



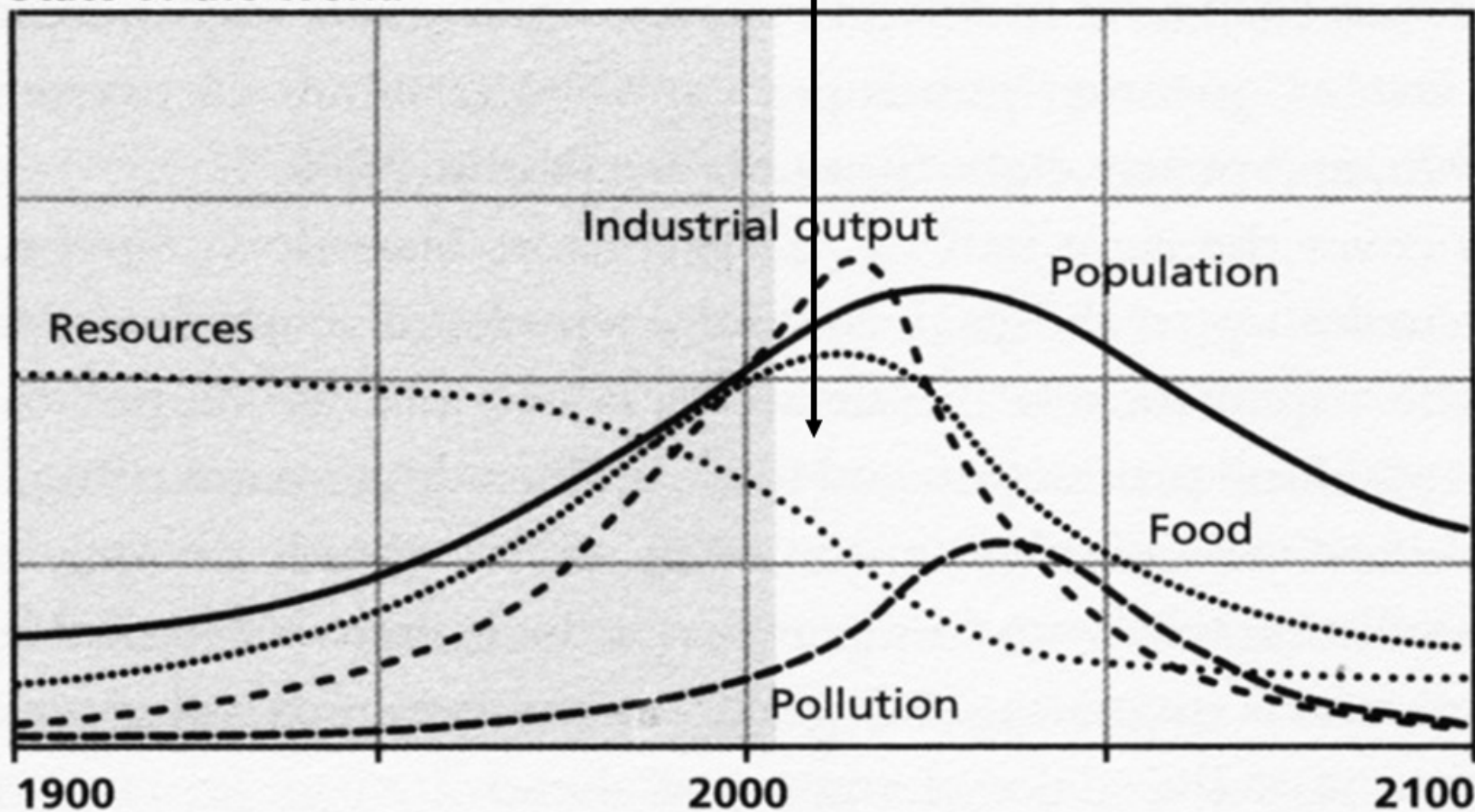
Rio + 20: Living Within Limits

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Direttore scientifico e Senior
Advisor WWF Italia



“Limits to Growth” Scenario in 1972 for 2009

State of the World



From:

"Limits to growth"

"Carrying capacity"

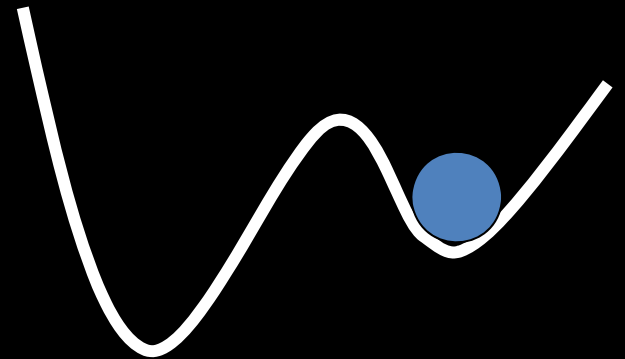
"Guardrails"

"Tipping Elements"



To:

"Planetary Boundaries"



Climate Change

$< 350 \text{ ppm CO}_2 < 1 \text{ W m}^2$
($350 - 500 \text{ ppm CO}_2$;
 $1-1.5 \text{ W m}^2$)

Ozone depletion

$< 5 \% \text{ of Pre-Industrial } 290 \text{ DU}$
($5 - 10\%$)

Biogeochemical loading: Global N & P Cycles

Limit industrial fixation of N_2 to 35 Tg N yr^{-1} (25 % of natural fixation) (25%-35%)
 $P < 10 \times \text{natural weathering inflow to Oceans}$ ($10 \times - 100 \times$)

Atmospheric Aerosol Loading

To be determined

Ocean acidification

Aragonite saturation ratio $> 80 \% \text{ above pre-industrial levels}$ ($> 80\% - > 70\%$)

Planetary Boundaries



Global Freshwater Use

$< 4000 \text{ km}^3/\text{yr}$
($4000 - 6000 \text{ km}^3/\text{yr}$)

Rate of Biodiversity Loss

$< 10 \text{ E/MSY}$
($< 10 - < 1000 \text{ E/MSY}$)

Land System Change

$\leq 15 \% \text{ of land under crops}$ (15-20%)

Chemical Pollution

Plastics, Endocrine Disruptors, Nuclear Waste Emitted globally
To be determined

The Anthropocene: A New Epoch of Geological Time?



PHILOSOPHICAL
TRANSACTIONS
— OF —
THE ROYAL
SOCIETY

A

MATHEMATICAL,
PHYSICAL
& ENGINEERING
SCIENCES

The Anthropocene: conceptual and historical perspectives

Will Steffen, Jacques Grinevald, Paul Crutzen and John McNeill

Phil. Trans. R. Soc. A 2011 **369**, 842-867
doi: 10.1098/rsta.2010.0327

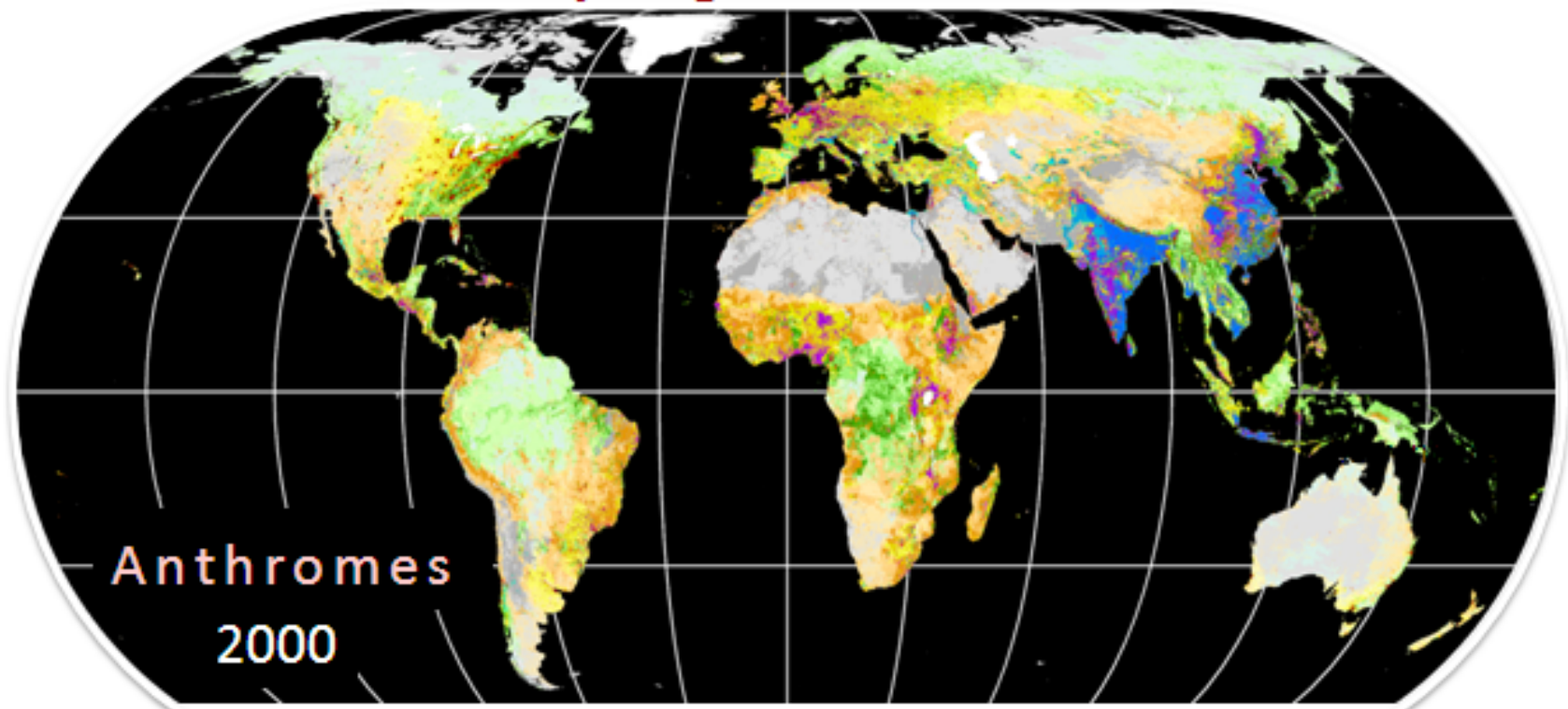
The Anthropogenic Biosphere

$$\text{Ecosystems} = f(P, T)$$

P = Population density

T = Land use

Anthropogenic Biomes



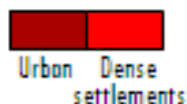
Anthromes
2000

Used

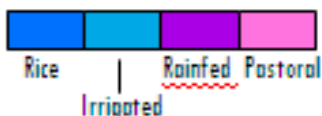
Seminatural

Wild

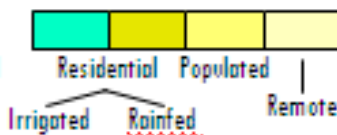
Dense Settlements



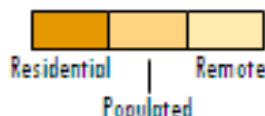
Villages



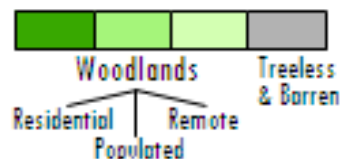
Croplands



Rangelands



Seminatural



Wildlands

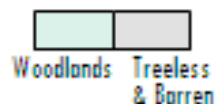
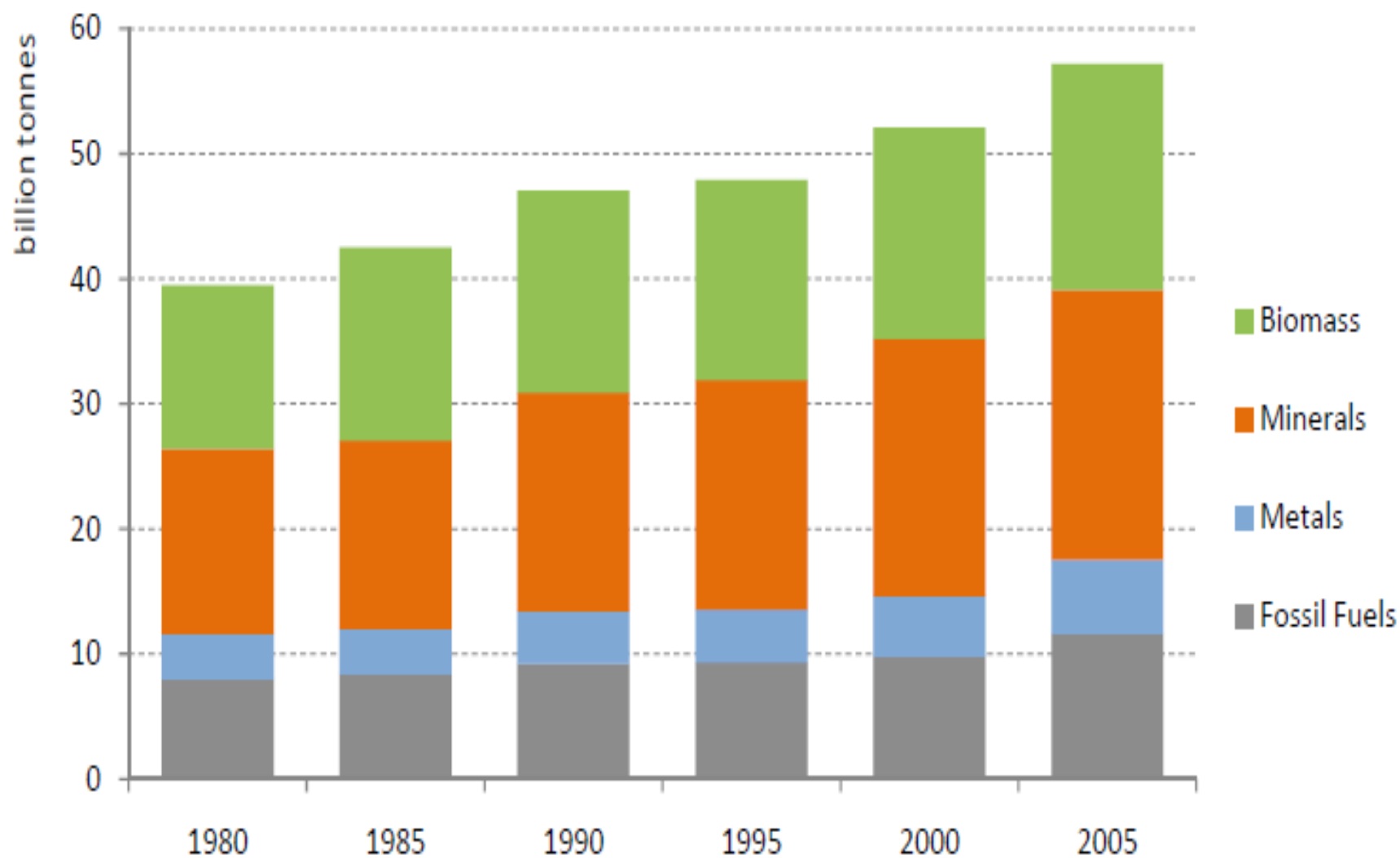


Figure 2: Global extraction of natural resources, 1980 to 2005 ⁽ⁱⁱ⁾



The International Council for Science's
GLOBAL-CHANGE RESEARCH PROGRAMMES ANNOUNCE A
MAJOR INTERNATIONAL SCIENCE CONFERENCE

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2012 26-29 March
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GLOBAL
SUSTAINABILITY

www.planetunderpressure2012.net



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Changing Planet



Science & Solutions



**Earth System
Science Partnership
ESSP**

DIVERSITAS

IGBP

IHDP

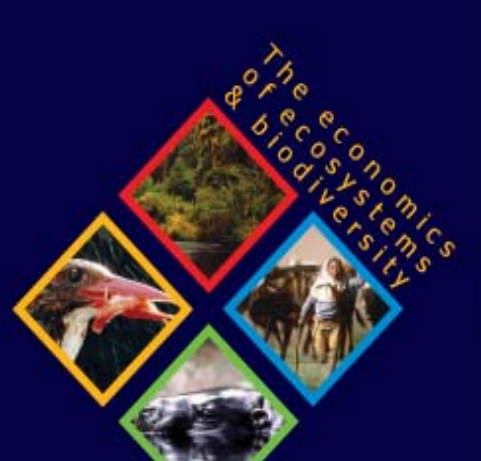
WCRP



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The Economics of Ecosystems and Biodiversity (TEEB)

 **BANK OF NATURAL CAPITAL**
PART OF THE TEEB STUDY

- Current Account
- Natural Capital
- Ecosystem Services
- Stocks & Investments
- Advice & Guidance

Valuing the invaluable

It's your wealth and your children's heritage that is being squandered when ecosystems and biodiversity are lost.

[Read more >](#)





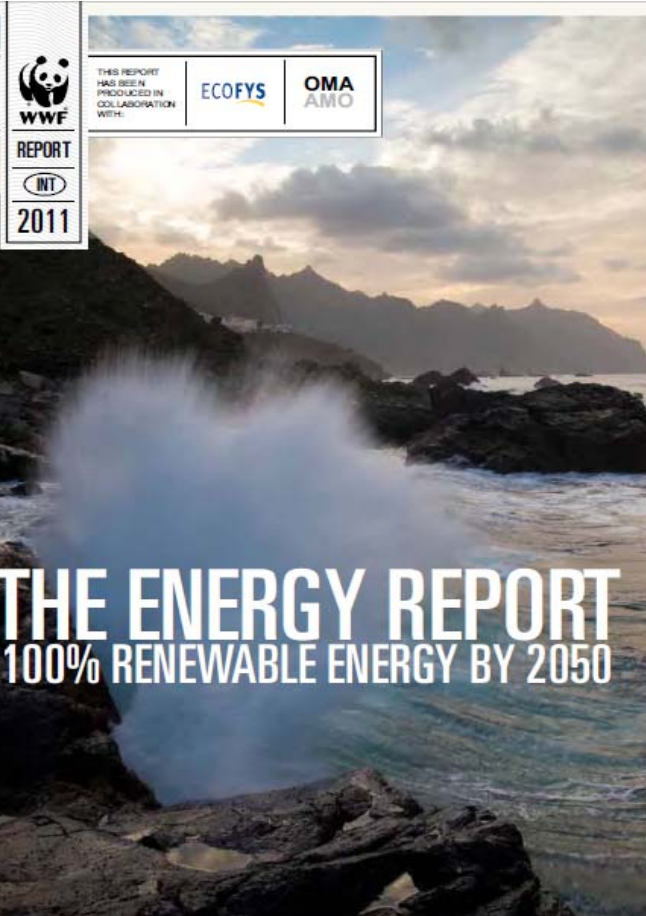
ONE
PLANET
LIVING



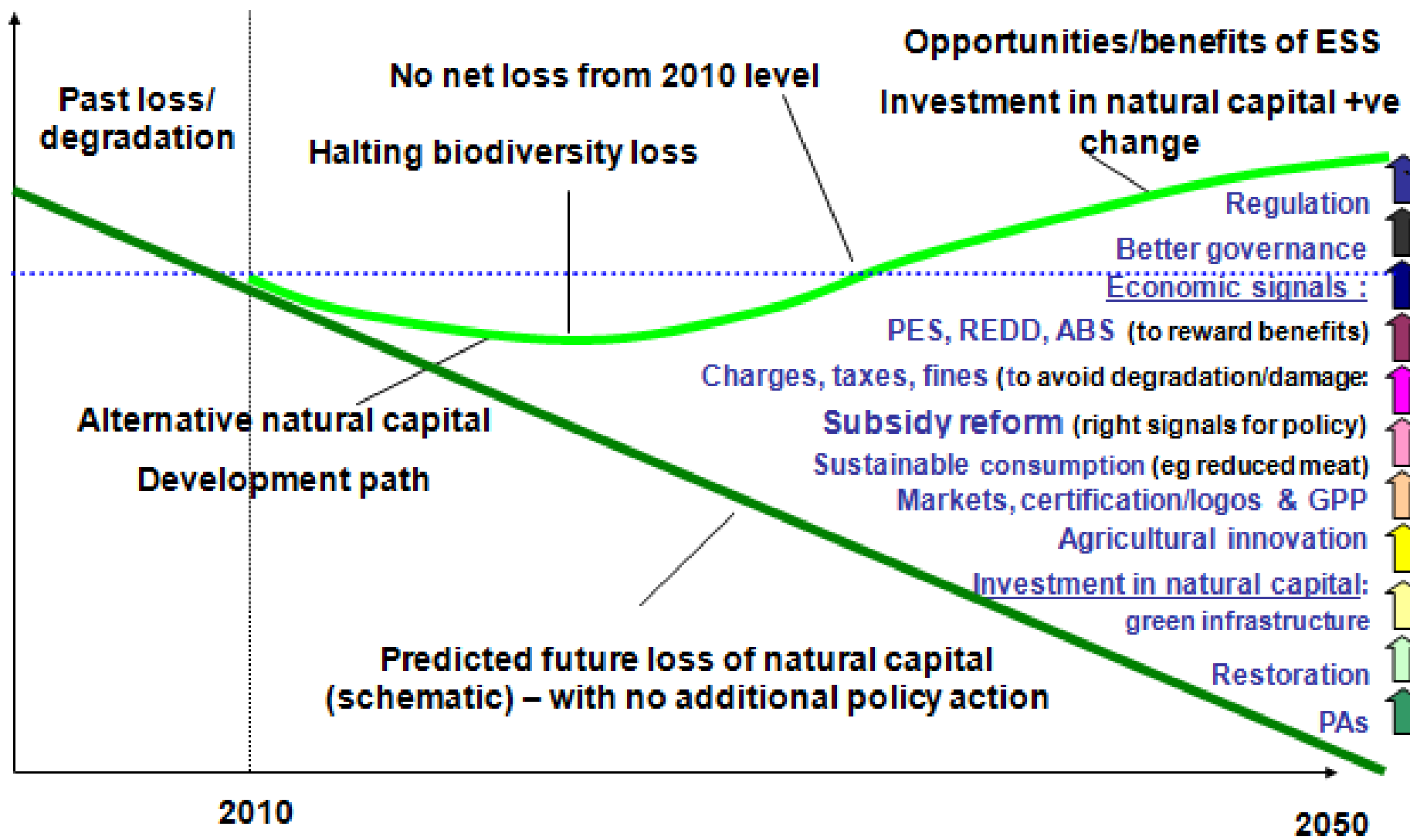
If everyone in the world lived like an average **North American** we would need **five planets** to live on...



One Planet Living is a global initiative based on 10 principles of sustainability developed by BioRegional and WWF.



What instrument portfolio do you see as helping promote the alternative natural capital development pathway?



Common International Classification of Ecosystem Services (CICES): 2011 Update

Table1: CICES Basic Structure and Relationship of Classes to TEEB Classification.

CICES Theme	CICES Class	TEEB Categories			
Provisioning	Nutrition	Food	Water		
	Materials	Raw Materials	Genetic resources	Medicinal resources	Ornamental resources
	Energy				
Regulating and Maintenance	Regulation of wastes	Air purification	Waste treatment (esp. water purification)		
	Flow regulation	Disturbance prevention or moderation	Regulation of water flows	Erosion prevention	
	Regulation of physical environment	Climate regulation (incl. C-sequestration)	Maintaining soil fertility		
	Regulation of biotic environment	Gene pool protection	Lifecycle maintenance	Pollination	Biological control
Cultural	Symbolic	Information for cognitive development			
	Intellectual and Experiential	Aesthetic information	Inspiration for culture, art and design	Spiritual experience	Recreation & tourism

Green infrastructure and territorial cohesion

The concept of green infrastructure and its integration into policies using monitoring systems

Table ES.1 Potential assets that make up green infrastructure grouped into three scale groups

Local, neighbourhood and village scale	Town, city and district scale	City-region, regional and national scale
<ul style="list-style-type: none"> • street trees, verges and hedges • green roofs and walls • pocket parks • private gardens • urban plazas • town and village greens and commons • local rights of way • pedestrian and cycle routes • cemeteries, burial grounds and churchyards • institutional open spaces • ponds and streams • small woodlands • play areas • local nature reserves • school grounds • sports pitches • swales (preferably grassed), ditches • allotments • vacant and derelict land 	<ul style="list-style-type: none"> • business settings • city/district parks • urban canals • urban commons • forest parks • country parks • continuous waterfronts • municipal plazas • lakes • major recreational spaces • rivers and floodplains • brownfield land • community woodlands • (former) mineral extraction sites • agricultural land • landfill 	<ul style="list-style-type: none"> • regional parks • rivers and floodplains • shorelines • strategic and long distance trails • forests, woodlands and community forests • reservoirs • road and railway networks • designated greenbelt and strategic gaps • agricultural land • national parks • national, regional or local landscape designations • canals • common lands • open countryside

Ecological Footsteps



Establish the Limits

1. Establishing clearly defined resource/emissions caps
2. Fiscal Reform for Sustainability
3. Promoting Technology Transfer and Ecosystem Protection

Fix the Economics

4. Developing the macro-economics of sustainability
5. Investing in public assets and infrastructures
6. Increasing financial and fiscal prudence
7. Improving macro-economic accounting

Change the social logic

8. Sharing the work and improving the work-life balance
9. Tackling systemic inequality
10. Measuring capabilities and flourishing
11. Strengthening human and social capital
12. Reversing the culture of consumerism