

Resource Extraction and Biodiversity Conservation

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Past President, IUCN and Club of Rome**

***International Conference on
Mining and Biodiversity
New Delhi, 16 March 2014***

Mining – Boon or Bane?

Mining is a key sector of the economy.

It delivers materials, energy and valuable resources.

It must also ensure positive benefits for *ALL*:

- ❖ ***Economy* – Materials, Access, Secure Supplies**
- ❖ ***Global Life-Support Systems* – Biodiversity, Climate, Nature**
- ❖ ***Environment* – Ecosystem Services, Air and Water Quality**
- ❖ ***Communities* – Sustainable Livelihoods, Social Capital,**
- ❖ ***Institutions* -- Governance, Partnerships (Govt, Industry, Civil Society), Ownership**

Full Disclosure . . .



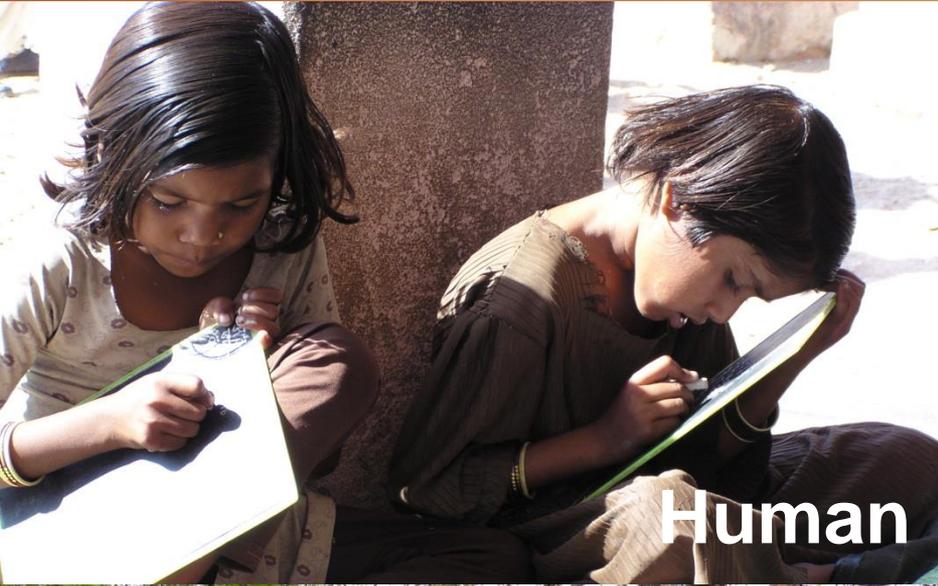
. . . To hand on a World at
least as *Livable* as we
Inherited

Sustainability, then, means

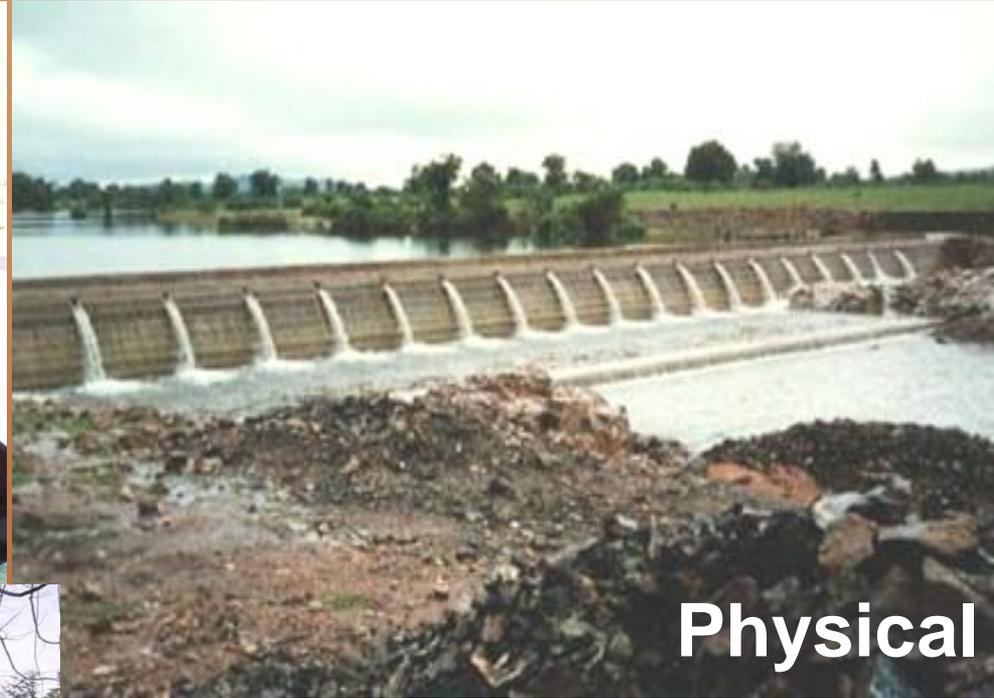
Handing to the Next Generation

***MORE THAN* the Capital We Inherited**

ALL Types of Capital – NO Substitutes



Human



Physical



Natural



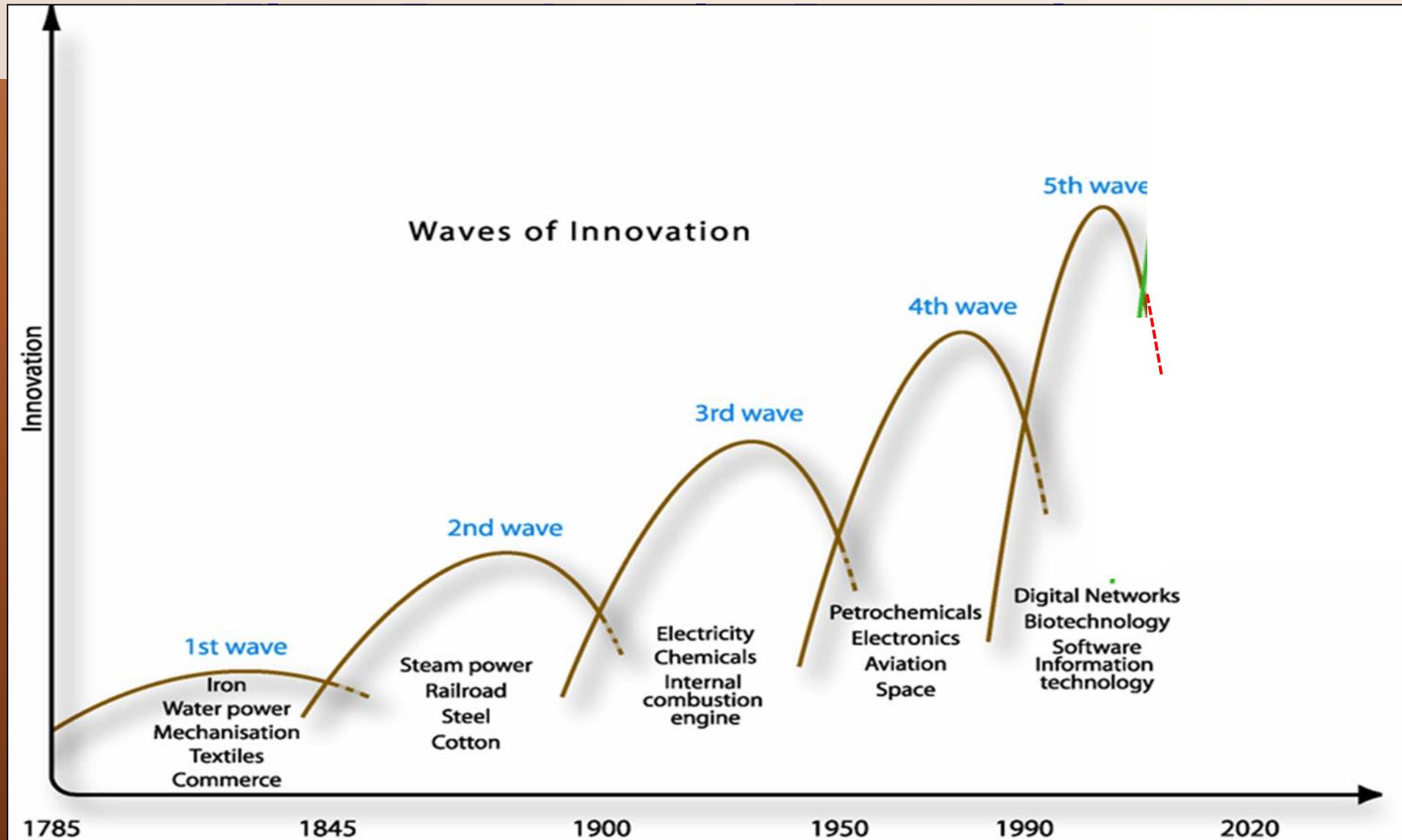
Financial

Systemic Solutions

Sustainable Jobs *AND* Sustained Resources



Last 5 Kondratiev Cycles

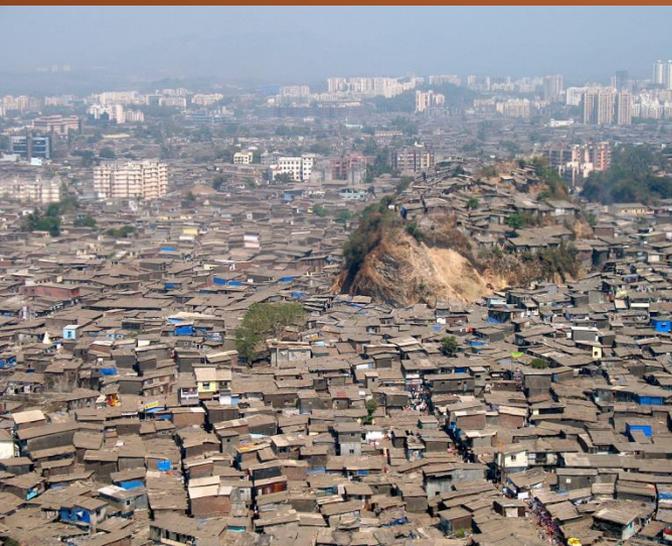


Waves of Innovation

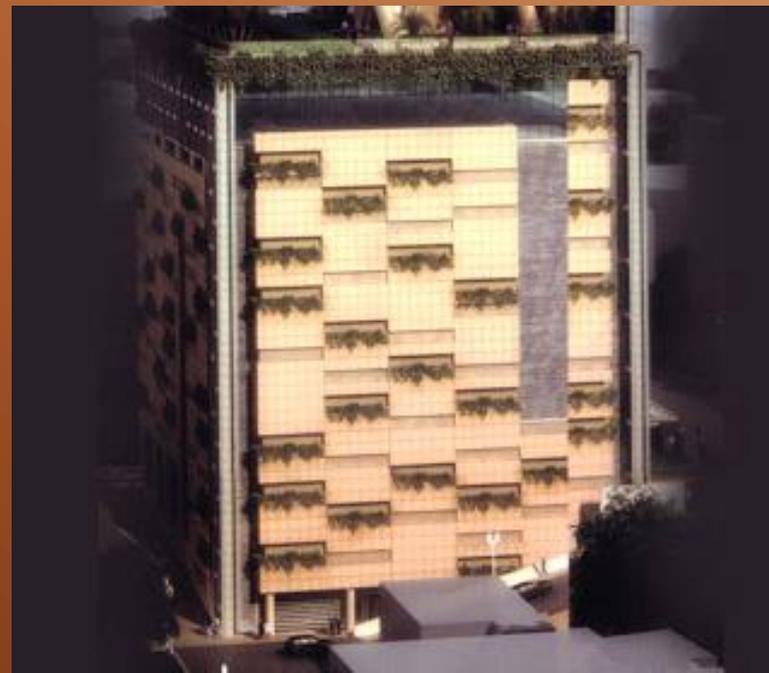




Consumption Society vs Subsistence Society



Affluenza . . .

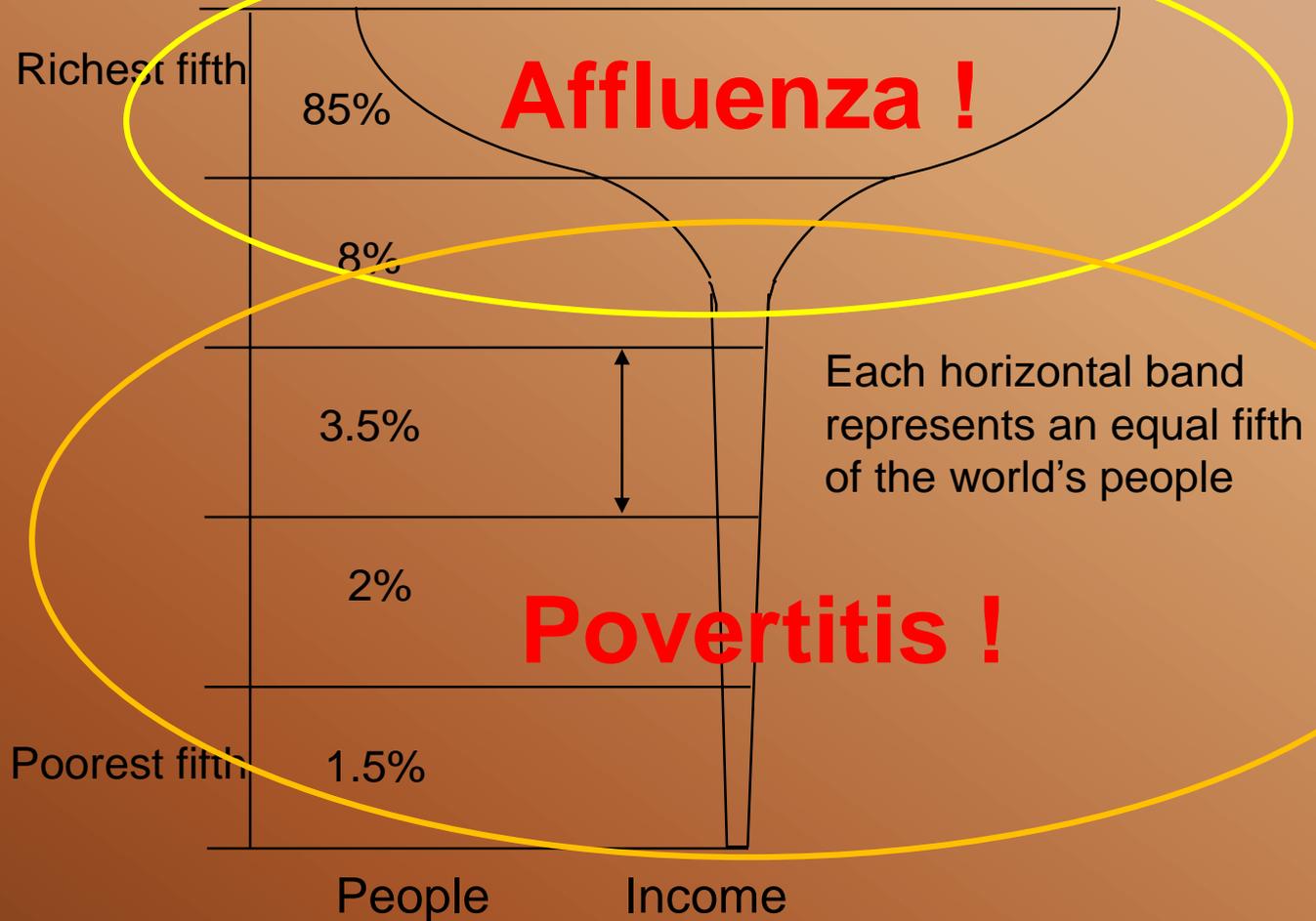


... Poveritis



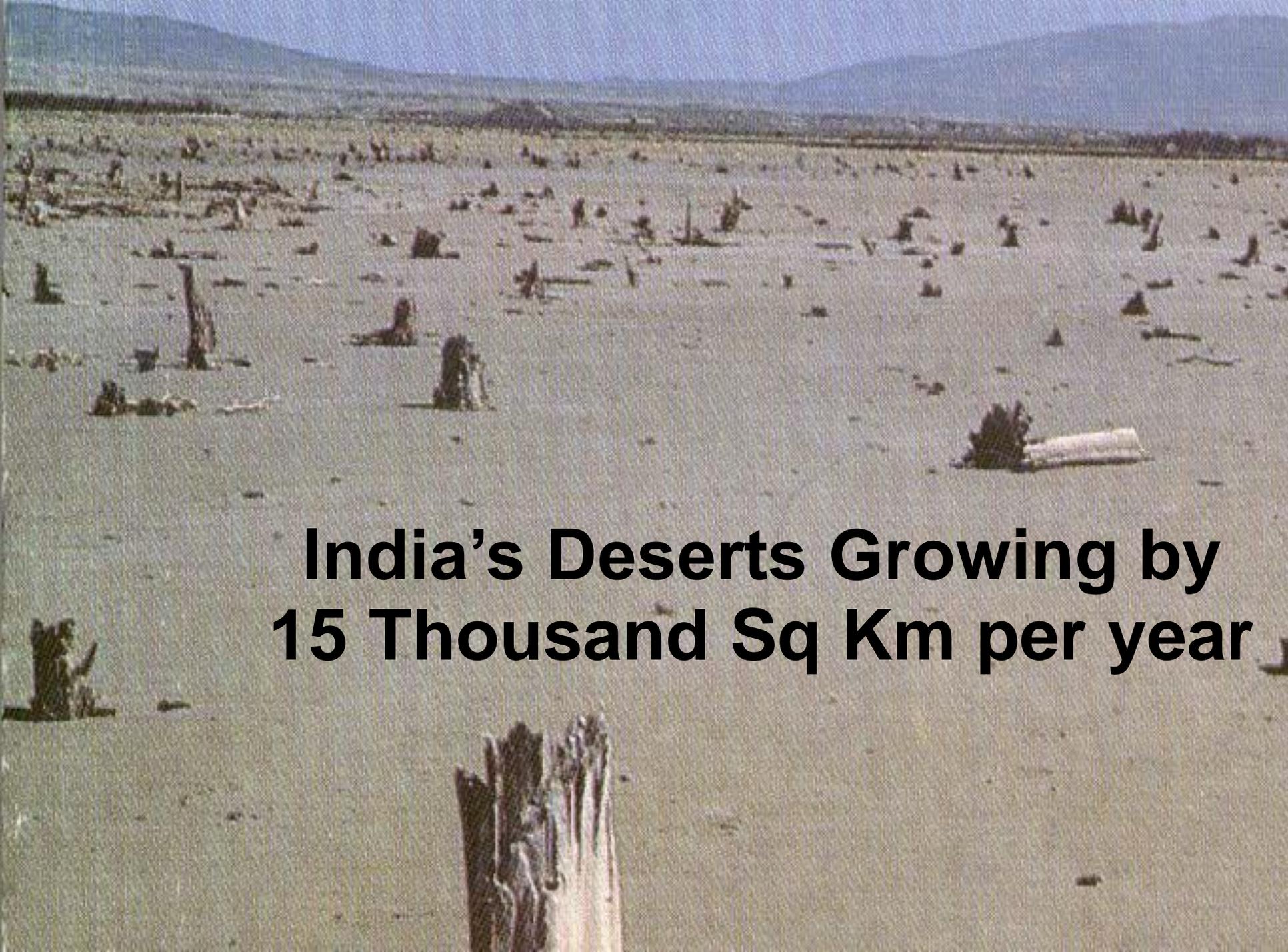


Today's Inequity





Massive Pollution and Waste

A wide-angle photograph of a desolate, arid landscape. The ground is a flat, light-colored expanse, likely sand or dry earth, dotted with numerous dead, bleached tree stumps and charred remains of vegetation. In the far distance, a range of low, hazy mountains stretches across the horizon under a clear, pale blue sky. The overall scene conveys a sense of environmental degradation and desertification.

**India's Deserts Growing by
15 Thousand Sq Km per year**

Scarred Landscapes



Climate Change





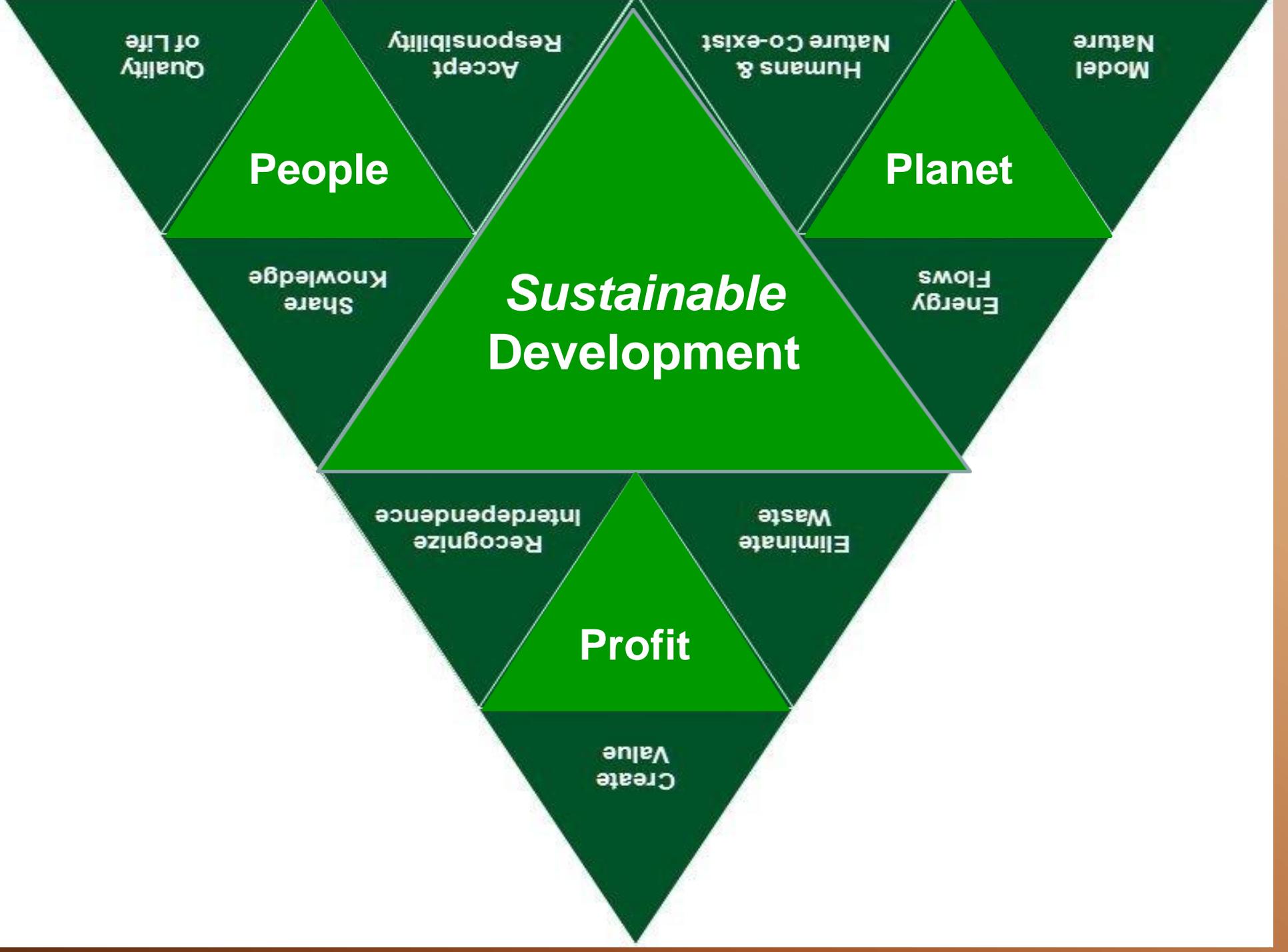
Endangered Species

Many Icebergs . . .



. . . Ahead





Sustainable Development

People

Planet

Profit

Quality of Life

Accept Responsibility

Humans & Nature Co-exist

Model Nature

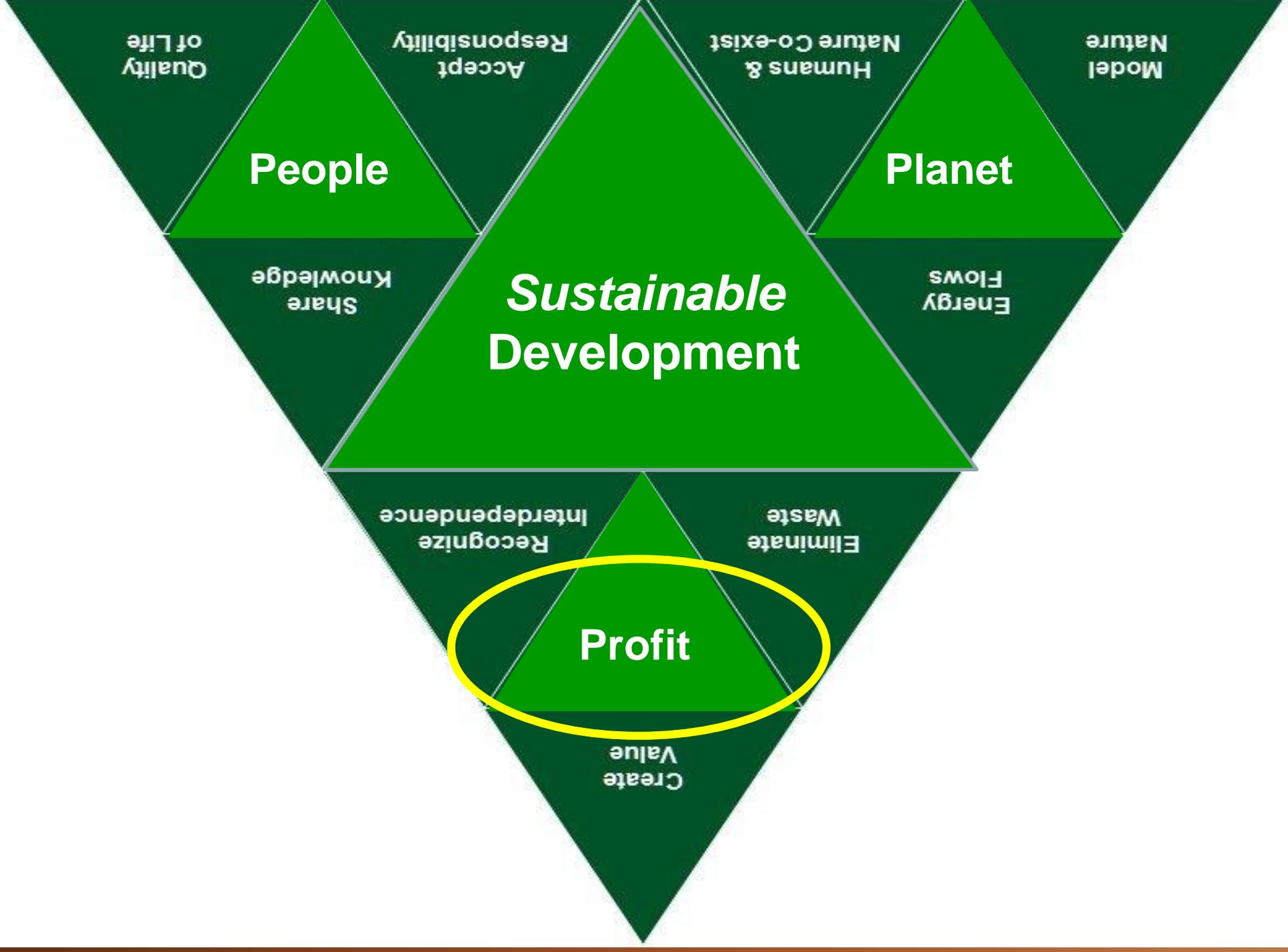
Share Knowledge

Energy Flows

Recognize Interdependence

Eliminate Waste

Create Value



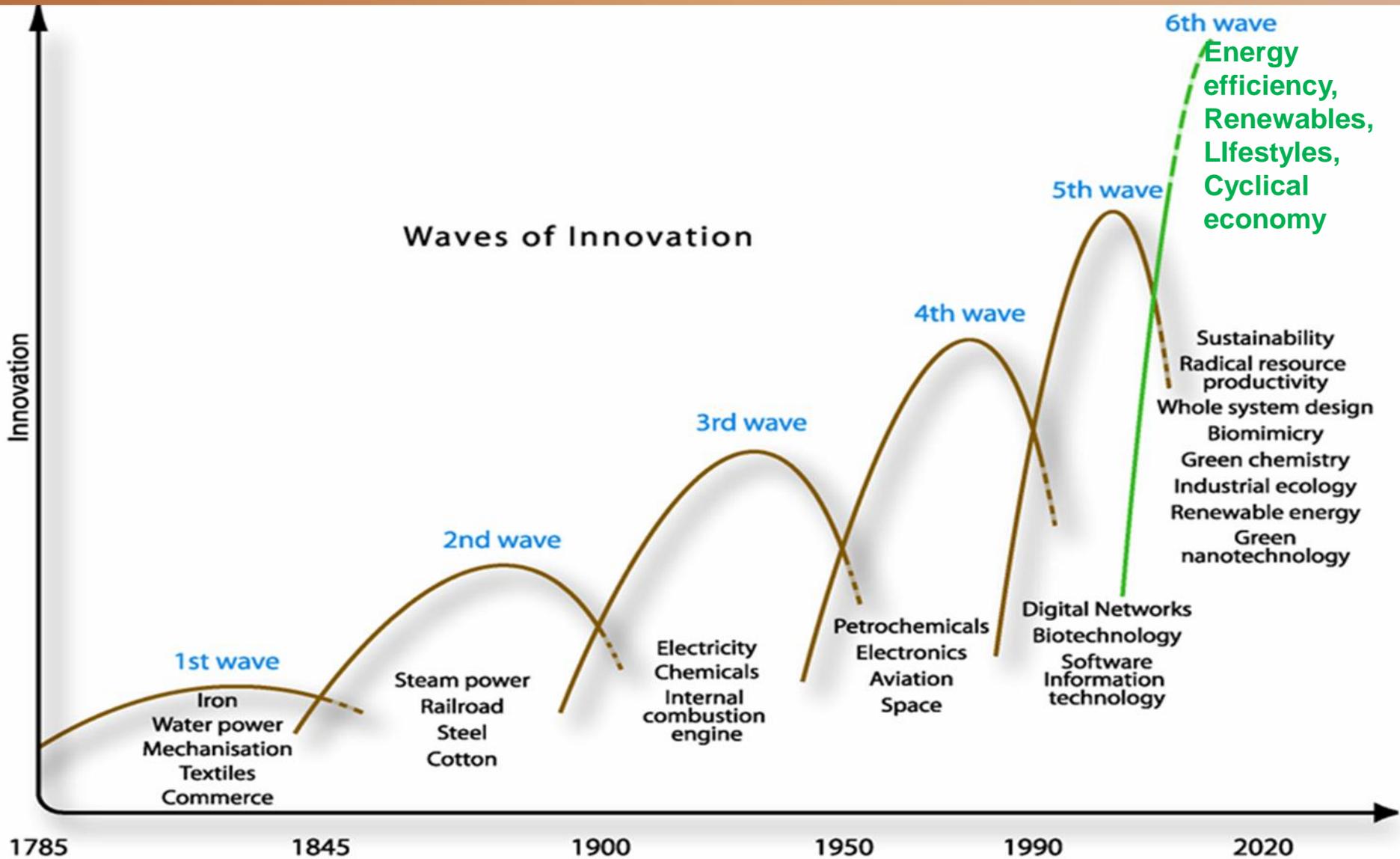
Sustainable Development

People

Planet

Profit

Next (6th) Kondratiev Cycle: Green



Waves of Innovation

Natural Resource Management: Key Concepts for Society

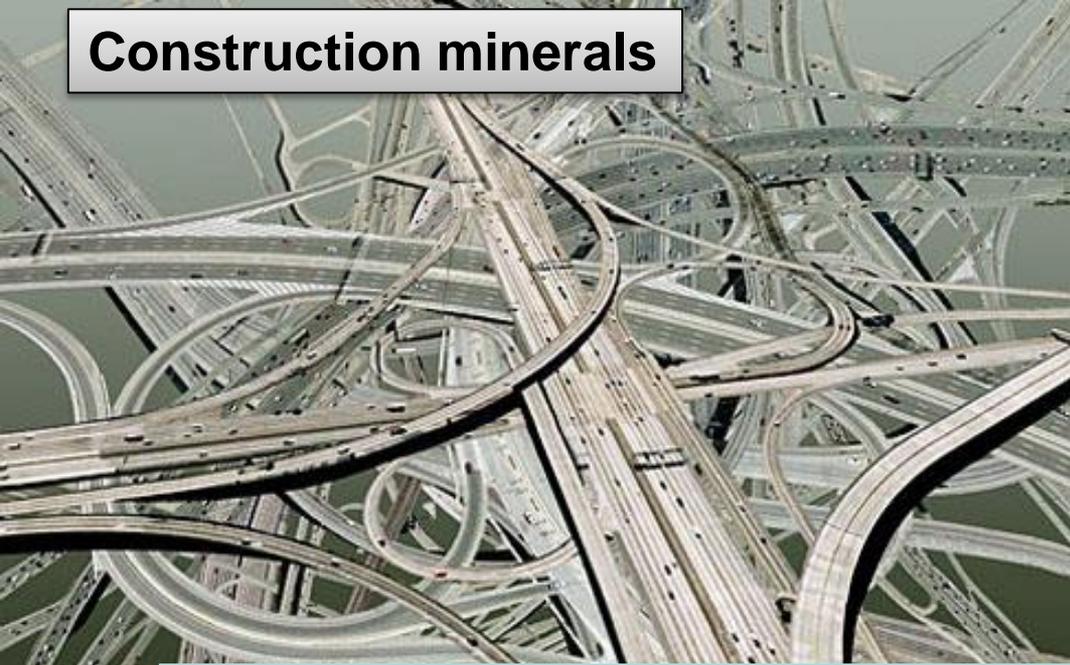
- **Efficiency**
- **Productivity**
- **Conservation**

- **Decoupling**
- **Dematerialization**

Sustainable Mining: Key Concepts for Enterprises

- **Maximize Market Opportunity
and Competitive Advantage**
- **Minimize Operational Costs
and Strategic Risks**

Construction minerals



Ores and industrial minerals



Major Types of Primary Raw Materials

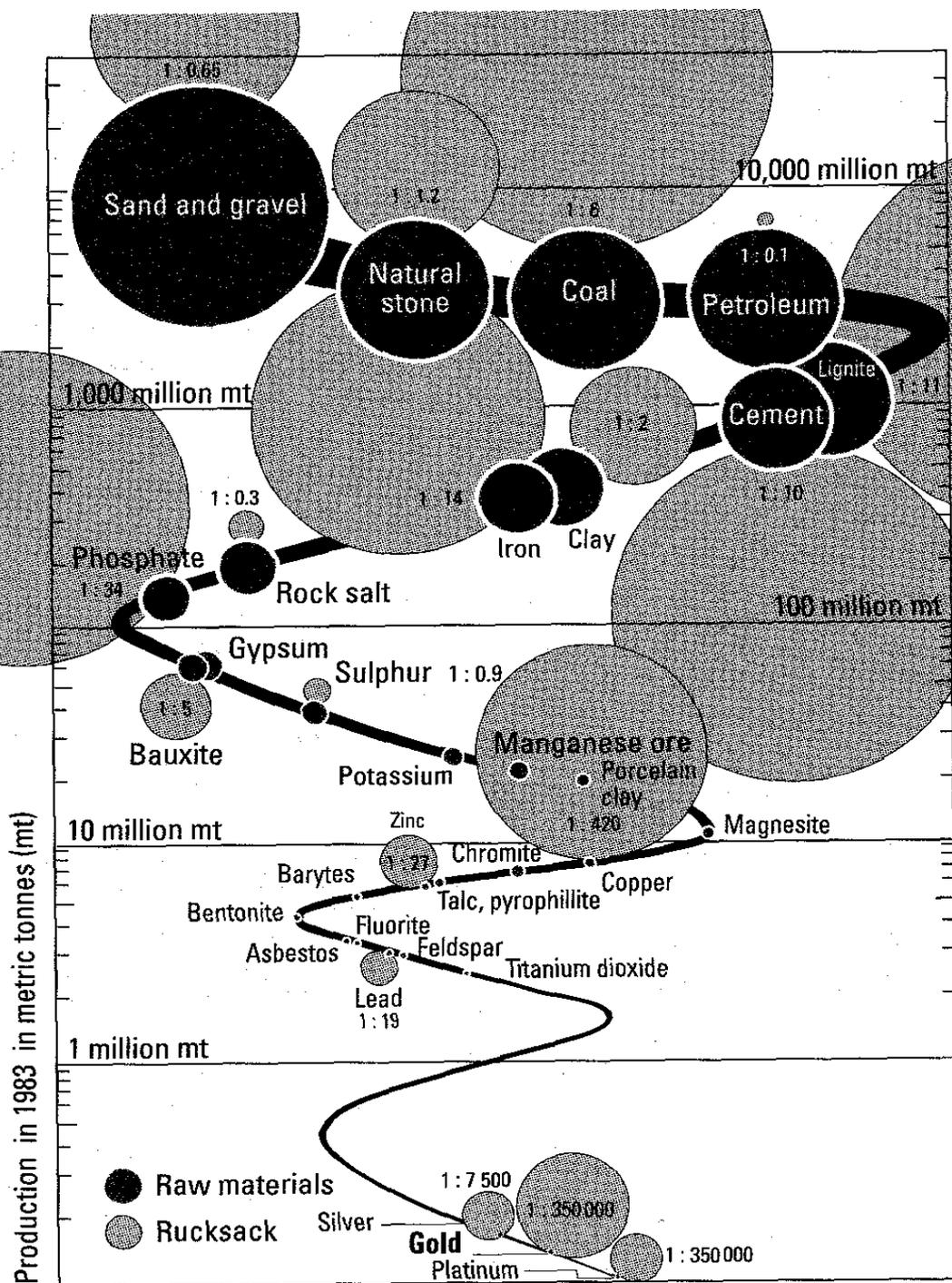


Fossil fuels



Biomass

Ecological Rucksacks



Raw Material

Rucksack



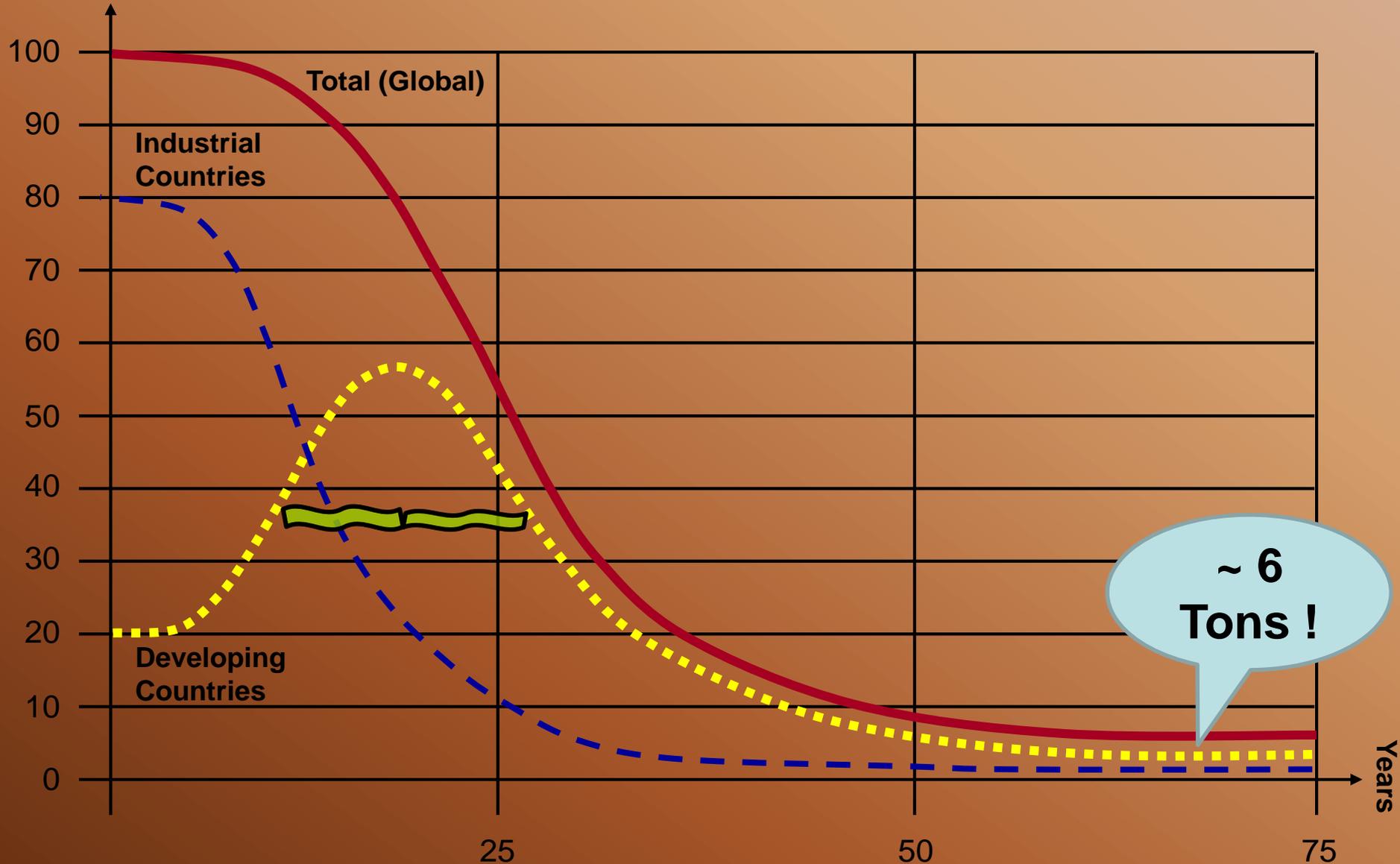
Gold Ring

Weight?

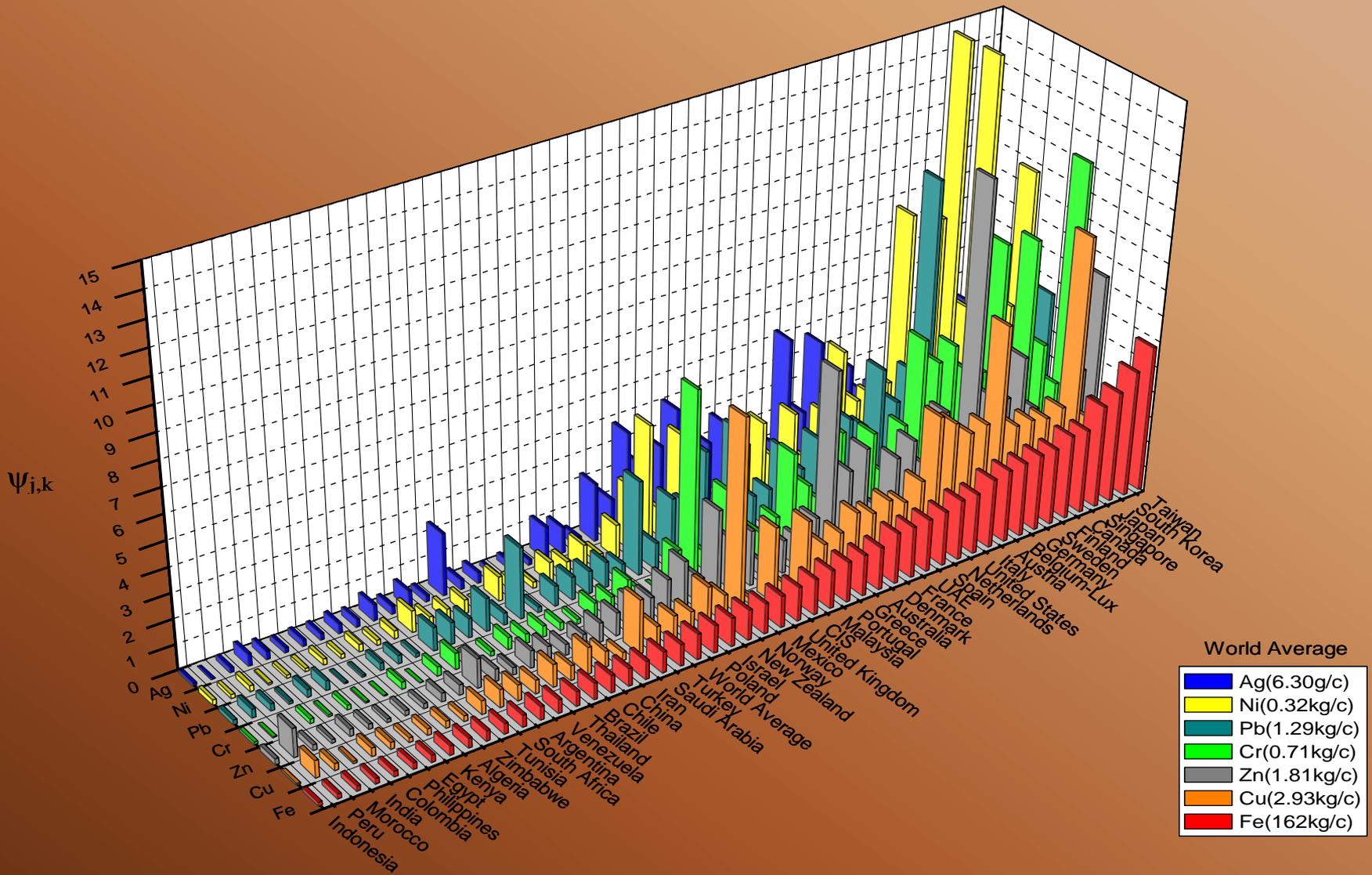
20 gms?

**20 Tonnes
!**

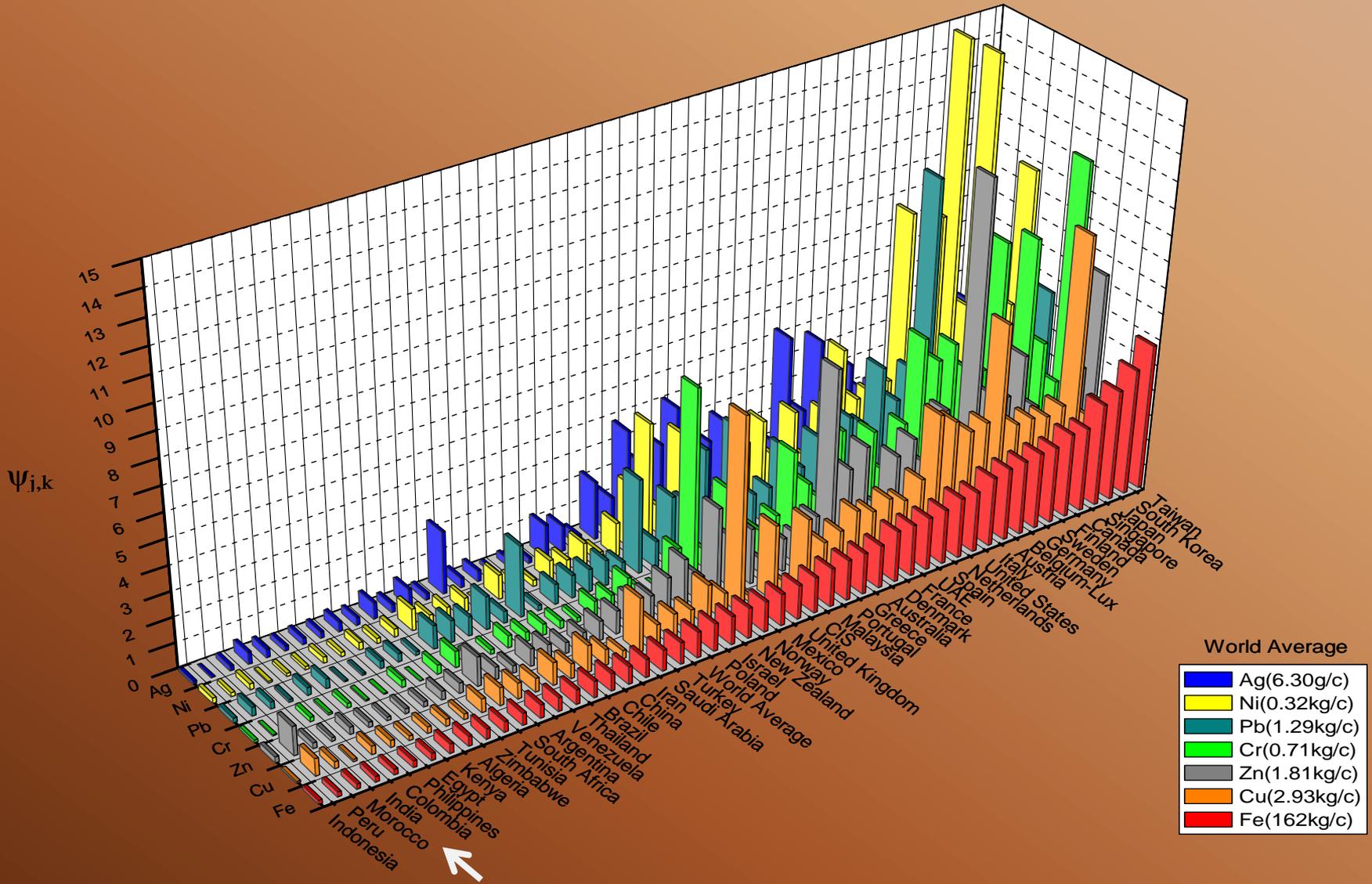
Contraction and Convergence



Country by Country Metal Use (2000)

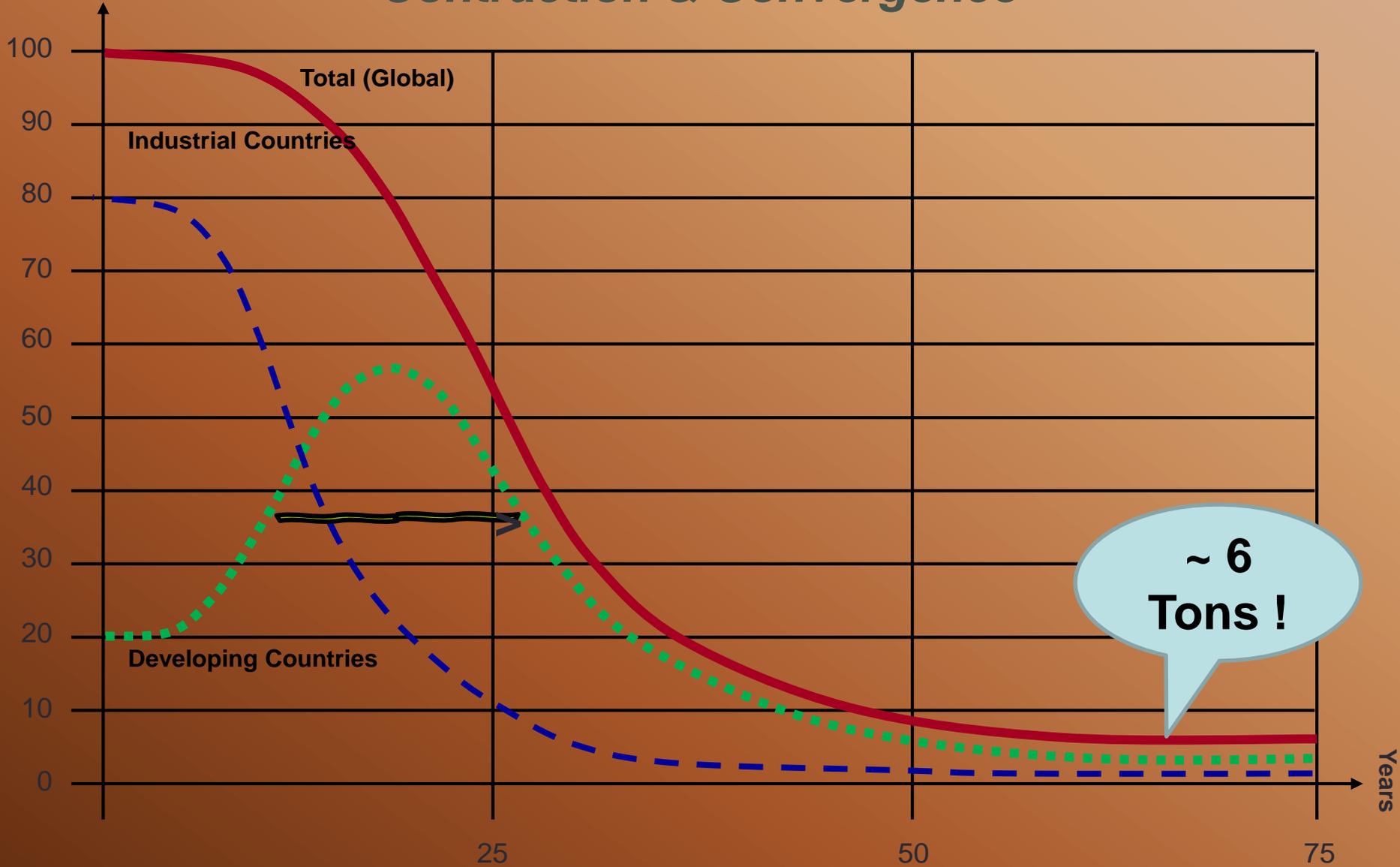


Country by Country Metal Use (2000)

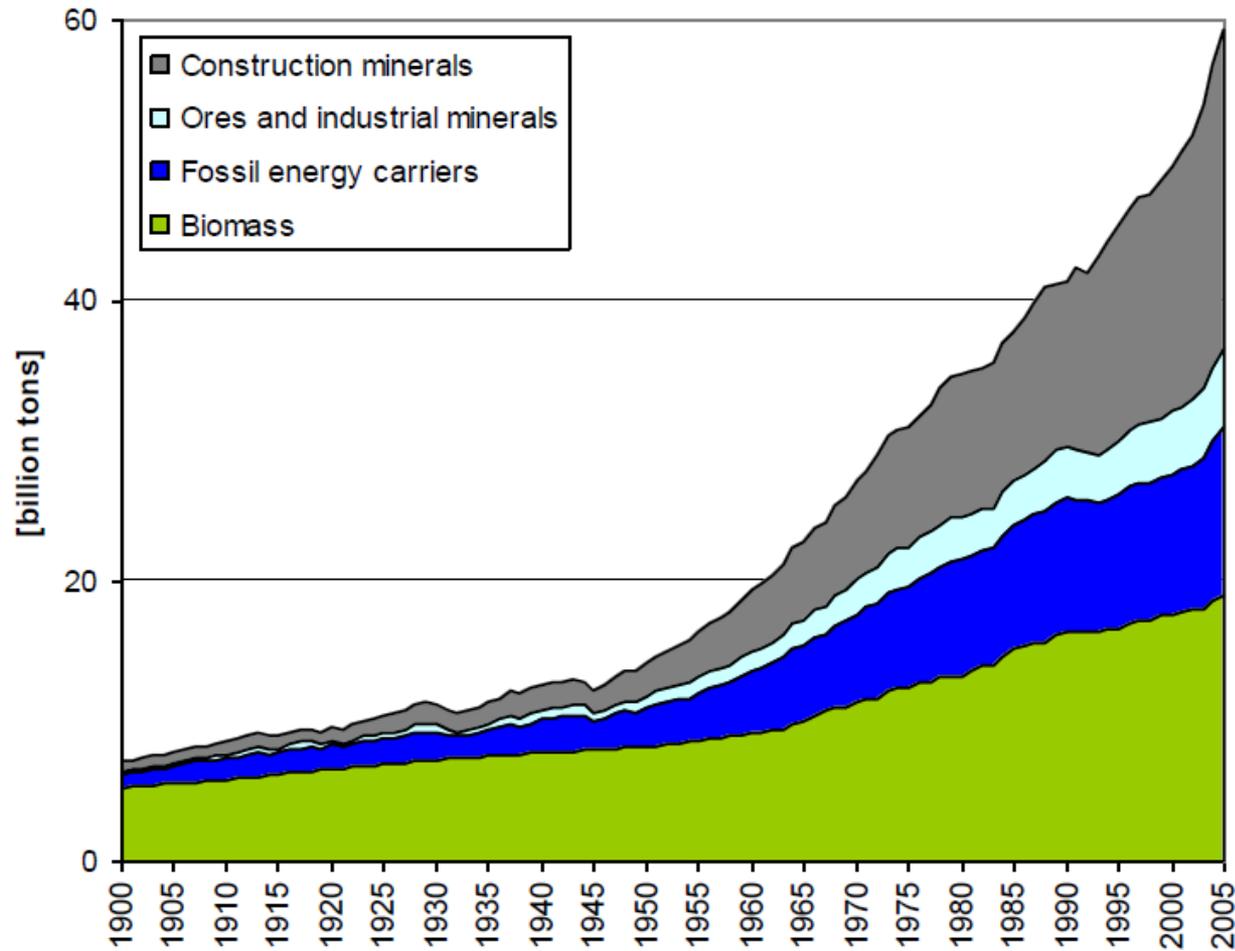


To Save the Planet

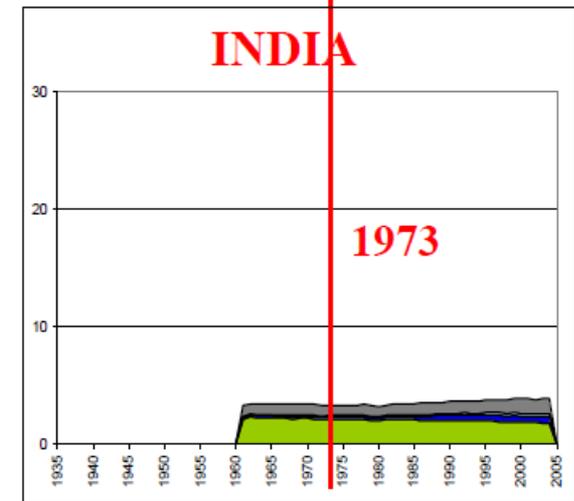
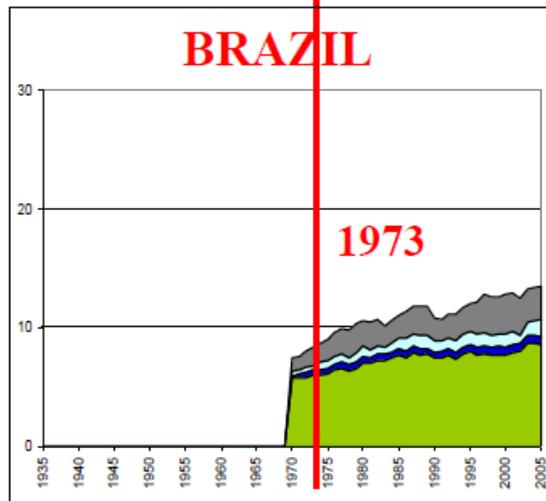
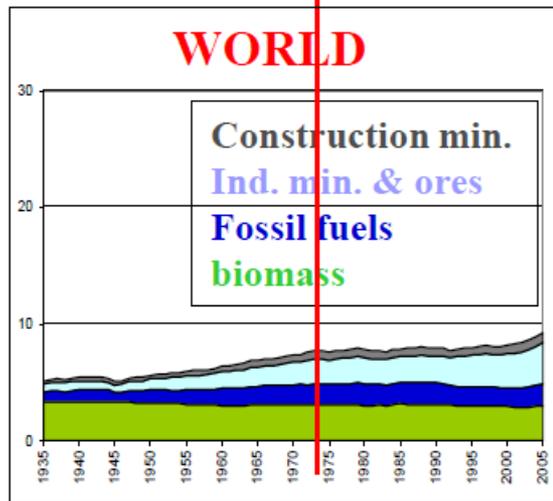
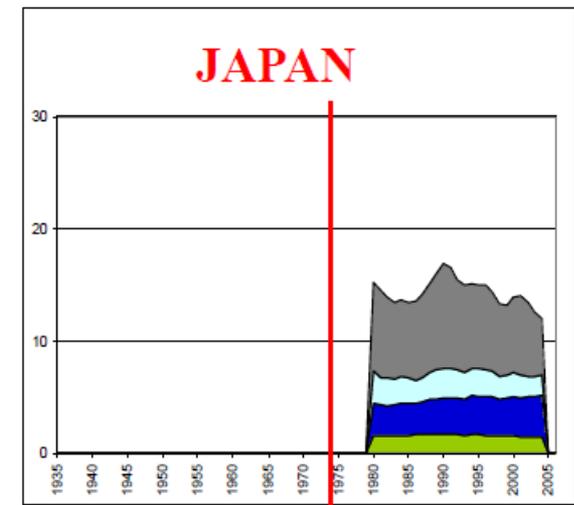
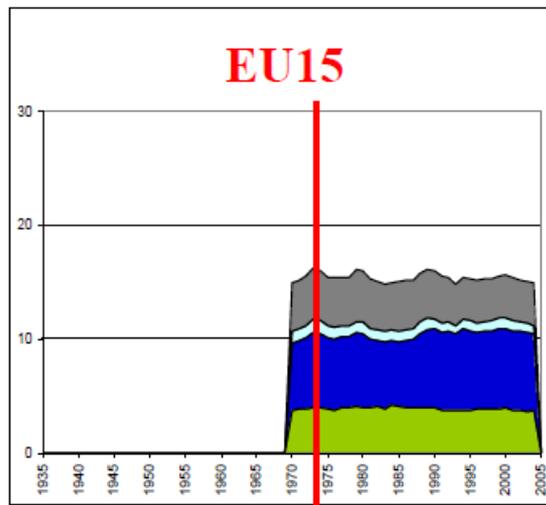
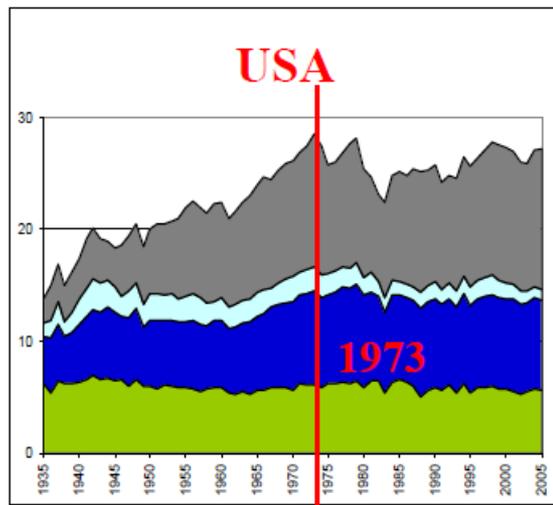
Contraction & Convergence



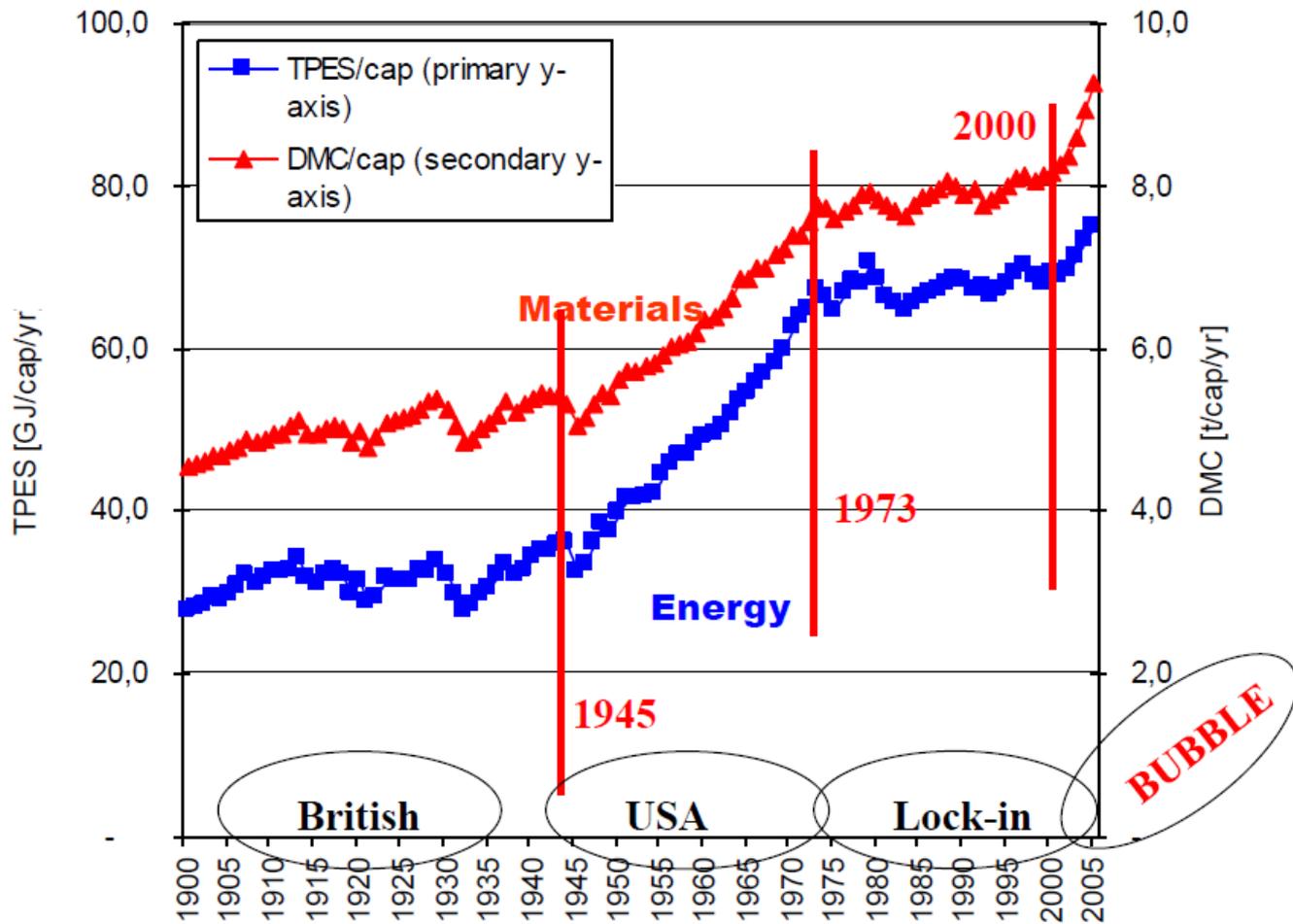
Metabolic scale: Global materials use 1900 to 2005



National trends: material metabolic rates (resource use in tons / capita) 1935 - 2005

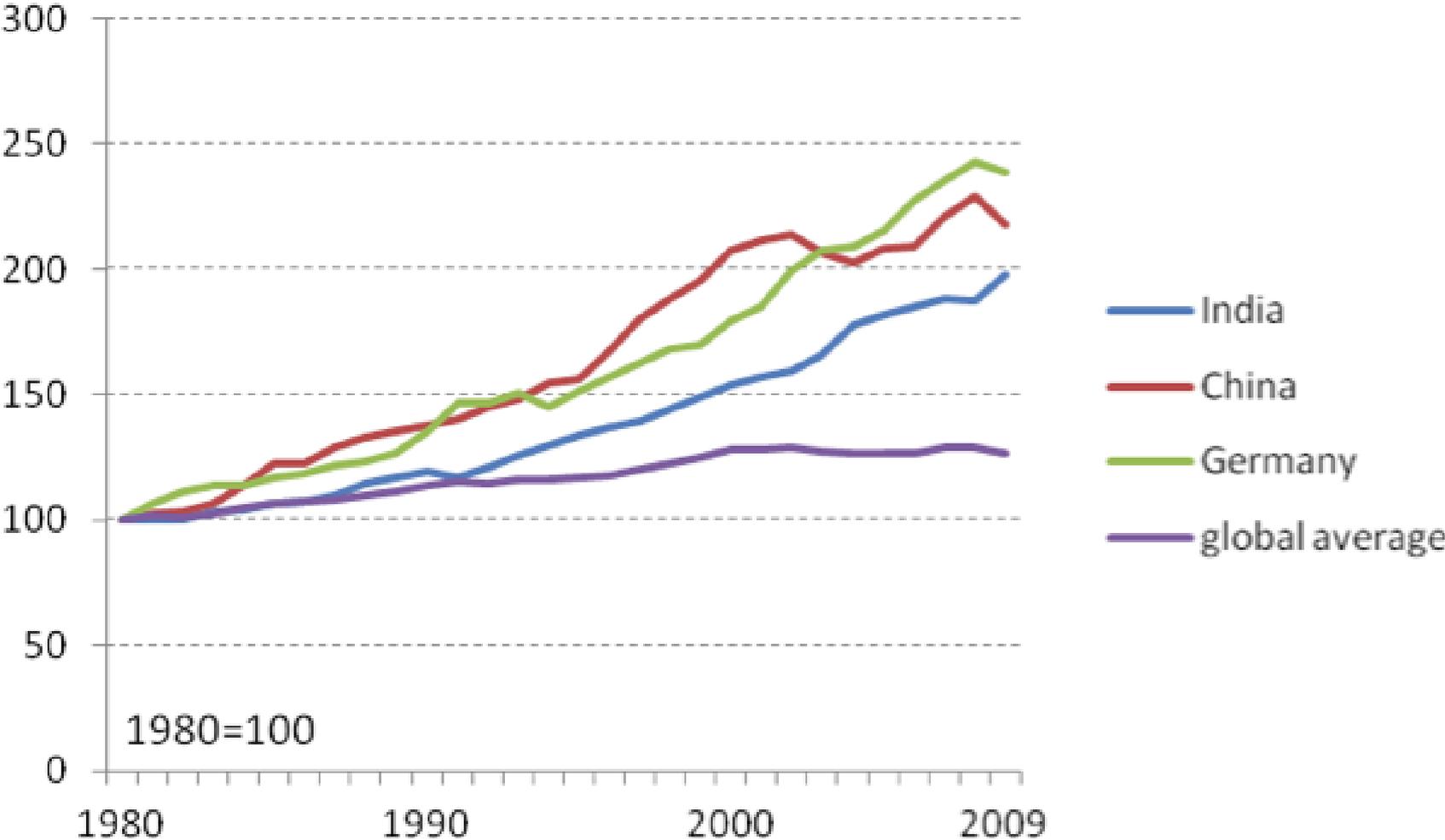


Metabolic rates and metabolic phases: global material and energy use per capita



Growth of Resource Productivity

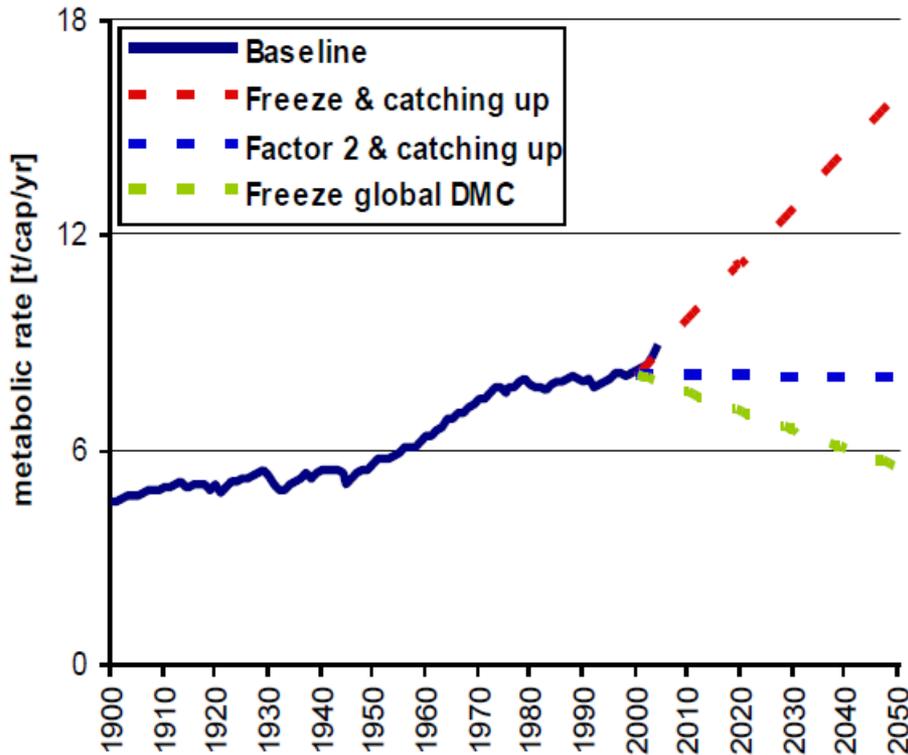
GDP per DMC



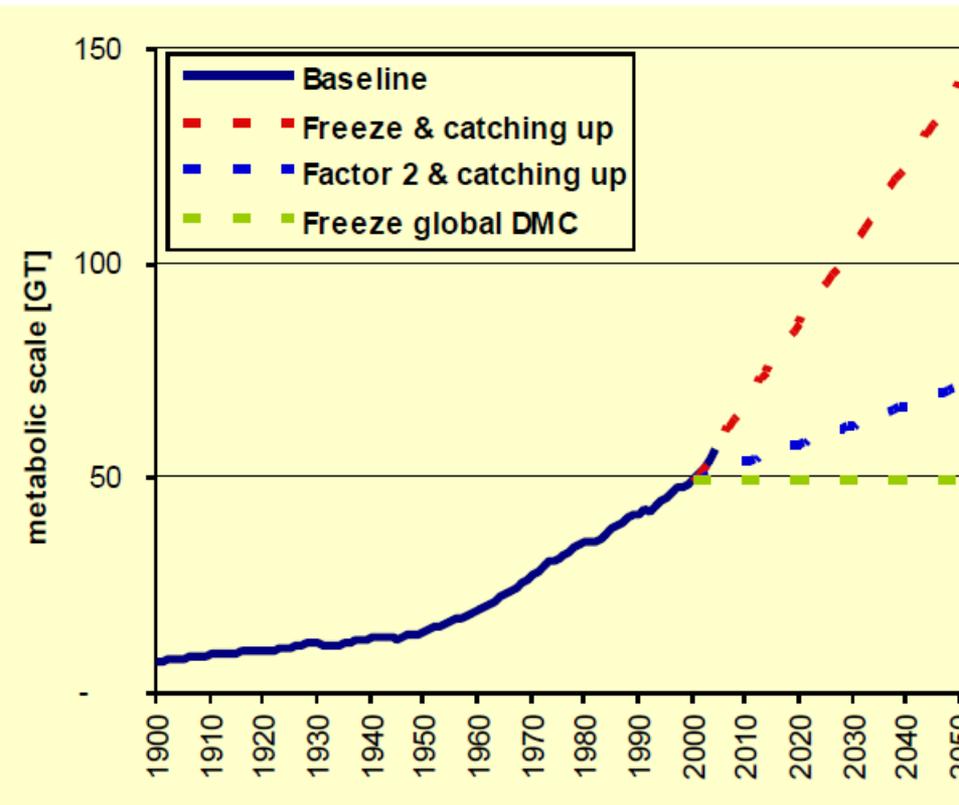
Source: Calculation based on Dittrich 2012, SERI 2011 and Worldbank 2011. Measured as GDP (ppp const. 2005) per DMC

Projections of resource use up to 2050 – three forced future scenarios

Global metabolic rates in t/cap



Global metabolic scales in billion tonnes

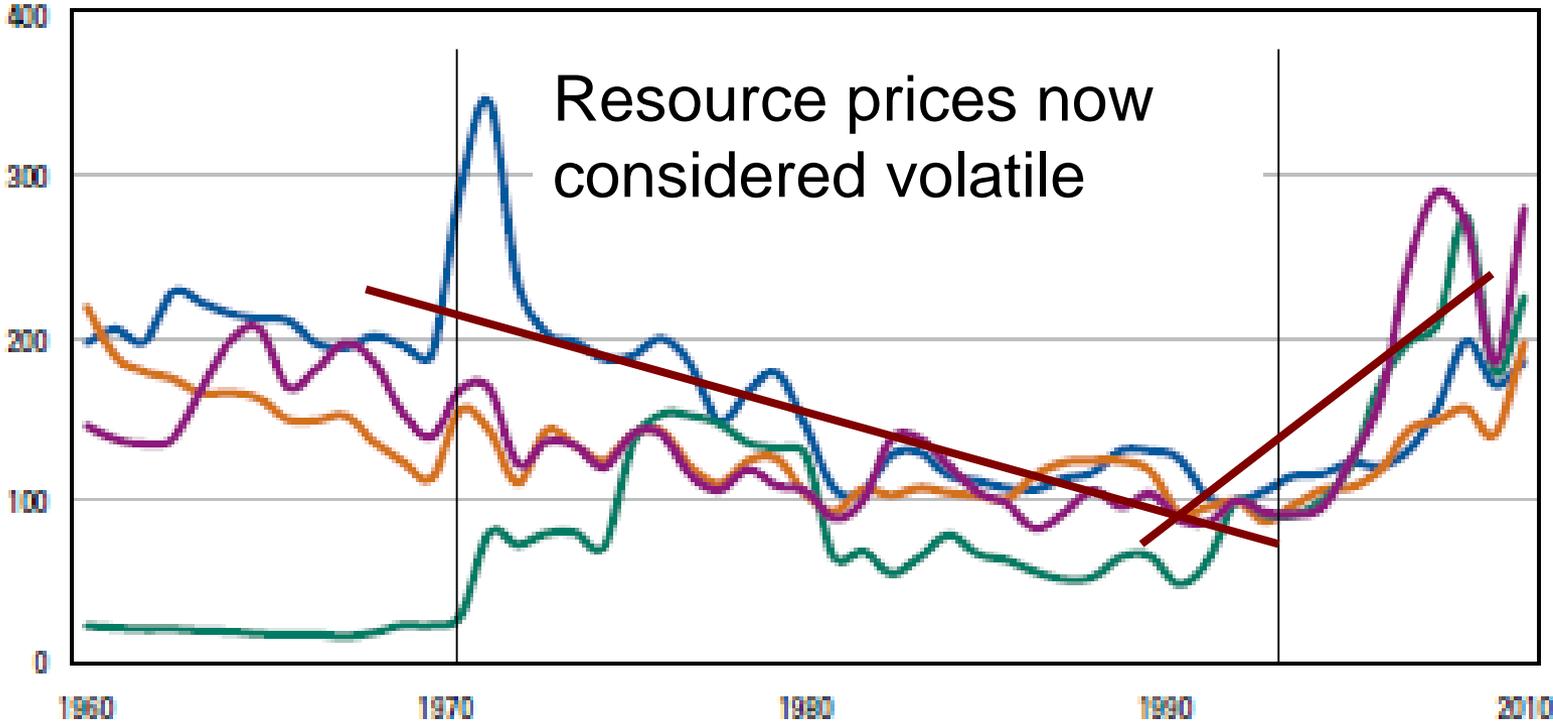


Resource Prices

Figure 2.5. Commodity price indices

Price index (real year 2000 US\$)
2000=100

- Food
- Raw materials
- Energy
- Metals and minerals (jr)

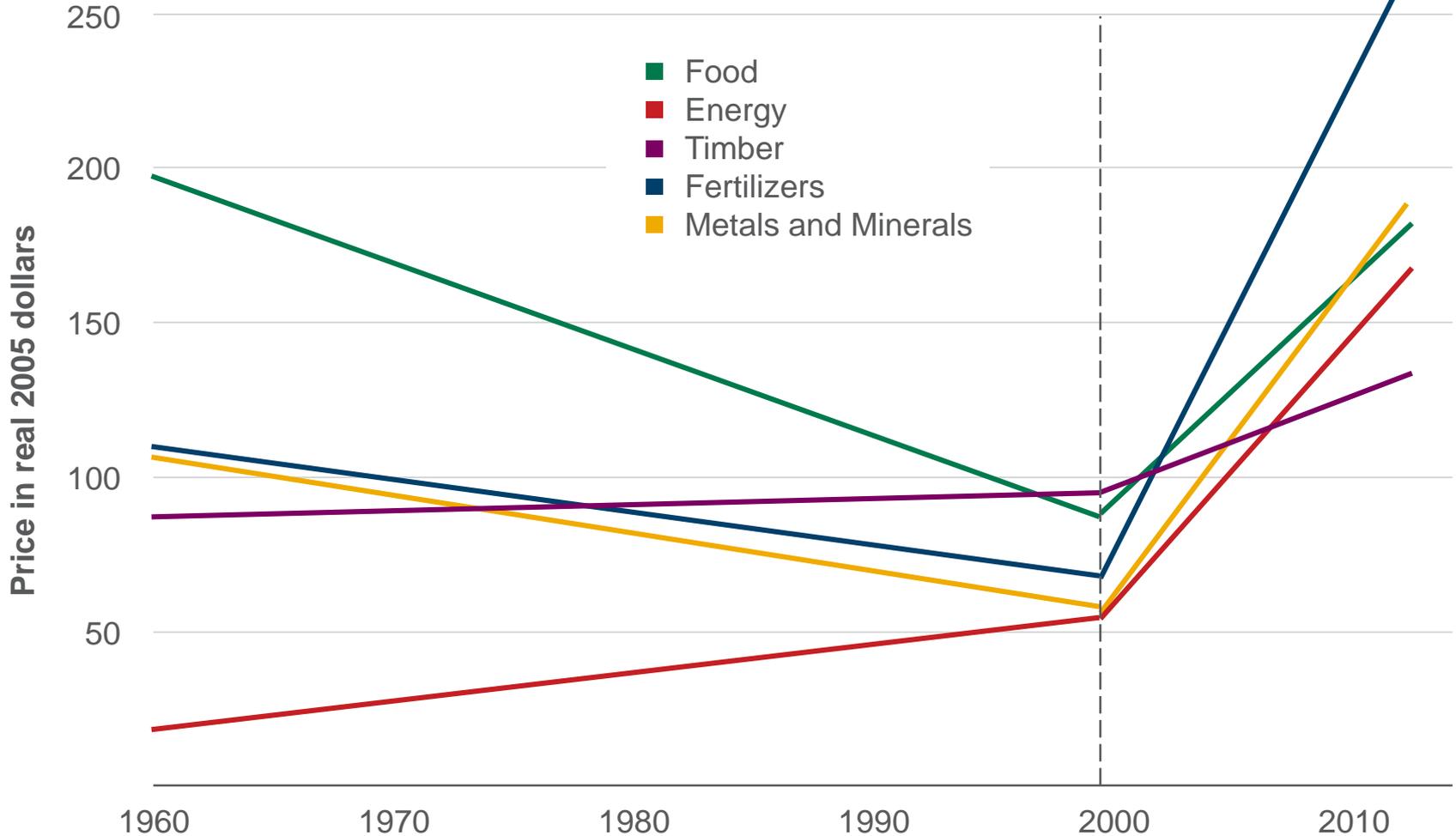


Source: World Bank Commodity Price Data (Pink Sheet), historical price data, available from <http://blogs.worldbank.org/prospects/global-commodity-watch-march-2011>

Are We Running Out?

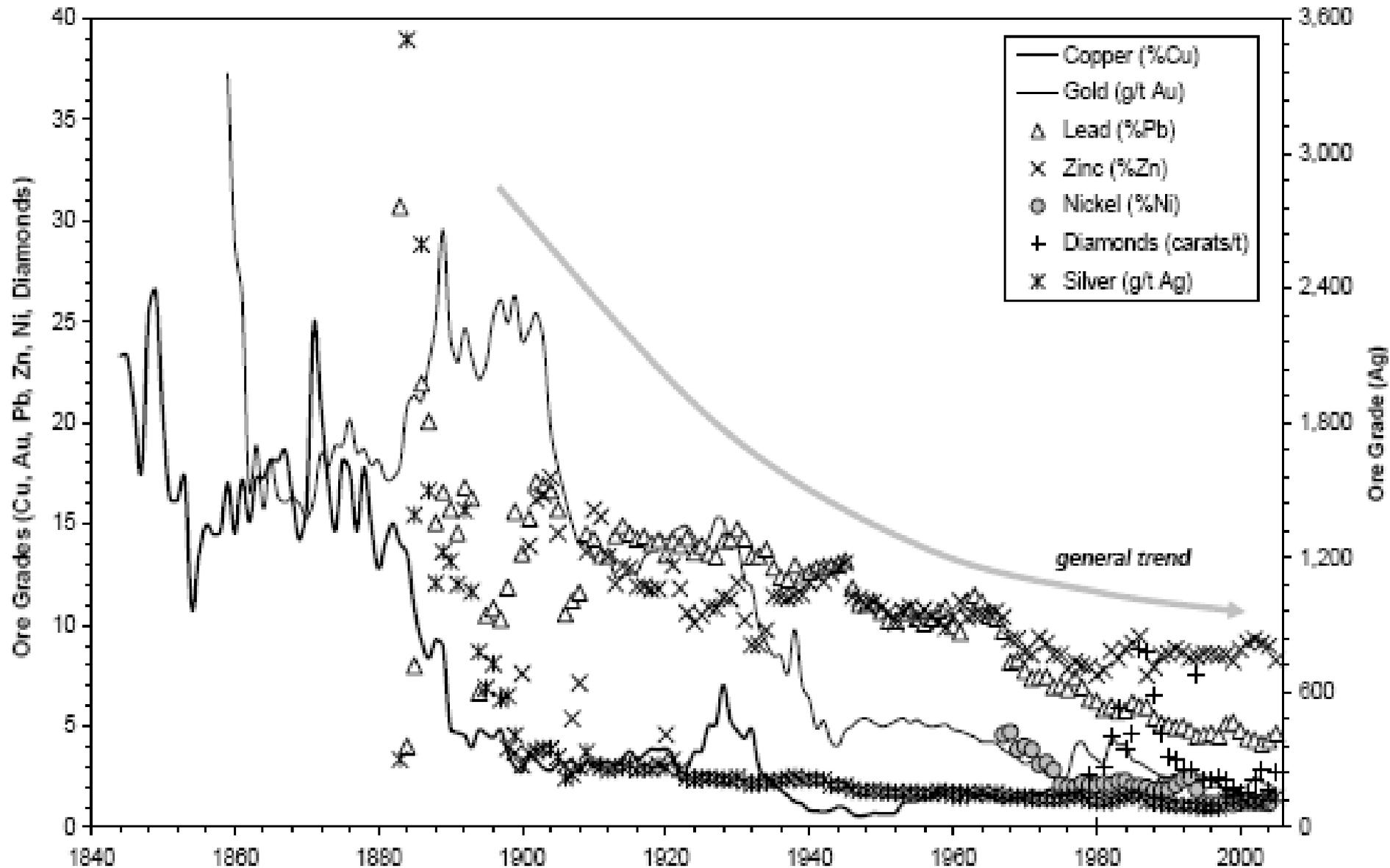
Price Trends of Major Commodity Bundles

(constant \$ 2005)

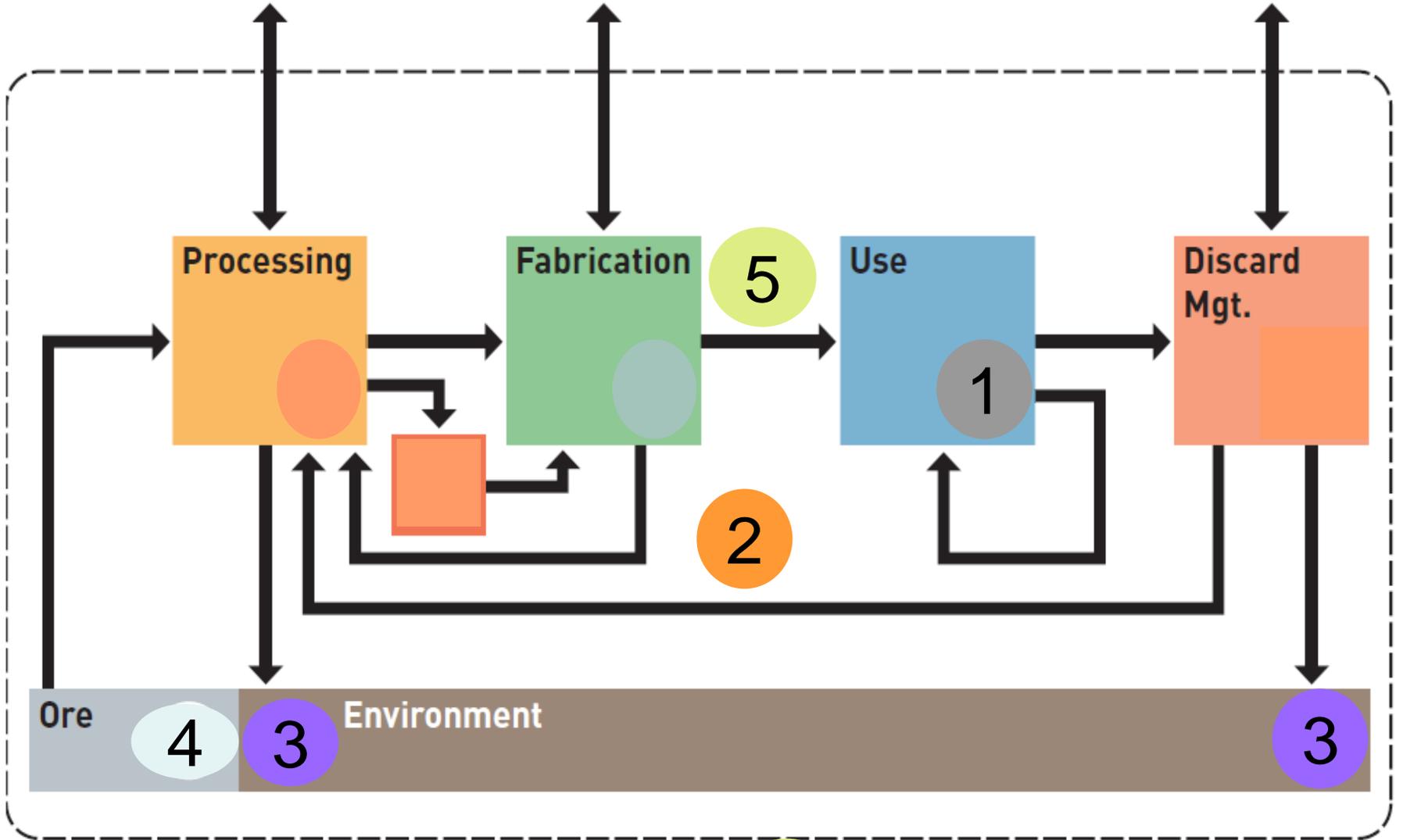


Histories of Australian Ore Grades, 1845-2007

Source: G.M. Mudd, Sustainability of Mining in Australia, Research Report No. RR5, Monash Univ., 2007.

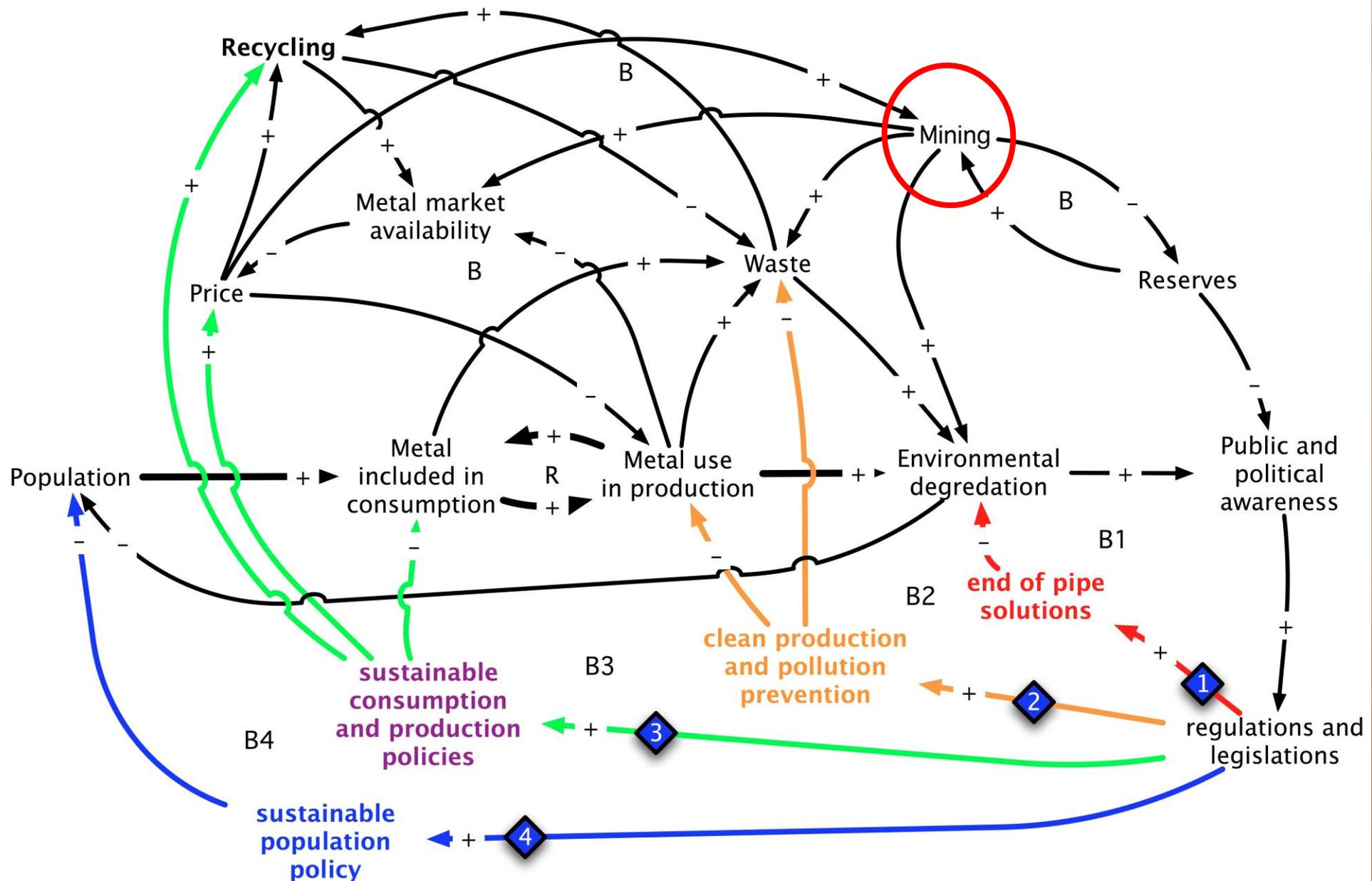


Import/Export



6

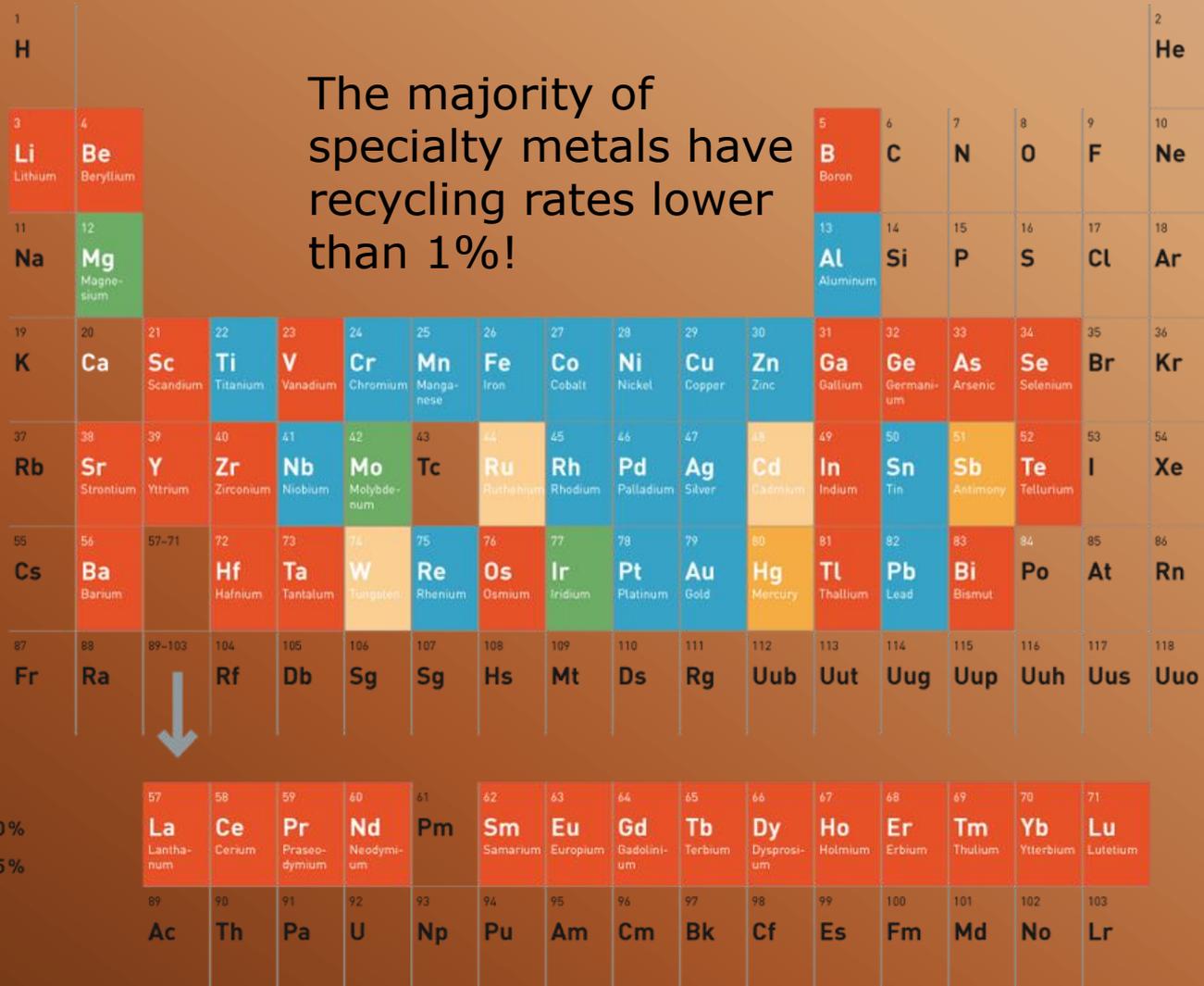
The causal loop map of our material society



Metals Recycling Rates



The majority of specialty metals have recycling rates lower than 1%!



- > 50%
- > 25-50%
- > 10-25%
- 1-10%
- < 1%

RAPID Transition From an Empty to a Full World



HOLOCENE

Upto 1800



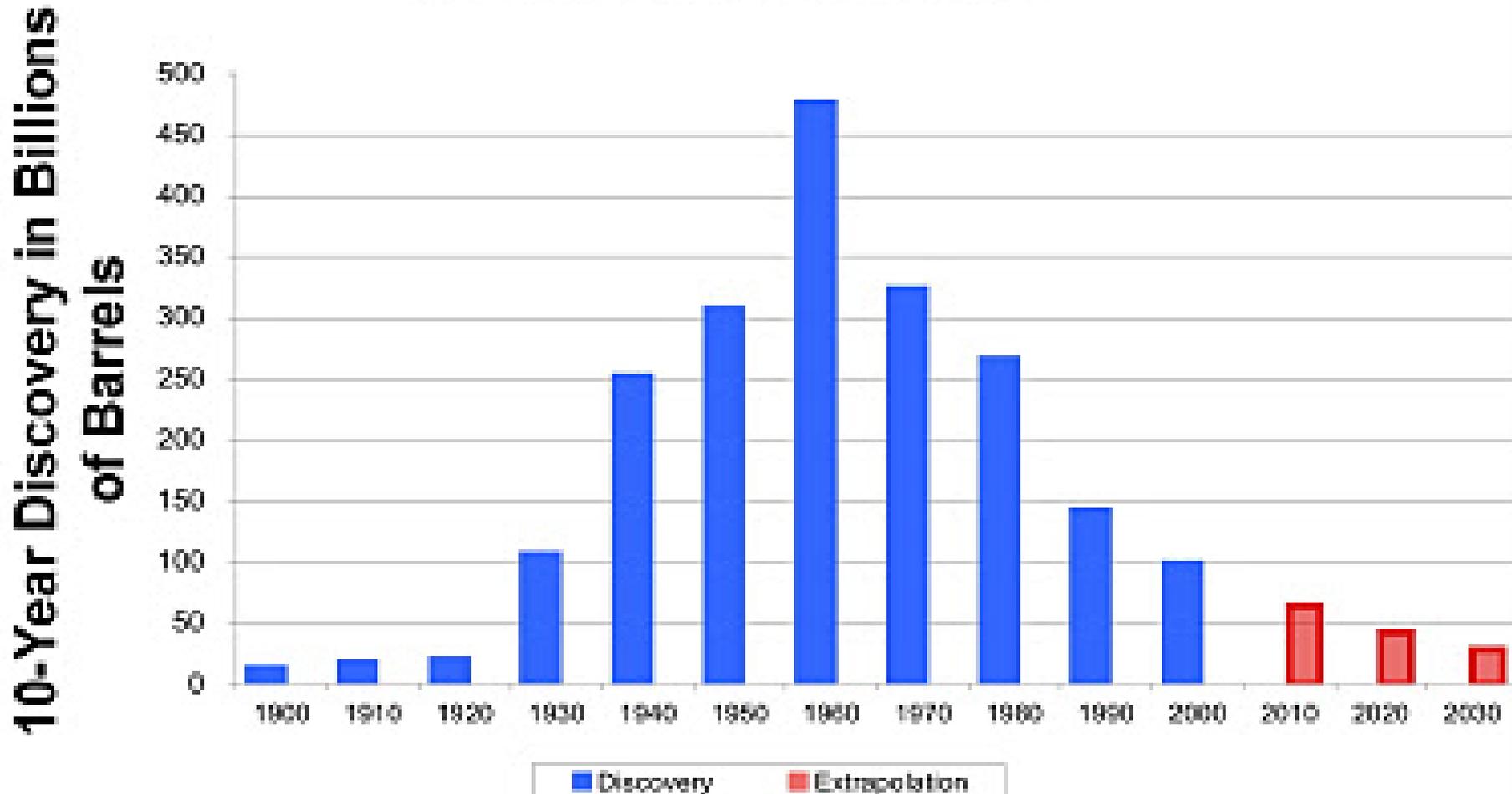
ANTHROPOCENE

Since 1800



PEAK OIL

New Oil discoveries have been declining since 1964



Note: World oil discovery over 10-year periods, by Association for the Study of Peak Oil and Gas.

Not Just Peak Oil... “Peak Many Things” In The Next 20 Years

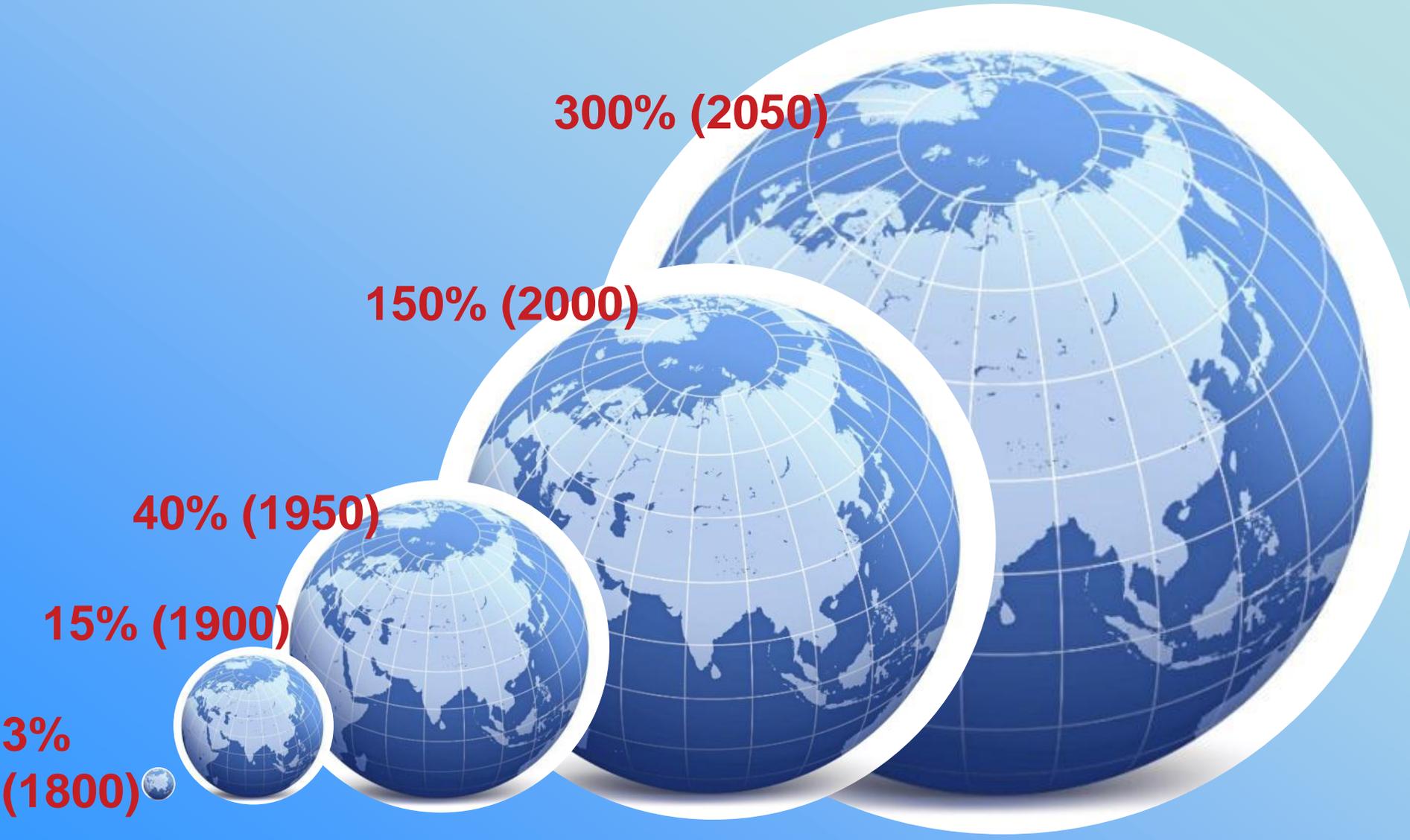
- Food production
- Topsoil
- Phosphorous
- Fish
- Water supplies
- Uranium
- **Rare Earths**



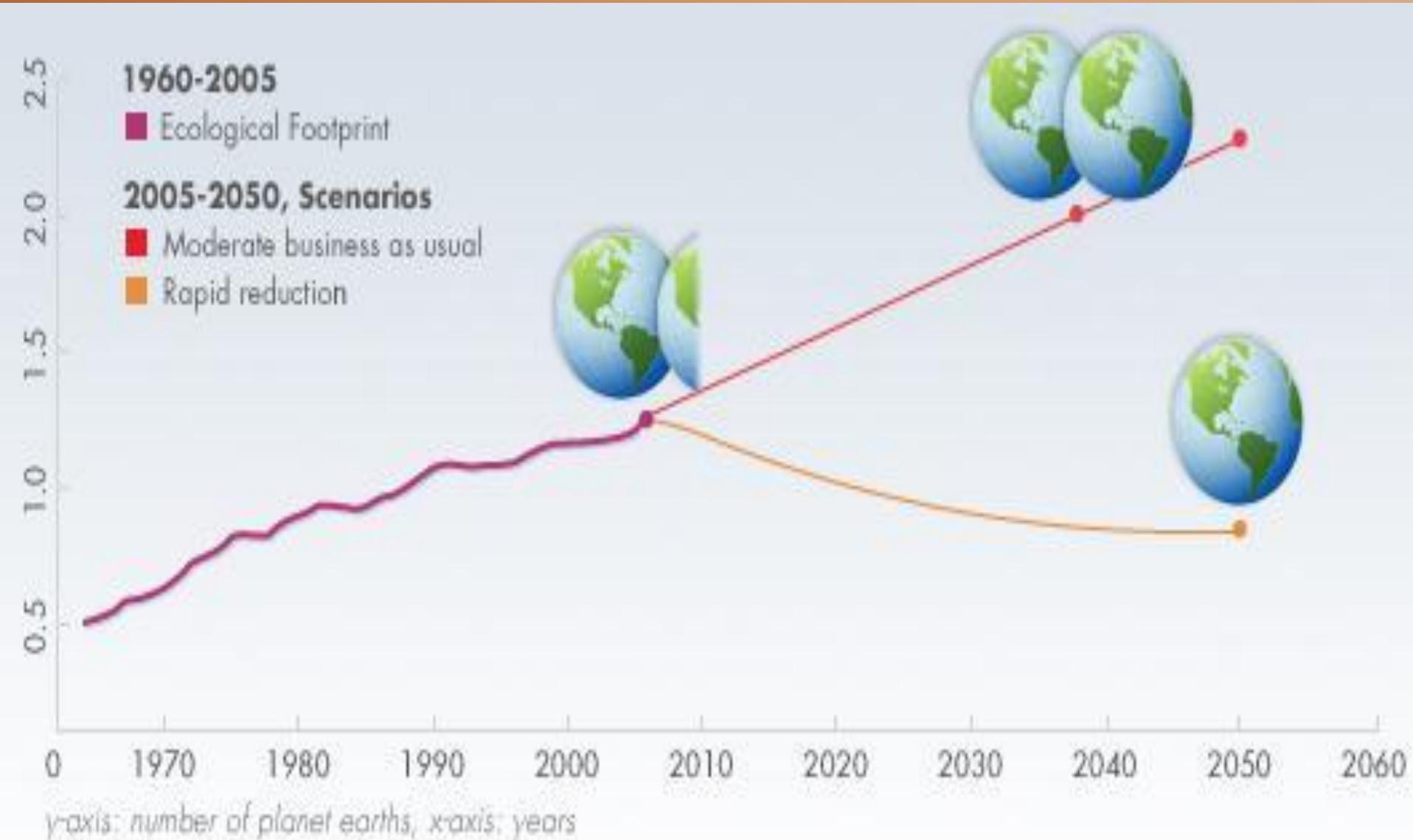
The Ecological Footprint



Ecological Footprint: Ave per Capita (Est)

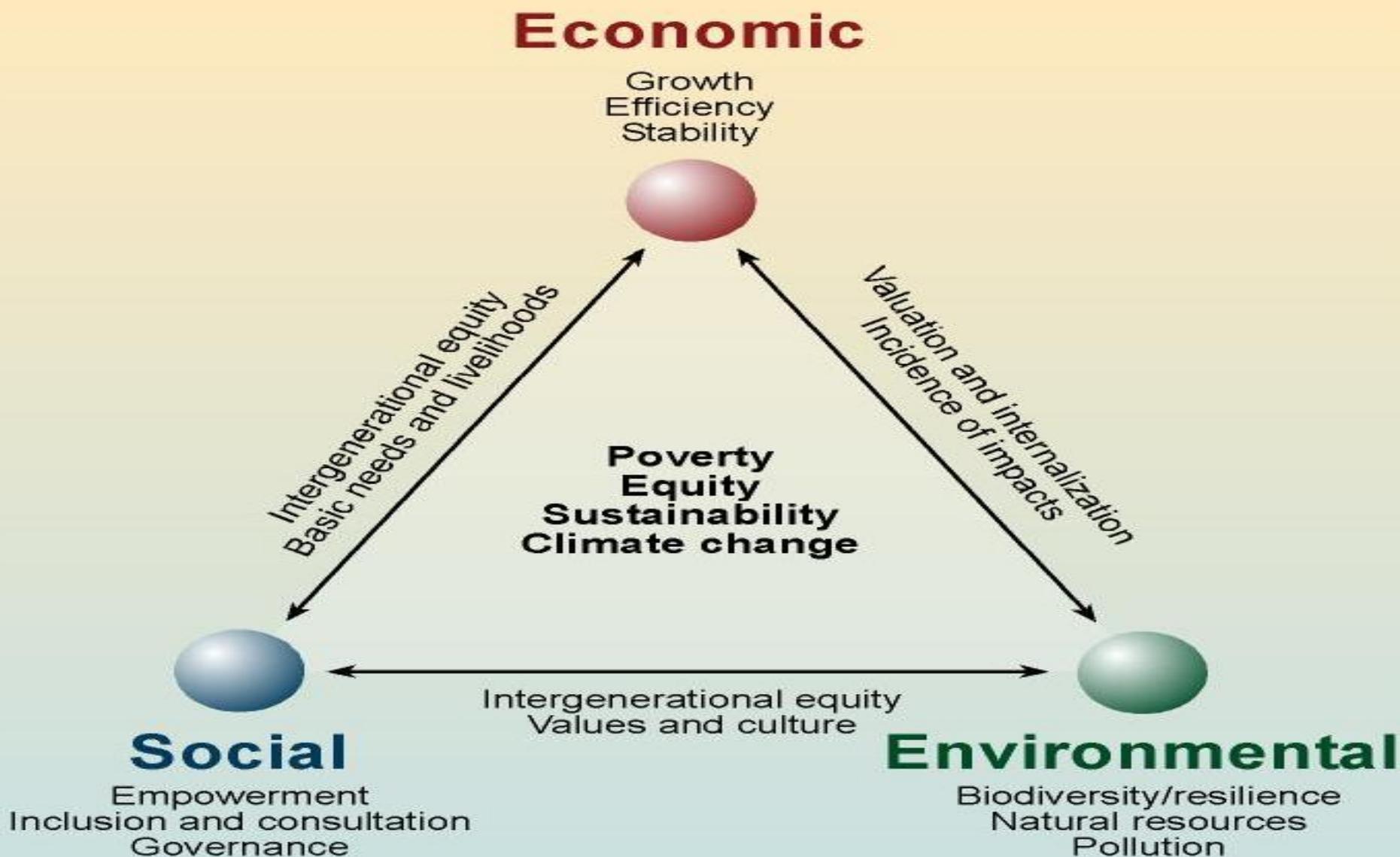


Ecological Footprint





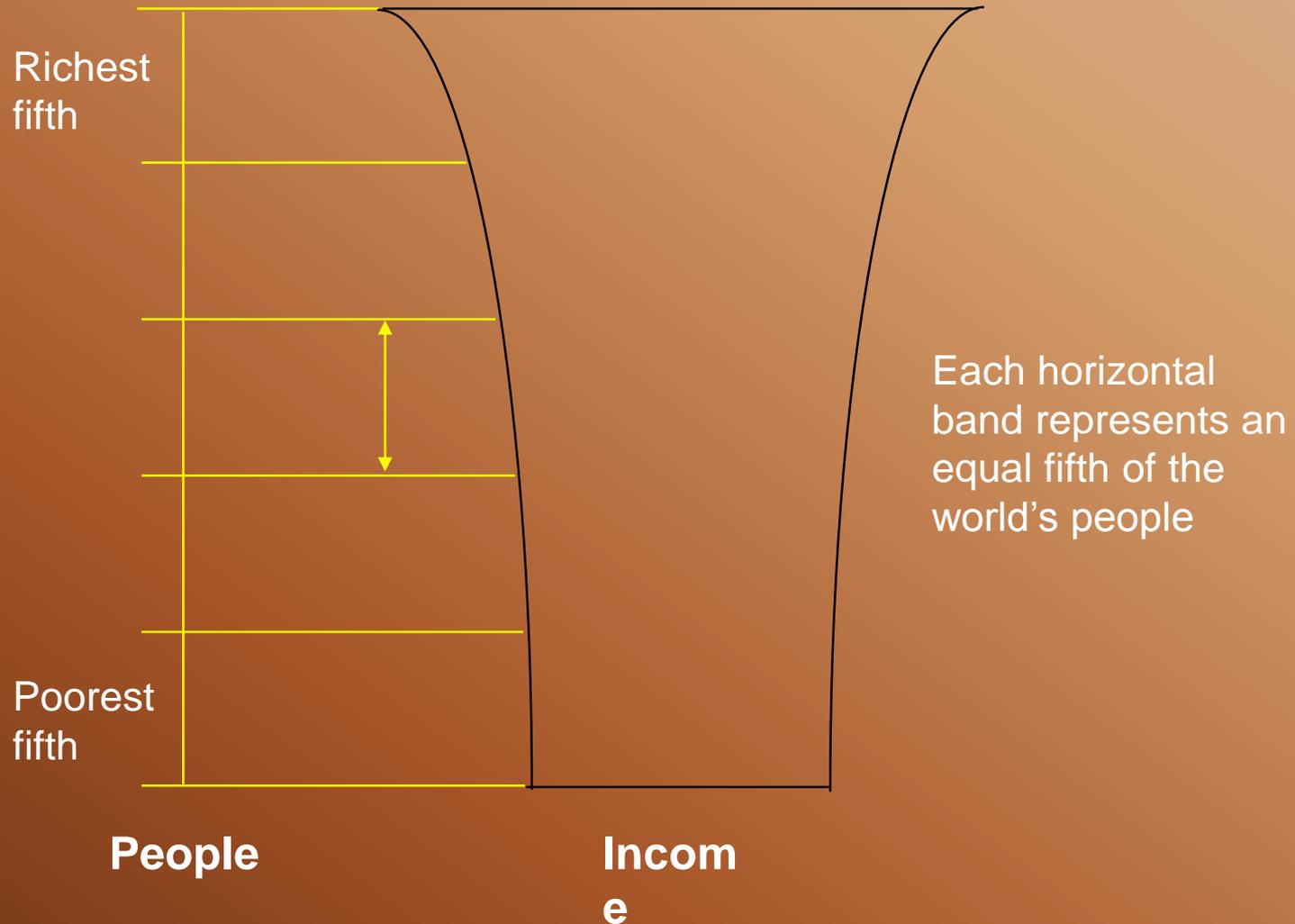
Key elements of sustainable development and interconnections

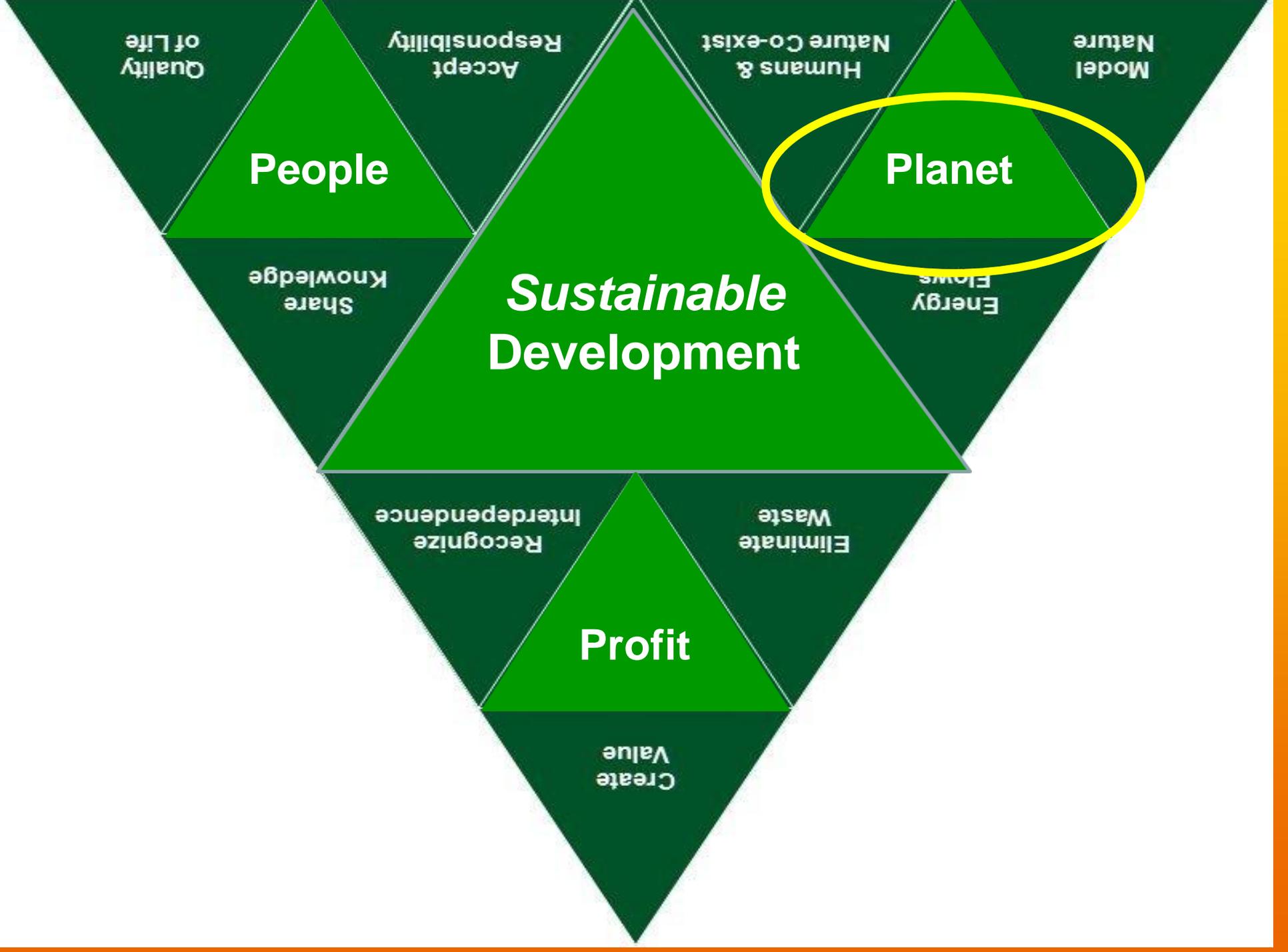


A Sustainable World

- *Green Economies*
- *Just Societies*

Sustainable Distribution of Global Income





Sustainable Development

People

Planet

Profit

Quality of Life

Accept Responsibility

Humans & Nature Co-exist

Model Nature

Share Knowledge

Energy Flows

Create Value

Recognize Interdependence

Eliminate Waste



Nature's infrastructure



Ecosystem Services

Our Natural Areas Are Under Great Threat !





Killing our Wetlands



Either
by Being
Too
Careless

or

by Being
TOO
Efficient

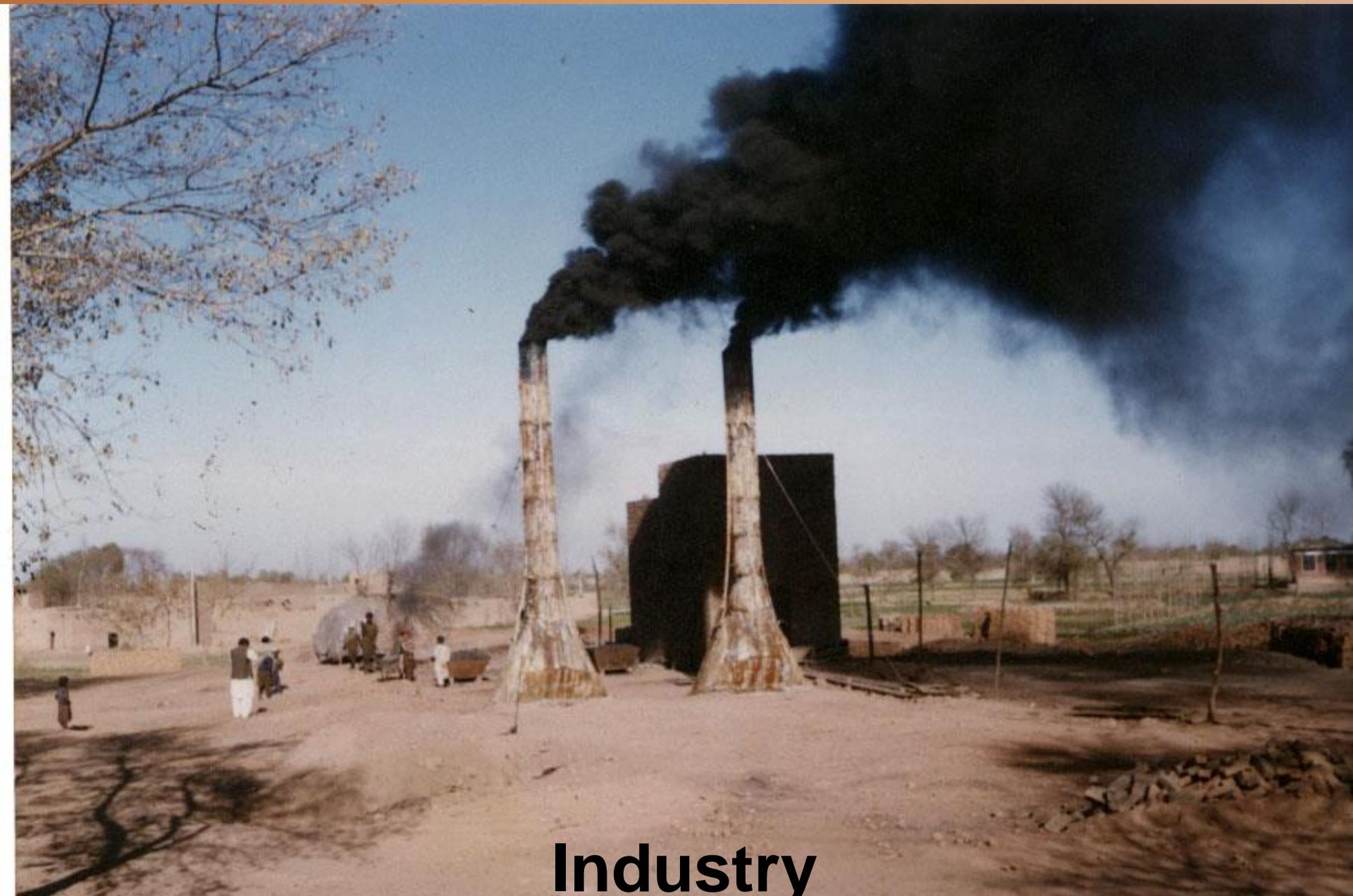
Masters of the Universe



Pollution from Industry



High Pressure on the Environment



Industry

Resource Extraction





Mother Earth's Blood and Scars













Water for Resource Processing





**Lock-in for Decades
-- even Centuries**



Sand Mafia – a 400 Crores Business

Key Mindsets for a Sustainable Mining Sector

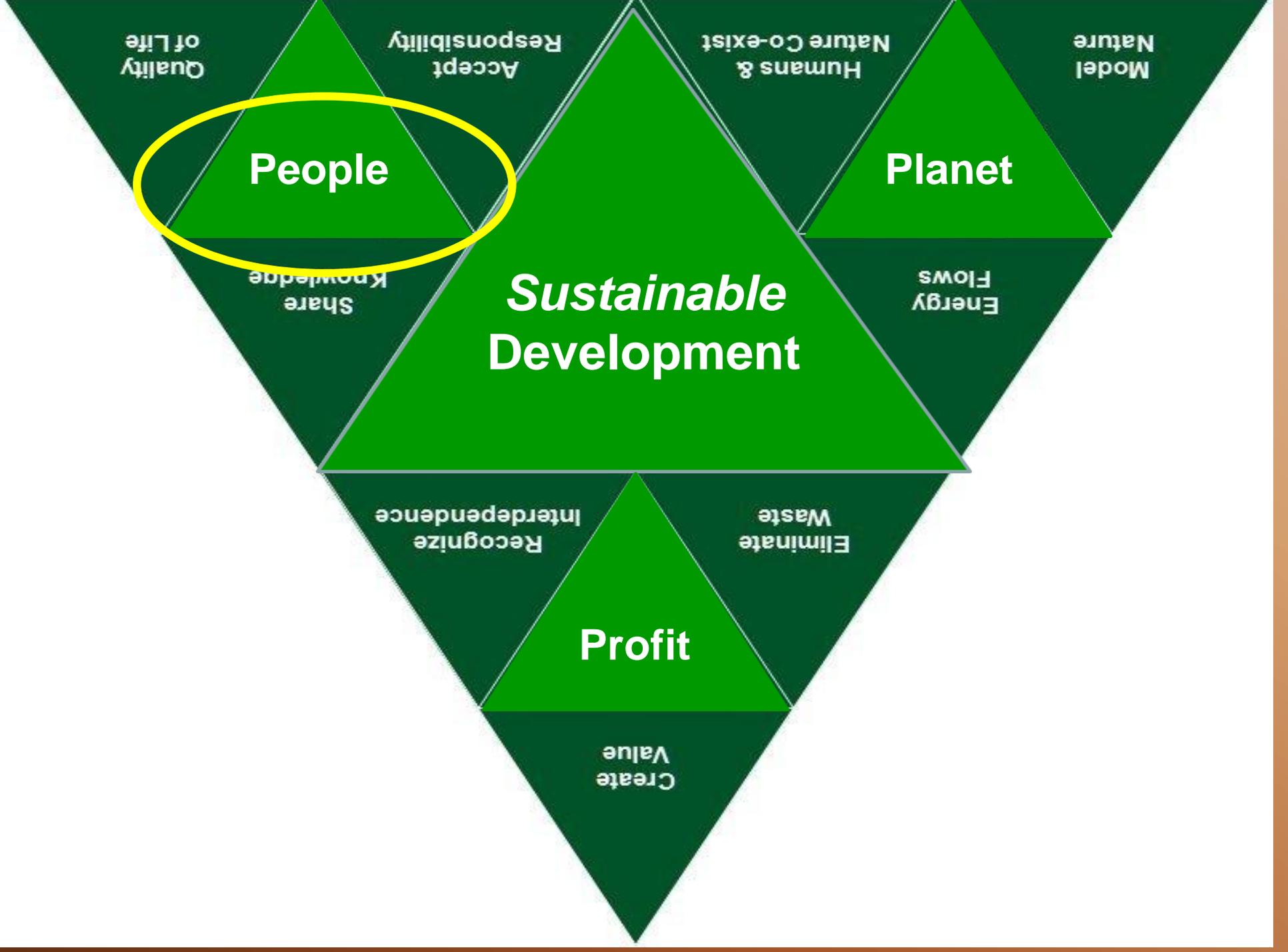
- ❖ Minimizing Negative Externalities**
 - ❖ Nurturing Nature**
 - ❖ Respecting Communities**
- ❖ Full Cost Pricing**
- ❖ No Regrets Options**
- ❖ Regenerative Technology**
- ❖ Precautionary Approach**

metals without mining inspired by bacteria



recovery
of all metals
from e-waste





We Need Jobs !



Sustainable, Modern Jobs



**We Need
ALL Kinds
of Jobs**



Sustainable Livelihoods

- Deliver products for *Basic Needs*
- Generate incomes for even the *Poorest*
- Give meaning and dignity to the *Worker*
- Strengthen the local *Community*
- Conserve the *Environment*
- Regenerate the *Resource Base -- particularly Biodiversity*



Community Decisions Systems



A GOD UNDER THREAT

Find-a-film: SMS FIND followed by movie name and area to 56388









In a Permanent Trap

Family Size

No Income

Poverty

No Markets

Resource Destruction



The 3 Mine Sets of the Past

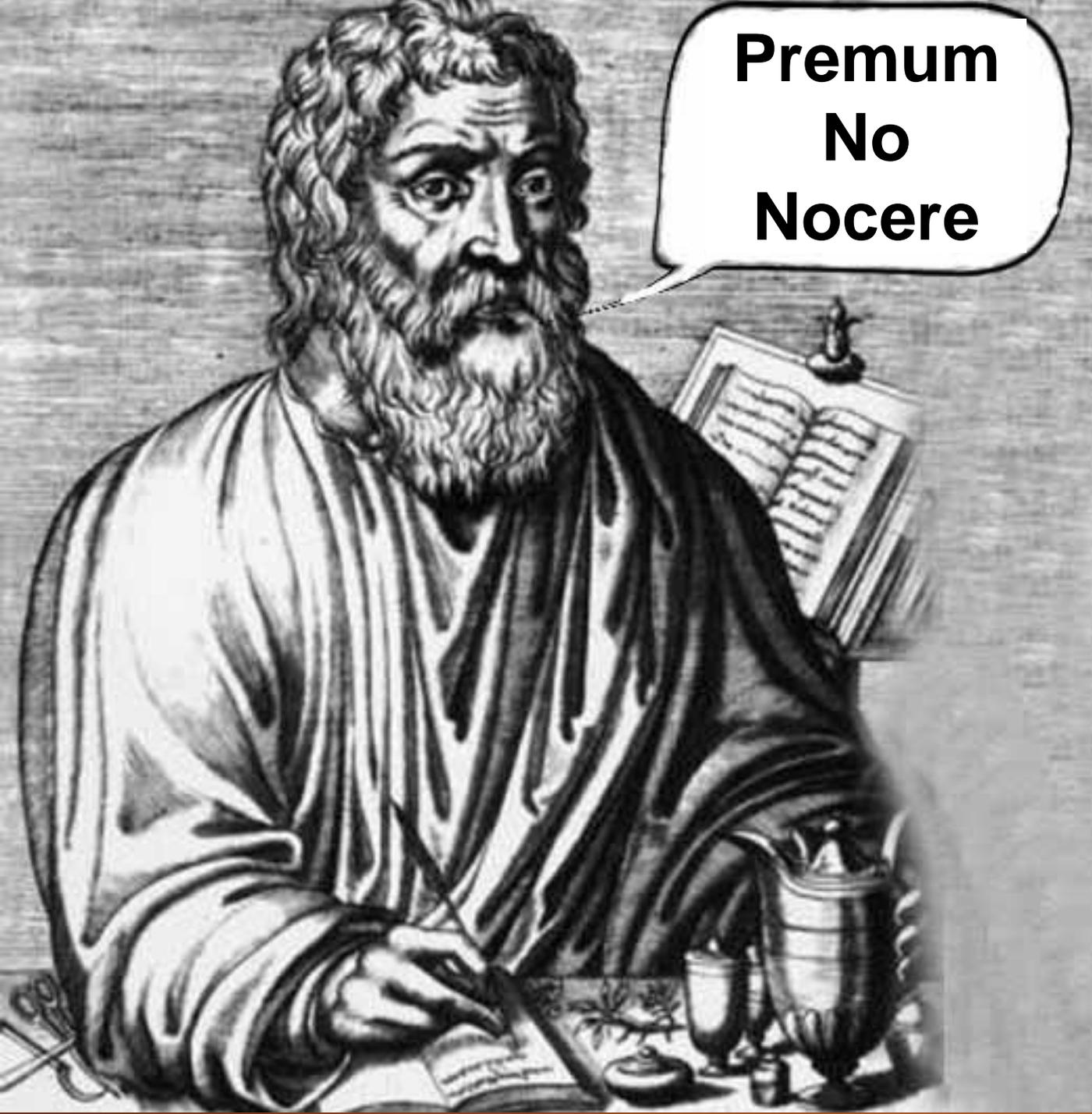
- ***mine* and plunder the earth as fast as possible there to be subjugated”**
- **“what’s *mine* is mine, what’s yours is up for grabs – the poor are there to do the work”, and**
- **“*mine* and bomb the natives until they give us what we want**

The 3 Mine Sets

- *mine* and plunder the earth as fast as possible there to be subjugated”
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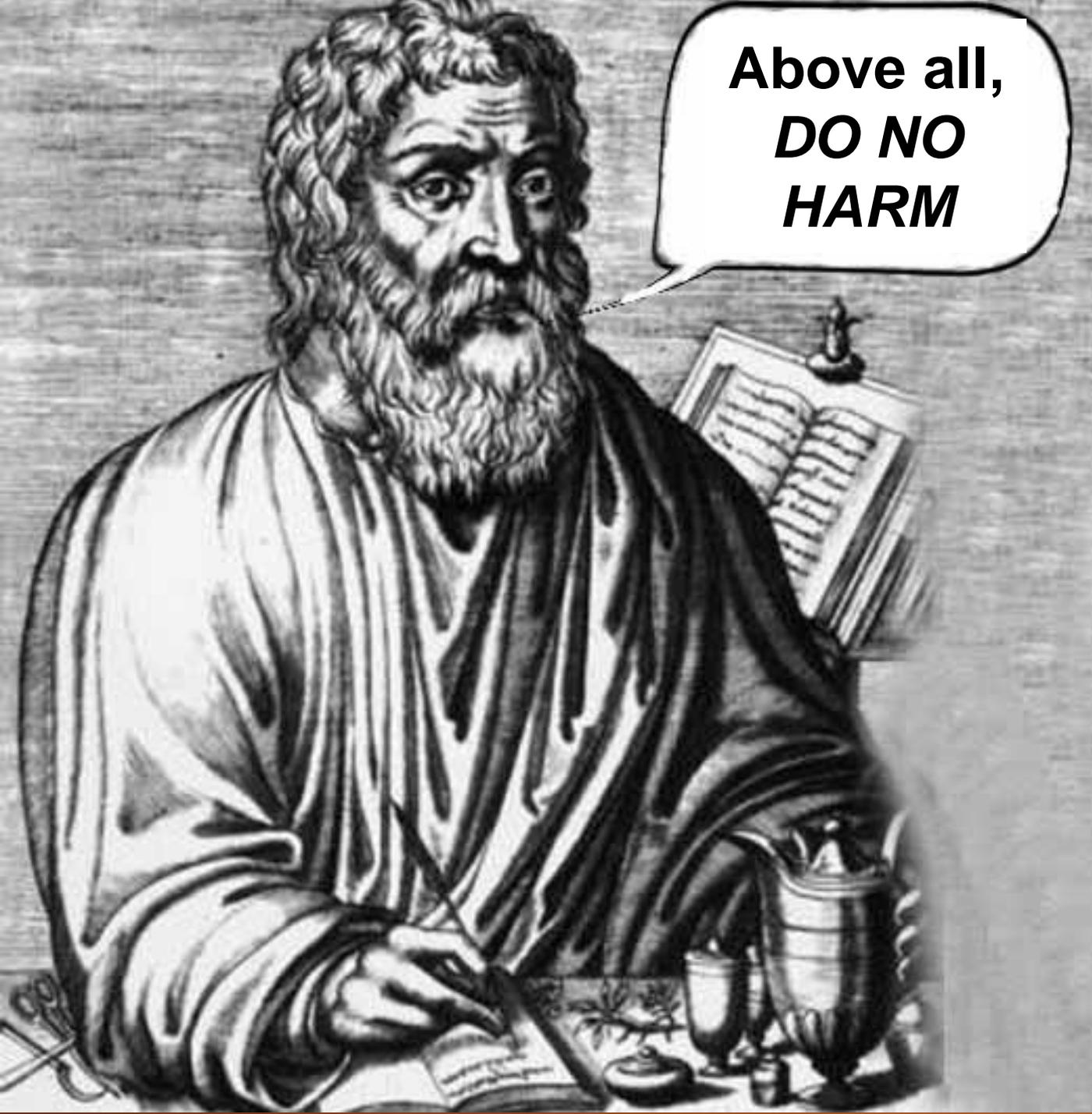


No Longer Valid
in 21st Century



**Primum
Non
Nocere**

Hippocrates
(460 to 377 BC)



Above all,
***DO NO
HARM***

Hippocrates
(460 to 377 BC)



Lord Buddha (~560 to ~480 BC)

“If you can, help others; if you cannot do that, at least do not harm them”

“Harm no person, animal, plant or mineral”

“We all share this world, we have to learn to live in harmony and peace with each other and with nature”



St Francis of Assisi (1182 – 1226)

**”In the name
of Christ, I
order you not
to hurt
anyone”**



Mahatma Gandhi (1969-1948)

“The *earth*, the *air*, the *land* and *water* are not an inheritance from our forefathers but on loan from our children. So we have to handover to them at least as it was handed over to us.”

“What we are doing to the forests of the world is but a mirror reflection of what we are doing to ourselves and to one another.”

Be The Change . . .



... You Want to See



**Otherwise, We Will
Need 2 Additional
Worlds by 2030**



... Our One Earth



It's OUR World !

Lakes and Wetlands





Natural Reservoirs



Growing Food



Gathering Food



Catching Fish



Fodder



Fiber



Fuel



Livelihoods



Pharmacy

Traditional Medicines





Materials



Wetlands – Balancing Water Cycles



Nature's Food and Water Factories



**Glaciers for Year Round
River Flows**



Water Purification Plant



Waste Treatment



Storm Protection



Habitats

Species





Ecotourism



Recreation



**Aesthetic Beauty
and Inspiration**



**People in Harmony
with Nature**

Floods Cost Billions in the North and the South



**UK Flood Costs
Today:**

**US \$ 2 Billion
per Year**

Australia: Value of Pollination

Amount: US \$ 1.3 Billion

Date: 2000

**Estimated by: Rural Industries Research
and Development Corp,
Govt of Australia**

**35 % of human
food comes from
plants pollinated
by wild pollinators**



**100,000
species of
bats, bees,
beetles,
birds, and
butterflies –
plus flies and
moths --
provide *free*
pollination
services**

USA: Value of Pollination

Amount: US \$ 5.7 to 8.3 Billion

Value of Crops: US \$ 24 Billion

Ref: Ecological Society of America

Replacement of Chemical Pesticides Saves Money – and Lives



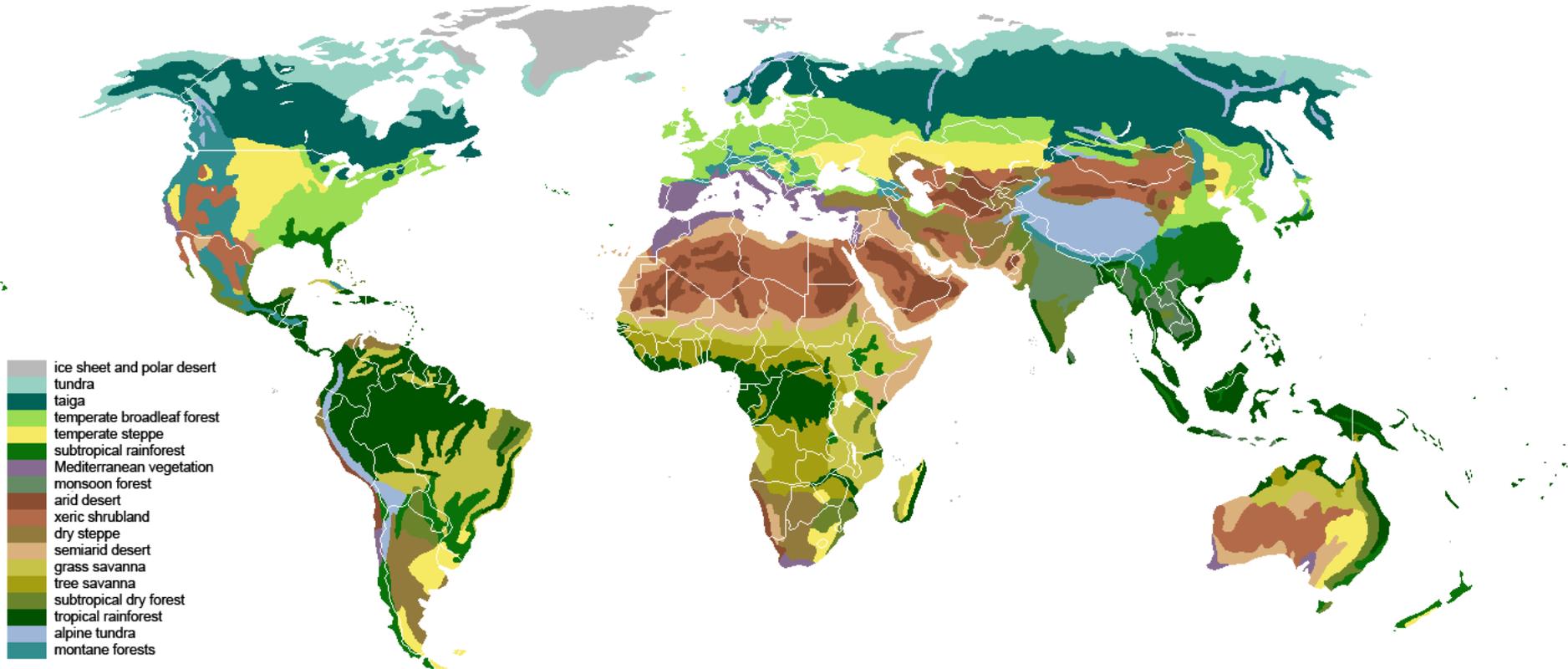
**2000 Estimate of
Replacement Value:
US \$ 54 Billion per year.
(Not Including Health
Costs Saved)**

**40 % of Pharmaceuticals
derived from Natural Products.
Including 9 out of Top 10**

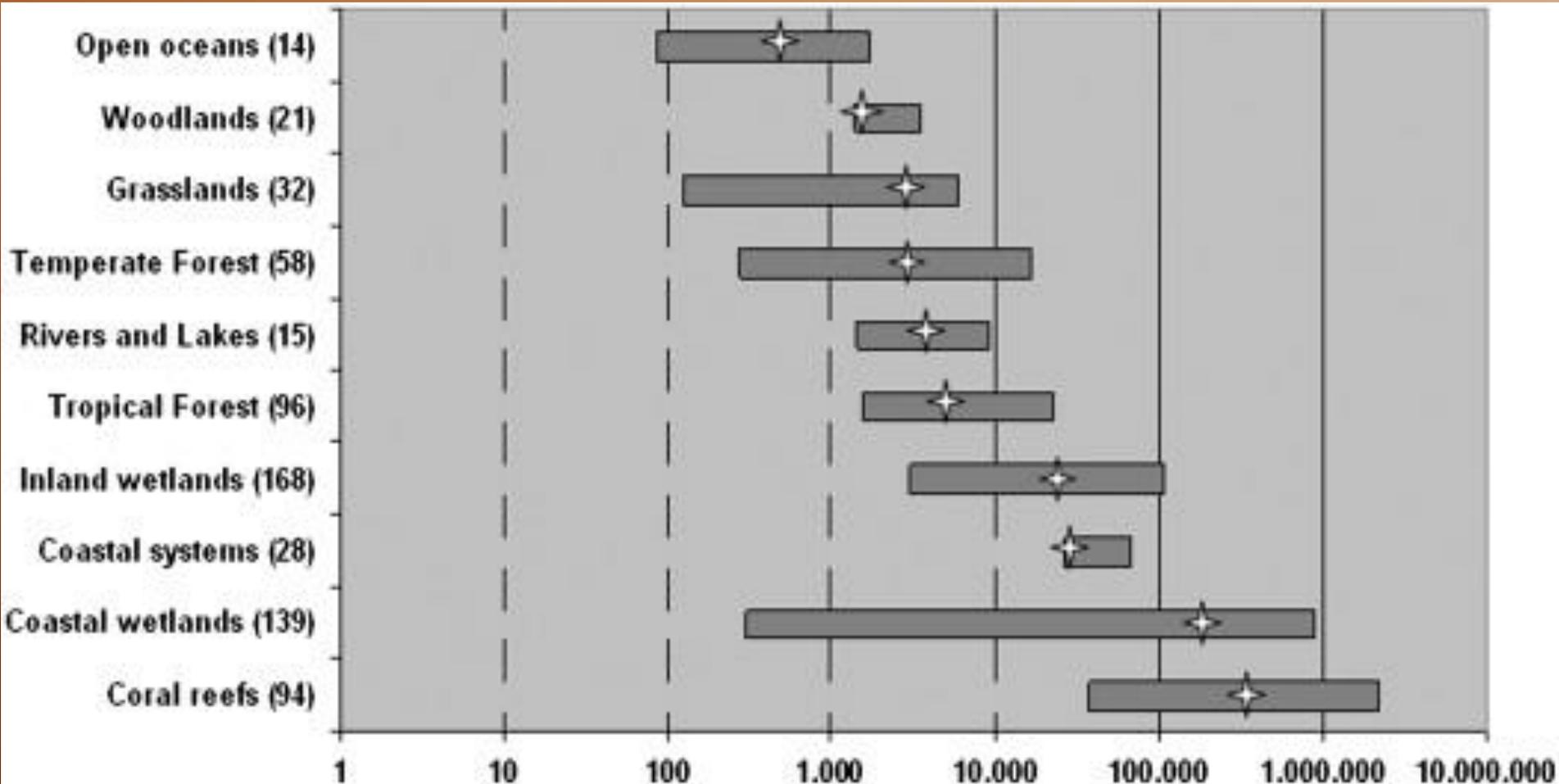


**2003 Sales of
Pharmaceuticals:
US \$ 480 Billion**

The World's Primary Biomes



Global Estimates of the Value of Ecosystem Services (2007 \$/Ha/Year)



World: Value of Ecological Services (\$ Trillion/year, 1997) – By Biome

Coastal Zones	12.6
Open Ocean	8.4
Wetlands	4.9
Forests	4.7
Lakes/Rivers	1.7
Miscellaneous	1.0
TOTAL	33.3

Global GDP (in 1997)

**Approximately
US \$ 20 Trillion**

However !