



The *Inclusive* Wealth of Nations 2018: **Valuation methodology**





I. Fundamentals



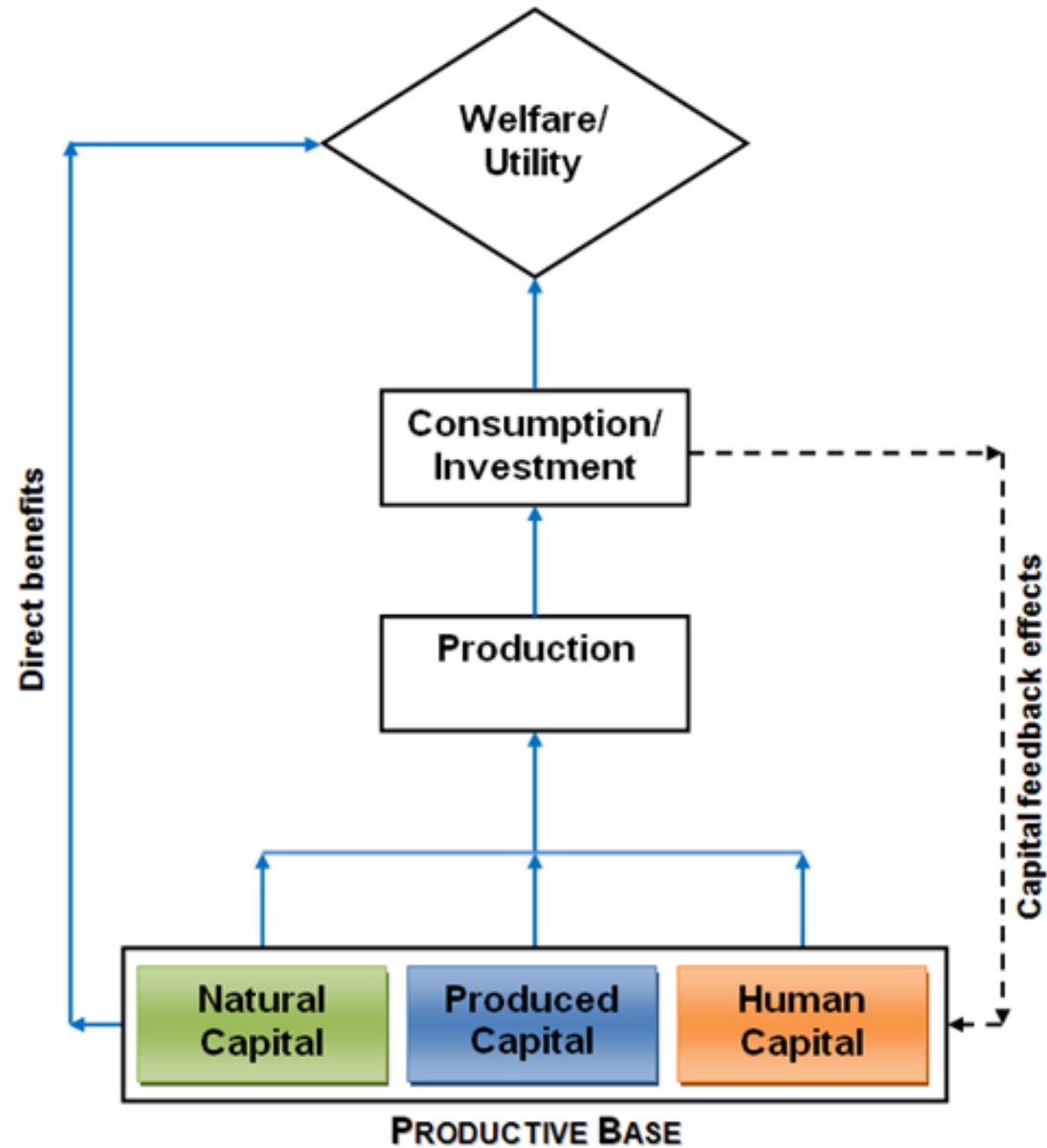
Proposal:

Well-being can be measured by inclusive wealth

- "Sustainable development is development that meets the needs of the present **without compromising the ability of future generations to meet their own needs.**" (*Our Common Future*, 1987)
- It is important to monitor the productive base for future generations – non-declining
- IWR 2018: coverage of **140 countries**, from **1990 to 2014**

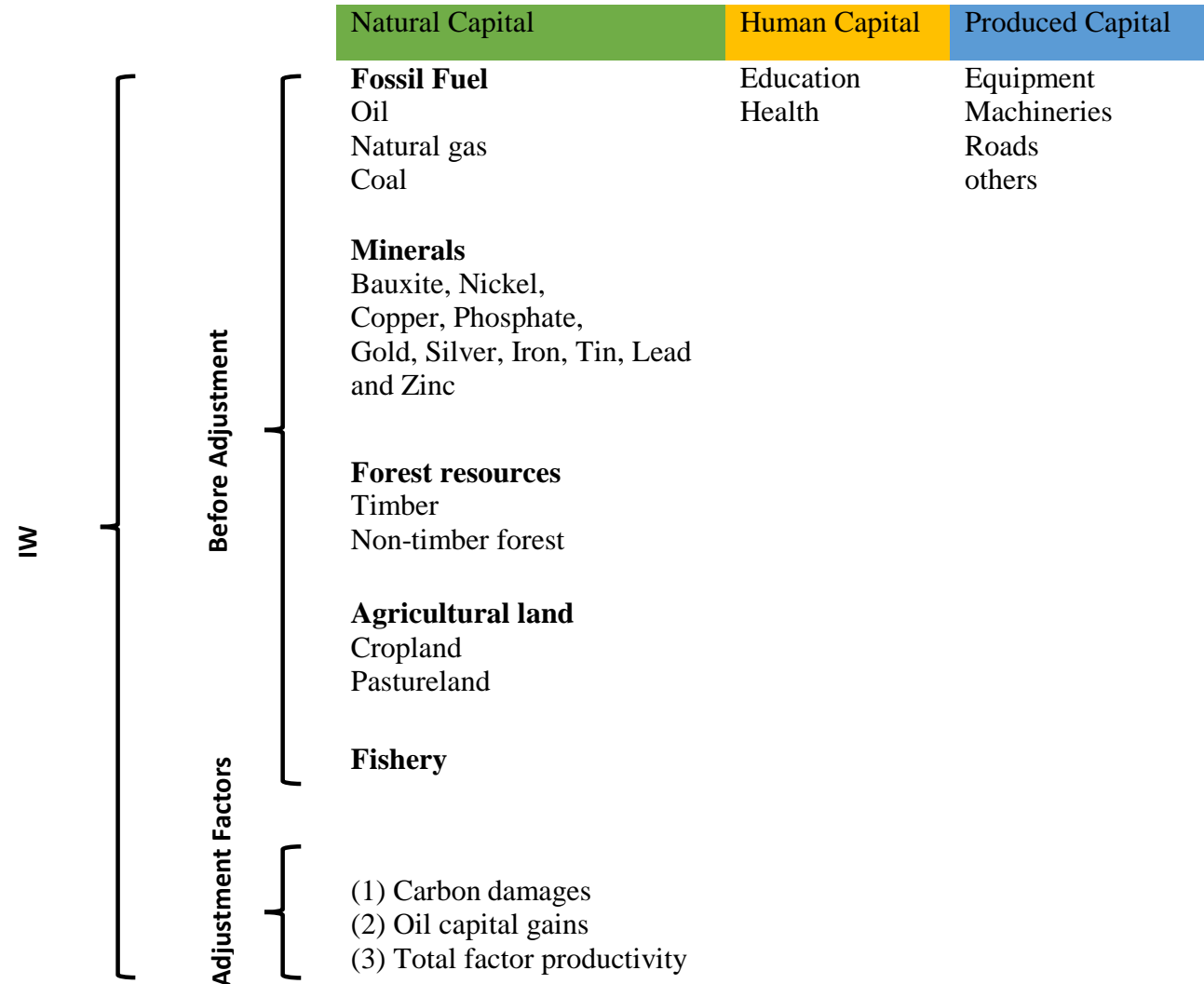


The Economics of Ecosystems & Biodiversity





Components of Inclusive wealth 2018





Components of Inclusive wealth 2018

		Natural Capital	Human Capital	Produced Capital
IW	Before Adjustment	Fossil Fuel	Education	Equipment
		Oil	Health	Machineries
Natural gas			Roads	
Coal			others	
Minerals				
	Adjustment Factors	Bauxite, Nickel, Copper, Phosphate, Gold, Silver, Iron, Tin, Lead and Zinc		
		Forest resources		
		Timber Non-timber forest		
		Agricultural land		
		Cropland Pastureland		
		Fishery		
		(1) Carbon damages		
		(2) Oil capital gains		
		(3) Total factor productivity		

Natural capital - adjustments

- Petrol-dependent countries uniquely sensitive
- Carbon footprint of one country may harm capital stocks of another



II. Methodologies



Methodology: Overview

- Methodology in IWR (2018) builds on IWR 2014
 - e.g. Dasgupta, 2009; Arrow et al., 2012; UNU and UNEP 2012, 2014; Dasgupta et al., 2015; Managi (ed.), 2015
 - Fisheries stock assessment and some analysis of human capital is new



Methodology: Overview

- Methodology in IWR (2018) builds on IWR 2014
 - e.g. Dasgupta, 2009; Arrow et al., 2012; UNU and UNEP 2012, 2014; Dasgupta et al., 2015; Managi (ed.), 2015
 - Fisheries stock assessment and some analysis of human capital is new
- What matters for sustainability analysis is the *change* in

$$\text{wealth } p_i(t) \frac{dK_i(t)}{dt}$$



Methodology: Agricultural Land

Stock

Cropland/pastureland area available for country i in year j

Shadow prices

Rental price/ha for country i in year j : $RPA_{ij} = \left(\frac{1}{A}\right) \sum_{k=1}^{159} R_{ik} P_{ijk} Q_{ijk}$

NPV of rental price/ha: $Wha_{ij} = \sum_{\tau=t}^{\infty} \frac{RPA_{ij}}{(1+r)^{\tau}}$ and taking year average

Variables	Data sources / assumptions
Quantity of crops produced, Q	FAO (2015)
Price of crops produced, P	FAO (2015)
Rental Rate, R	Narayanan et. al. (2012)
Harvested area in crops, A	FAO (2015)
Discount rate, r	5%
Permanent cropland/pastureland area	FAO (2015)



Methodology: Non-Timber Forest Products

Shadow prices:

- $$\sum_{\tau=t}^{\infty} \frac{PQ_{\tau}\gamma}{(1+r)^{\tau}}$$

Variables	Data sources / assumptions
P : forest ecosystem service benefit to social well-being	ESVD: van der Ploeg and de Groot (2010) weighted the corresponding values by the share of each forest type in the total forest of the country
Q : total forest area in the country under analysis, excluding cultivated forest	FAO (2015)
γ : fraction of the total forest area which is accessed by individuals to obtain benefits	10% (World Bank 2006)
Discount rate, r	5%



Methodology: Fisheries I

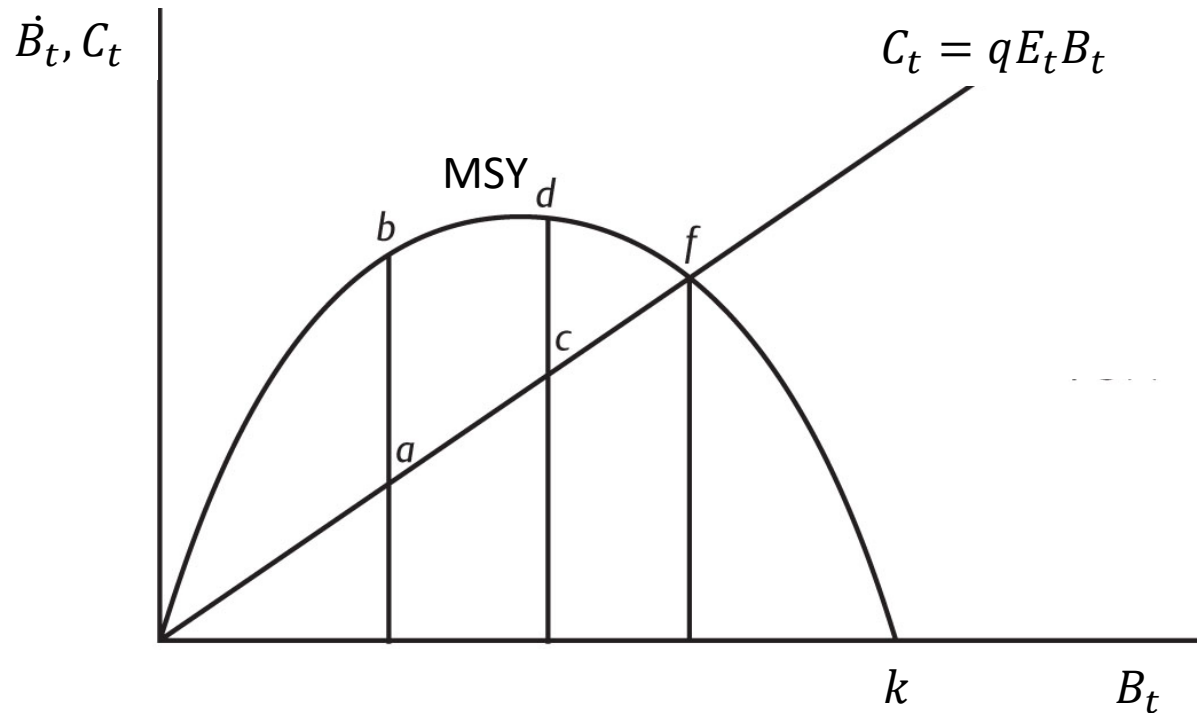
- According to Froese et al. (2012) and Kleisner et al. (2013), **the status of fishery is determined by the following criteria:**

Status of fishery	Code	Year	C/C_{max}	C/MSY
Developing	D	Year of landing < year of max. landing AND landing is < or = 50% of max. landing OR year of max. landing = final year of landing	0.1 – 0.5	0.2 – 0.75
Exploited	E	Landing > 50% of max. landing	> 0.5	> 0.75
Overexploited	O	Year of landing > year of max. landing AND landing is between 10-50% of max. landing	0.1 – 0.5	0.2 – 0.75
Collapsed	C	Year of landing > year of max. landing AND landing is < 10% of max. landing	< 0.1	< 0.2
Rebuilding	R	Year of landing > year of post-max. min. landing AND post-max. min. landing < 10% of max. landing AND landing is 10-50% of max. landing		



Methodology: Fisheries II

- Gordon-Schaefer model of fishery biomass stock:





Methodology: Fisheries III

- Stock: B_t
- Shadow prices: $P * R$

Variables	Data sources / assumptions
C_t : catch of each country's economic exclusive zone (EEZ) for the period of 1950-2010	searoundus.org only evaluate the stock that has a catch record for at least 20 years and which has a total catch in a given area of at least 1000 tons over
P : Shadow prices	Species-specific market prices, average for 1990-2014.



III. Results/Interpretation of results



Positive GDP growth, negative IW

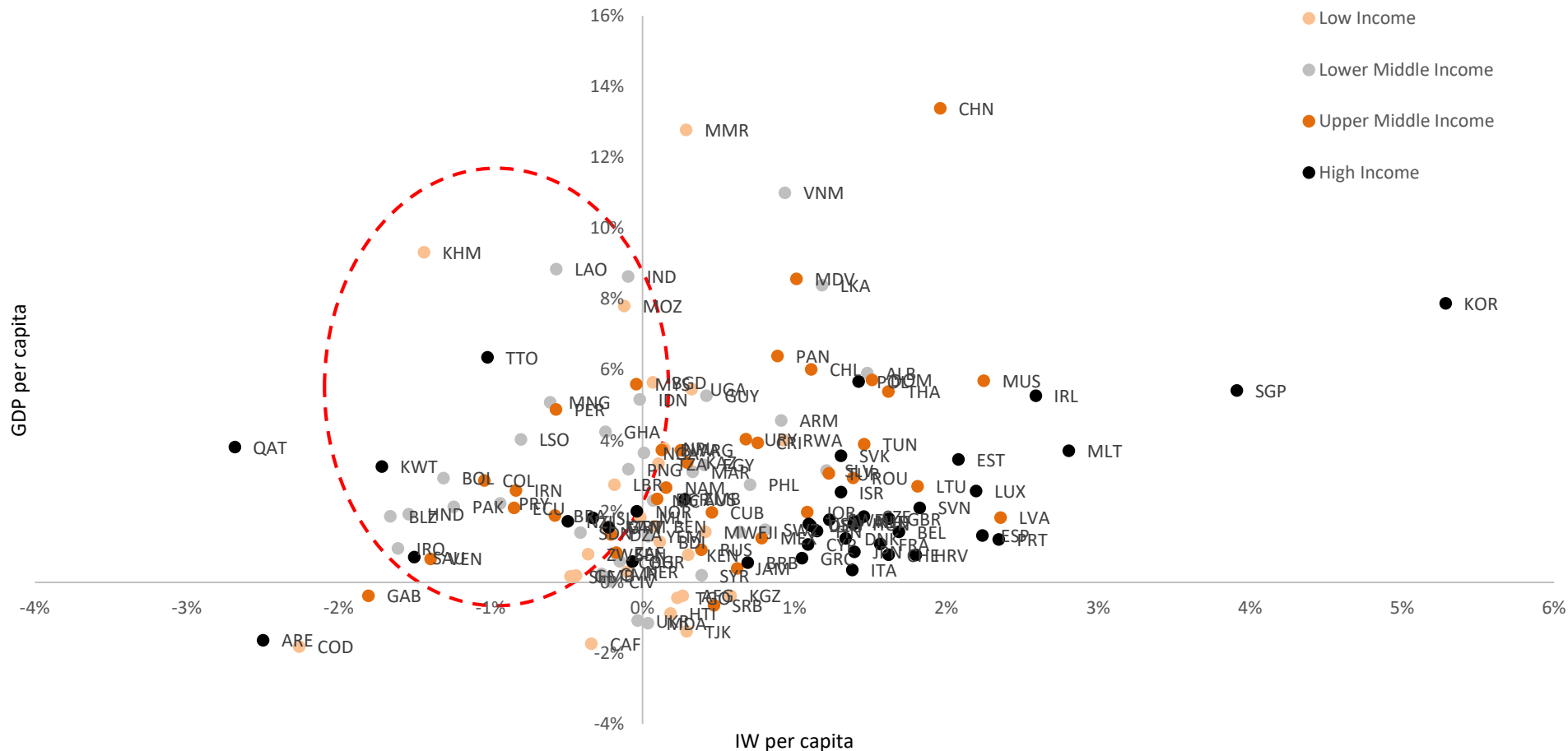


Figure: Growth rate in GDP *per capita* and growth rate in IW *per capita*, 1990-2014



135 of the **140** countries experienced a positive annual average growth rate in Inclusive Wealth Index

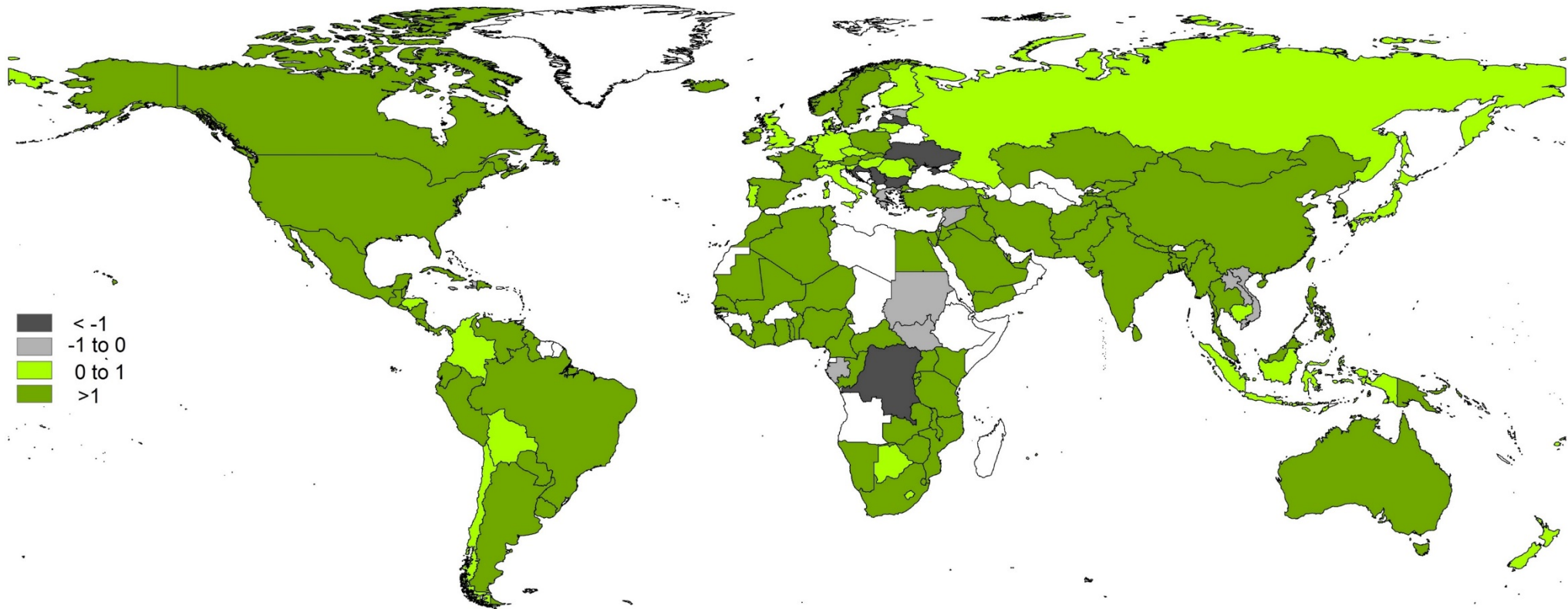
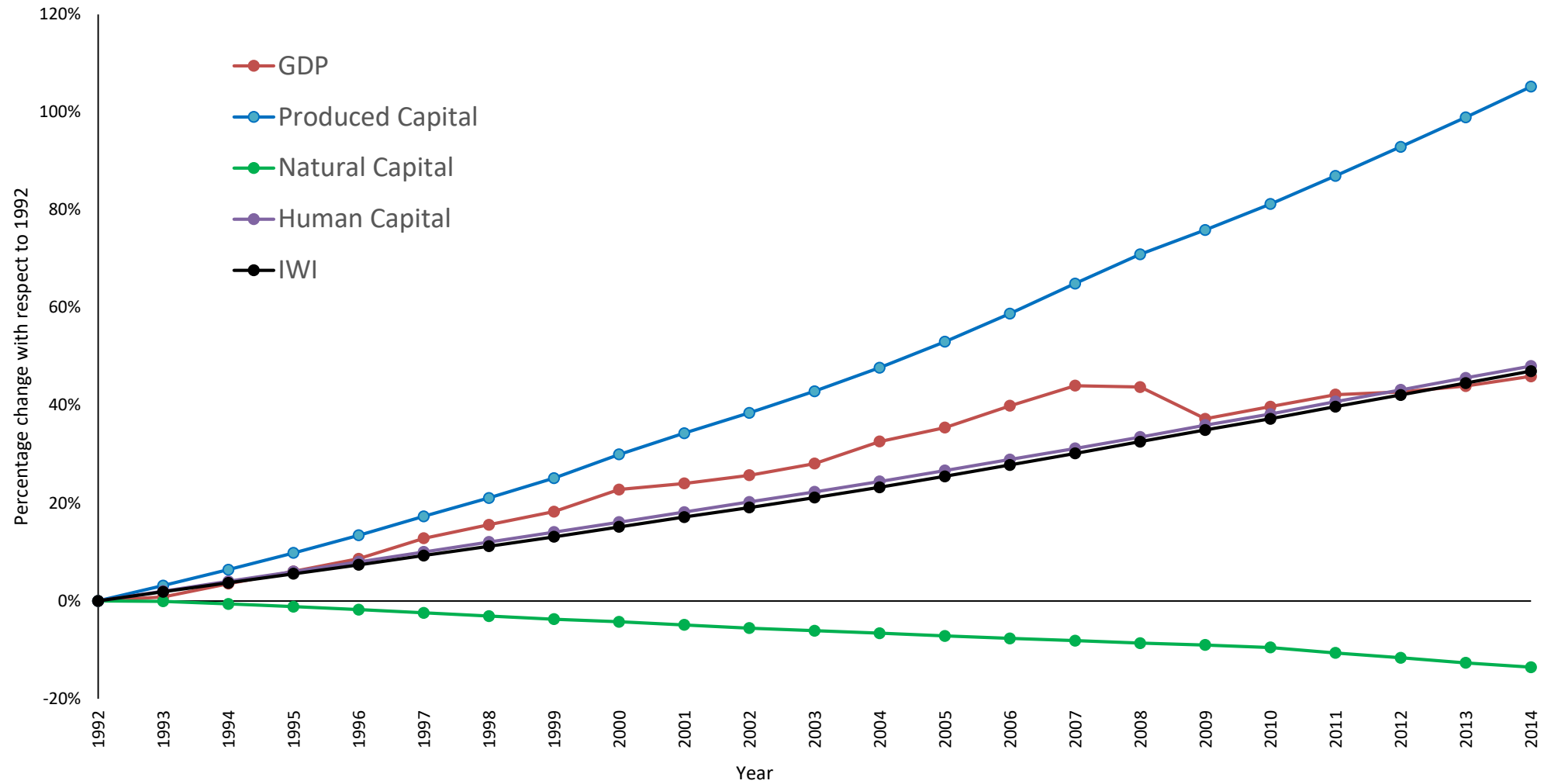


Figure: Average annual growth rate of Inclusive Wealth Index (%), 1990-2014



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Regional and sub-regional compositions (%) of wealth by capita from average 1990-2014

	Human Capital	Produced Capital	Natural Capital
Africa	79%	7%	15%
Eastern Africa	95%	4%	2%
Middle Africa	49%	2%	48%
Northern Africa	79%	12%	9%
Southern Africa	76%	13%	11%
Western Africa	94%	2%	4%
Asia	56%	20%	24%
Eastern Asia	45%	33%	22%
South-Central Asia	73%	8%	19%
South-Eastern Asia	55%	18%	27%
Western Asia	50%	22%	27%
Europe	51%	41%	9%
Eastern Europe	66%	23%	11%
Northern Europe	44%	42%	14%
Southern Europe	52%	42%	7%
Western Europe	43%	55%	3%
Latin America and the Caribbean	46%	21%	33%
Caribbean	59%	28%	13%
Central America	49%	21%	31%
South America	29%	15%	55%
Northern America	31%	37%	31%
Oceania	45%	18%	38%
Australia/New Zealand	20%	22%	58%
Melanesia	70%	13%	17%
Total World Average	59%	21%	20%



IV. Conclusions



1. Inclusive Wealth is a performance indicator that is complimentary to SEEA-EEA



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2. Tracking changes in stocks of capital is critical w.r.t. environmental sustainability and the SDGs



1. Inclusive Wealth is a performance indicator that is complimentary to SEEA-EEA
2. Tracking changes in stocks of capital is critical w.r.t. environmental sustainability and the SDGs
3. The IW methodology (IWR, 2018) has iterated/improved since IWR (2014) and may evolve further



The headline messages are clear:

- ❖ globally, natural capital is being depleted and thus we are not meeting the condition of strong sustainability
- ❖ Massive regional heterogeneity, e.g. in Africa 95% of the composition of wealth from human capital versus 31% in Northern America
- ❖ Notwithstanding the IW/GDP comparison, 135/140 countries experienced IW increase 1990-2014



Thanks!



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