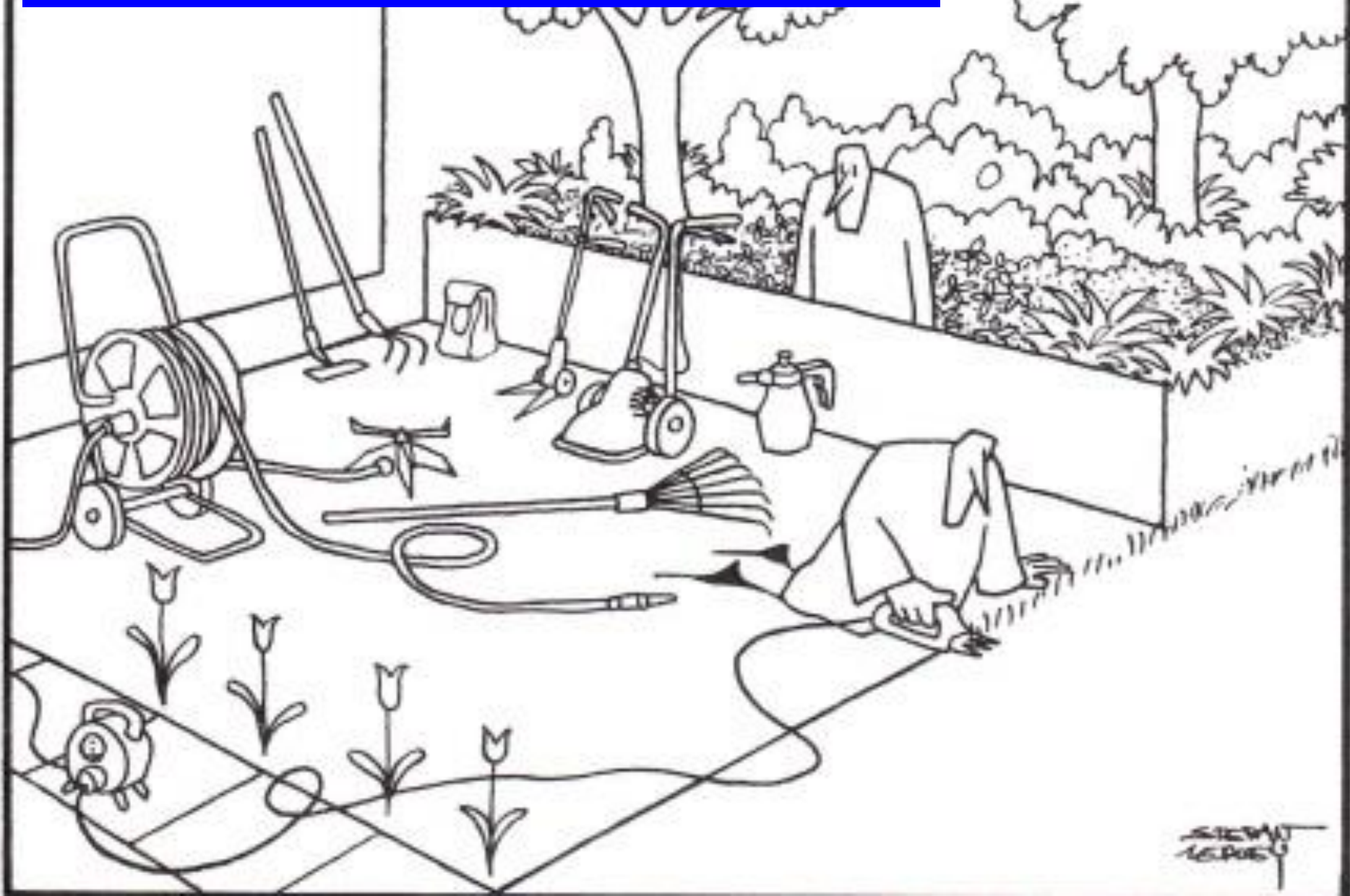


# Hoe Groen is de Vooruitgang?

Jan J. Boersema CML, Leiden University



# Idea of Progress / Vooruitgang / Groei

The economists have hijacked the idea of Progress  
(and narrowed it down to economic growth~increase GDP)

- “The idea that civilization has advanced in the past, is now advancing and in all likelihood will continue to advance in the foreseeable future” (Robert Nisbet, 1998, xi)

## Literature:

**Progress:** Bury, Edelstein, Harrison, Iggers, Nisbet, Newman, Spadafora

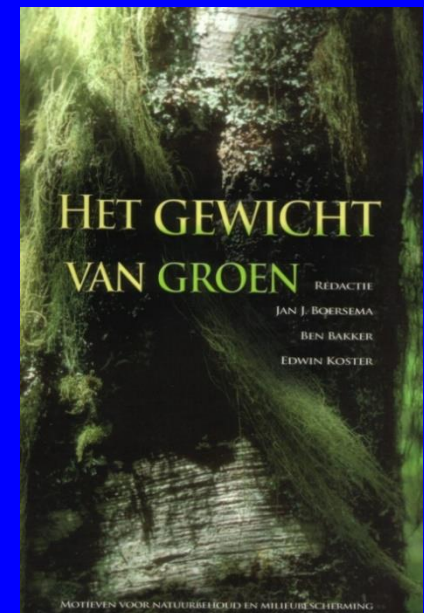
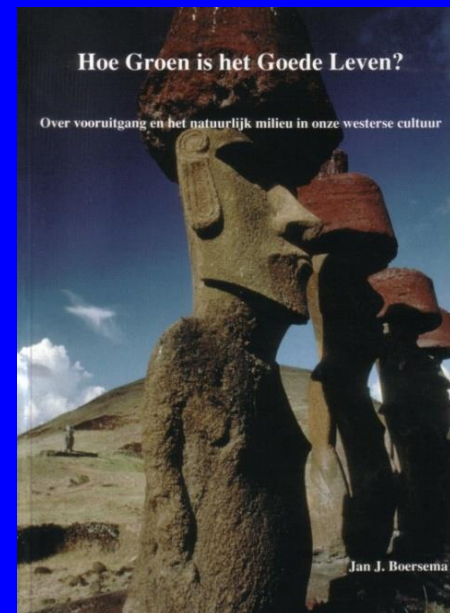
**Growth:** Easterbrook, Gray, Inglehart, Landes, Madison, Sachs, Stern

# 'Groen' paraplu term

- Stofwisseling met de aarde verstoord
  - Mineralen N, P; C (energie); probleemstoffen
- Klimaatverandering
- Verlies Biodiversiteit

- Maatschappelijke  
Context

Nieuwe fase in menselijke  
Geschiedenis  
Antropoceen ?



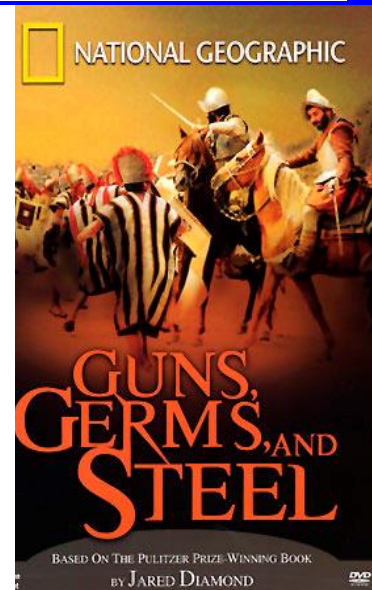
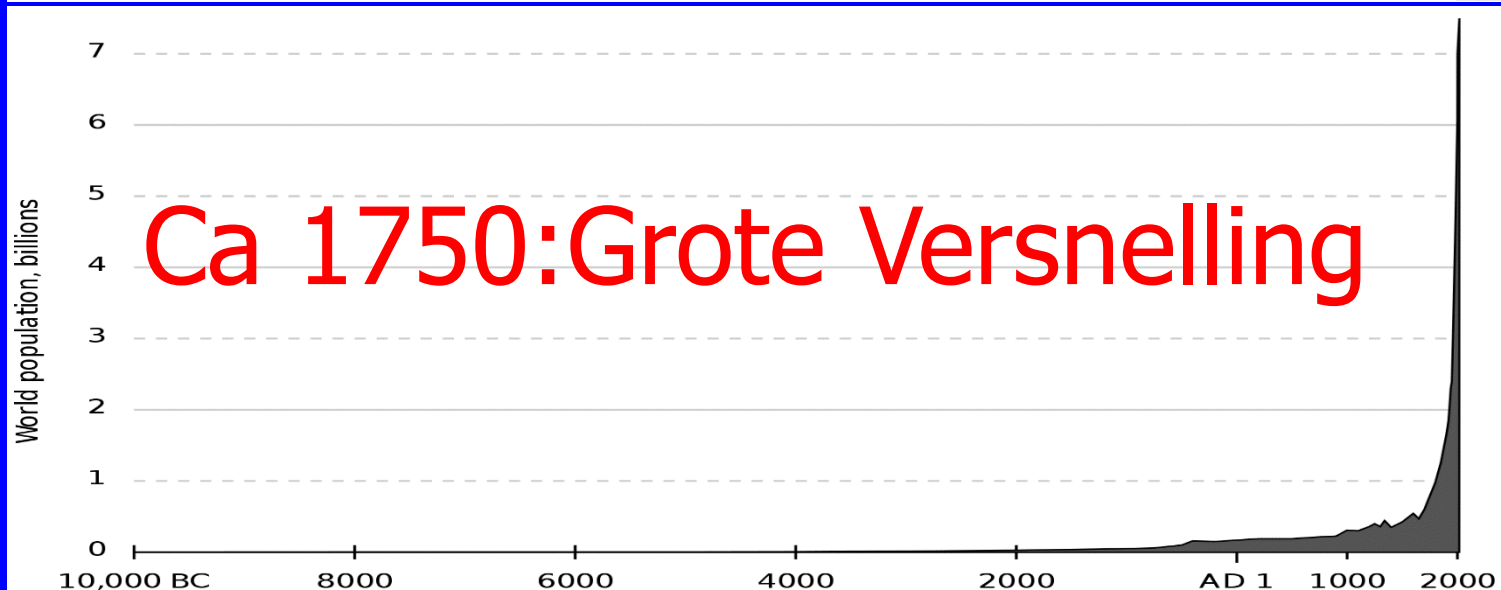
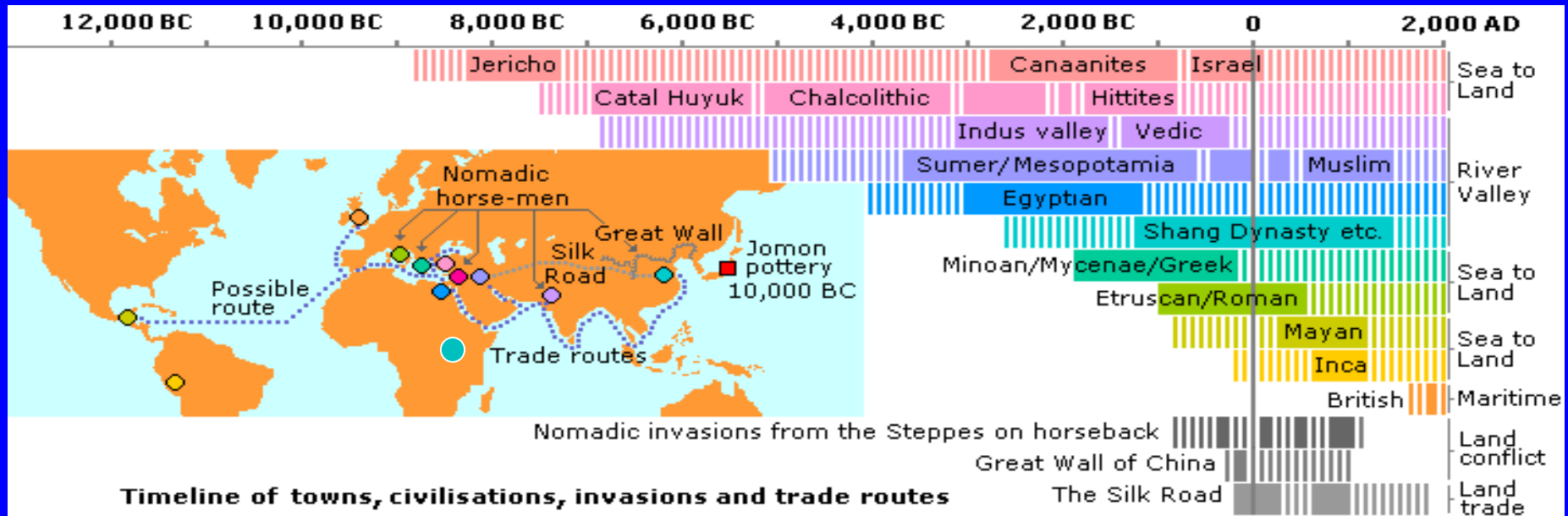


# Neolithische (R)evolutie 11.700 BCE → Holoceen





# Domesticatie / Steden / Staten, Schrift / Instituties / Religie Europa



# (Ren/Ref. - Verlichting) Industriële Revolutie ca 1750



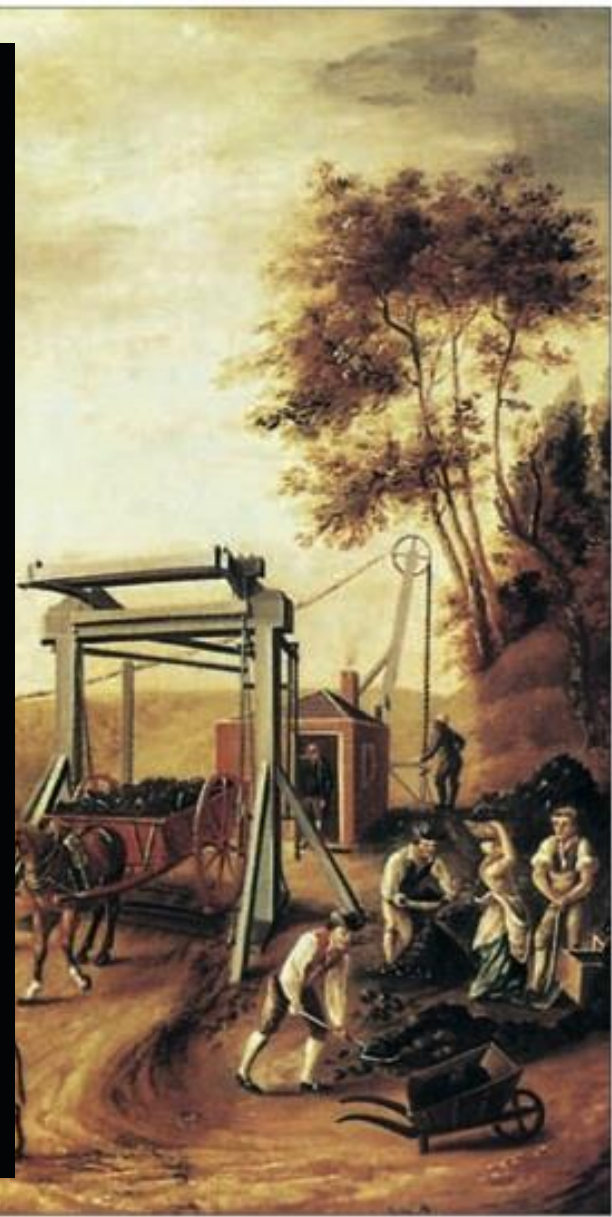
Hans Joachim Schellnhuber

## SELBST VERBRENNUNG

Die fatale Dreiecksbeziehung  
zwischen Klima, Mensch  
und Kohlenstoff



C.Bertelsmann



# Transformation Developed World 1820-2000

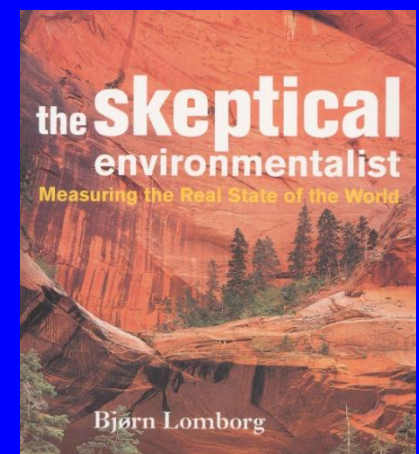
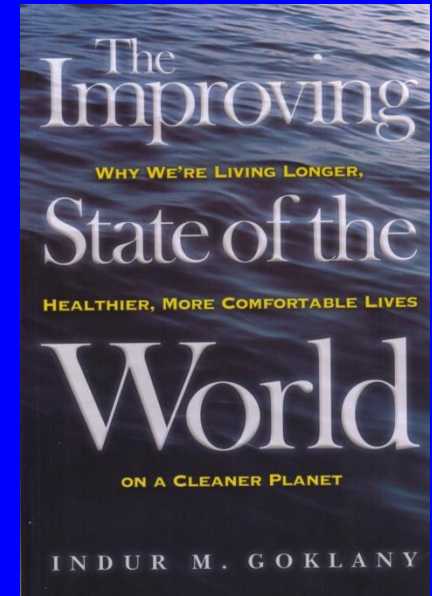
(Angus Maddison RuG; Jan Luiten van Zanden 'How was Life?')

## Soaring

- Real income
- Life expectancy
- Daly's
- Literacy
- Educations rates

## Plummeting

- Infant mortality
- Hours worked
- Food prices
- Pollution air, water, soil (only after 1970)





**U.S. POSTAGE**

CENTURY  
OF PROGRESS

CHICAGO  
1833-1933



FEDERAL BUILDING

**CENTS**







1960-70

Rachel Carson '62

Paul Ehrlich '68

Barry Commoner '70

$(I=P*A*T)$

Metabolism / economy

Blueprint for Survival '72

Club of Rome '72

Stockholm – UN – 1972

Lynn White '67

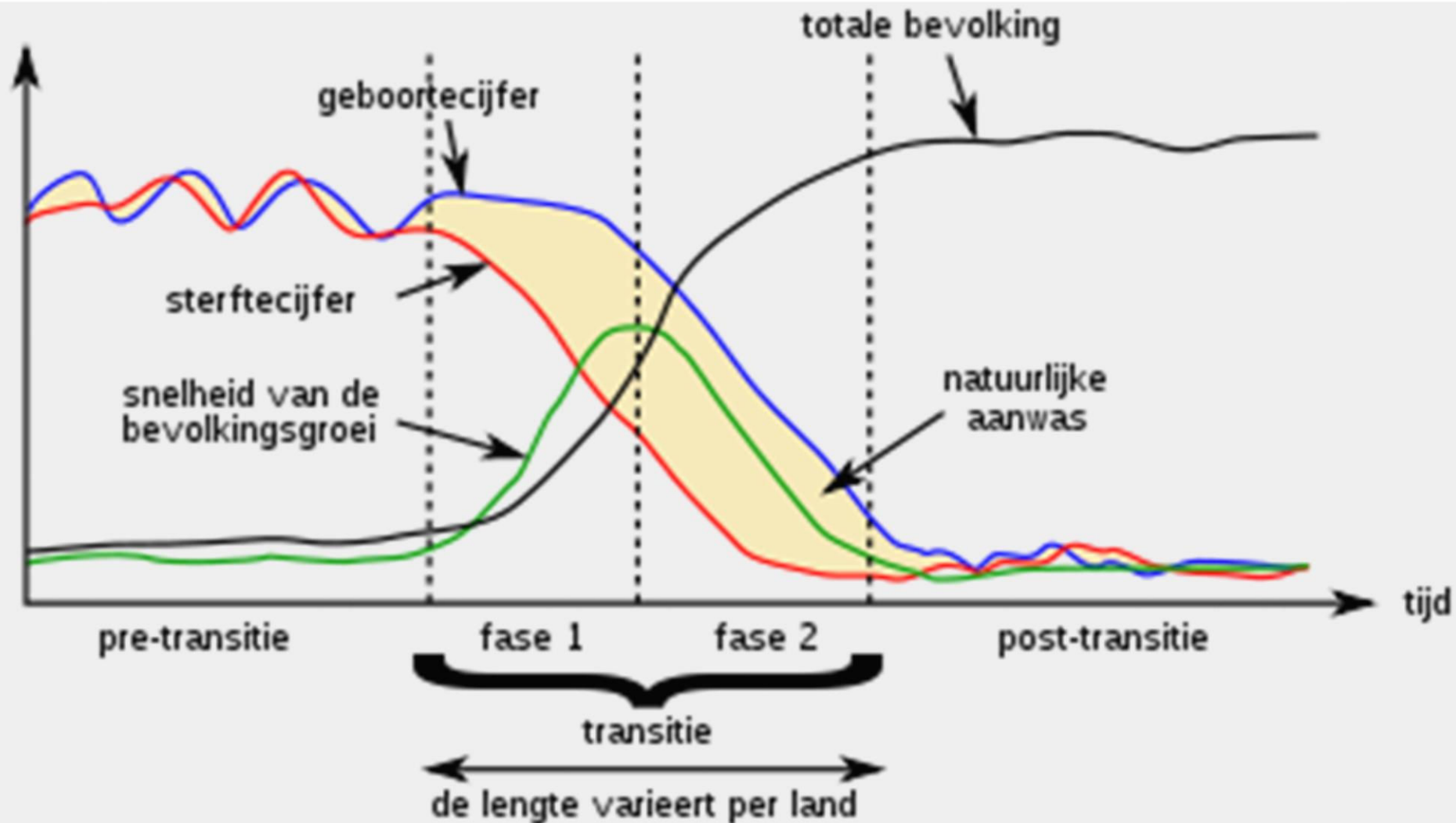
# The IPAT Equation

The IPAT equation is a widely used simplification of the factors causing environmental degradation. The equation is  $I = P \times A \times T$ . This is short for environmental **I**mpact = **P**opulation x **A**ffluence (consumption per person) x **T**echnology (impact per unit of consumption). It's crucial to remember that the three factors are intermediate causes, not root causes.

$$\begin{array}{ccccccc} \text{Impact} & = & \text{Population} & \times & \frac{\text{consumption}}{\text{per person}} & \times & \frac{\text{impact}}{\text{per unit of consumption}} \\ \mathbf{I} & & \mathbf{P} & & \mathbf{A} & & \mathbf{T} \end{array}$$

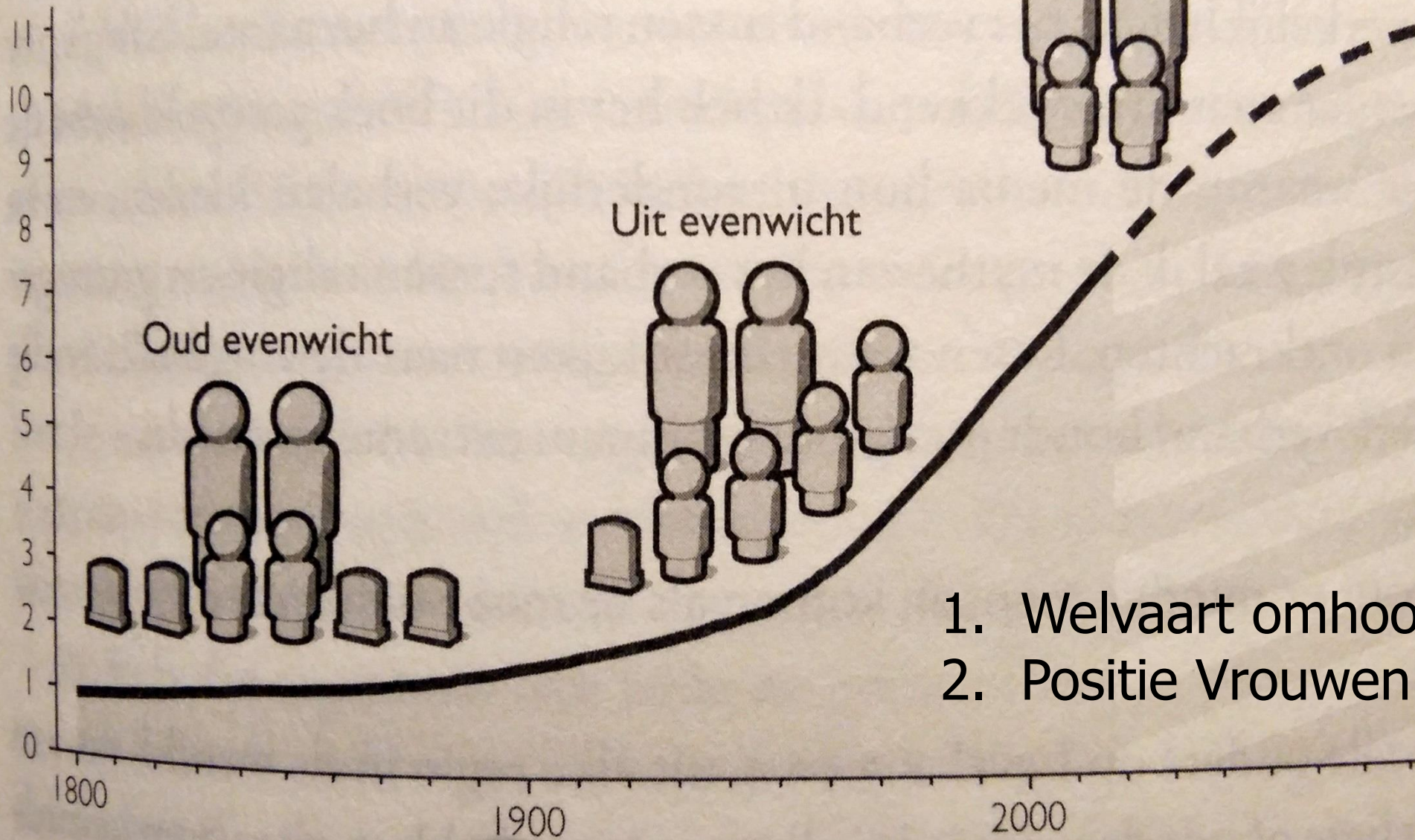


# Demografische Transitie



# WERELDBEVOLKING

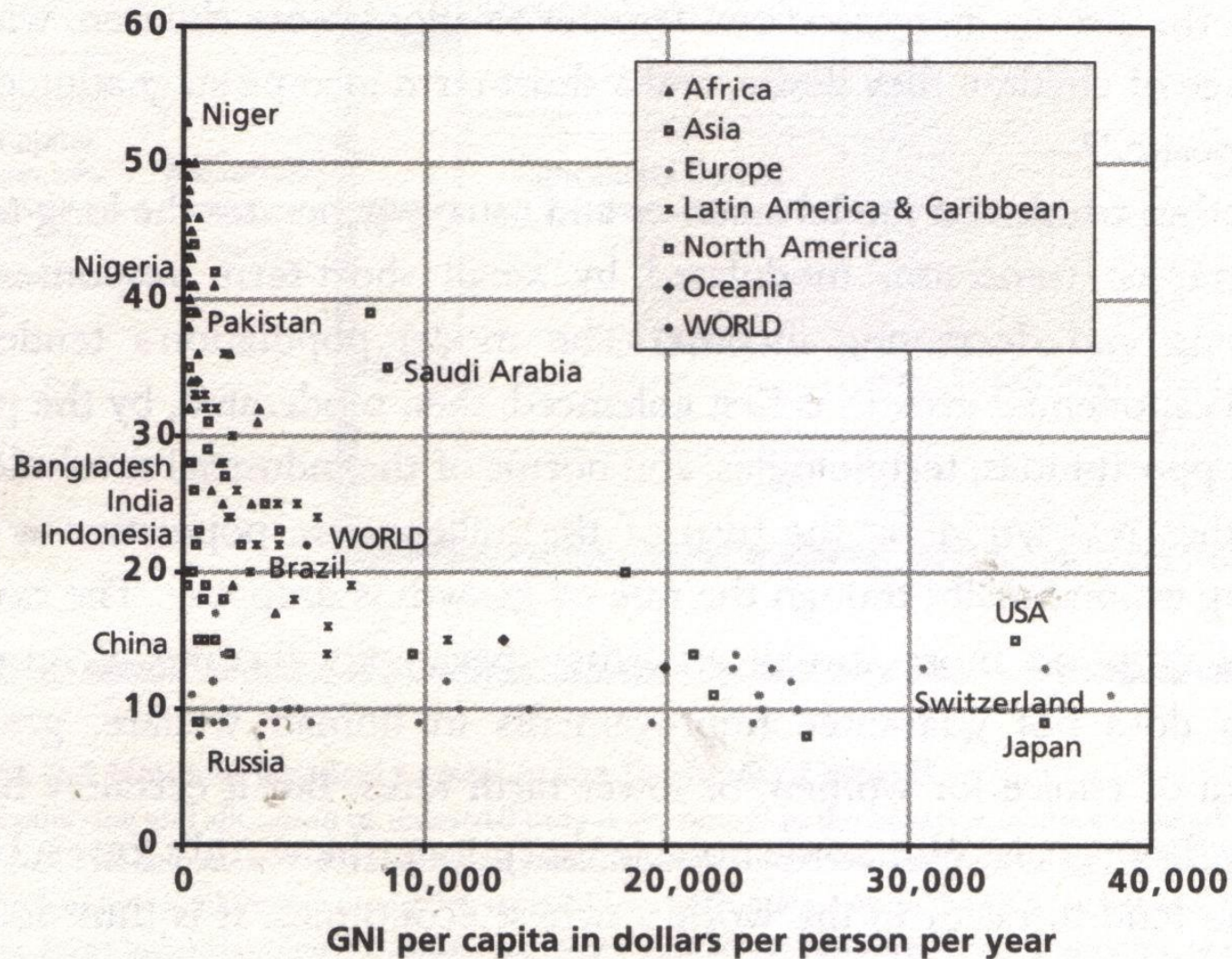
Miljard mensen



1. Welvaart omhoo
2. Positie Vrouwen



births per 1,000 per year

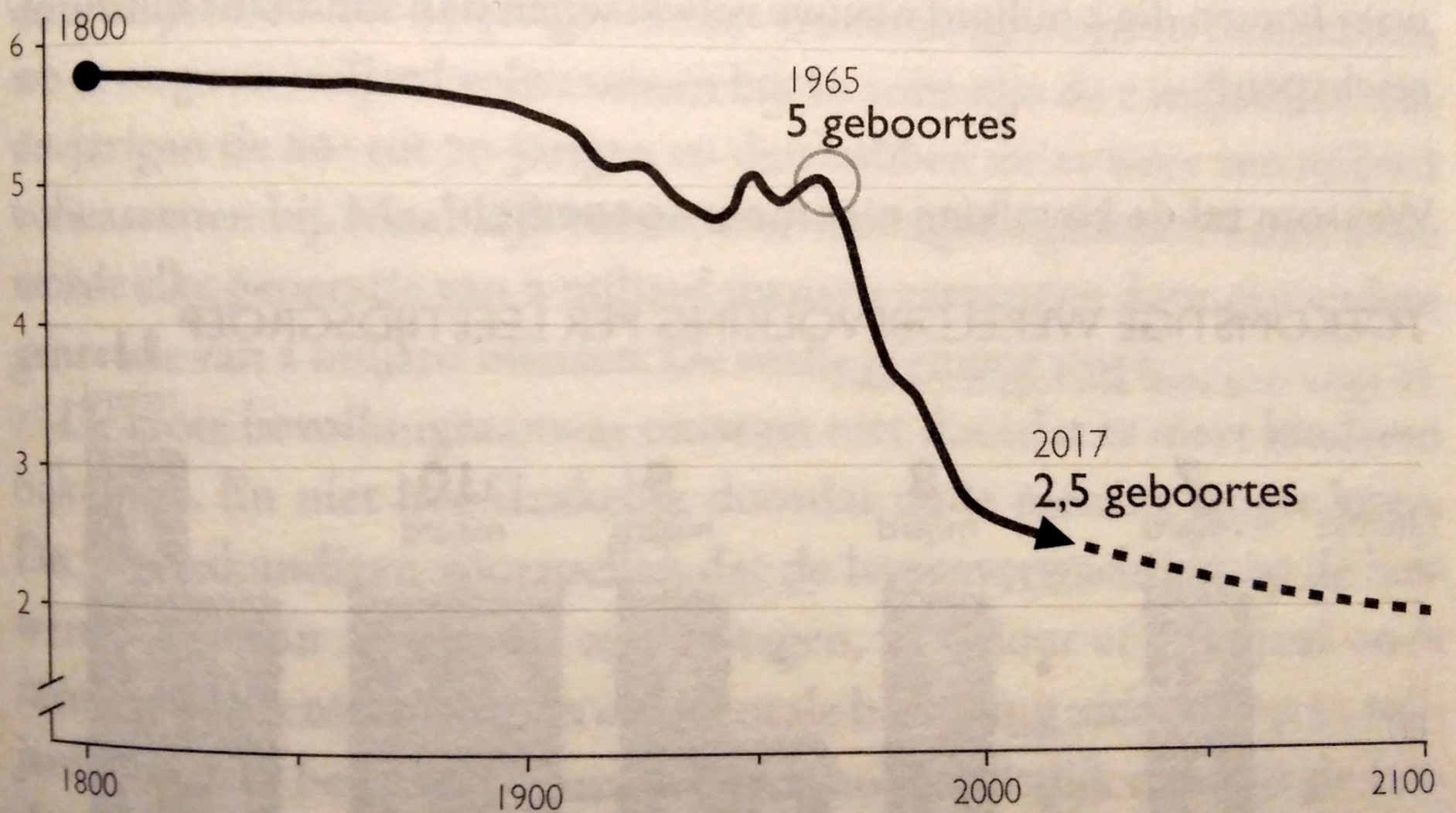


**FIGURE 2-7 Birth Rates and Gross National Income per Capita in 2001**

As a society becomes wealthier, the birth rate of its people tends to decline. The poorest nations experience birth rates from 20 to more than 50 births per 1,000 people per year. None of the richest nations has a birth rate above 20 per 1,000 per year. (Source: PRB; World Bank.)



# GEMIDDELD AANTAL BABY'S PER VROUW VAN 1800 TOT NU







1960-70

Rachel Carson '62

Paul Ehrlich '68

Barry Commoner '70

( $I=P*A*T$ )

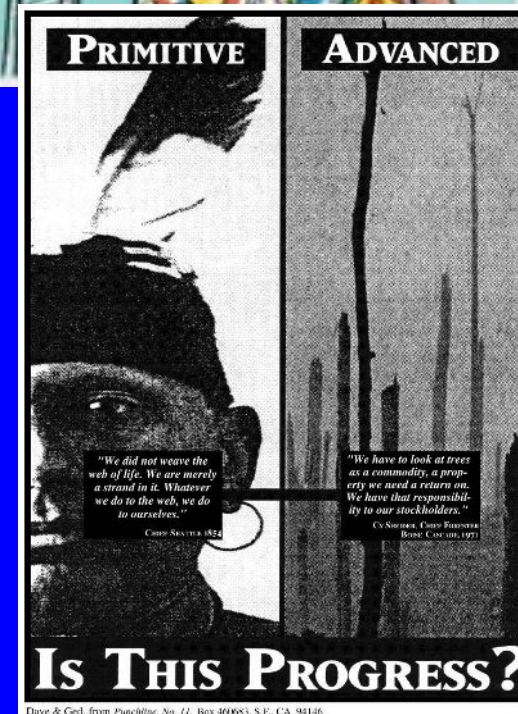
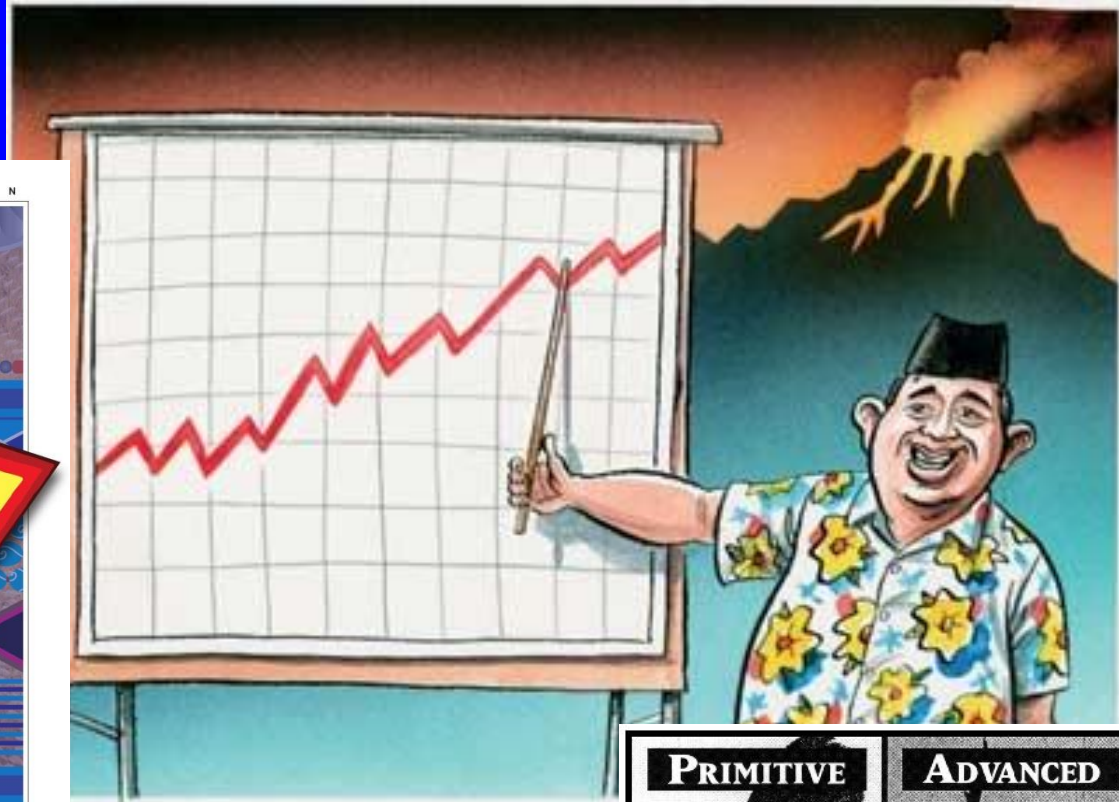
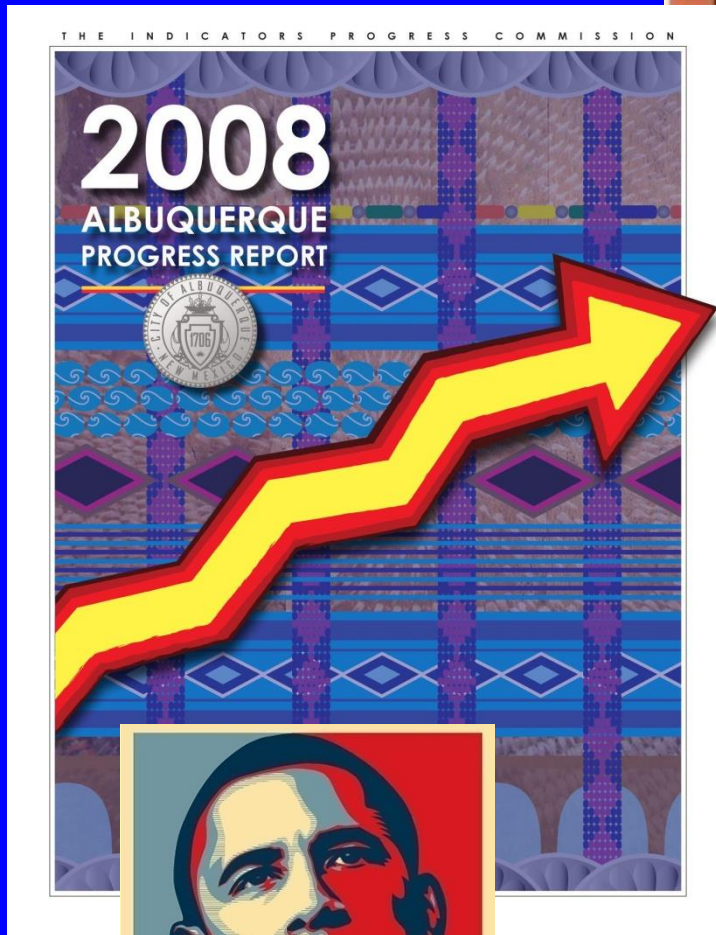
Metabolism / economy

Blueprint for Survival '72

Club of Rome '72

Stockholm – UN – 1972

Lynn White '67



Why Growth?  
Why Progress?



# Pursuit of Happiness (welzijn)

“they are endowed by their Creator with unalienable Rights, that among these are Life, Liberty and the Pursuit of Happiness”

(Declaration of Independence)

or

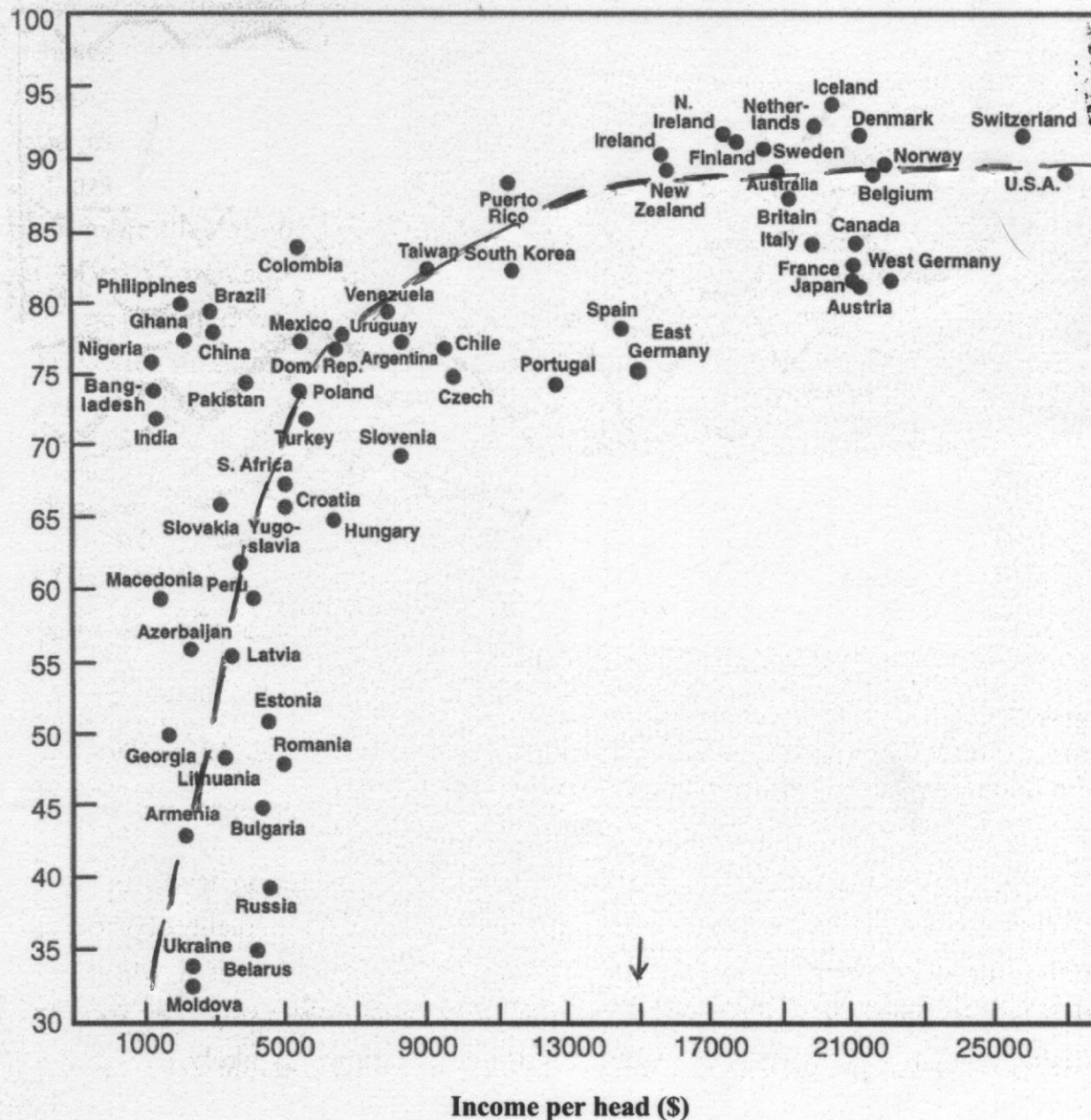
## Pursuit of GDP?

The market value of all goods and services produced within the boundaries of a country in a certain period of time

(modern economic policy)

# Income and happiness

Happiness (index)



Source: Inglehart and Klingemann (2000), Figure 7.2 and Table 7.1. Latest year (all in 1990s).

**Ronald Inglehart**  
**Hans D. Klingemann**  
 "Genes, Culture,  
 Democracy, and  
 Happiness" (2000)





De Krimp 1925



Moeskersgang 1914

## Poverty Abatement

Auke van der Woud (2010) *Koninkrijk vol sloppen*

Nu: Afrika





# The IPAT Equation

The IPAT equation is a widely used simplification of the factors causing environmental degradation. The equation is  $I = P \times A \times T$ . This is short for environmental **I**mpact = **P**opulation x **A**ffluence (consumption per person) x **T**echnology (impact per unit of consumption). It's crucial to remember that the three factors are intermediate causes, not root causes.

$$\begin{array}{ccccccc} \text{Impact} & = & \text{Population} & \times & \frac{\text{consumption}}{\text{per person}} & \times & \frac{\text{impact}}{\text{per unit of consumption}} \\ \mathbf{I} & & \mathbf{P} & & \mathbf{A} & & \mathbf{T} \end{array}$$

# Nieuwe Concepten

Ecological Economics  
Evolutionary Economics  
Green GDP

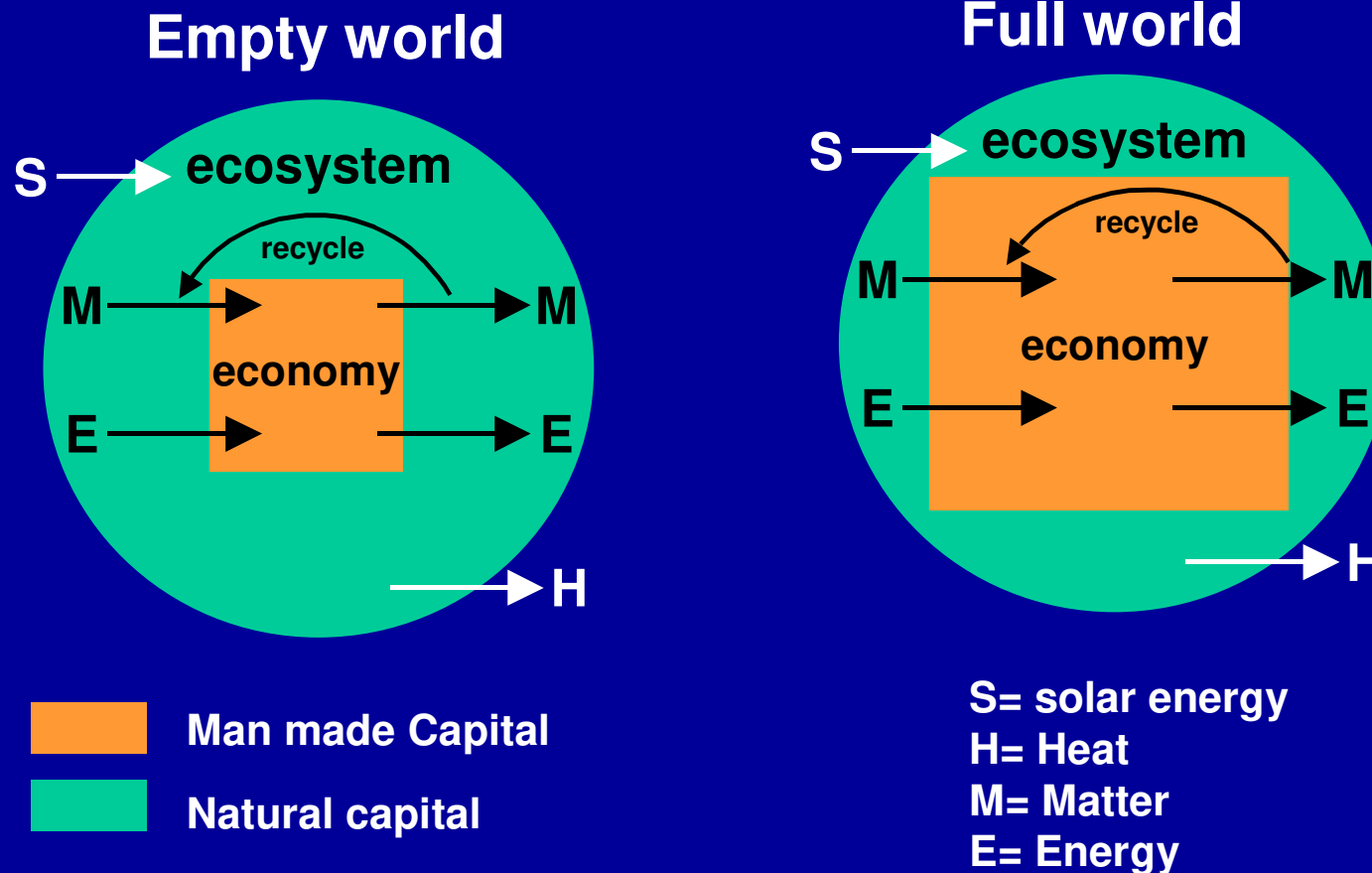
Circular Economy  
sustainable development

Better Indicators



# Groene Revolutie

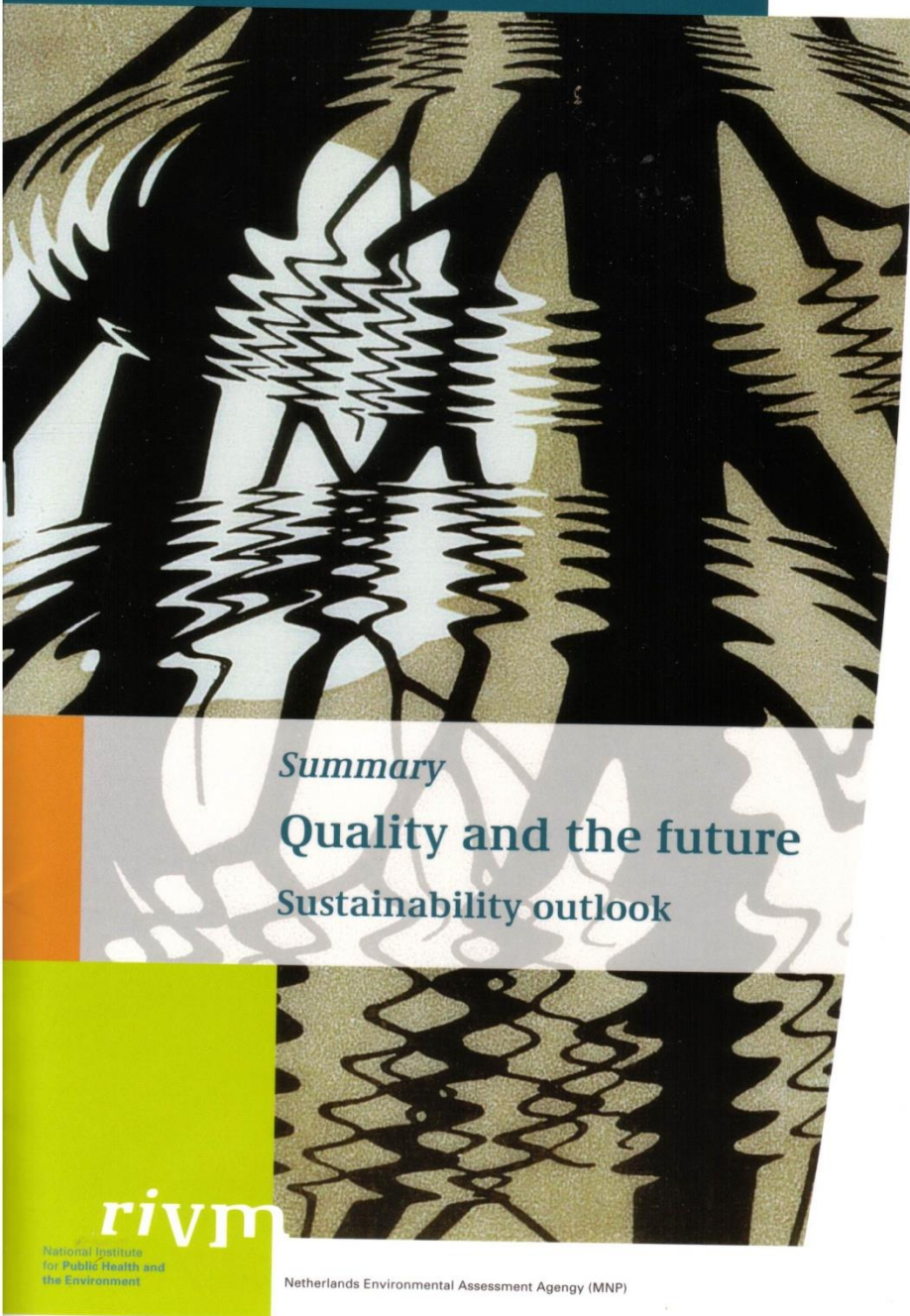
## The economy as an subsystem of the ecosystem



Steady State Economy ----- Ecological economics J.S. Mill --- B. Commoner  
Herman E. Daly (1996) *Beyond Growth. The Economics of Sustainable Development*. Boston: Beacon Press p. 49

# Netherlands Environmental Assessment Agency

2005





# Worldviews

**Globalization**

**'End of history'**

**Fukuyama**

**Global Market**

*Berlin '89 / TTIP / CETA*

**'Our common future'**

**Brundtland**

**Global Solidarity**

*Rio 1992 / Paris 2015*

**'Clash of Civilisations'**

**Huntington // Wilders/Baudet // Trump**

**Safe Region**

*September 11 2001*

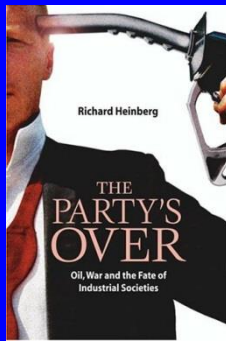
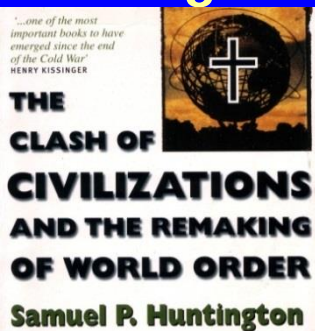
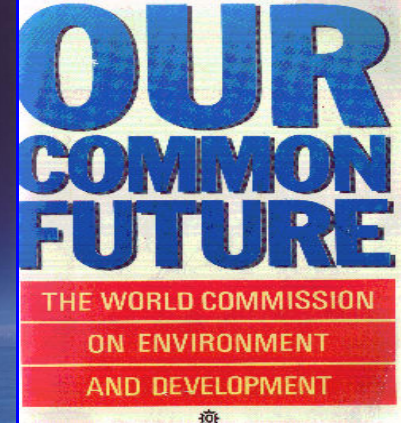
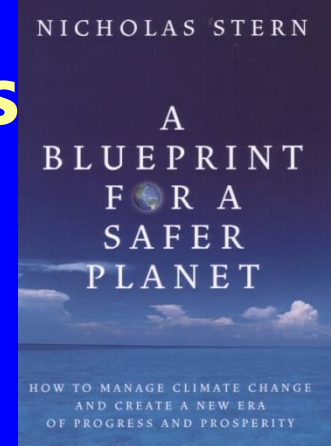
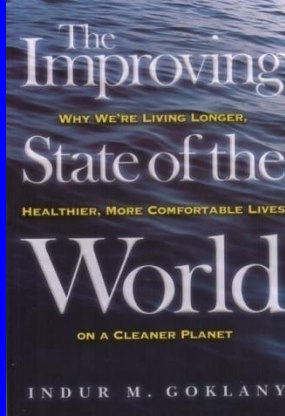
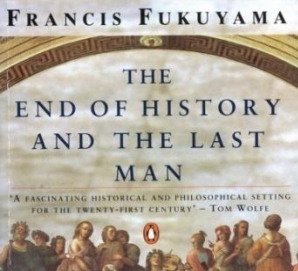
**'No Logo'; 'Small is beautiful'**

**Naomi Klein; Schumacher**

**Caring region**

*Seattle 1999, Cancun 2003*

**Regionalisation**



efficiency

solidarity

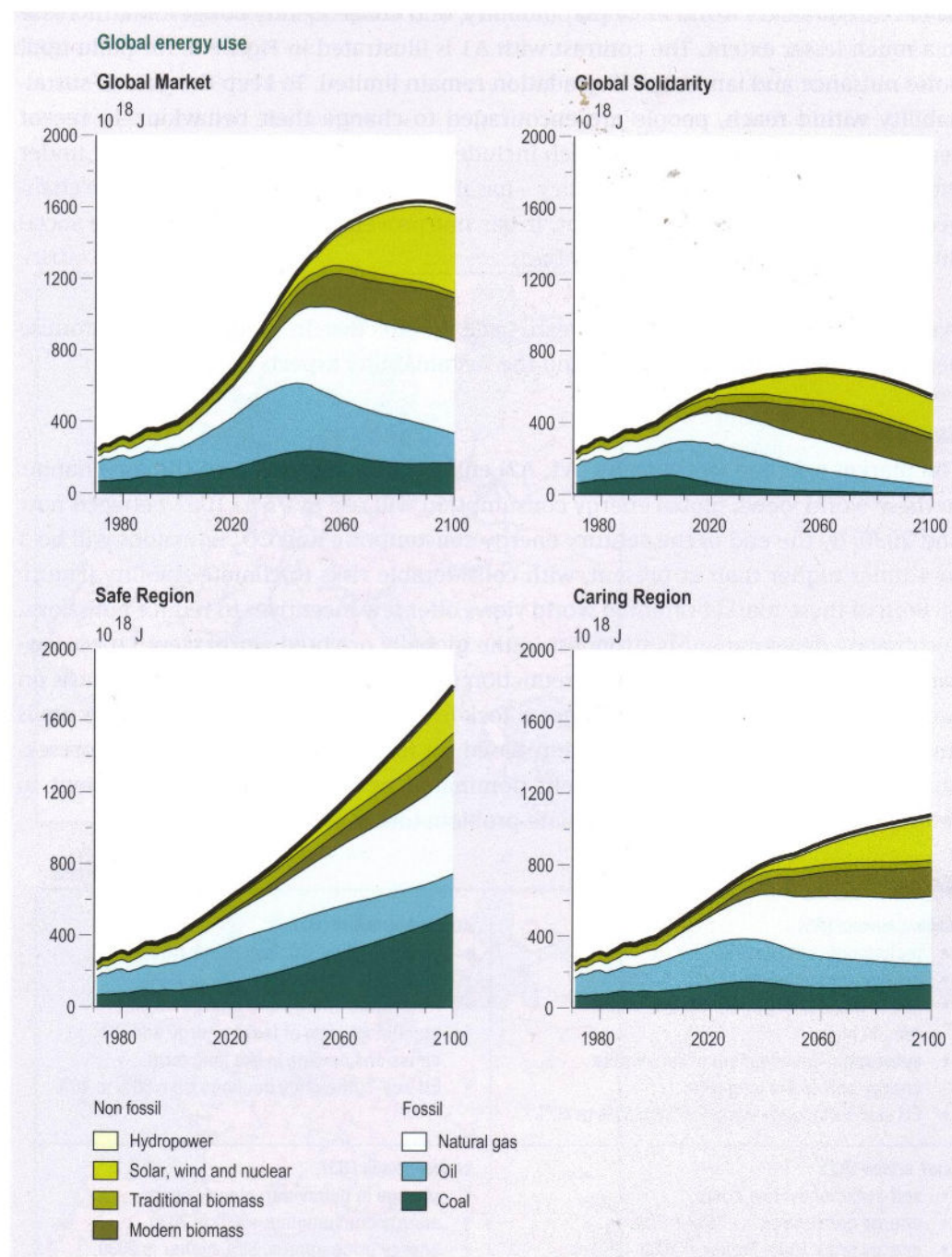


Figure 5 Global energy use, 1970–2100.



1960-70

Rachel Carson '62

Paul Ehrlich '68

Barry Commoner '70  
( $I=P*A*T$ )

Metabolism / economy  
Blueprint for Survival '72

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Stockholm – UN – 1972

Lynn White '67





# Lynn T. White Jr.

*Science*, Vol. 155, No. 3767  
(March 1967), pp. 1203-1207

## The Historical Roots of Our Ecologic Crisis

Lynn White, Jr.

A conversation with Aldous Huxley not infrequently put one at the receiving end of an unforgettable monologue. About a year before his lamented death he was discoursing on a favorite topic: Man's unnatural treatment of nature and its sad results. To illustrate his point he told how, during the previous summer, he had returned to a little valley in England where he had spent many happy months as a child. Once it had been composed of delightful grassy glades; now it was becoming overgrown with unsightly brush because the rabbits that formerly kept such growth under control had largely succumbed to a disease, myxomatosis, that was deliberately introduced by the local farmers to reduce the rabbits' destruction of crops. Being something of a Philistine, I could be silent no longer, even in the interests of great rhetoric. I interrupted to point out that the rabbit itself had been brought as a domestic animal to England in 1176, presumably to improve the protein diet of the peasantry.

All forms of life modify their contexts. The most spectacular and benign instance is doubtless the coral polyp. By serving its own ends, it has created a vast undersea world favorable to thousands of other kinds of animals and plants. Ever since man became a numerous species he has affected his environment notably. The hypothesis that his fire-drive method of hunting created the world's great grasslands and

helped to exterminate the monster mammals of the Pleistocene from much of the globe is plausible, if not proved. For 6 millennia at least, the banks of the lower Nile have been a human artifact rather than the swampy African jungle which nature, apart from man, would have made it. The Aswan Dam, flooding 5000 square miles, is only the latest stage in a long process. In many regions terracing or irrigation, overgrazing, the cutting of forests by Romans to build ships to fight Carthaginians or by Crusaders to solve the logistics problems of their expeditions, have profoundly changed some ecologies. Observation that the French landscape falls into two basic types, the open fields of the north and the *bocage* of the south and west, inspired Marc Bloch to undertake his classic study of medieval agricultural methods. Quite unintentionally, changes in human ways often affect nonhuman nature. It has been noted, for example, that the advent of the automobile eliminated huge flocks of sparrows that once fed on the horse manure littering every street.

The history of ecologic change is still so rudimentary that we know little about what really happened, or what the results were. The extinction of the European aurochs as late as 1627 would seem to have been a simple case of overenthusiastic hunting. On more intricate matters it often is impossible to find solid information. For a thousand years or more the Frisians and Hollanders have been pushing back the North Sea, and the process is culmi-

nating in our own time in the reclamation of the Zuider Zee. What, if any, species of animals, birds, fish, shore life, or plants have died out in the process? In their epic combat with Neptune have the Netherlanders overlooked ecological values in such a way that the quality of human life in the Netherlands has suffered? I cannot discover that the questions have ever been asked, much less answered.

People, then, have often been a dynamic element in their own environment, but in the present state of historical scholarship we usually do not know exactly when, where, or with what effects man-induced changes came. As we enter the last third of the 20th century, however, concern for the problem of ecologic backlash is mounting feverishly. Natural science, conceived as the effort to understand the nature of things, had flourished in several eras and among several peoples. Similarly there had been an age-old accumulation of technological skills, sometimes growing rapidly, sometimes slowly. But it was not until about four generations ago that Western Europe and North America arranged a marriage between science and technology, a union of the theoretical and the empirical approaches to our natural environment. The emergence in widespread practice of the Baconian creed that scientific knowledge means technological power over nature can scarcely be dated before about 1850, save in the chemical industries, where it is anticipated in the 18th century. Its acceptance as a normal pattern of action may mark the greatest event in human history since the invention of agriculture, and perhaps in nonhuman terrestrial history as well.

Almost at once the new situation forced the crystallization of the novel concept of ecology; indeed, the word *ecology* first appeared in the English language in 1873. Today, less than a century later, the impact of our race upon the environment has so increased in force that it has changed in essence. When the first cannons were fired, in the early 14th century, they affected ecology by sending workers scrambling to the forests and moun-

The author is professor of history at the University of California, Los Angeles. This is the text of a lecture delivered 26 December 1966 at the Washington meeting of the AAAS.



Lynn White, 1967

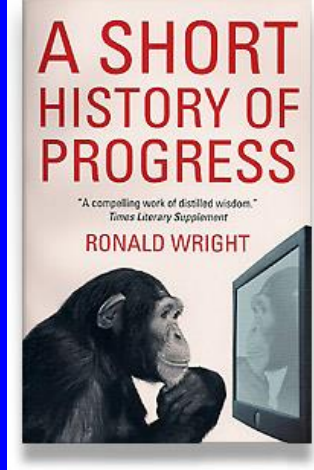


“Christianity inherited from Judaism not only a striking story of creation but also a concept of time as nonrepetitive and linear.”

The Arrow of Time



# Origin(s) and Career



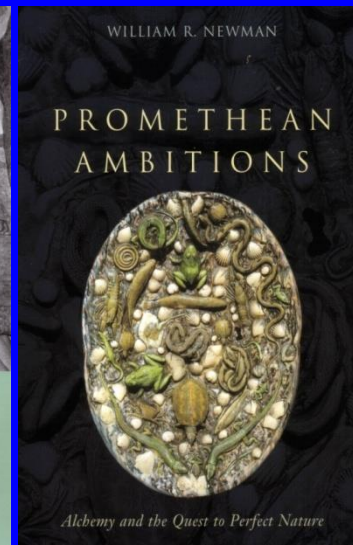
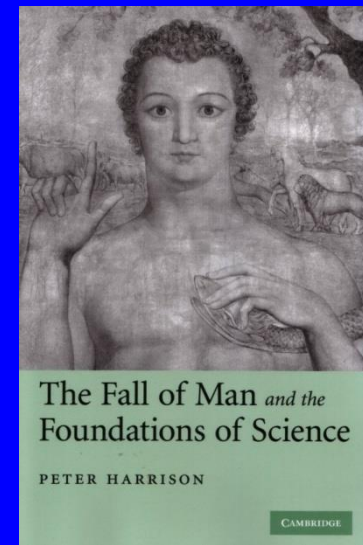
- Greek idea of natural growth, step by step

**Aristotle:** Grow: ἐπιδιδόναι and Growth: ἐπίδοσις ; ἐντελέχεια

**Lucretius:** *pedetemptim progredientes* gradually advancing  
(De Rerum Natura. V, 1453)

- Biblical idea of a (sacred) history  
Genesis, Present and Eschatology

Fused by St Augustine



# Augustinus

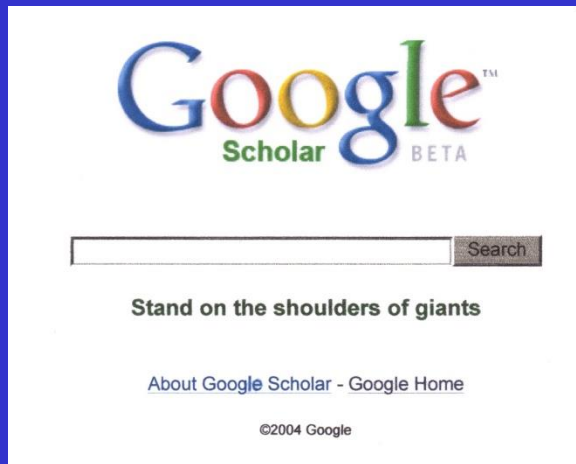
- Time has a beginning and an End
- “The wicked walk in a circle”

*De Civitate Dei* XII, 14,15, 19  
*Confessions* Book 11



# Newton & Clinton on Progress

*"If I have been able to see further, it was only because I stood on the shoulders of giants."*



## Isaac Newton

Letter to Robert Hooke, February 15, 1675



*"The future can be better than the past, and each individual has a personal, moral obligation to make it so."*

## Bill Clinton

Citing Prof Carroll Quigley

In *My Life* Alfred A. Knopf, New York, p78



Hoe groen is die vooruitgang?

# Progress, civilization & nature

- Progress is made at the expense of nature
- Conquering **nature/Wilderness** *is* progress

# Two Faces of Nature

- Tamed & domesticated
  - The wheat field
  - The vine yard
  - The life stock
  - The Garden
- Untamed & Wild; Wilderness
  - Admiration, Awe Lily of the Field
  - Frightening, hostile; a curse: beasts of the field; desert

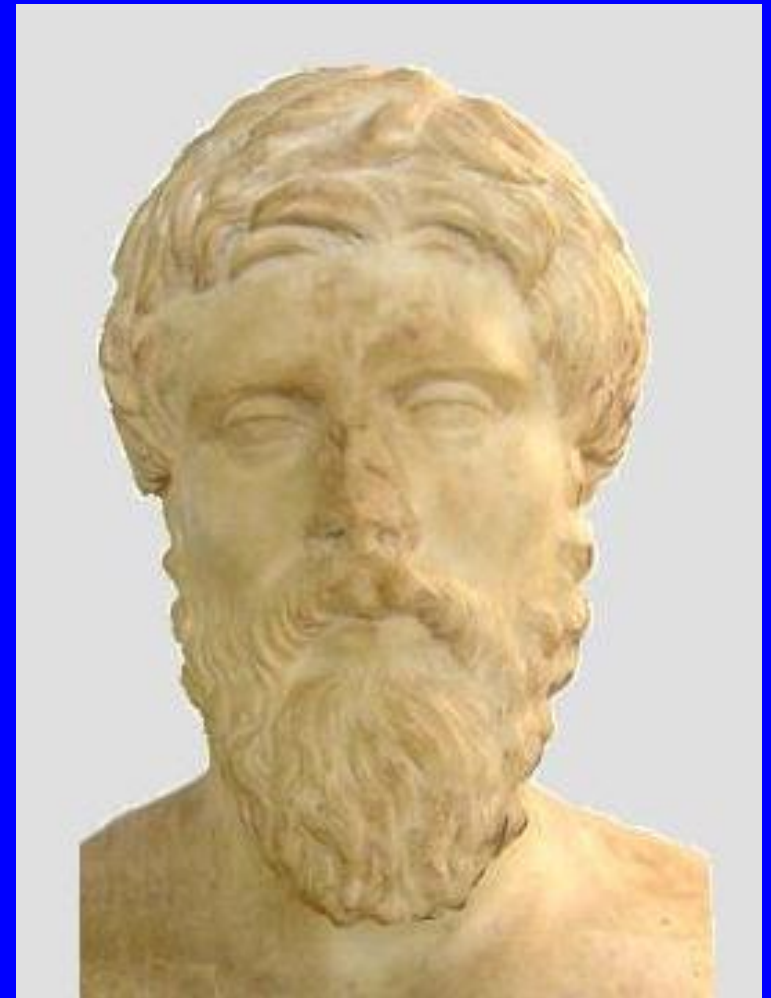
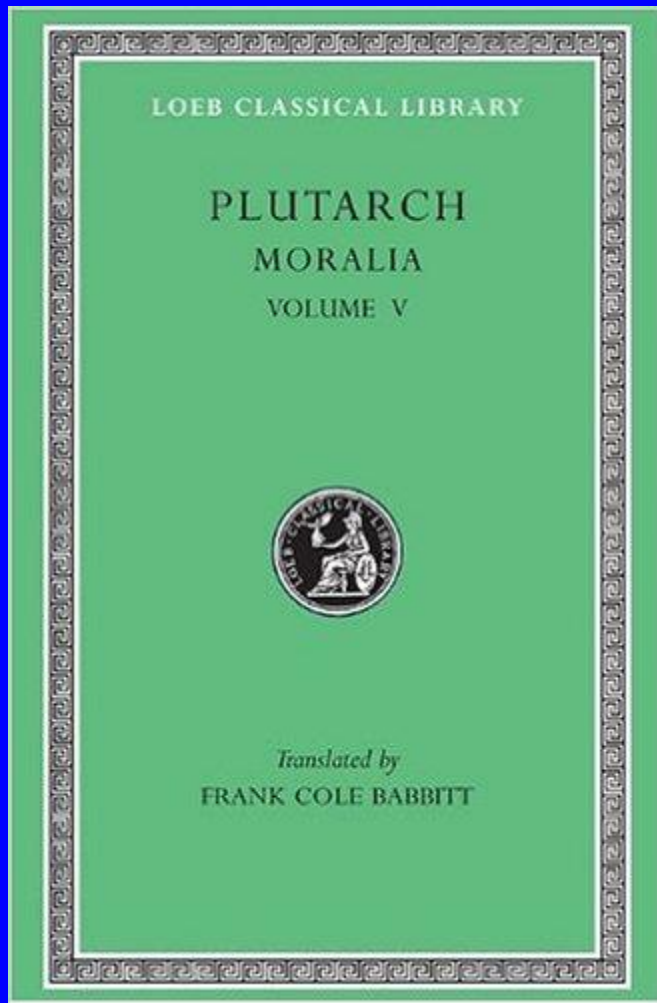






Aristoteles: "Telkens wanneer de geaardheid van de dieren volkomen wordt, wordt deze tam. Wat uiterst volmaakt is, is altijd tam en niet wild."

L.S. Filius (1989) *Problemata Physica Arabica*. 2dln VU, Amsterdam



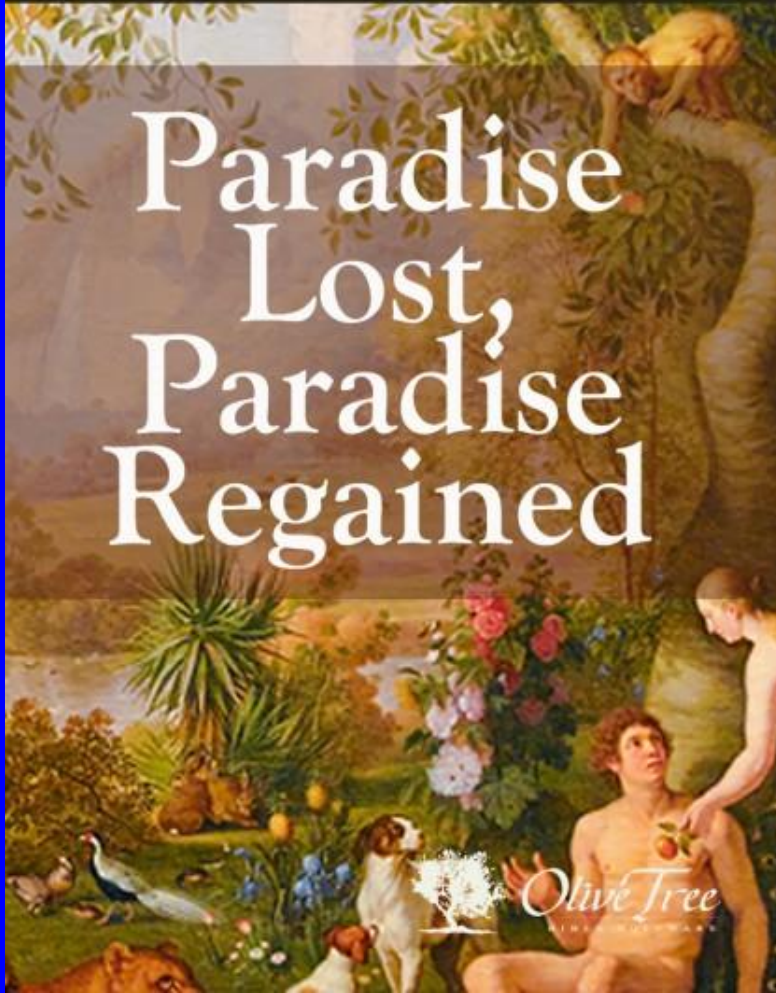
“Er is zeker geen onrecht in het straffen en neerslaan van dieren die antisociaal zijn en de mens kunnen verwonden, en evenmin in het temmen van die dieren die vriendelijk zijn voor de mens, zeker niet als wij hen tot onze helpers maken in de taken waarvoor zij door de natuur zijn toegerust”

(Plutarchus *Moralia* Book XII, 964 F)



John Milton

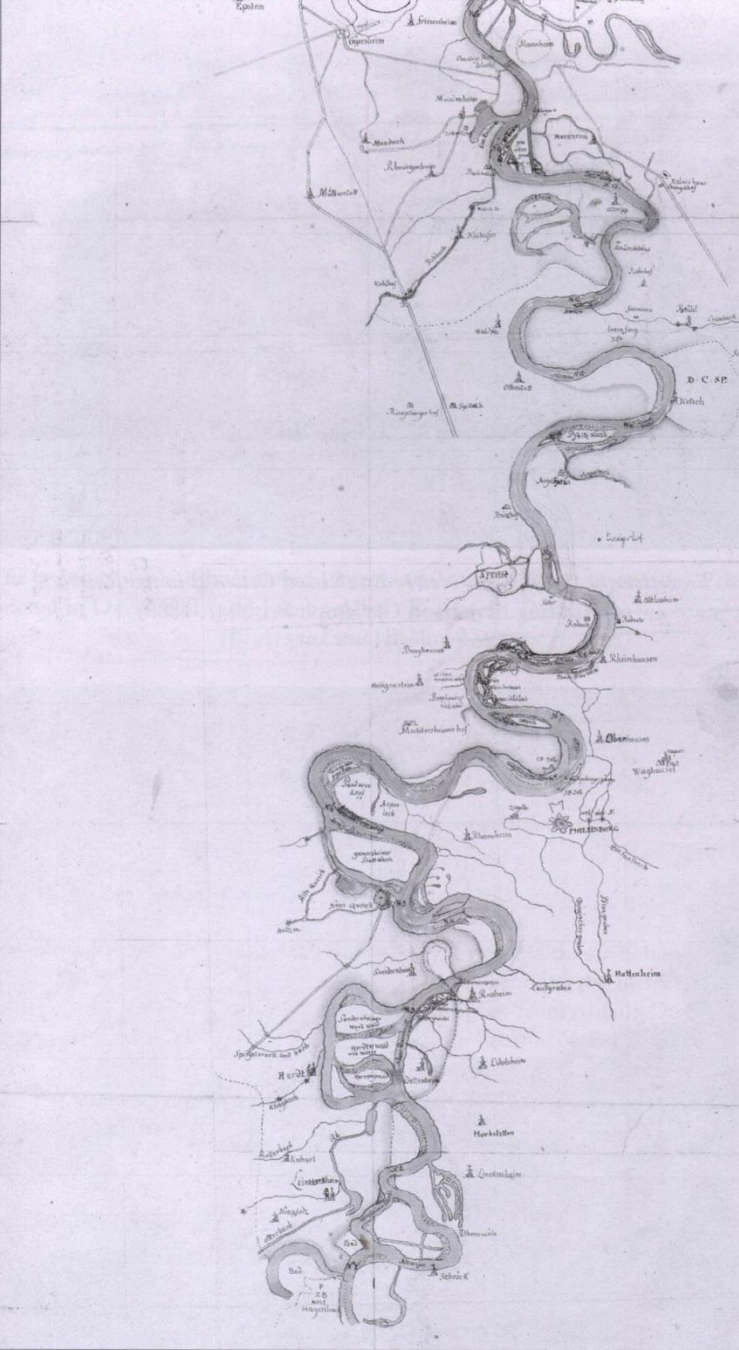
# Paradise Lost, Paradise Regained



Edward Hicks Peaceable Kingdom 1835

Verlangen naar herstel van een verloren harmonie in de schepping  
De natuur (zoals hij nu is) = geen norm





7. This 1789 map shows the serpentine course of the Rhine prior to Johann Tulla's 'correction'.



8. Johann Gottfried Tulla, 'the man who tamed the wild Rhine'.





American Progress by John Gast 1872





## The Newhouse traps..

“going before the axe and the plow, forms the prow with which iron-clad civilization is pushing back barbaric solitude, causing the bear and beaver to give way to the wheatfield, the library and the piano”

Samuel Newhouse, *The Newhouse Trapper's Guide* (Oneida Community, Ltd., 1914), p. 155



# Has the Earth's sixth mass extinction already arrived?

Anthony D. Barnosky<sup>1,2,3</sup>, Nicholas Matzke<sup>1</sup>, Susumu Tomiya<sup>1,2,3</sup>, Guinevere O. U. Wogan<sup>1,3</sup>, Brian Swartz<sup>1,2</sup>, Tiago B. Quental<sup>1,2,4</sup>, Charles Marshall<sup>1,2</sup>, Jenny L. McGuire<sup>1,2,3,4</sup>, Emily L. Lindsey<sup>1,2</sup>, Kaitlin C. Maguire<sup>1,2</sup>, Ben Mersey<sup>1,4</sup> & Elizabeth A. Ferrer<sup>1,2</sup>

Palaeontologists characterize mass extinctions as times when the Earth loses more than three-quarters of its species in a geologically short interval, as has happened only five times in the past 540 million years or so. Biologists now suggest that a sixth mass extinction may be under way, given the known species losses over the past few centuries and millennia. Here we review how differences between fossil and modern data and the addition of recently available palaeontological information influence our understanding of the current extinction crisis. Our results confirm that current extinction rates are higher than would be expected from the fossil record, highlighting the need for effective conservation measures.

Of the four billion species estimated to have evolved on the Earth over the last 3.5 billion years, some 99% are gone<sup>1</sup>. That shows how very common extinction is, but normally it is balanced by speciation. The balance wavers such that at several times in life's history extinction rates appear somewhat elevated, but only five times qualify for 'mass extinction' status: near the end of the Ordovician, Devonian, Permian, Triassic and Cretaceous Periods<sup>2,3</sup>. These are the 'Big Five' mass extinctions (two are technically 'mass depletions')<sup>4</sup>. Different causes are thought to have precipitated the extinctions (Table 1), and the extent of each extinction above the background level varies depending on analytical technique<sup>5,6</sup>, but they all stand out in having extinction rates spiking higher than in any other geological interval of the last ~540 million years<sup>7</sup> and exhibiting a loss of over 75% of estimated species<sup>8</sup>.

Increasingly, scientists are recognizing modern extinctions of species<sup>9</sup> and populations<sup>9</sup>. Documented numbers are likely to be serious underestimates, because most species have not yet been formally described<sup>10,11</sup>. Such observations suggest that humans are now causing the sixth mass extinction<sup>10,12–17</sup>, through co-opting resources, fragmenting habitats,

introducing non-native species, spreading pathogens, killing species directly, and changing global climate<sup>18,12–20</sup>. If so, recovery of biodiversity will not occur on any timeframe meaningful to people: evolution of new species typically takes at least hundreds of thousands of years<sup>21,22</sup>, and recovery from mass extinction episodes probably occurs on timescales encompassing millions of years<sup>5,23</sup>.

Although there are many definitions of mass extinction and gradations of extinction intensity<sup>4,5</sup>, here we take a conservative approach to assessing the seriousness of the ongoing extinction crisis, by setting a high bar for recognizing mass extinction, that is, the extreme diversity loss that characterized the very unusual Big Five (Table 1). We find that the Earth could reach that extreme within just a few centuries if current threats to many species are not alleviated.

## Data disparities

Only certain kinds of taxa (primarily those with fossilizable hard parts) and a restricted subset of the Earth's biomes (generally in temperate latitudes) have data sufficient for direct fossil-to-modern comparisons

**Table 1 | The 'Big Five' mass extinction events**

| Event                                                                                                                                                   | Proposed causes                                                                                                                                                                                                                                                                                                                                                                                                                                           |
|---------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| The Ordovician event <sup>64–66</sup> ended ~443 Myr ago; within 3.3 to 1.9 Myr 57% of genera were lost, an estimated 86% of species.                   | Onset of alternating glacial and interglacial episodes; repeated marine transgressions and regressions. Uplift and weathering of the Appalachians affecting atmospheric and ocean chemistry. Sequestration of CO <sub>2</sub> .                                                                                                                                                                                                                           |
| The Devonian event <sup>64,67–70</sup> ended ~359 Myr ago; within 29 to 2 Myr 35% of genera were lost, an estimated 75% of species.                     | Global cooling (followed by global warming), possibly tied to the diversification of land plants, with associated weathering, paedogenesis, and the drawdown of global CO <sub>2</sub> . Evidence for widespread deep-water anoxia and the spread of anoxic waters by transgressions. Timing and importance of bolide impacts still debated.                                                                                                              |
| The Permian event <sup>71–73</sup> ended ~251 Myr ago; within 2.8 Myr to 160 Kyr 56% of genera were lost, an estimated 96% of species.                  | Siberian volcanism. Global warming. Spread of deep marine anoxic waters. Elevated H <sub>2</sub> S and CO <sub>2</sub> concentrations in both marine and terrestrial realms. Ocean acidification. Evidence for a bolide impact still debated.                                                                                                                                                                                                             |
| The Triassic event <sup>74,75</sup> ended ~200 Myr ago; within 8.3 Myr to 600 Kyr 47% of genera were lost, an estimated 80% of species.                 | Activity in the Central Atlantic Magmatic Province (CAMP) thought to have elevated atmospheric CO <sub>2</sub> levels, which increased global temperatures and led to a calcification crisis in the world oceans.                                                                                                                                                                                                                                         |
| The Cretaceous event <sup>76–80,79–79</sup> ended ~65 Myr ago; within 2.5 Myr to less than a year 40% of genera were lost, an estimated 76% of species. | A bolide impact in the Yucatán is thought to have led to a global cataclysm and caused rapid cooling. Preceding the impact, biota may have been declining owing to a variety of causes: Deccan volcanism contemporaneous with global warming; tectonic uplift altering biogeography and accelerating erosion, potentially contributing to ocean eutrophication and anoxic episodes. CO <sub>2</sub> spike just before extinction, drop during extinction. |

Myr, million years. Kyr, thousand years.

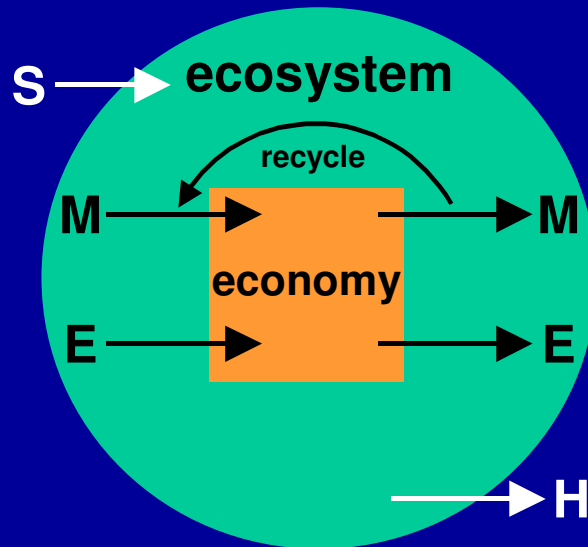
<sup>1</sup>Department of Integrative Biology, University of California, Berkeley, California 94720, USA. <sup>2</sup>University of California Museum of Paleontology, California, USA. <sup>3</sup>University of California Museum of Vertebrate Zoology, California, USA. <sup>4</sup>Human Evolution Research Center, California, USA. <sup>5</sup>Present addresses: Departamento de Ecologia, Universidade de São Paulo (USP), São Paulo, Brazil (T.B.Q.); National Evolutionary Synthesis Center, 2024 W. Main Street, Suite A200, Durham, North Carolina 27705, USA (J.L.M.).

A.D. Barnosky et al.  
(2011) *Nature*, 471,  
51–57

Loss of ¾ of its  
species in geologically  
short interval  
(happened 5 times in  
the past 540 million  
years)

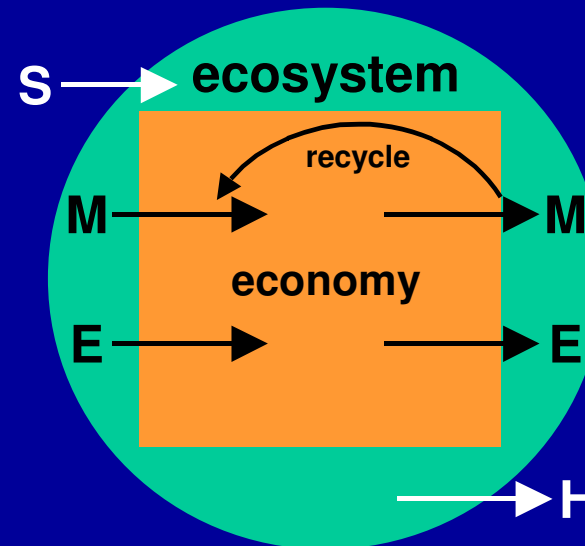
# The economy as an subsystem of the ecosystem

## Empty world



 Man made Capital  
 Natural capital

## Full world



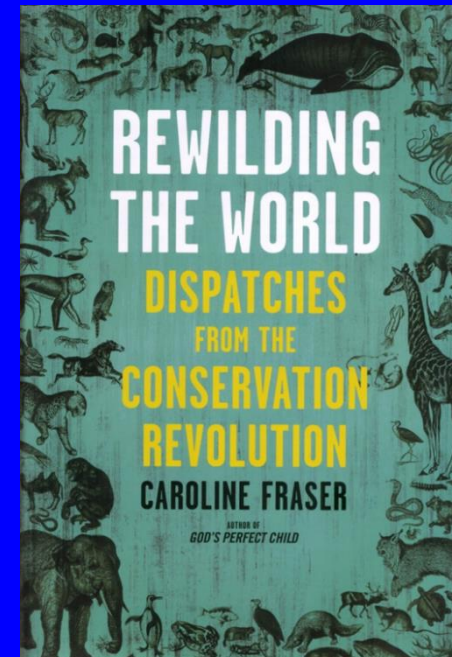
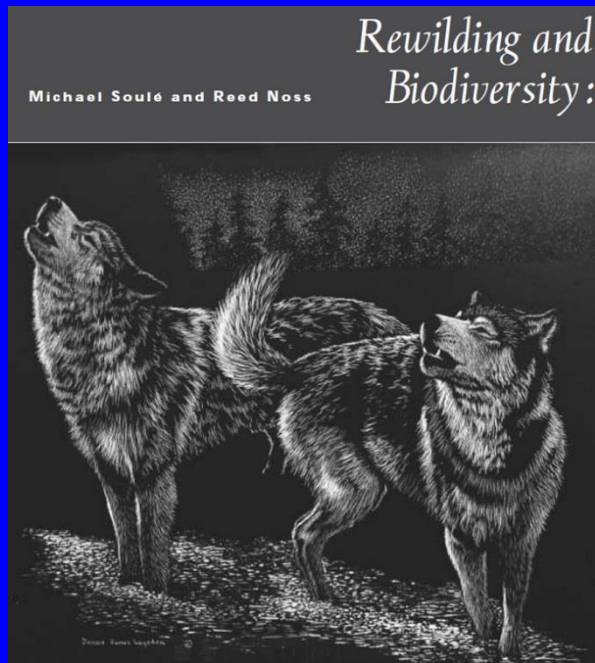
S= solar energy  
H= Heat  
M= Matter  
E= Energy

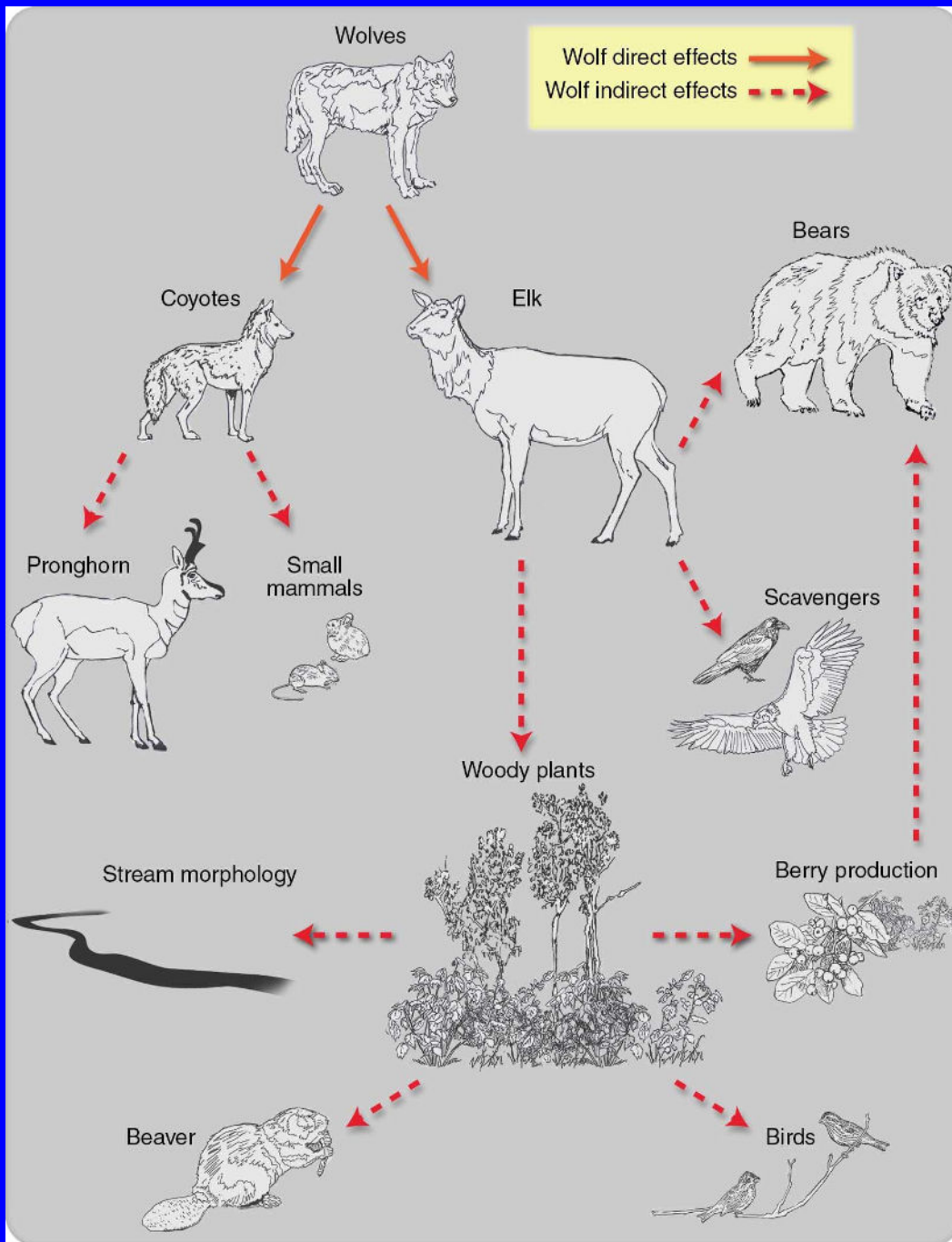
Herman E. Daly (1996) *Beyond Growth. The Economics of Sustainable Development*. Boston: Beacon Press p. 49



# Biodiversiteit

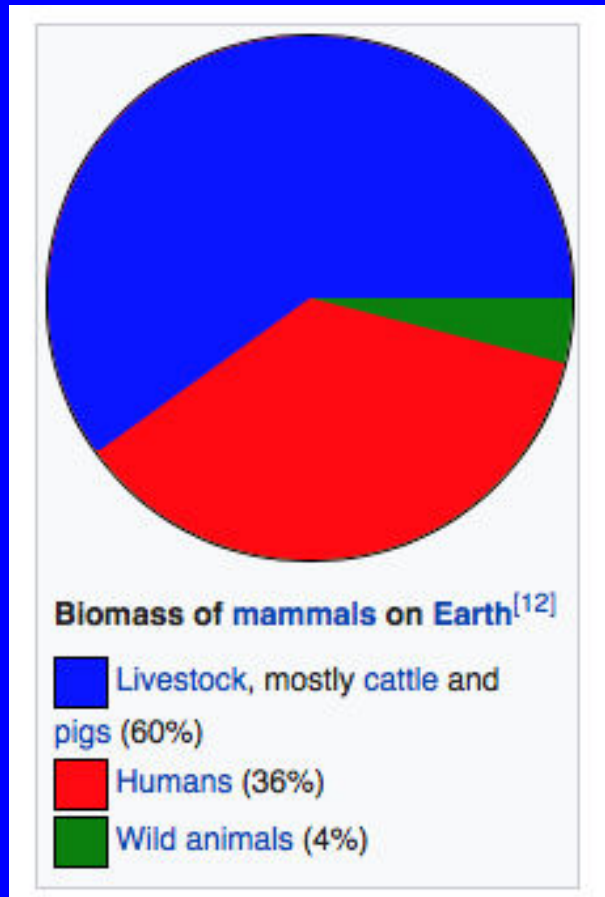
- Primair bos, diepe oceanen en ongerepte gebieden (No-Go)
  - Voorzorg principe / Precautionary principle
- Verstandig gebruik, onderhoud en bescherming
- Doordachte 'Rewilding'; meer ruimte





Yellowstone  
after 1994  
(vgl zeeotter Cieraad)

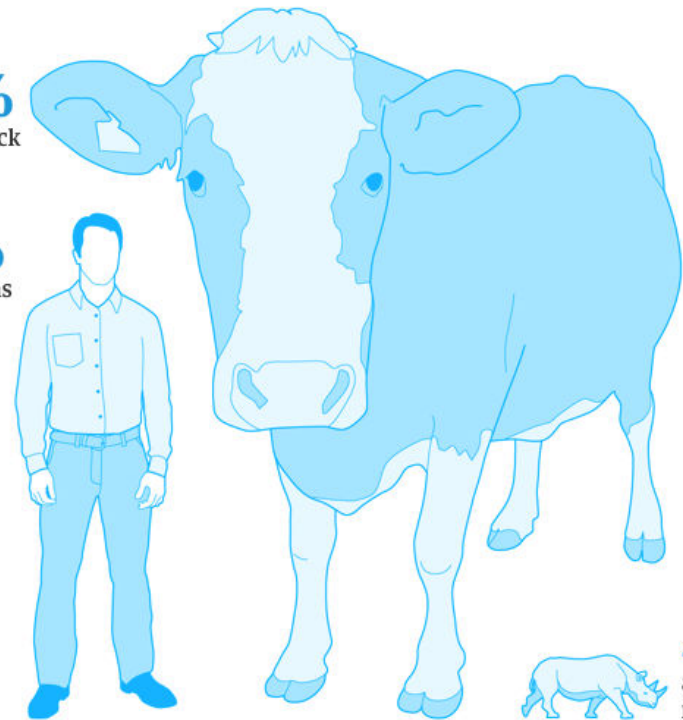
# Biomassa zoogdieren



**Of all the mammals on Earth, 96% are livestock and humans, only 4% are wild mammals**

**60%**  
are livestock

**36%**  
are humans



**4%**  
are wild mammals



# Wolven in Nederland



2013 Luttelgeest (Pools)



Media spektakel

2017 dood Hardenberg  
Wolvenprotocol

2019 Veluwe (wifje! Man?)



Groningen 2015, welkom, mits hij zich natuurlijk gedraagt

# Progress not at the expense of Nature

- Onze stofwisseling met energie - materie
  - Met duurzame energiebronnen
  - Minder materie
  - Verschuiving naar minder problematische materie
  - Technologisch geavanceerd
- Kwaliteit van (alle) leven centraal
- Goede indicatoren van Vooruitgang (verandering GDP)
- In Levensbeschouwing verankeren



Dank voor uw Aandacht

