Towards a Resource-Index of Nations

Prof. Arnold Tukker, CML, Leiden University and TNO
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Universiteit Leiden
The Netherlands

CML
Institute of Environmental Sciences

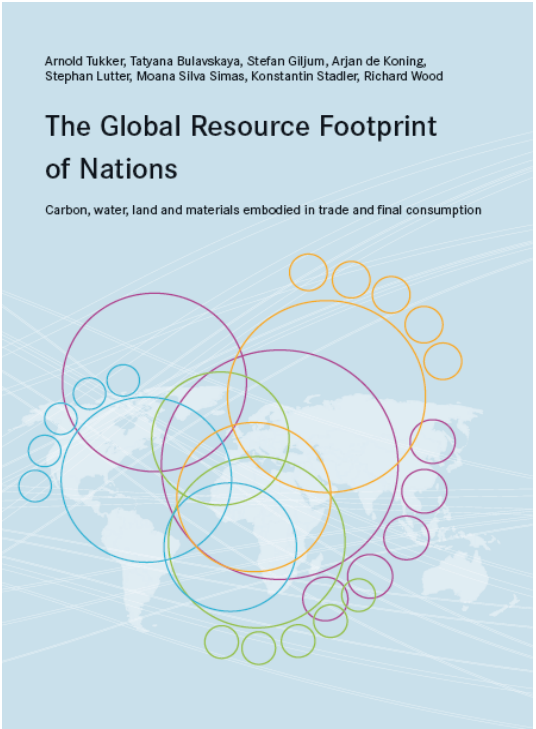
Introduction

- Some backgrounds
- Approaches for data mining / inventory and other points of departure
- Economic or ‘reference’ indicator
- Indicators by resource category
  - Water
  - Land
  - Materials
  - Carbon??
- Integration

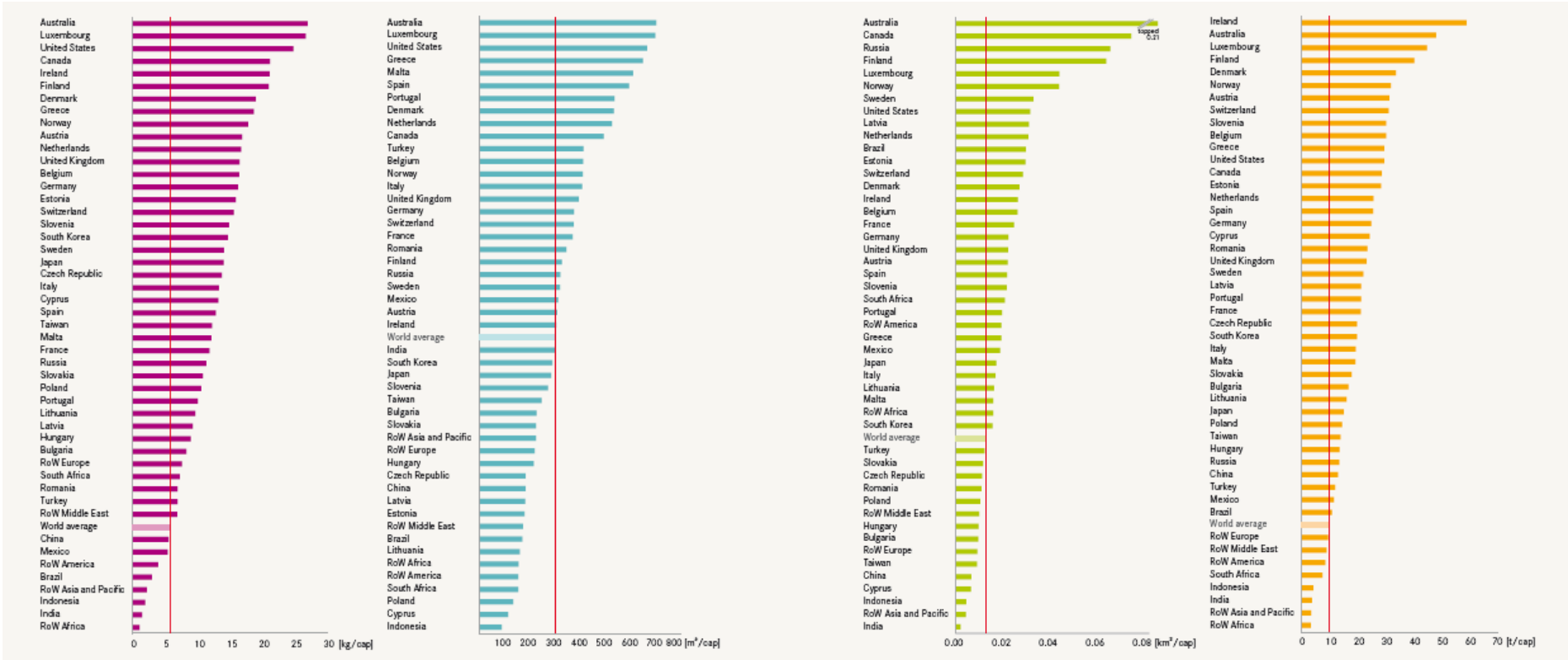
Some backgrounds

- Series of EU projects constructing EXIOBASE
- Calculating resource footprints per capita per country
- Question: can't we aggregate this to ONE resource footprint as counterpart to GDP?

		Industries				$Y_{*,A}$	$Y_{*,B}$	$Y_{*,C}$	$Y_{*,D}$	q
Products		$Z_{A,A}$	$Z_{A,B}$	$Z_{A,C}$	$Z_{A,D}$	$Y_{A,A}$	$Y_{A,B}$	$Y_{A,C}$	$Y_{A,D}$	q_A
		$Z_{B,A}$	$Z_{B,B}$	$Z_{B,C}$	$Z_{B,D}$	$Y_{B,A}$	$Y_{B,B}$	$Y_{B,C}$	$Y_{B,D}$	q_D
		$Z_{C,A}$	$Z_{C,B}$	$Z_{C,C}$	$Z_{C,D}$	$Y_{C,A}$	$Y_{C,B}$	$Y_{C,C}$	$Y_{C,D}$	q_C
		$Z_{D,A}$	$Z_{D,B}$	$Z_{D,C}$	$Z_{D,D}$	$Y_{D,A}$	$Y_{D,B}$	$Y_{D,C}$	$Y_{D,D}$	q_D
W		W_A	W_B	W_C	W_D					
g		g_A	g_B	g_C	g_D					
C & L		$Capital_A$	C_B	C_C	C_D					
		$Labor_A$	L_B	L_C	L_D					
Environ Ext		$NAMEA_A$	$NAMEA_B$	$NAMEA_C$	$NAMEA_D$					
		$Agric_A$	$Agric_B$	$Agric_C$	$Agric_D$					
		$Energy_A$	$Energy_B$	$Energy_C$	$Energy_D$					
		$Metal_A$	$Metal_B$	$Metal_C$	$Metal_D$					
		$Mineral_A$	$Mineral_B$	$Mineral_C$	$Mineral_D$					
		$Land_A$	$Land_B$	$Land_C$	$Land_D$					

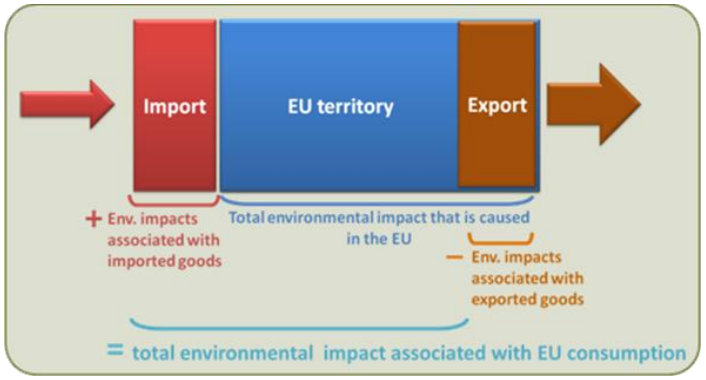


Some backgrounds: resource footprint p.c.

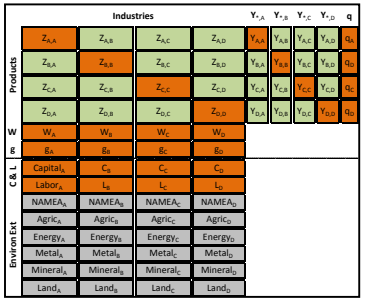


Approaches for data mining and other basics

- Consumption and production oriented



- Data mining; 2 accepted methods
  - Co-efficient approaches
  - MR EE IO approaches

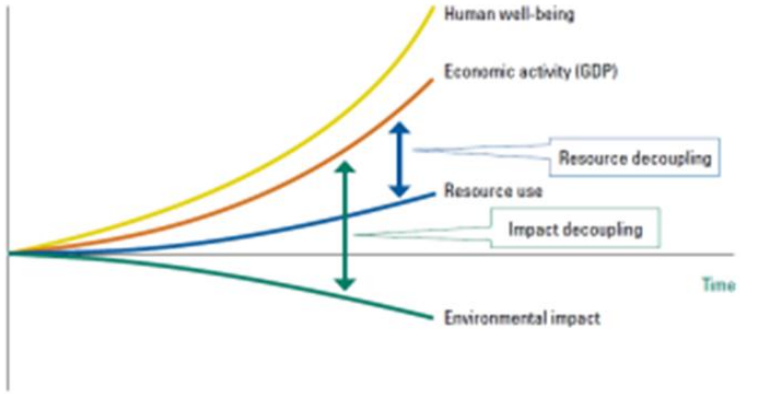


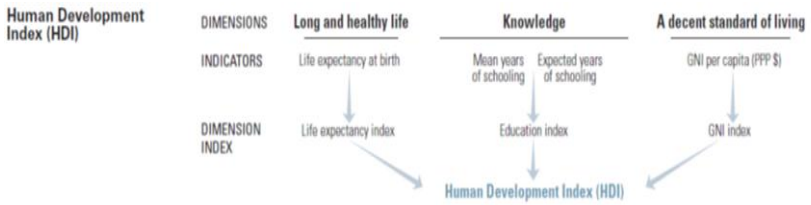
- Should we include carbon footprint (=impact)?

Economic reference indicator

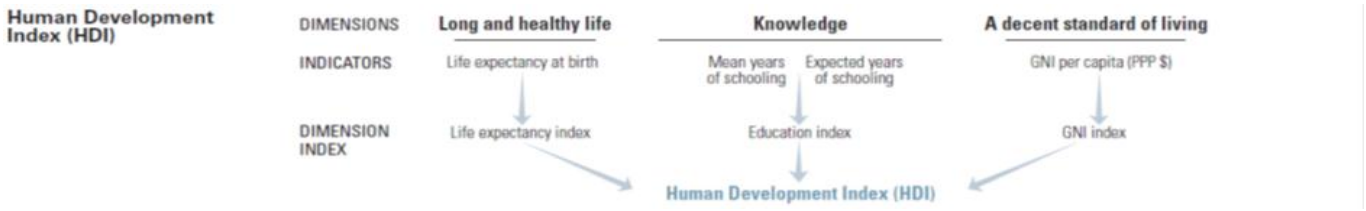
- GDP as the classic
- But we need a ‘quality of life ‘ indicator too
  - Adjusted net savings
  - ISWE
  - GPI

  (all corrections on GDP instead of measuring QoL)
  - Better life index (not integrated)
- Our preferences:
  - Human Development Index
  - Happy life years index





Intermezzo: constructing HDI



- Life expectancy at birth – normalized from 0-1 for 20-85 years
- Knowledge - normalized from 0-1 for 0 to 18 years of schooling
- Living standard: normalised from 0-1 for 100$ to 75.000 $ /year

- Multiply the 3 normalised indices…..take the cube root

- PRESTO – we have the HDI

Proposal Resource 1: Carbon

- GWP is already for decades the default indicator to aggregate carbon emissions
- The real question is if the carbon footprint should be included in a Resource index of nations, since it represents an impact rather than resource extraction
- So: high consensus on the indicator, low consensus if it should be included

Proposal Resource 2: Water

- Exclude Green (rain) water: natural vegetation also has evapotranspiration
- Exclude Grey water: that is an impact, not a resource extraction
- Include Blue (river, aquifers) water, but correct for the water stress in the catchment area where extraction takes place.
  - Withdrawal ratio < 20%: no stress
  - Withdrawal ratio > 40%: severe stress
- This in essence proposes the Water stress index proposed by Pfister et al. (2009) => reasonable consensus
- Note: in the GRFoN we followed the convention of the Water footprint network and just counted m3 water extracted

Proposal Resource 3: Land

- Low consensus on the best approach (but maybe the LC Impact session solved this ;-))
  - Land use occupation in m2* time span
  - Idem but correcting for (changes in) land productivity or quality (e.g. EF, HANPP)
  - Idem but trying to assess things in terms of biodiversity loss (PDF, MSA), etc…..
  - …plus suggestions for including a time dimension for restoring the system to a natural state
- Host of other complicating factors
- In sum, methods are available but consensus is low

Proposal Resource 4: Materials

- Various methods
  - Simply adding up by weight as in ewMFA – which over-emphasises non critical materials with low impacts
  - Aggregating on the basis of life cycle impacts (EMC, v.d. Voet et al. 2005
  - Aggregating on the basis of scarcity or criticality
    - Based on reserves
    - Based on energy or exergy use)

Methods for weigthing across resources

- One-issue methods (e.g. express everything in one parameter such as land use (EF), carbon emissions (CF), monetary units (external costs)
- Methods with implicit weighting (e.g. Distance to target; Prevention costs to reach a specific target)
- Explicit weighting of midpoints or end points
  - Existing panel values
  - New panel values

Suggestion to WRF for a first exercise

- Keep it simple: use on of the existing MR EE IO databases (WIOD, EORA, EXIOBASE) to calculate footprints, or maybe all of them
- Use the following ways of aggregation within resource categories:
  - Water: Pfister et al., 2009
  - Land: t.b.a. (use pragmatically an LCIA method well accepted)
  - Materials: t.b.a.(use pragmatically an LCIA method well accepted)
- Use explicit weighting
  - Existing panel values
  - New panel values
  - …or worst case, copy the HDI weighting method (which would require normalisation on minimal and maximum footprints per capita, which is a discussion in itself)