Circular economy and valorization/recycling: a potential way to reduce dependence on raw material and energy

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Emissions?  
Ecosystem Services?
• Convention of Biological Diversity (CBD)
• Six targets of the European Biodiversity Strategy to 2020
• Target 2 aims to “maintain and enhance ecosystems and their services by establishing green infrastructure and restoring at least 15% of degraded ecosystems” (Maes, 2016)
• Action 5: the Member States of the EU are committed to map and assess the ecosystems and their services on their national territory

Total Value of Ecosystem Services
• **Provisioning services** – for example wild foods, crops, fresh water and plant-derived medicines;

• **Regulating services** – for example filtration of pollutants by wetlands, climate regulation through carbon storage and water cycling, pollination and protection from disasters;

• **Cultural services** – for example recreation, spiritual and aesthetic values, education;

• **Supporting services** – for example soil formation, photosynthesis and nutrient cycling.

>ecosystem services
Figure 1: Approaches for the estimation of nature's values

Preference-based approaches
- USE VALUE
  - DIRECT USE VALUE
    - Market analysis
    - Cost methods
    - Production function
    - Contingent valuation
  - INDIRECT USE VALUE
    - Market analysis
    - Cost methods
    - Hedonic pricing
  - (QUASI) OPTION VALUE
- NON-USE VALUE
  - SOCIAL JUSTICE
    - DEONTOLOGICAL VALUES
    - LEXICOGRAPHIC PREFERENCES
  - LEGACY / EXISTENCE / ALTRUISM
  - NON HUMAN VALUES
- OUTPUT VALUE

Biophysical approaches
- USE VALUE
  - INSURANCE VALUE
    - Resilience value
    - Physical consumption
  - RESILIENCE VALUE
  - PROBABILITY OF FAILS
    - Energy / exergy / emergy
  - PHYSICAL COST
    - Materials / surface / landcover

Source: TEEB Foundations, Chapter 5
Circular economy → Avoiding emissions → Cost forgone → Benefit
• Estimating the impact of:
  ◦ Economic activities on climate change
  ◦ Economic policy on climate change
  ◦ Climate change policy on climate change
  ◦ .....
Economy wide modeling of emissions

Tax Policy and Carbon Emissions in South Africa

Shantayanan Devarajan, Delfin S. Go, Sherman Robinson, Karen Thierfelder

Draft, March 27, 2009
Building reliable databases
Emissions by sector (CO2 equivalent), Greece

Average 1990 - 2014

- Synthetic Fertilizers: 20.6 %
- Crop Residues: 3.8 %
- Enteric Fermentation: 37 %
- Manure Management: 8.6 %
- Manure left on Pasture
- Manure applied to Soils

Ongoing work:
Incorporating agricultural emissions and estimating the effects of rural development policies in Greece