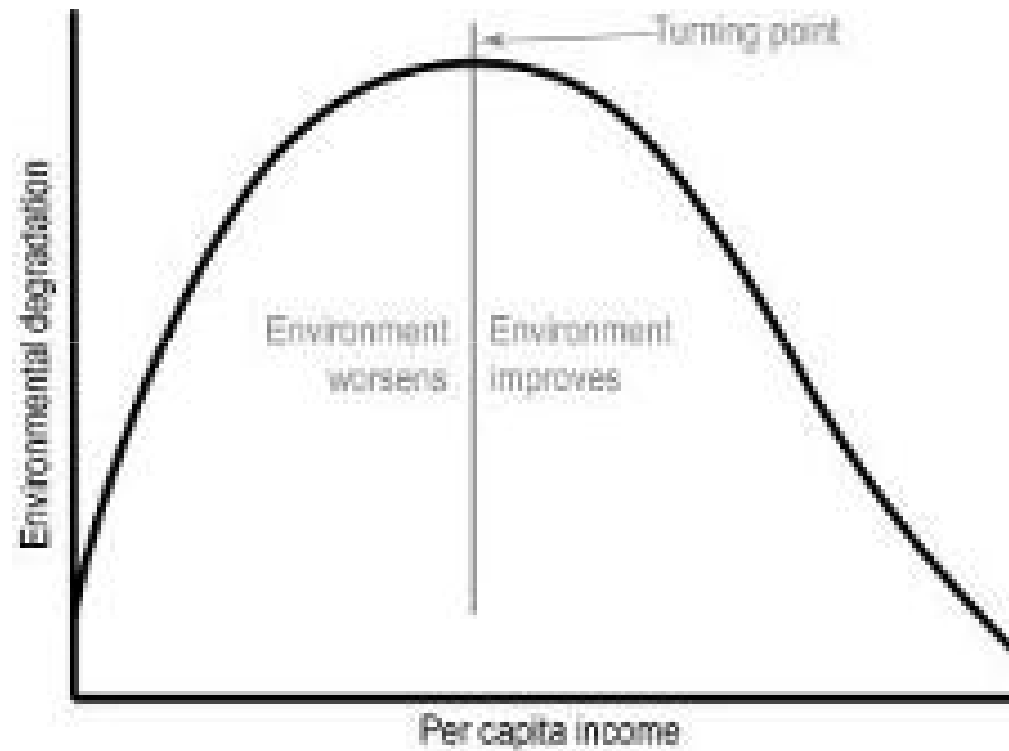
Overview on terms – Blue/green growth

- **Green growth – just a new name for an old concept (Brand 2012) . It will not work (bad compromise like SD).**
- **OECD: *The focus of green growth strategies is ensuring that natural assets can deliver their full economic potential on a sustainable basis.***
- **Blue growth means green growth with a special focus on the marine environment (EC Consultation)**

Overview on terms – Blue/green growth

- **What assumptions are behind green growth?**
 - **Two examples**
 - **Environmental Kuznets Curve**
 - **Decoupling of growth and resource use**

Overview on terms – Blue/green growth – EKC concept

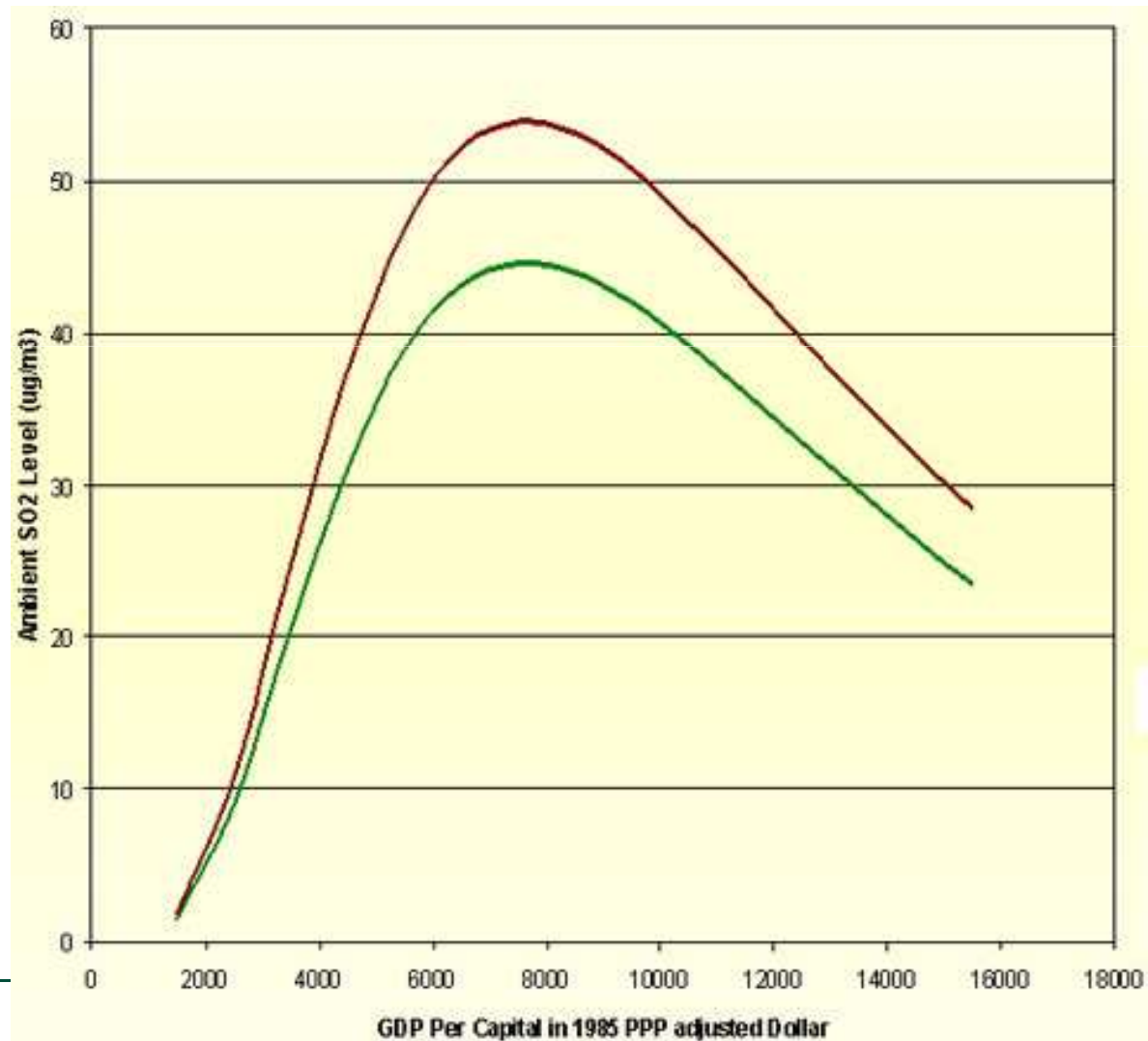


Seems to work for: SO₂, CO₂ (partly)

Source: Green Wiki

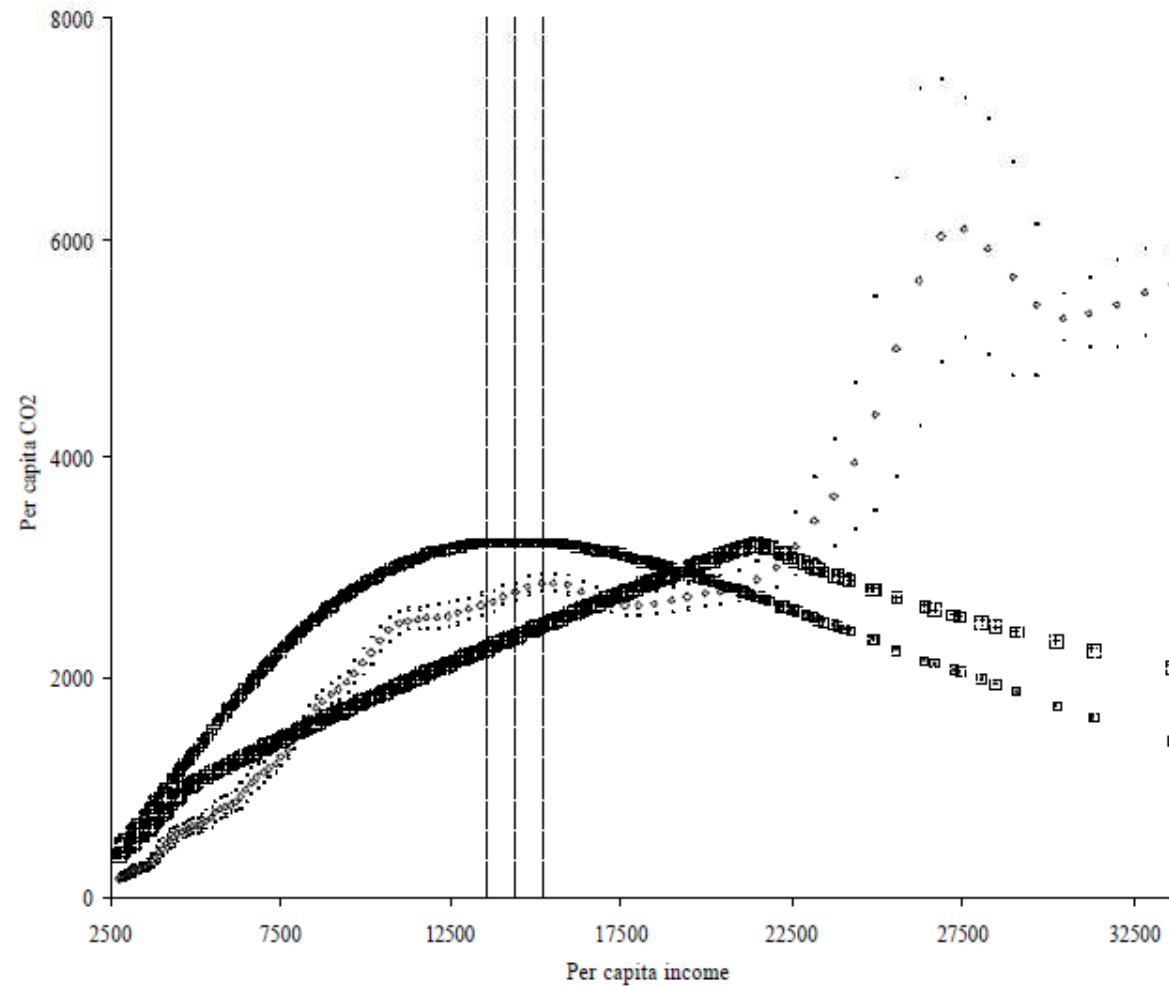
Seems not to work for: biodiversity, heavy metals (stocks increase even with lower flows)

Overview on terms – Blue/green growth – EKC concept



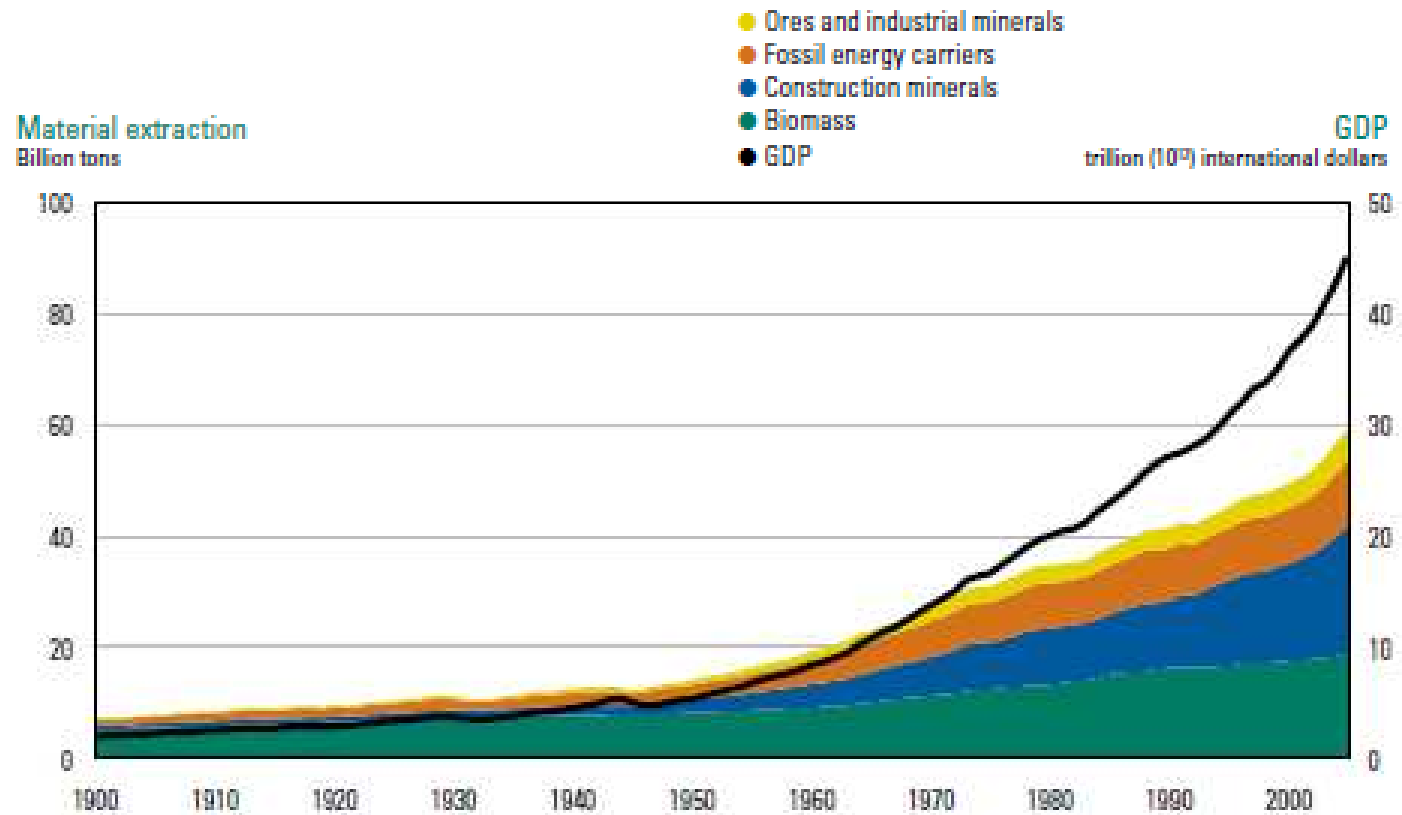
Overview on terms – Blue/green growth – EKC concept

Figure 2: Estimation results for 24 OECD countries, based on the homogeneity assumption for GDP^{a)}



Overview on terms – Blue/green growth – Decoupling debate

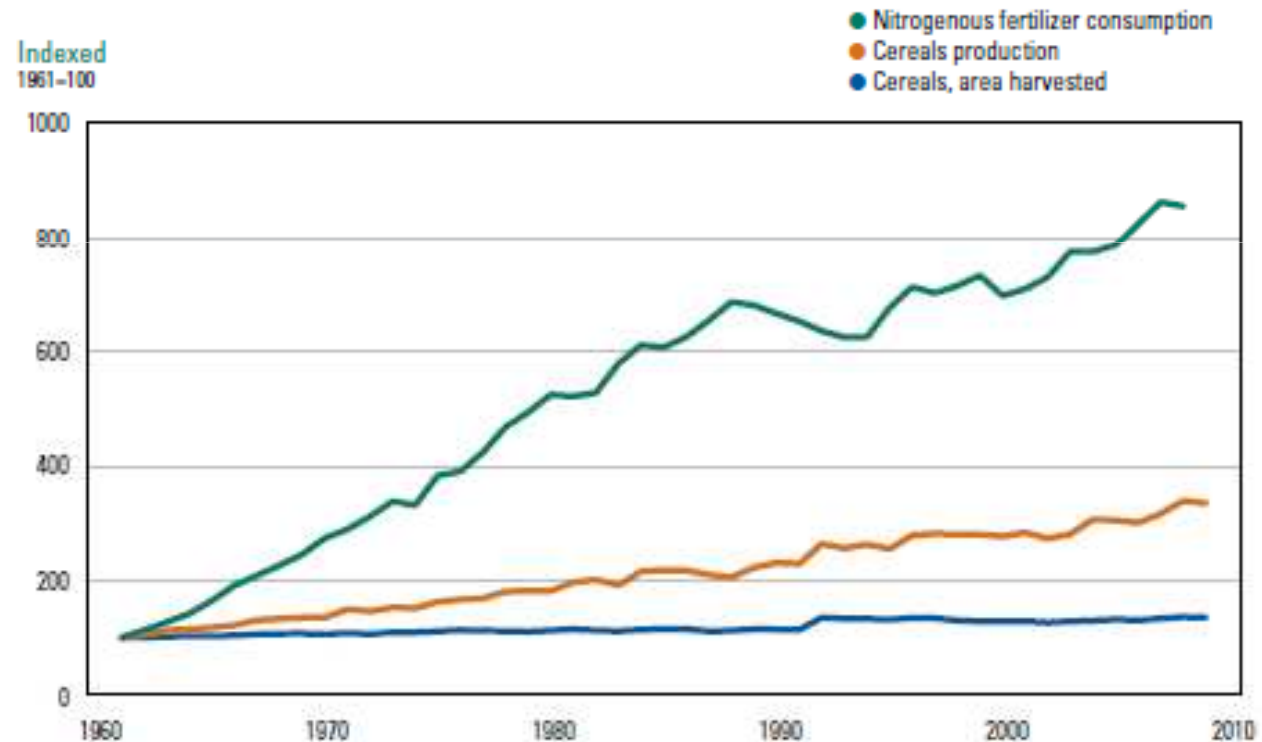
Figure 2. Global material extraction in billion tons, 1900–2005



Source: Krausmann *et al.*, 2009

Overview on terms – Blue/green growth – Decoupling debate

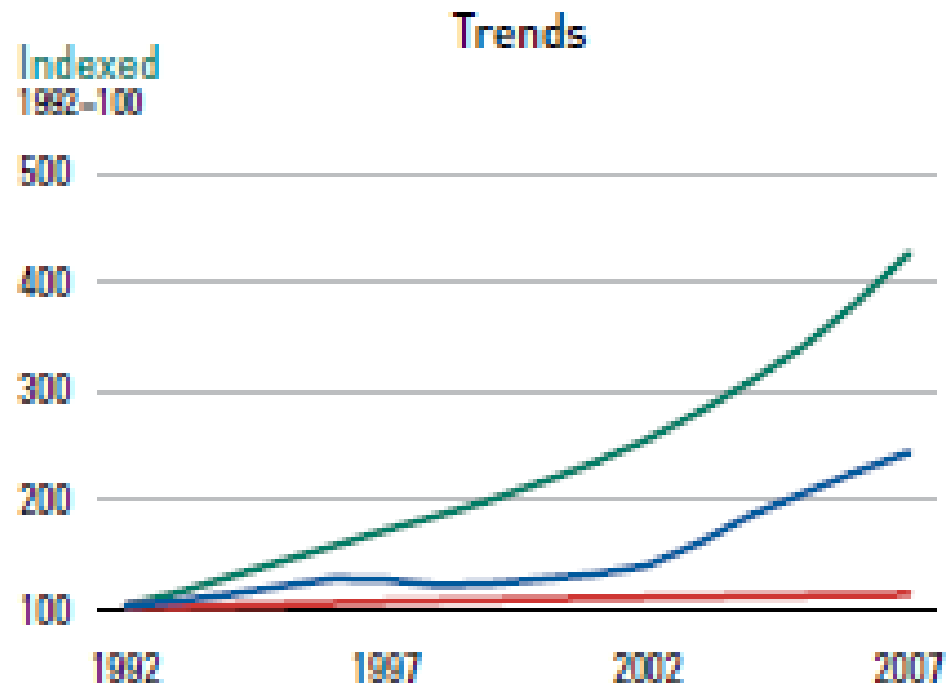
Figure 2.9. Global growth of cereals production and fertilizer consumption



Note: Global growth in the production of cereals since 1961 almost exclusively depended on intensification (nitrogen input, tractors, yields and many other factors not shown on this graph), whereas the expansion of harvested area played an insignificant role.
Source: UNEP GEO Portal, as compiled from FAOSTAT database, Food and Agriculture Organization of the United Nations (FAO), <http://geodata.grid.unep.ch>

Overview on terms – Blue/green growth

- GDP
- Primary energy consumption
- Population



Overview on terms – Degrowth

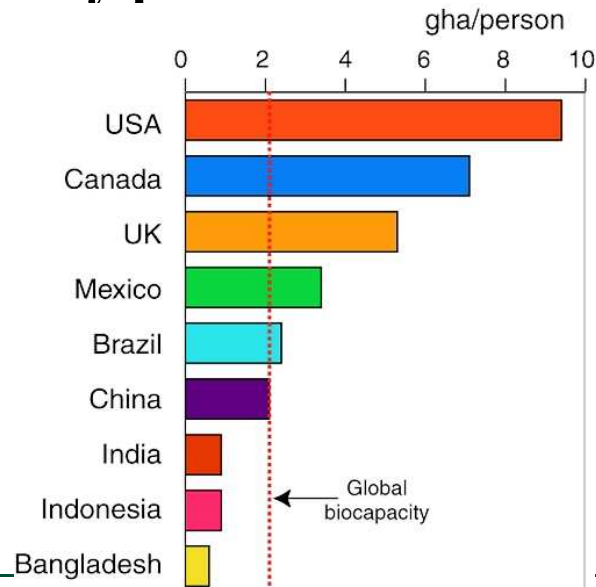
- **Strong international movement questioning economic growth as**
 - **not improving distributive justice**
 - **not improving quality of life anymore (threshold hypothesis)**
 - **cannot go on forever as there are limits (ecological, social)**
- **Some aspects taken up by the degrowth movement (rebound effect, ecological footprint, resource depletion)**

Overview on terms – Degrowth

- **One proposed position is similar to contraction and convergence**
 - the global north will have to degrow
 - the south can grow up to the threshold
- **A second position is around the argument that not all countries can grow to the level of the industrialized north**

Overview on terms – Degrowth

- **Rebound effect:**
Observation that when a less resource-exhaustive technology is introduced, behaviour surrounding the use of that technology will change and consumption of that technology will increase and offset any potential resource savings.
- **Ecological footprint/HANPP**



Strong sustainability – the flow/fund concept

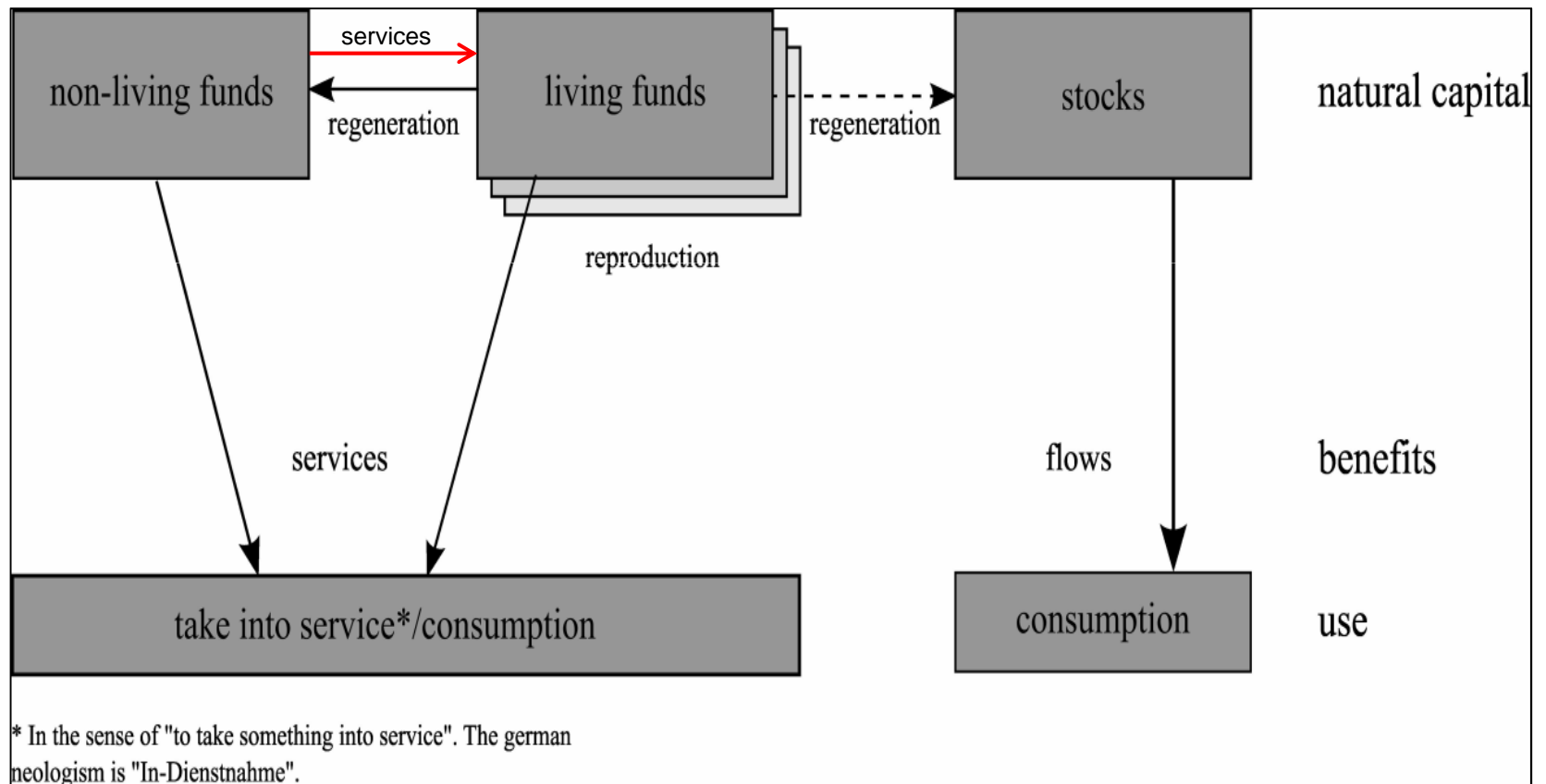
- **Introduced the flow/fund concept**
 - **Fund: agents of production have to be kept at their constant specific efficiency**
 - **Flow: enter the economic process and are qualitatively changed/consumed through it → maintenance flows**
- **Georgescu-Roegen distinguishes between feasible and viable technologies**

Strong sustainability – the flow/fund concept

„a technology (...) is viable, if and only if it can maintain the corresponding material structure which supports its resource and sink functions, and consequently supports human activity indefinitely under current environmental conditions. A technology that draws down irreplaceable stocks, or generates irreducible pollution, or violates the ability of funds to provide assimilative and restorative services, is not viable. A viable technology must maintain the fund factors H , K , and L “ (Gowdy/O’Hara 1997, 242).

Fisheries later as an application

Strong sustainability – the flow/fund concept



Source: Ott/Döring 2008

Strong sustainability – the flow/fund concept

Marine Ecosystems

Energy

Nutrients

Salinity
Oxygen
Temperature

Cod

Sprat

Herring

Phytoplankton

Zooplankton

feeds on

services

Non-Living funds

Living funds

Human Consumption



Strong sustainability – the flow/fund concept

- **Problem: Fish stocks are living funds dependent on services/flows of non-living funds and living funds (predator-prey-relationship)**
- **More and more negative influences on the marine environment**
 - **Nutrient intake -> dead zones in the Baltic Sea**
 - **CO₂-Emissions decrease ph-level → probably loss of corals, mussels and phytoplankton**
 - **Heavy metals with negative effects on long lived species**
 - **Increasing extract of feed for aquaculture production?**
- **In the long run use potential of fish stocks may be questioned**

Conclusion

- **Overview on the terms in the growth debate. Food for thought if Green Growth seem possible**
 - **the EKC may not be sufficient in the long run as for e.g. heavy metals level of content count**
 - **it must be clearer how a real decoupling between growth and resource use/emissions is possible**
- **Is Aquaculture a solution if fisheries are stabilized on a 'MSY'-level?**
- **Questionable as the production of fish and other products in aquaculture needs inputs which cannot increase indefinitely (see flow-fund-concept)**

Thank you very much!