Centrum pro výzkum
toxických látek
v prostředí

# Udržitelný rozvoj

INVESTICE DO ROZVOJE VZDĚLÁVÁNÍ

**Inovace a rozšíření výuky zaměřené na problematiku životního prostředí na PřF MU** (CZ.1.07/2.2.00/15.0213)
spolufinancován Evropským sociálním fondem a státním rozpočtem České republiky

# Osnova kurzu ENV002

1. Úvod
2. Globální výzvy
3. Historie konceptu a souvislosti
4. Strategie TUR ve světě, EU a ČR + Agenda 21
5. (Princip předběžné opatrnosti)
6. Rozměry trvale udržitelného rozvoje
7. Udržitelná výroba
8. Udržitelná spotřeba
9. Indikátory - Měření udržitelnosti rozvoje

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# Úvod

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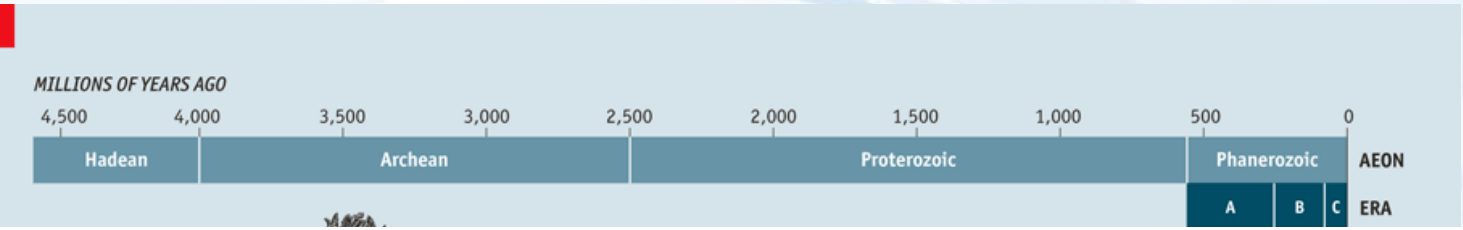
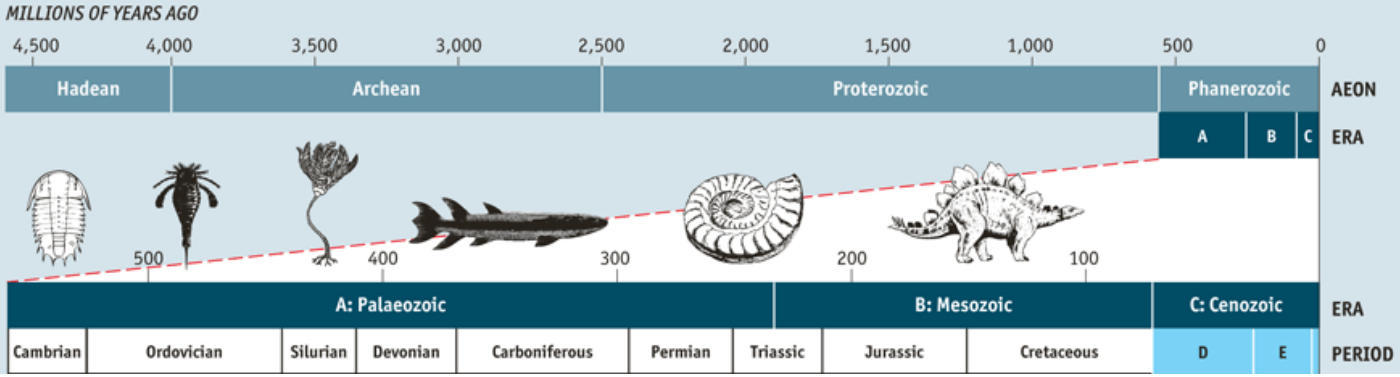
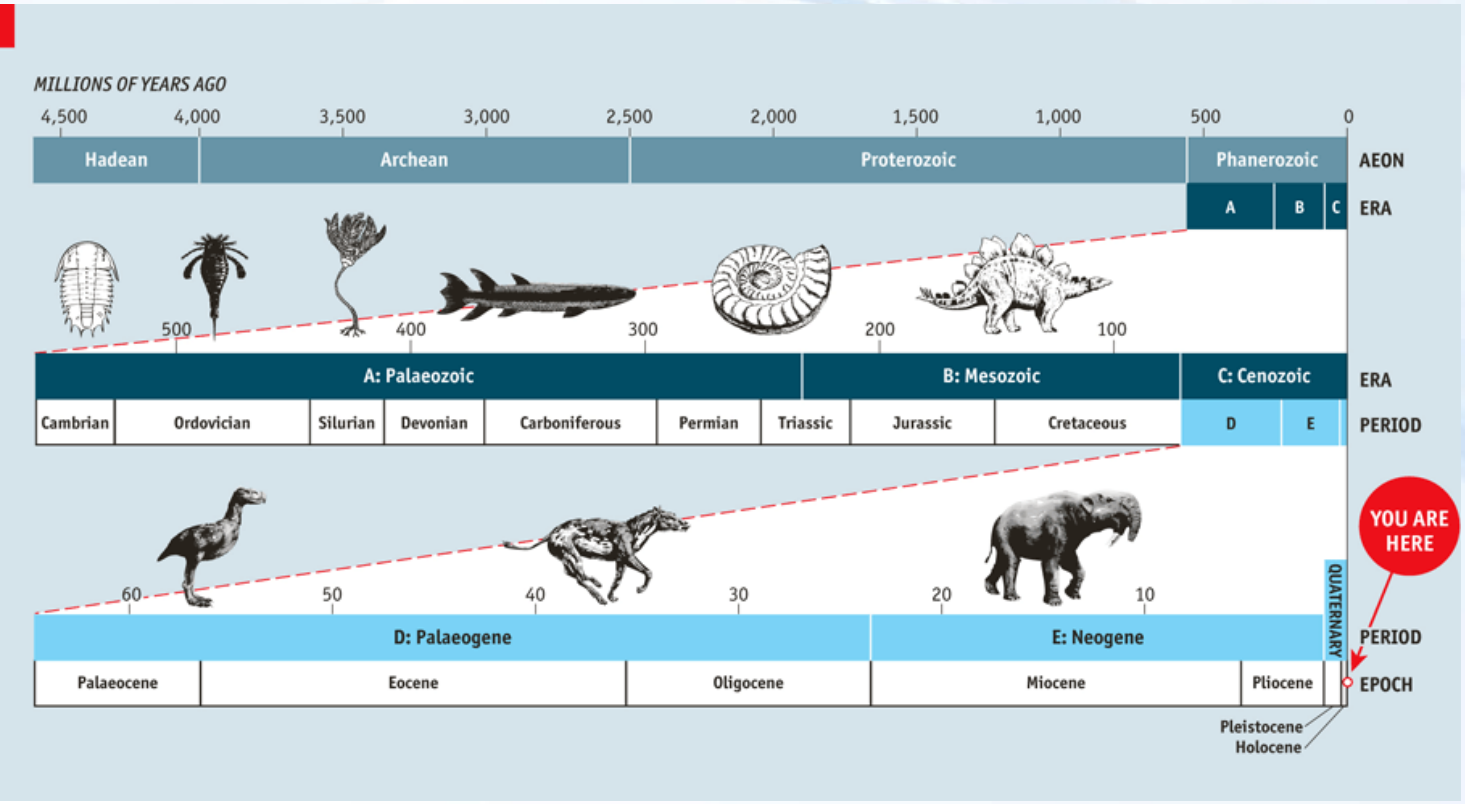
# Starohory - čtvrtohory...



# Starohory - čtvrtohory...



# Starohory - čtvrtohory...

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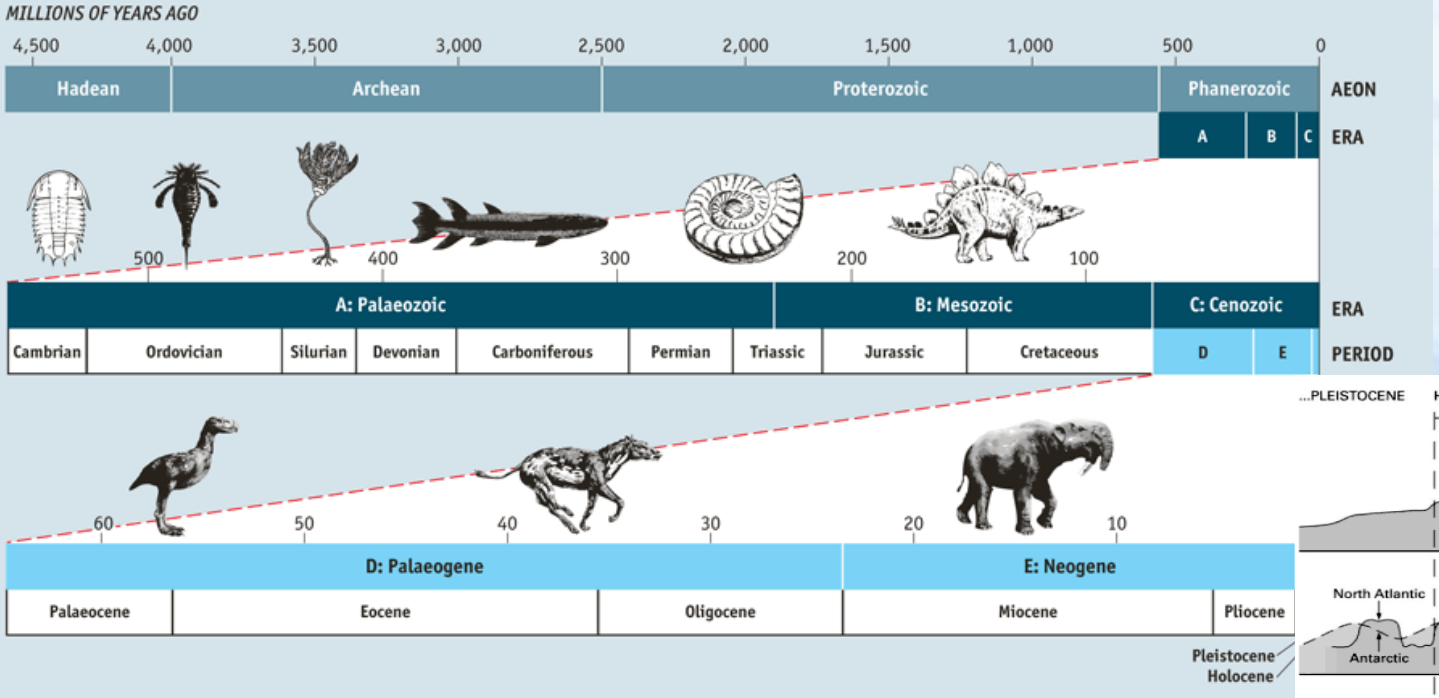
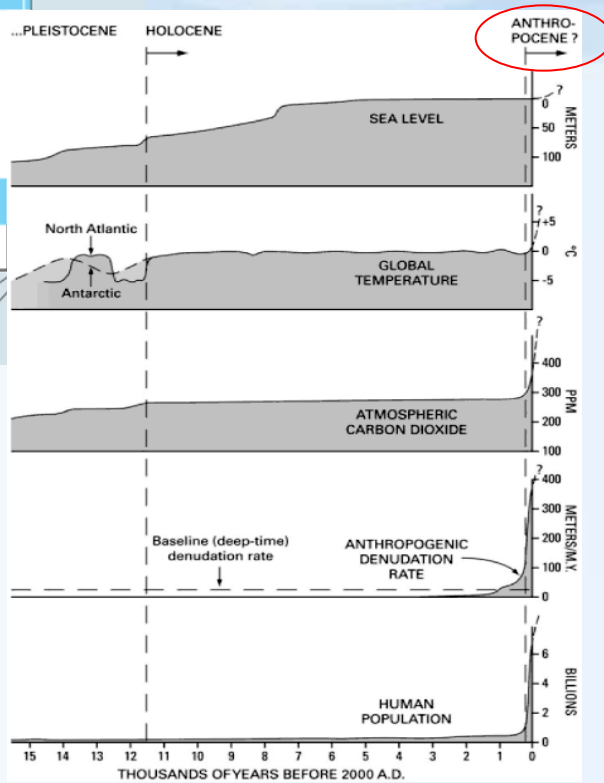
# Starohory - čtvrtohory...




# Geology of mankind

**Paul J. Crutzen**

For the past three centuries, the effects of humans on the global environment have escalated. Because of these anthropogenic emissions of carbon dioxide, global climate may depart significantly from

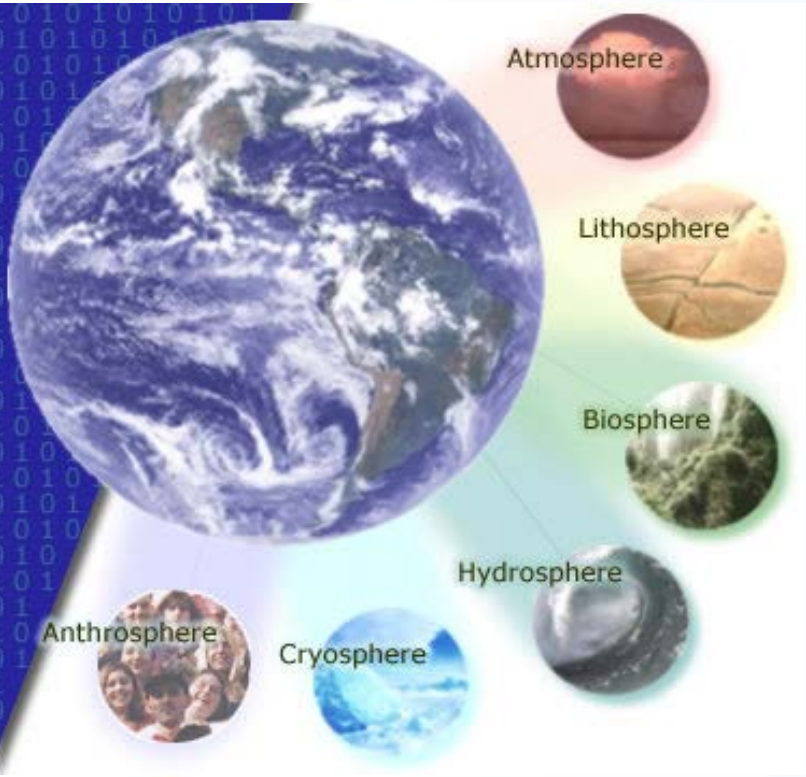
referring to the "anthropozoic era". And in 1926, V. I. Vernadsky acknowledged the increasing impact of mankind: "The direction in which the processes of evolution must proceed, namely towards increasing consciousness and thought, and forms having greater and greater influence on their

## The Anthropocene

*The Anthropocene could be said to have started in the late eighteenth century, when analyses of air trapped in polar ice showed the beginning of growing global concentrations of carbon dioxide and methane.*

# Stabilita Zemského systému

- Antropocén - geologický termín zpopulariz. P. Crutzenem
- od průmyslové revoluce (druhá půlka 18.stol.)
- období, kdy člověk začal představovat dominantní sílu **měnící stav „Zemského systému“**




Zemský systém – integrované biofyzikálně-socio-ekonomické procesy a interakce mezi hydro-, kryo-, bio-,geo- a antroposférou v prostorovém (od lokálních po globální) a časovém měřítku, jež určují environmentální stav planety v rámci její pozice ve vesmíru.

# Vliv člověka na své okolí

? dokáže 1,7 metru vysoký tvor působit ZMĚNY na ploše $128 \cdot 10^{12}$ $m^2$ ?

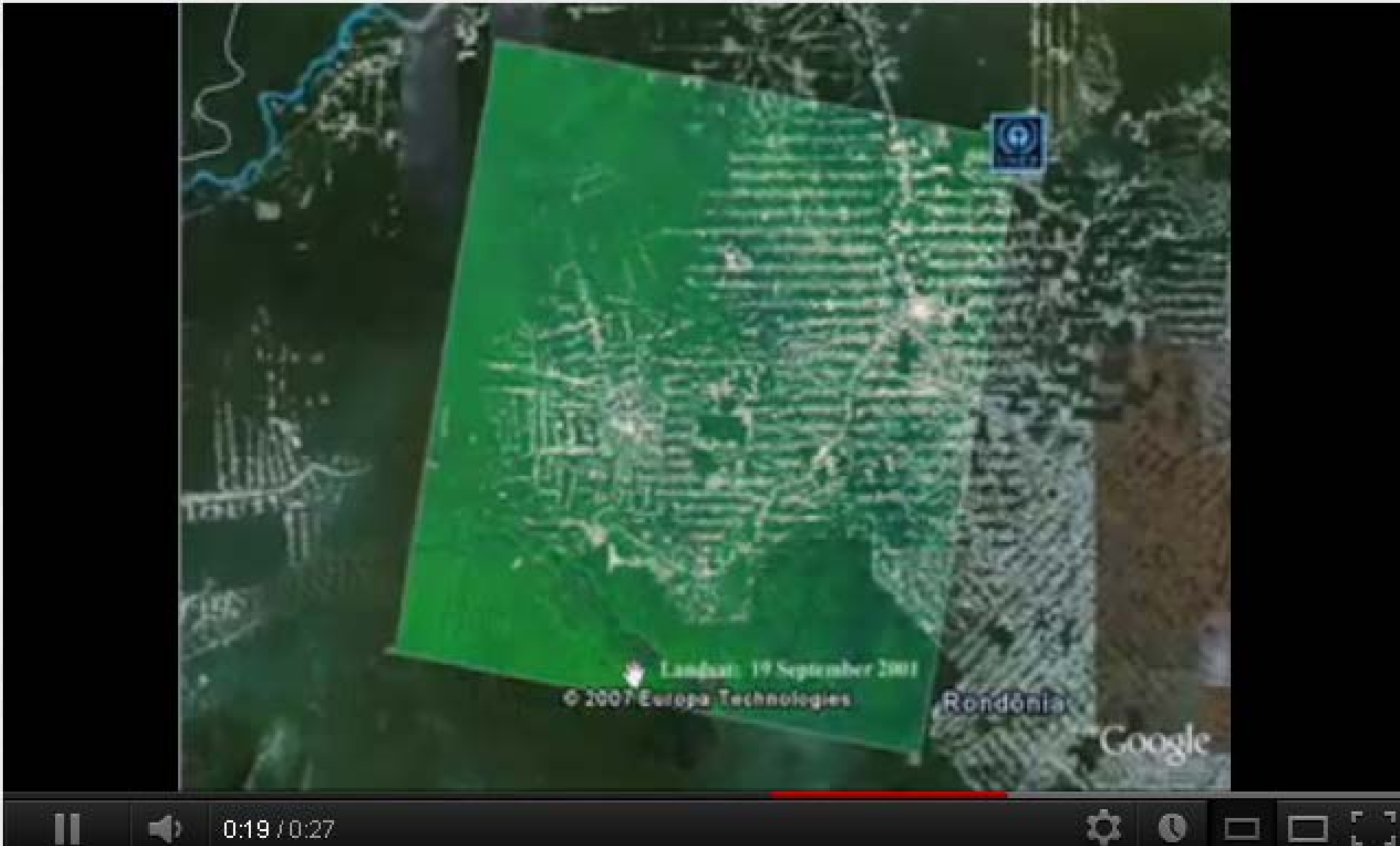
# Vliv člověka na své okolí

? dokáže 1,7 metru vysoký tvor působit ZMĚNY na ploše $128 \cdot 10^{12}$ $m^2$ ?


**- ano, protože je nás mnoho, jsme mocní a nároční**

# UNEP - Amazon Deforestation in Google Earth

EarthOutreach | Přihlásit se k odběru | 130 videí



# Almeria, Španělsko

## Srovnání situace z let 1974 a 2004: proměna původní zemědělské krajiny na intenzivní skleníkové hospodaření (využití omezených zdrojů vody)



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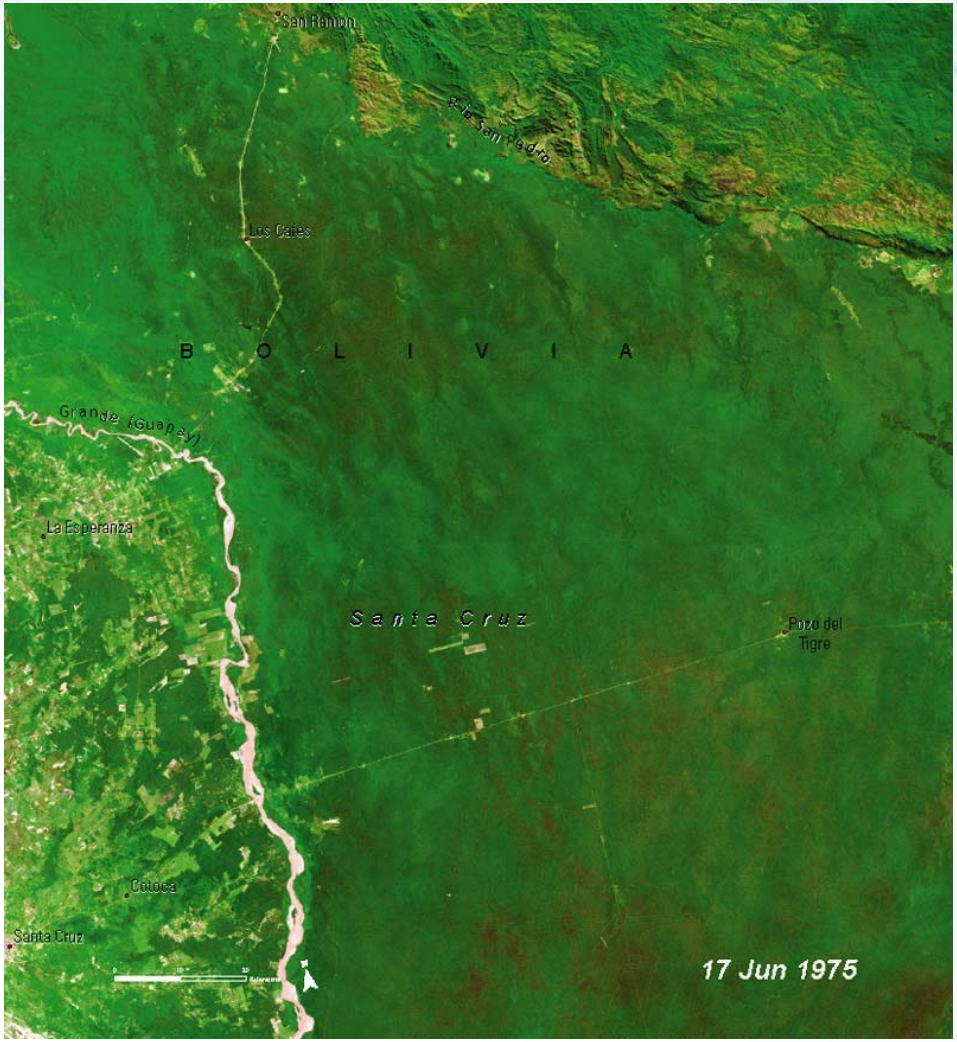
# Santa Cruz, Bolívie

Roku 1986 byly zbudovány silnice umožňující rozvoj nevyužívaných oblastí pralesa – přeměna na zemědělské usedlosti





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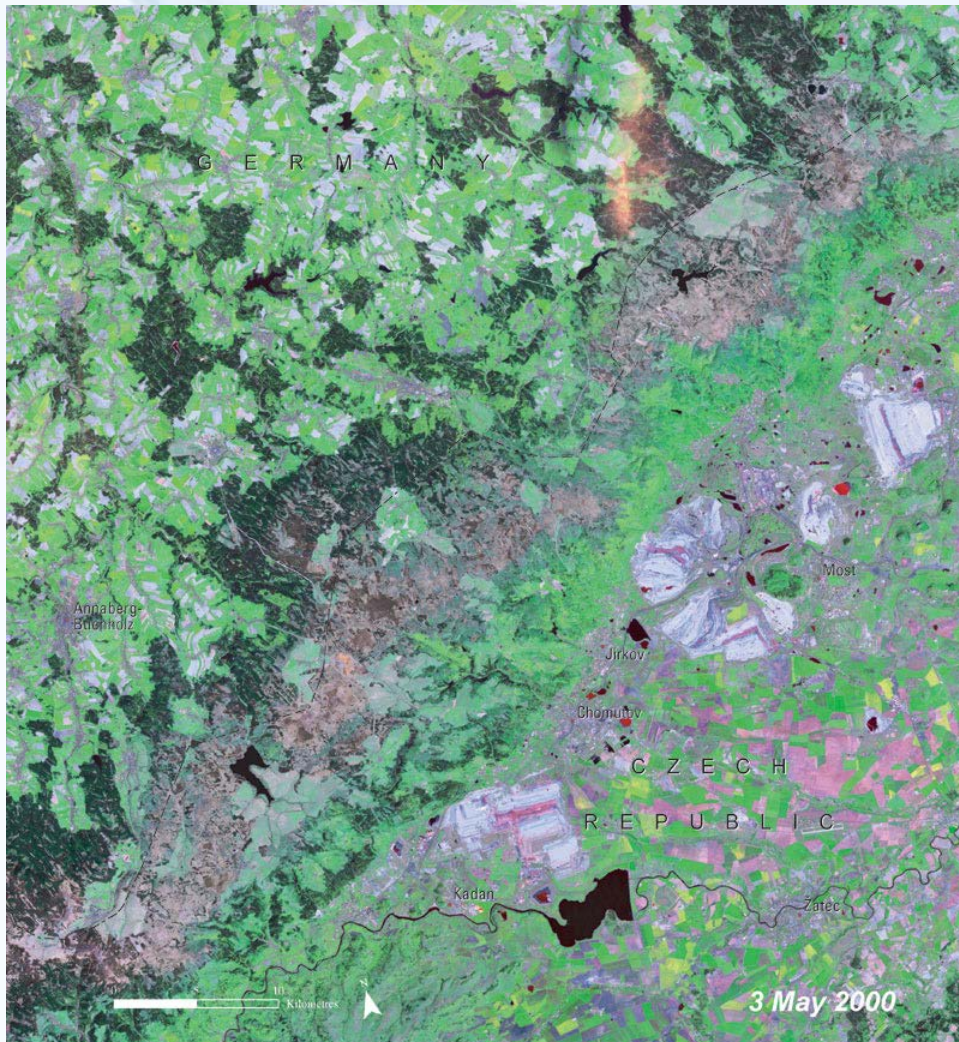
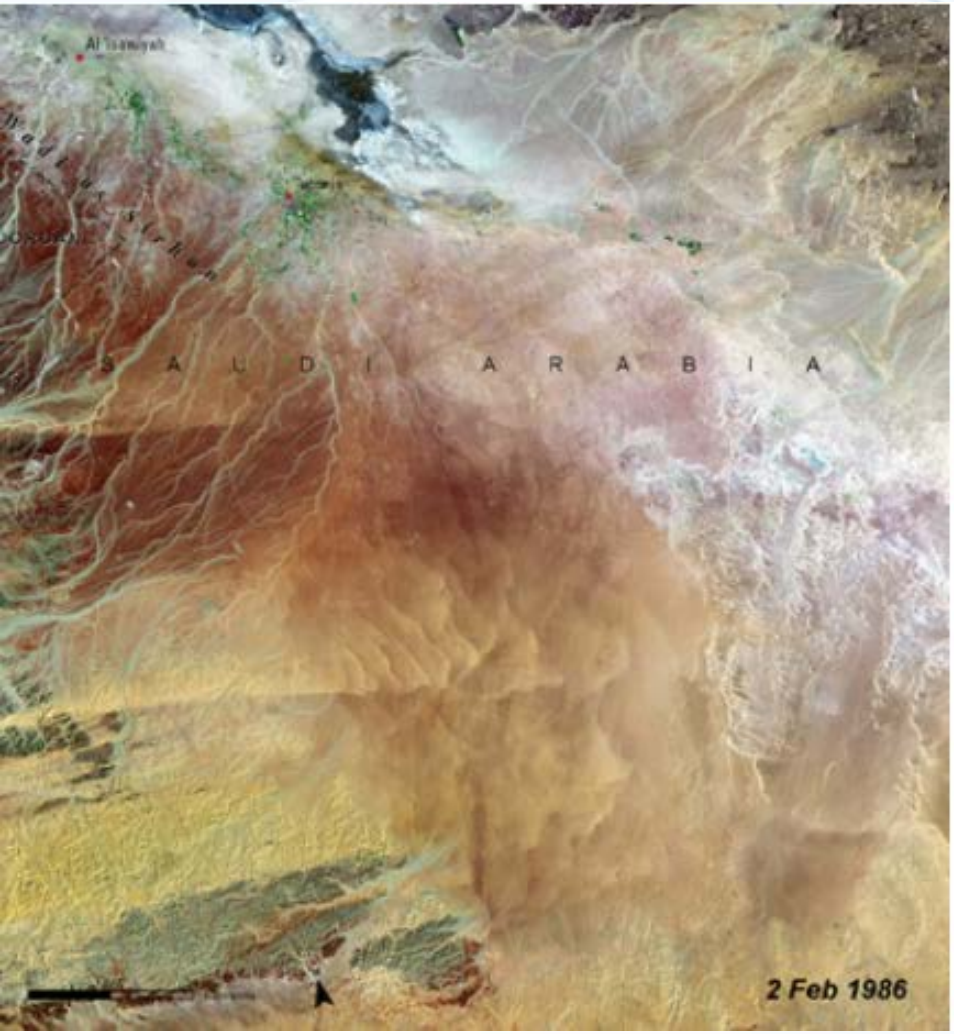
## Černý trojúhelník, ČR-Německo

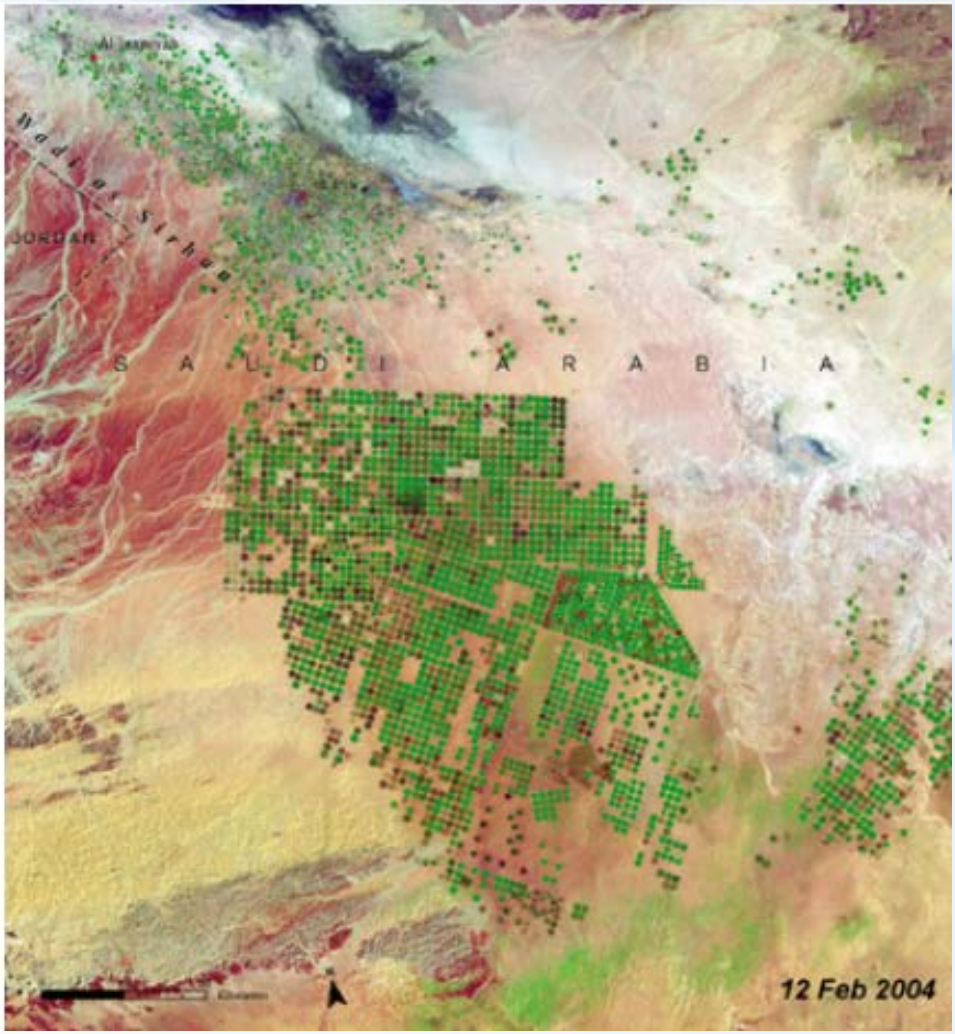
Oblast na rozhraní ČR, Německa a Polska s intenzivní povrchovou těžbou uhlí. Doly jsou šedivou barvou, hnědavý pás na hranici ČR-SRN zobrazuje deforestaci vlivem imisí. Zelený pás v podkrušnohoří zobrazuje remediované a obnovované oblasti – po zavedení čistších technologií

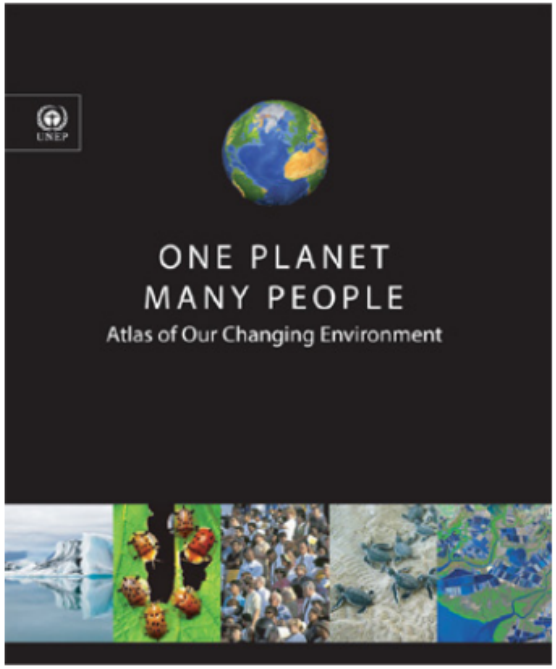



## Al'Isawiyah , Saudská Arábie

Srovnání situace z let 1986 a 2004: využití nových technologií pro závlahy v aridních oblastech (center-pivot irrigation system, CPI).






# One Planet Many People

United Nations Environment Programme
Hardcover: 322 pages
ISBN: 9280725718
Publication Date: 2005

Price: $100

One Planet, Many People is intended for environmental policy makers, non-governmental organizations, the private sector, academics, teachers and citizens. This colorful and approachable atlas contains photographs, satellite images, maps and narratives that provide insights into the many ways people around the world have changed, and continue to change, the environment.

Your Rating:
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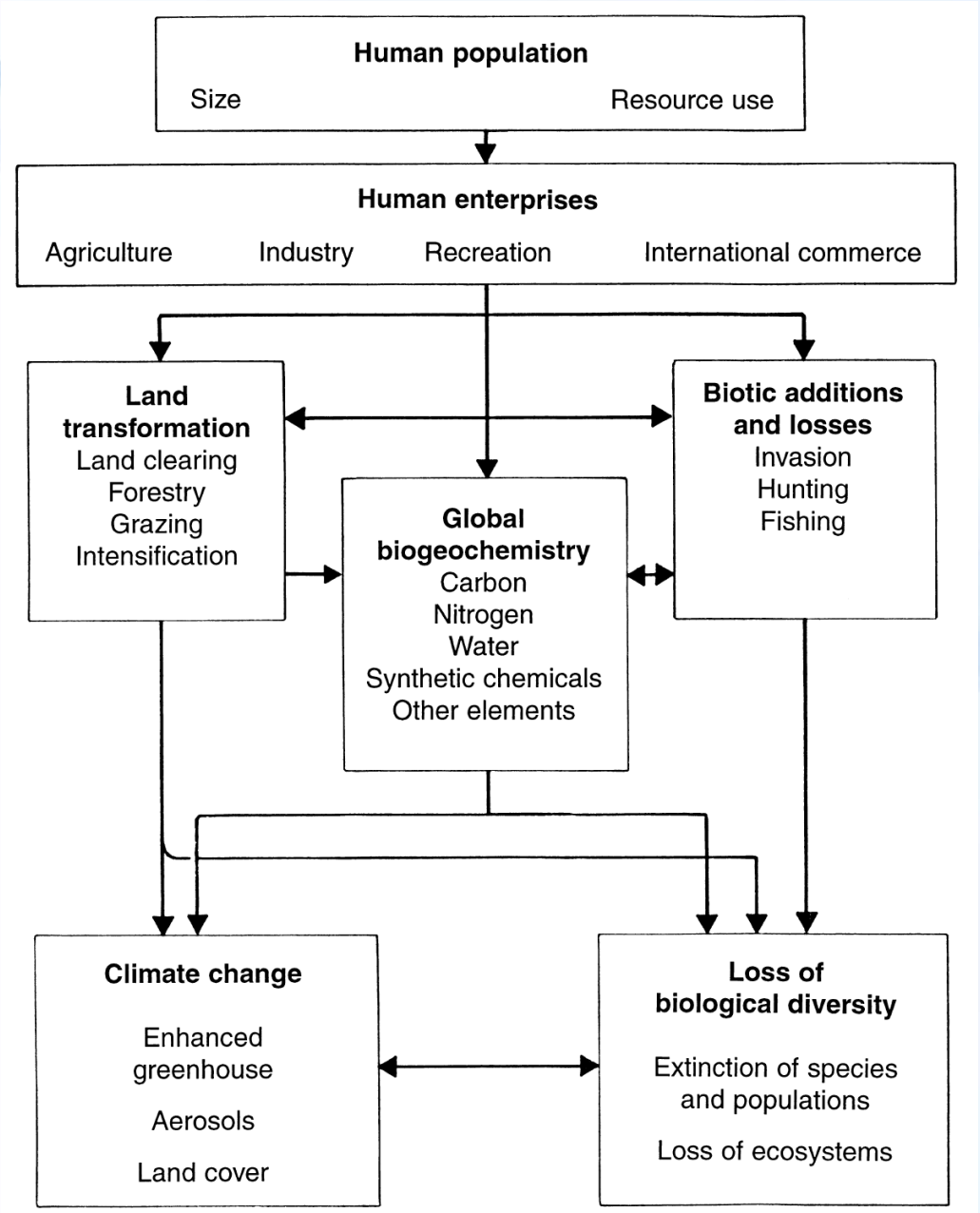
## Atlas Hotspots

Show All entries Search:

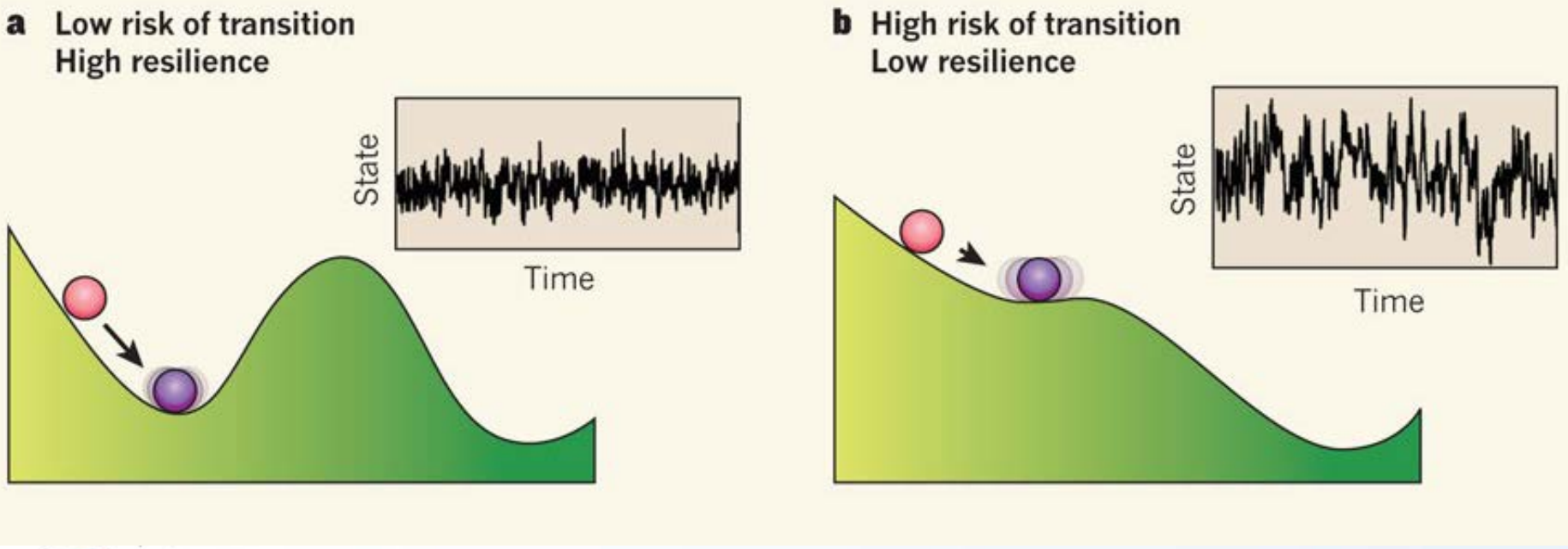
| Site Name | Country | Major Theme | Site Rating | Site Views | Site Detail |
|---|---|---|---|---|---|
| Al'Isawiyah | Saudi Arabia | Ecosystems | 4 | 6021 | |
| Almeria | Spain | Ecosystems | 2.97 | 17172 | |
| Angangueo | Mexico | Ecosystems | 5 | 697 | |




*A conceptual model illustrating humanity's direct and indirect effects on the Earth system*

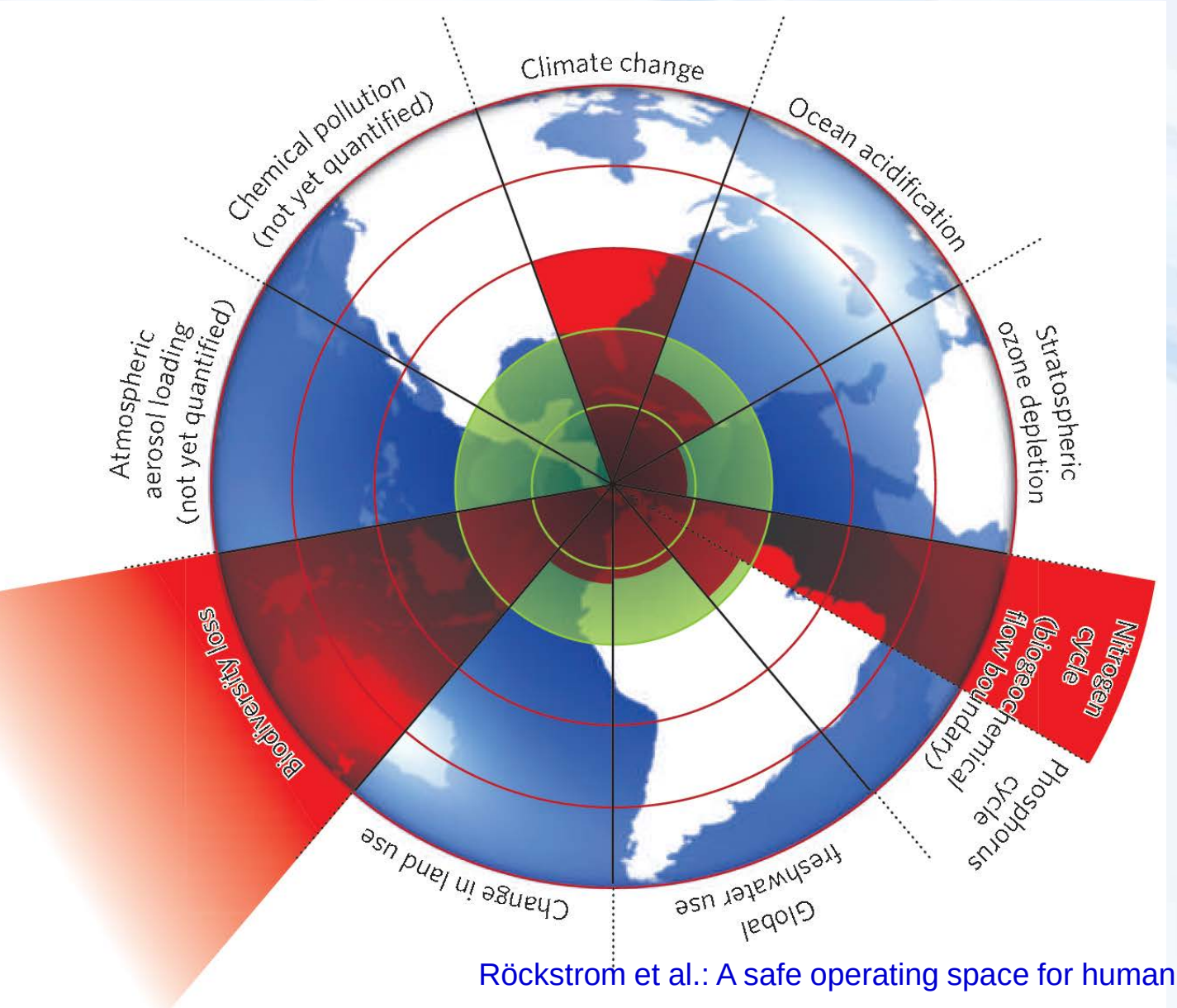
# Proč nás to zajímá?

- příliš rozsáhlé změny parametrů Zemského systému mohou destabilizovat kritické biofyzikální systémy (př. ekosystémy)
- to může spustit náhlé nebo nevratné nelineární změny v ŽP, což by bylo zhoubné nejen pro kvalitu života lidí



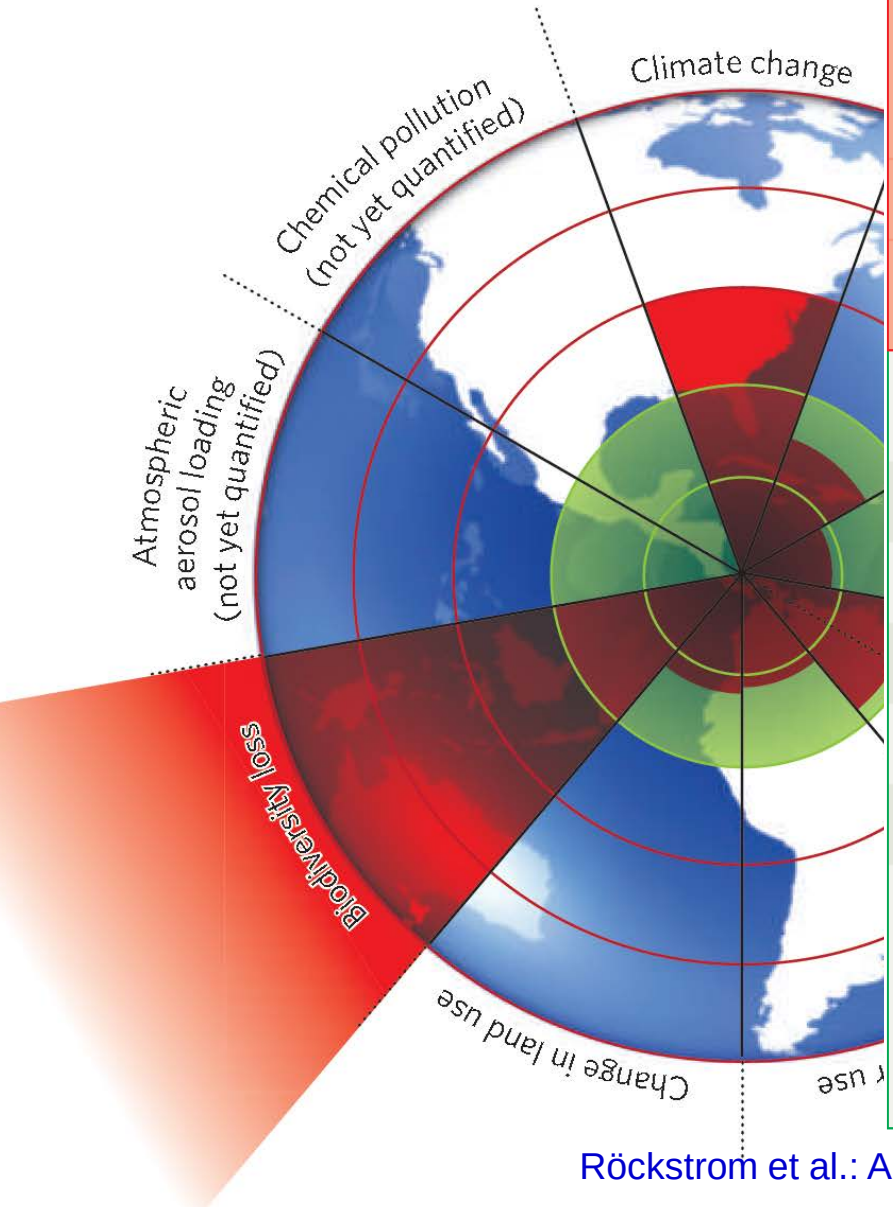
# Globální výzvy – meze planety

# Překročení hranic?




Röckstrom et al.: A safe operating space for humanity (*Nature) 2009*

# Překročení hranic?




**PLANETARY BOUNDARIES**

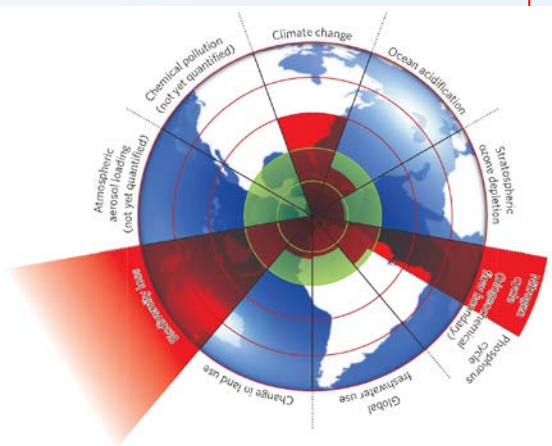
| Earth-system process | Parameters | Proposed boundary | Current status | Pre-industrial value |
|---|---|---|---|---|
| Climate change | (i) Atmospheric carbon dioxide concentration (parts per million by volume) | 350 | 387 | 280 |
| | (ii) Change in radiative forcing (watts per metre squared) | 1 | 1.5 | 0 |
| Rate of biodiversity loss | Extinction rate (number of species per million species per year) | 10 | >100 | 0.1–1 |
| Nitrogen cycle (part of a boundary with the phosphorus cycle) | Amount of $N_2$ removed from the atmosphere for human use (millions of tonnes per year) | 35 | 121 | 0 |
| Phosphorus cycle (part of a boundary with the nitrogen cycle) | Quantity of P flowing into the oceans (millions of tonnes per year) | 11 | 8.5–9.5 | ~1 |
| Stratospheric ozone depletion | Concentration of ozone (Dobson unit) | 276 | 283 | 290 |
| Ocean acidification | Global mean saturation state of aragonite in surface sea water | 2.75 | 2.90 | 3.44 |
| Global freshwater use | Consumption of freshwater by humans ($km^3$ per year) | 4,000 | 2,600 | 415 |
| Change in land use | Percentage of global land cover converted to cropland | 15 | 11.7 | Low |
| Atmospheric aerosol loading | Overall particulate concentration in the atmosphere, on a regional basis | | To be determined | |
| Chemical pollution | For example, amount emitted to, or concentration of persistent organic pollutants, plastics, endocrine disrupters, heavy metals and nuclear waste in, the global environment, or the effects on ecosystem and functioning of Earth system thereof | | To be determined | |

Röckstrom et al.: A safe operating space for humanity (*Nature) 2009*

# I. Globální klimatická změna

| Earth System process | Control variable | Threshold avoided or influenced by slow variable | Planetary Boundary (zone of uncertainty) | State of knowledge* |
|---|---|---|---|---|
| Climate change | Atmospheric $CO_2$ concentration, ppm;<br><br>Energy imbalance at Earth's surface, W $m^{-2}$ | Loss of polar ice sheets. Regional climate disruptions. Loss of glacial freshwater supplies. Weakening of carbon sinks. | Atmospheric $CO_2$ concentration: 350 ppm (350–550 ppm)<br><br>Energy imbalance:+1 W $m^{-2}$ (+1.0–+1.5 W $m^{-2}$) | 1. Ample scientific evidence.<br>2. Multiple sub-system thresholds.<br>3. Debate on position of boundary. |

**Boundary:** Atmospheric $CO_2$ concentration no higher than 350 ppm
**Pre-industrial level:** 280 ppm
**Current level:** 387 ppm
**Diagnosis:** Boundary exceeded

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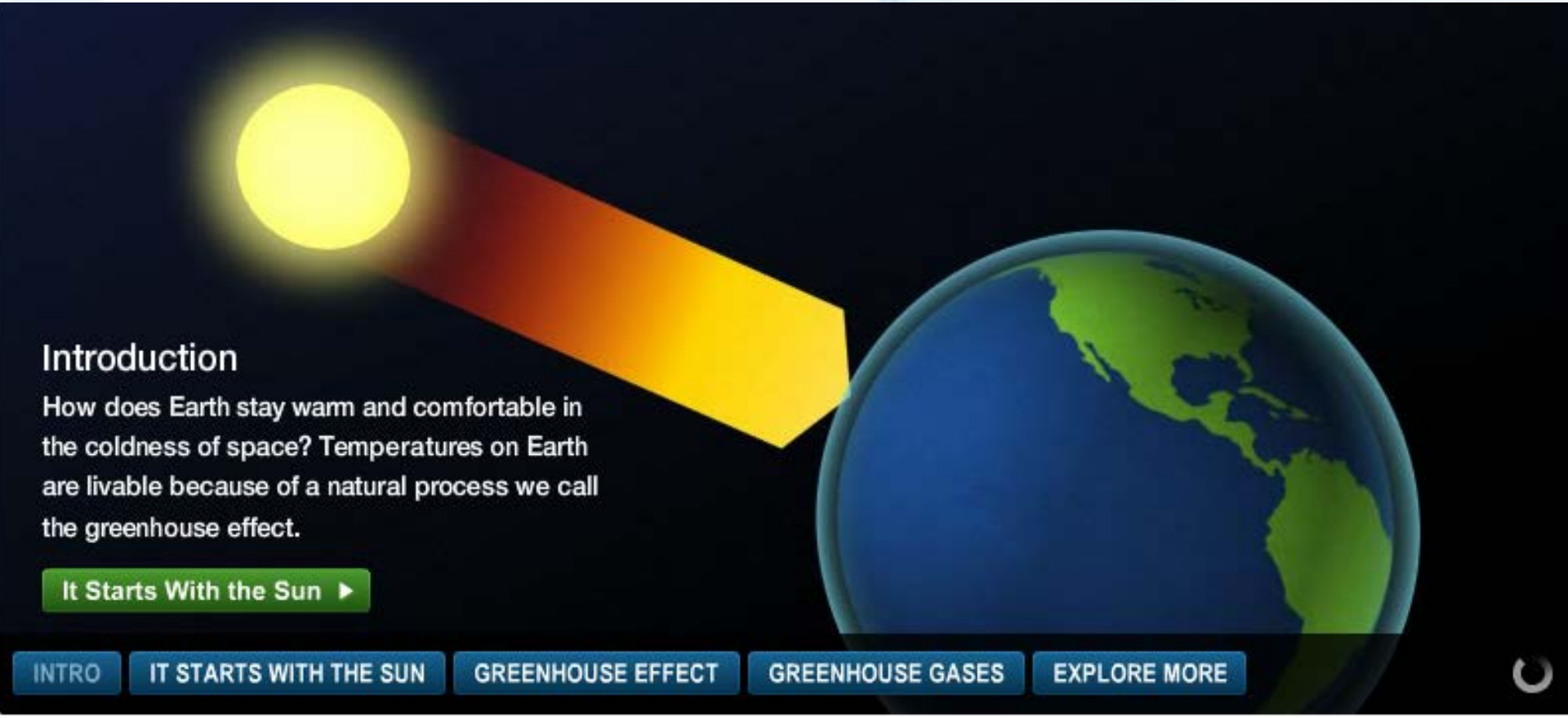
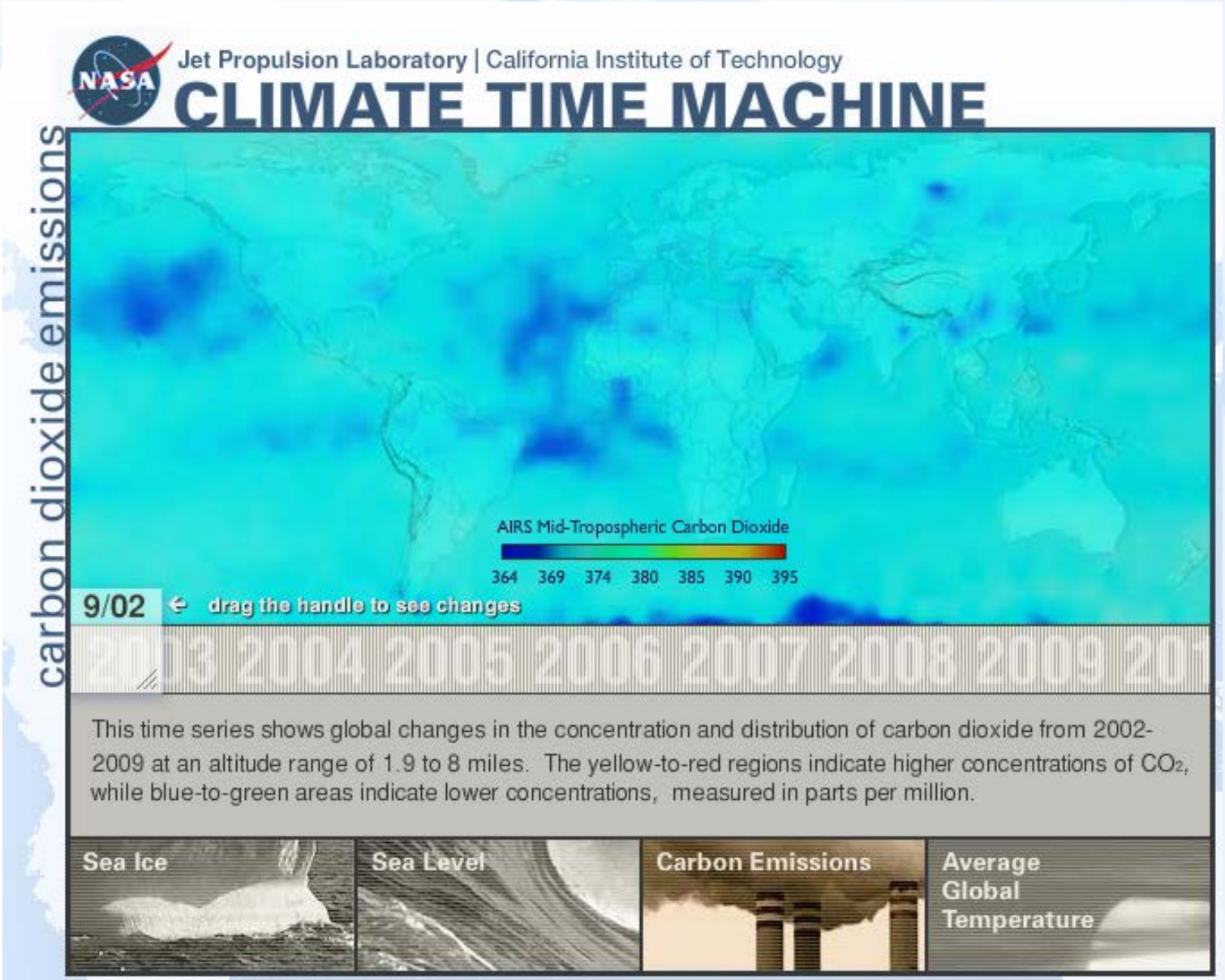
# Globální oteplování a klimatické změny

## Globální oteplování x klimatické změny ?



# Změna klimatu v čase



# Indikátory GW a změn klimatu

## GLOBAL CLIMATE CHANGE

Vital Signs of the Planet

- Home
- Key Indicators
- Evidence
- Causes
- Effects
- Uncertainties
- NASA's Role
- Missions
- Key Websites
- INTERACTIVES
- IMAGES AND VIDEO
- CLIMATE KIDS
- FOR EDUCATORS
- ENERGY INNOVATIONS

KEY INDICATORS

CARBON DIOXIDE CONCENTRATION | GLOBAL SURFACE TEMPERATURE | ARCTIC SEA ICE | LAND ICE | SEA LEVEL

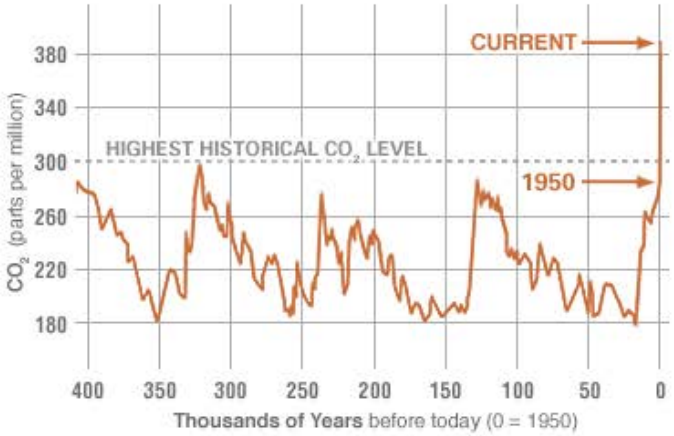
### Carbon Dioxide Concentration

download data

Data updated 01.11.12

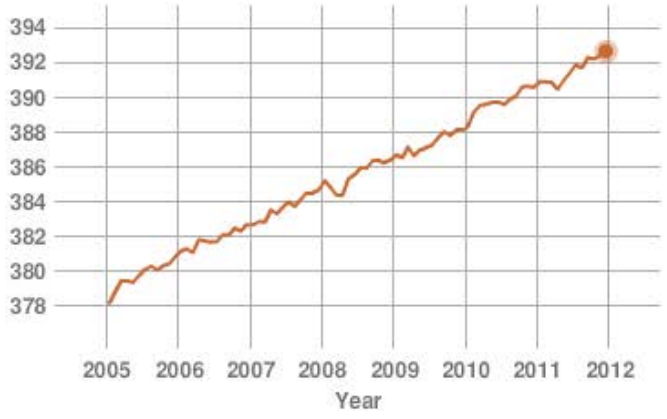
**PROXY (INDIRECT) MEASUREMENTS**

Data source: Reconstruction from ice cores.
Credit: NOAA




**DIRECT MEASUREMENTS: 2005-PRESENT**

Data source: Monthly measurements (corrected for average seasonal cycle). Credit: NOAA

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# Pozorované změny

Republic of Maldives: Vulnerable to sea level rise

## Sea level rise

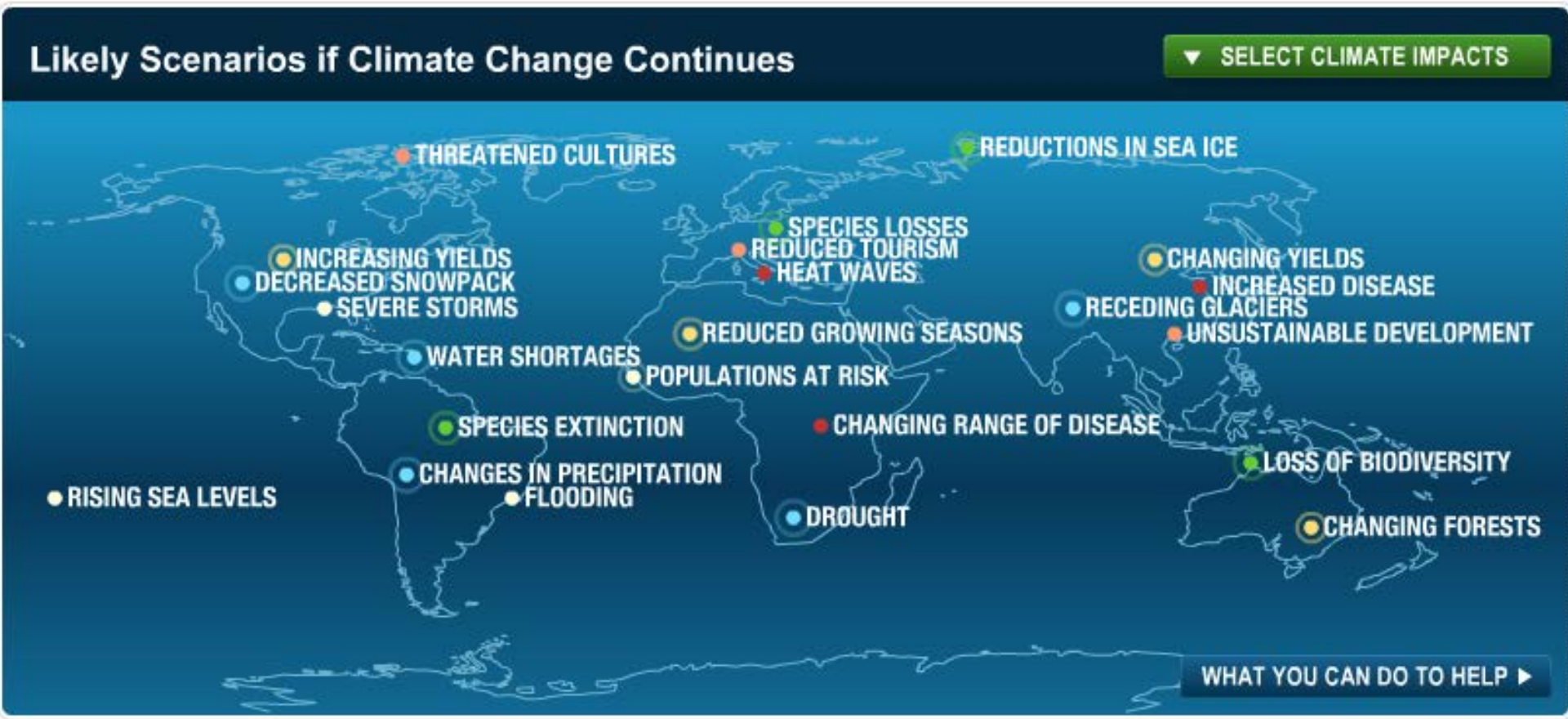
Global sea level rose about 17 centimeters (6.7 inches) in the last century. The rate in the last decade, however, is nearly double that of the last century.[4]

---

## Global temperature rise

All three major global surface temperature reconstructions show that Earth has warmed since 1880.[5] Most of this warming has occurred since the 1970s, with the 20 warmest years having occurred since 1981 and with all 10 of the warmest years occurring in the past 12 years.[6] Even though the 2000s witnessed a solar output decline resulting in an unusually deep solar minimum in 2007-2009, surface temperatures continue to increase.[7]

# Důsledky globální změny klimatu



# Co o klimatické změně ne-víme

## Climate change: What we do – and don't – know

*(Image: Maria Stenzel)*

There is much we do not understand about Earth's climate. That is hardly surprising, given the complex interplay of physical, chemical and biological processes that determines what happens on our planet's surface and in its atmosphere.

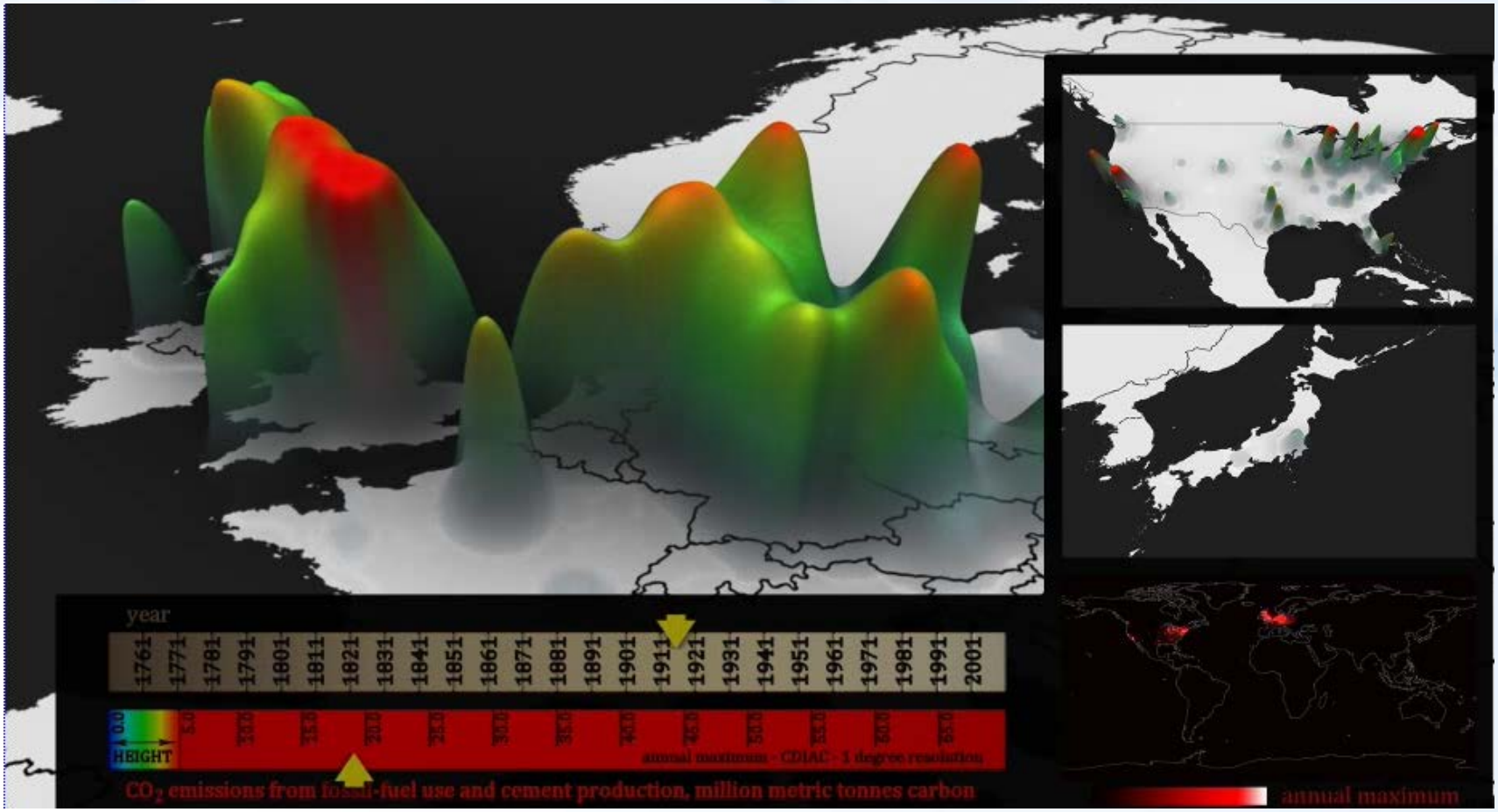
VIDEO


**Time-lapse shows biggest Greenland glacier breaking up**

The Petermann glacier between 2009 and 2011, showing a massive ice calving

**Read more**

# Histeorie emisí $CO_2$ x zodpovědnost řešení

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# Modelace x skutečné projevy

## Climate change: It's even worse than we thought

*(Image: Saul Loeb/AFP/Getty)*

Five years ago, the last report of the Intergovernmental Panel on Climate Change painted a gloomy picture of our planet's future. As climate scientists gather evidence for the next report, due in 2014, **Michael Le Page** gives seven reasons why things are looking even grimmer

### ARCTIC WARMING

The thick sea ice in the

### EDITORIAL

**Obama should fulfil his 2008 climate promises**

Extreme events caused by warming are happening much sooner than we thought they would. It's time for Obama to act

**Read more**



### CLIMATE CHANGE

**Wiping out top predators messes up the climate**

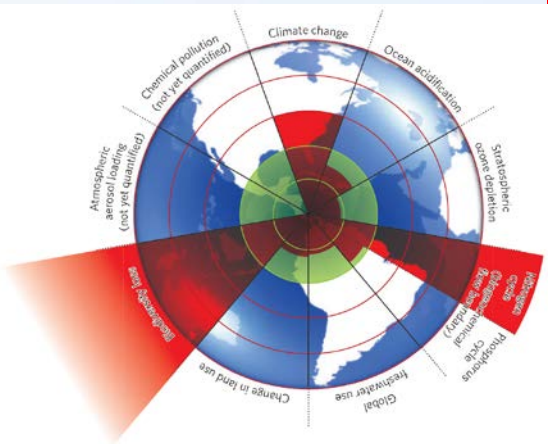
### This week's issue

Subscribe

# II. Ztráta biodiverzity

| Earth System process | Control variable | Threshold avoided or influenced by slow variable | Planetary Boundary (zone of uncertainty) | State of knowledge* |
|---|---|---|---|---|
| Rate of biodiversity loss | Extinction rate, extinctions per million species per year (E/MSY) | Slow variable affecting ecosystem functioning at continental and ocean basin scales. Impact on many other boundaries—C storage, freshwater, N and P cycles, land systems. Massive loss of biodiversity unacceptable for ethical reasons. | <10 E/MSY (10–100 E/MSY) | 1. Incomplete knowledge on the role of biodiversity for ecosystem functioning across scales. 2. Thresholds likely at local and regional scales. 3. Boundary position highly uncertain. |

**Boundary:** Annual species extinction rate no more than 10 per million / year
**Current level:** At least 100 per million / year
**Diagnosis:** Boundary far exceeded

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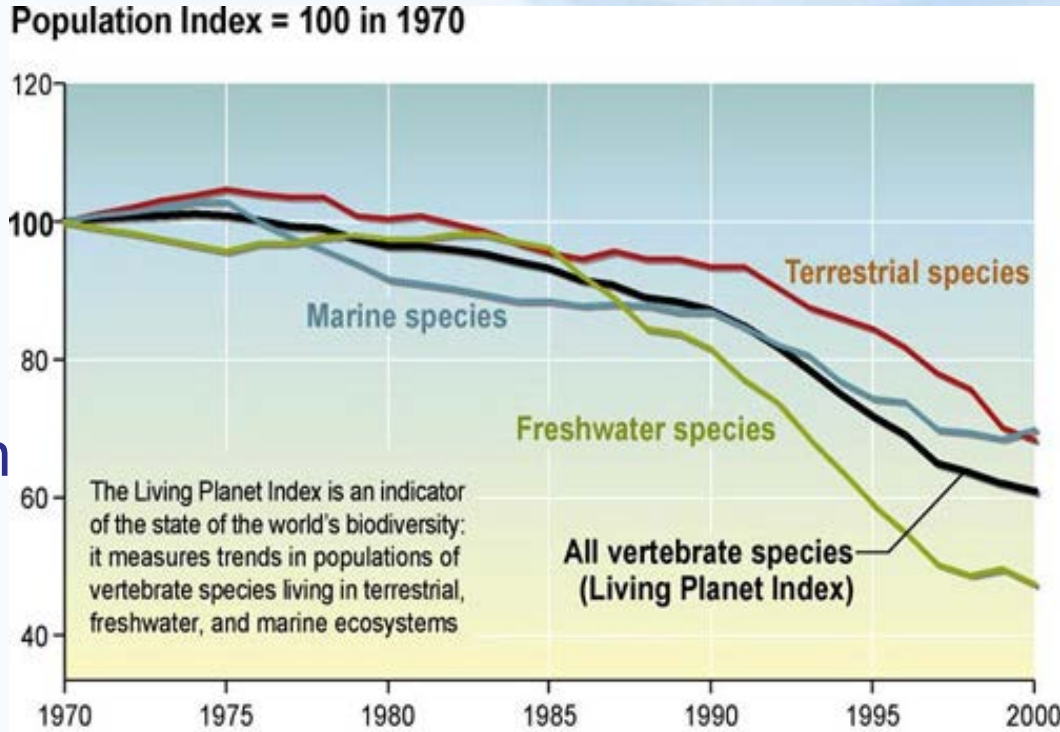
# II. Ztráta biodiverzity

- dnes probíhá 6. velké vymírání druhů v historii Země
- poprvé je důsledkem lidské činnosti
- ohroženo vyhynutím 12 % druhů ptáků, 23 % savců a 25 % jehličnanů, vyhynutím 32 % obojživelníků, 54 % cykasů
- biodiverzita je nezbytná pro udržení ekosystémových funkcí a služeb a udržení odolnosti a pružnosti ekosystémů
- ztráta biodiverzity může zvýšit zranitelnost terest. a aquat. ekosystémů při změnách klimatu a kyselosti vody

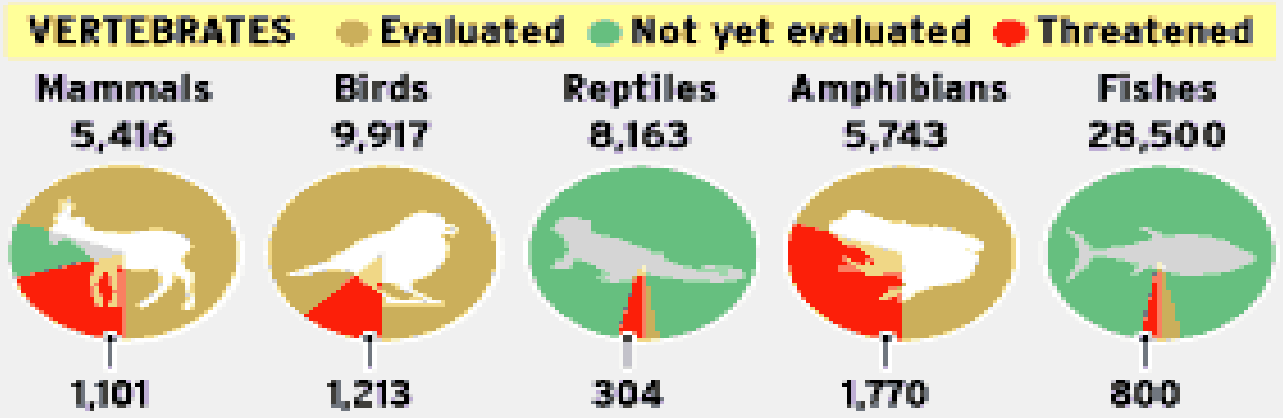


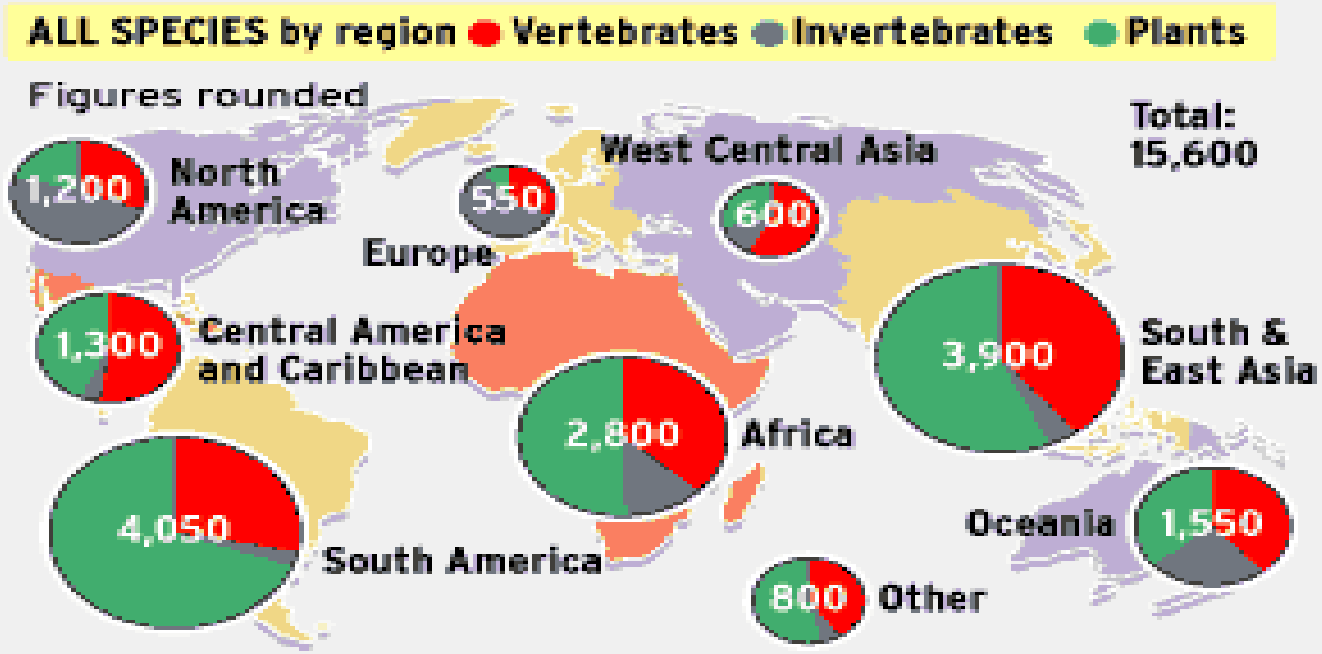
# Threatened species

The World Conservation Union's 2004 "Red List" shows more than 15,000 species threatened with extinction.

# Threatened species

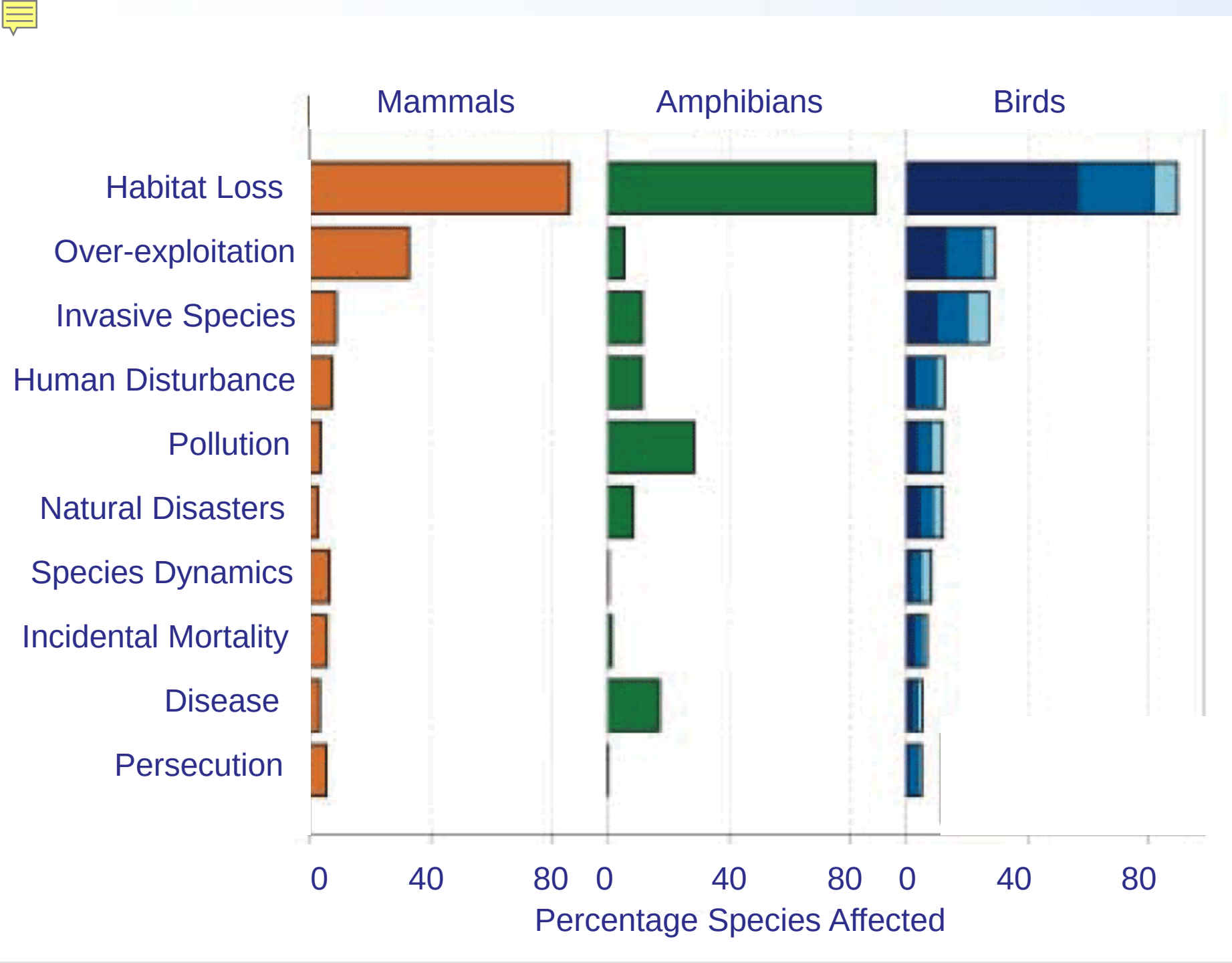
The World Conservation Union's 2004 "Red List" shows more than 15,000 species threatened with extinction.

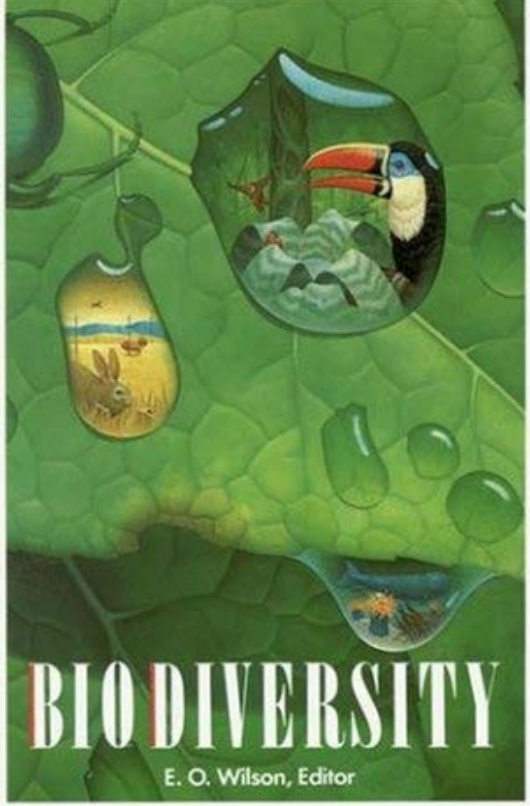



SOURCE: IUCN World Conservation Union

Reuters

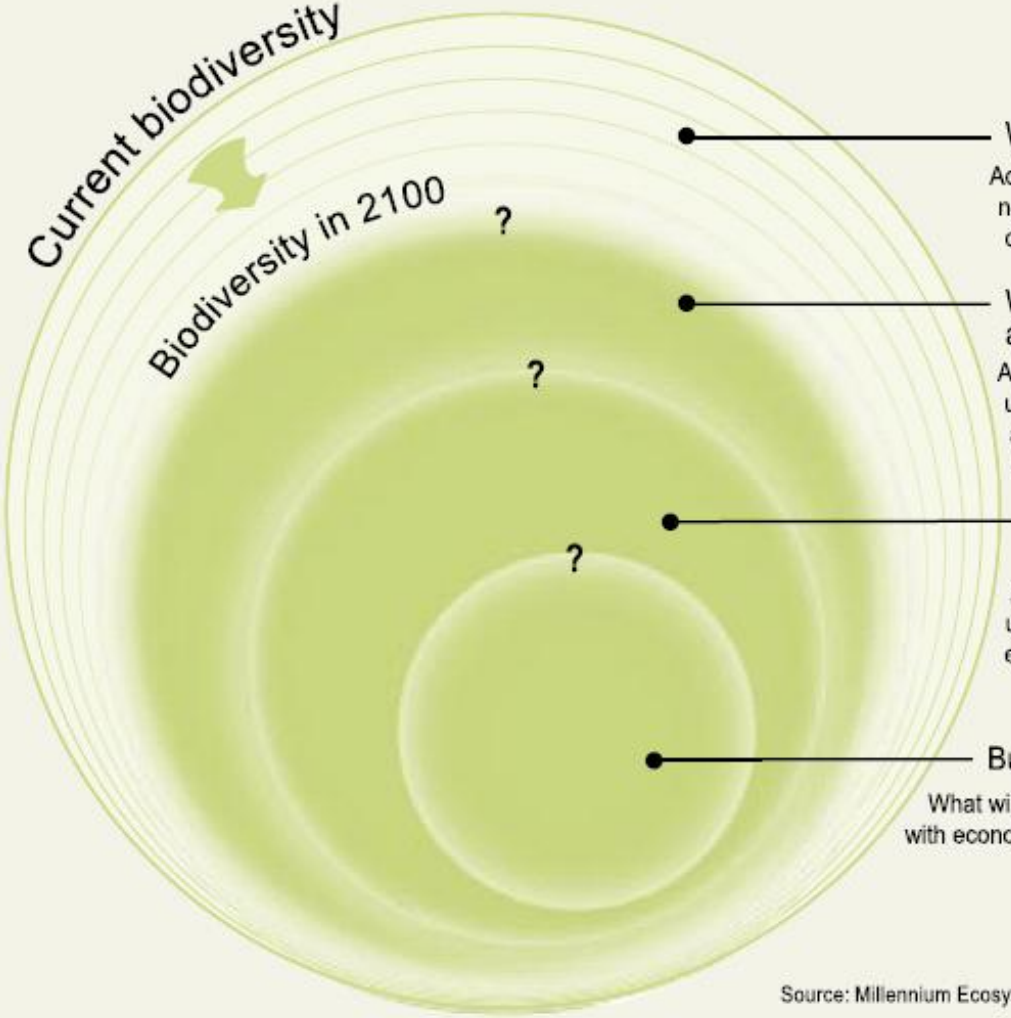

Mammals
Amphibians
Birds
Habitat Loss
Over-exploitation
Invasive Species
Human Disturbance
Pollution
Natural Disasters
Species Dynamics
Incidental Mortality
Disease
Persecution
0
40
80
0
40
80
0
40
80
Percentage Species Affected




2010 International Year of Biodiversity

**Figure 2.** How Much Biodiversity Will Remain a Century from Now under Different Value Frameworks?

The outer circle in the Figure represents the present level of global biodiversity. Each inner circle represents the level of biodiversity under different value frameworks. Question marks indicate the uncertainties over where the boundaries exist, and therefore the appropriate size of each circle under different value frameworks.




**With consideration of non-utilitarian values:**

Additional amount of biodiversity that should be conserved for non-utilitarian values such as intrinsic values and the equitable distribution of biodiversity.

**With consideration of resilience, thresholds, and option values:**

Additional amount of biodiversity that should be conserved for utilitarian reasons because of its role in maintaining capacity to adapt to change, as precaution against thresholds, and for option and existence values.

**With consideration of the biodiversity role in ecosystem services:**

Additional amount of biodiversity that should be conserved for utilitarian reasons because of its role in providing and sustaining ecosystem services.

**Business as usual:**

What will remain under current trends and policies given trade-offs with economic development, agriculture, etc.

Please note that the circle sizes are only conceptual and do not correspond to any calculation or estimate.

Source: Millennium Ecosystem Assessment

# III a IV. Biogeochemické toky P a N

| Earth System process | Control variable | Threshold avoided or influenced by slow variable | Planetary Boundary (zone of uncertainty) | State of knowledge* |
|---|---|---|---|---|
| Biogeo-chemical flows: interference with P and N cycles | P: inflow of phosphorus to ocean, increase compared with natural background weathering<br><br>N: amount of $N_2$ removed from atmosphere for human use, Mt N $yr^{-1}$ | P: avoid a major oceanic anoxic event (including regional), with impacts on marine ecosystems.<br><br>N: slow variable affecting overall resilience of ecosystems via acidification of terrestrial ecosystems and eutrophication of coastal and freshwater systems. | P: < 10× (10× - 100×)<br><br>N: Limit industrial and agricultural fixation of $N_2$ to 35 Mt N $yr^{-1}$, which is ~ 25% of the total amount of $N_2$ fixed per annum naturally by terrestrial ecosystems (25%–35%) | P: (1) Limited knowledge on ecosystem responses; (2) High probability of threshold but timing is very uncertain; (3) Boundary position highly uncertain.<br><br>N: (1) Some ecosystem responses known; (2) Acts as a slow variable, existence of global thresholds unknown; (3) Boundary position highly uncertain. |

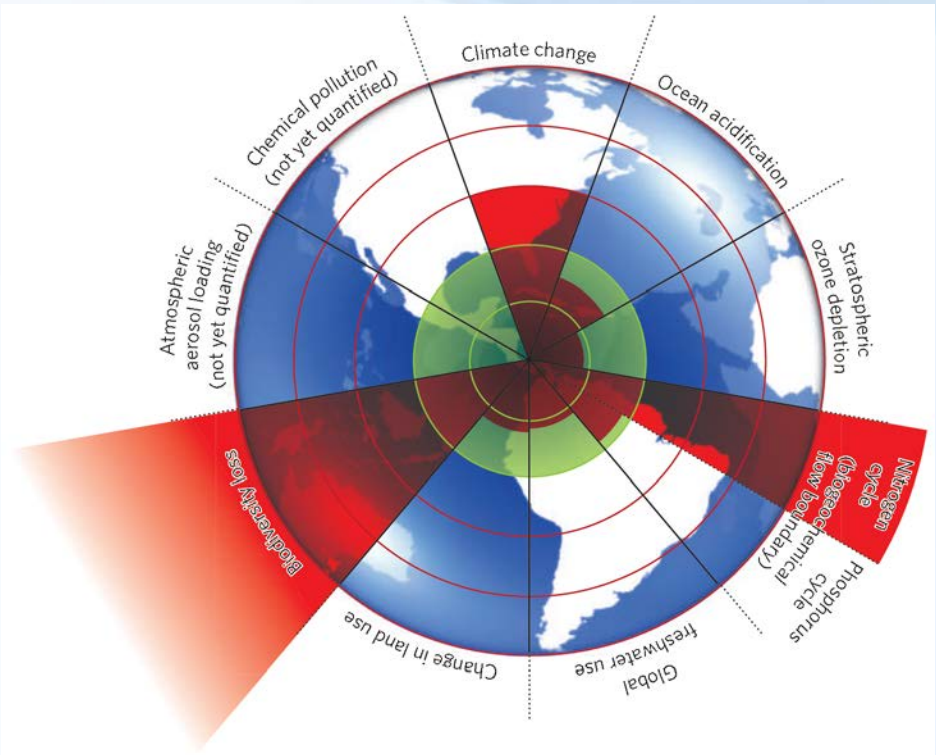
**Boundary N:** < 35 million tonnes of N fixed from the atmosphere per year
**Current level:** 121 million tonnes per year
**Diagnosis:** Boundary far exceeded and effects worsening

**Boundary P:** < 11 million tonnes of P to flow into the oceans per year
**Current level:** 9 million tonnes per year
**Diagnosis:** Boundary not yet exceeded

# Změny

- ovlivňování biogeoch. cyklů P a N působí:

1) na lokální až regionální úrovni náhlé změny v jezerních a mořských ekosystémech (např. anoxie v jezerech a Baltickém moři)
2) nelineární změny z oligotrofního stavu do eutrofního

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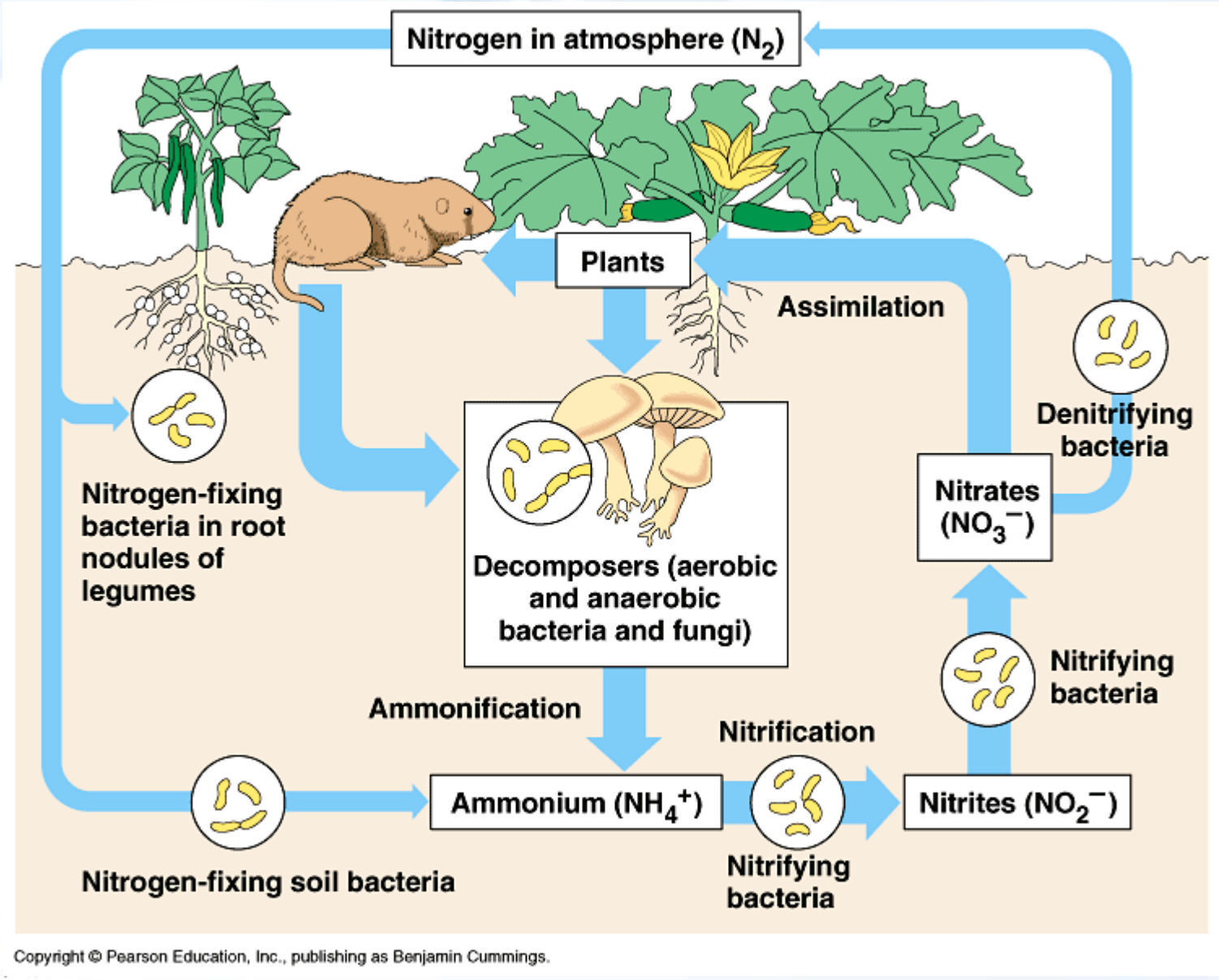
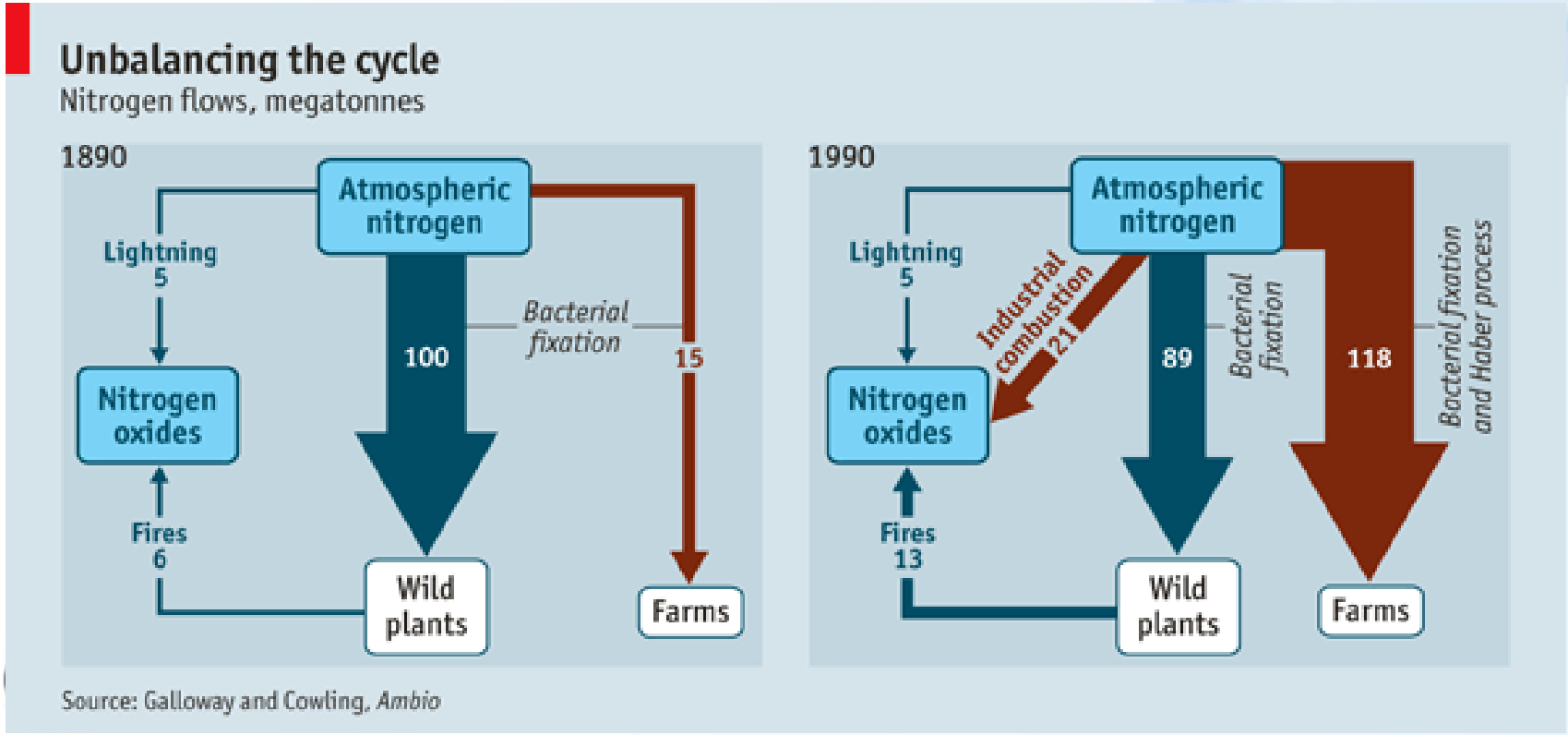
# Dusík



# Dusík

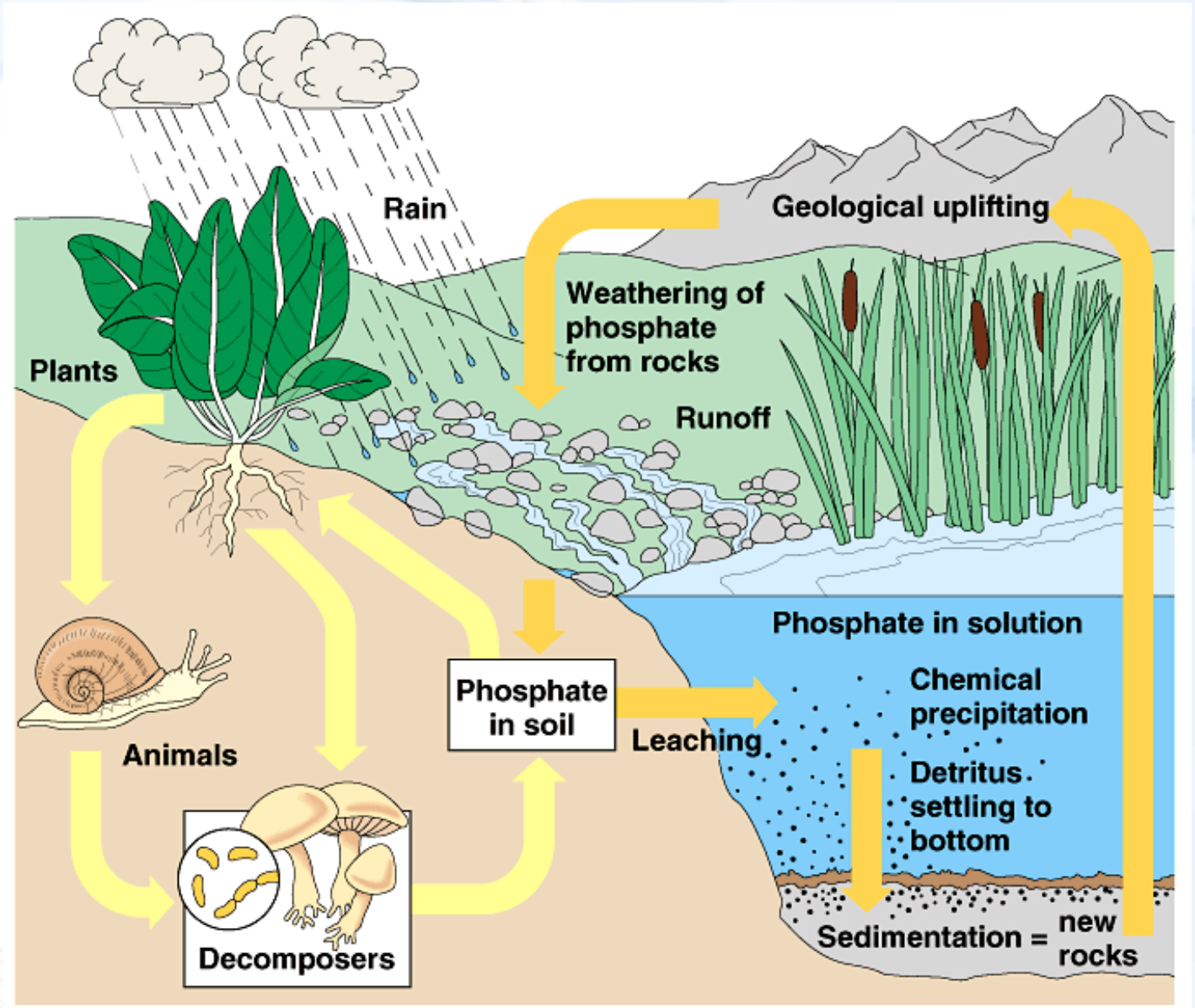
- lidskou aktivitou je dnes přeměněno více $N_2$ na reaktivní formy N, než ve všech terestriálních procesech dohromady
- Haber-Bosch 80 $Mt_N$/yr, leguminózy 40 $Mt_N$/yr, spalování fosilních paliv 20 $Mt_N$/yr, spalování biomasy 10 $Mt_N$/yr



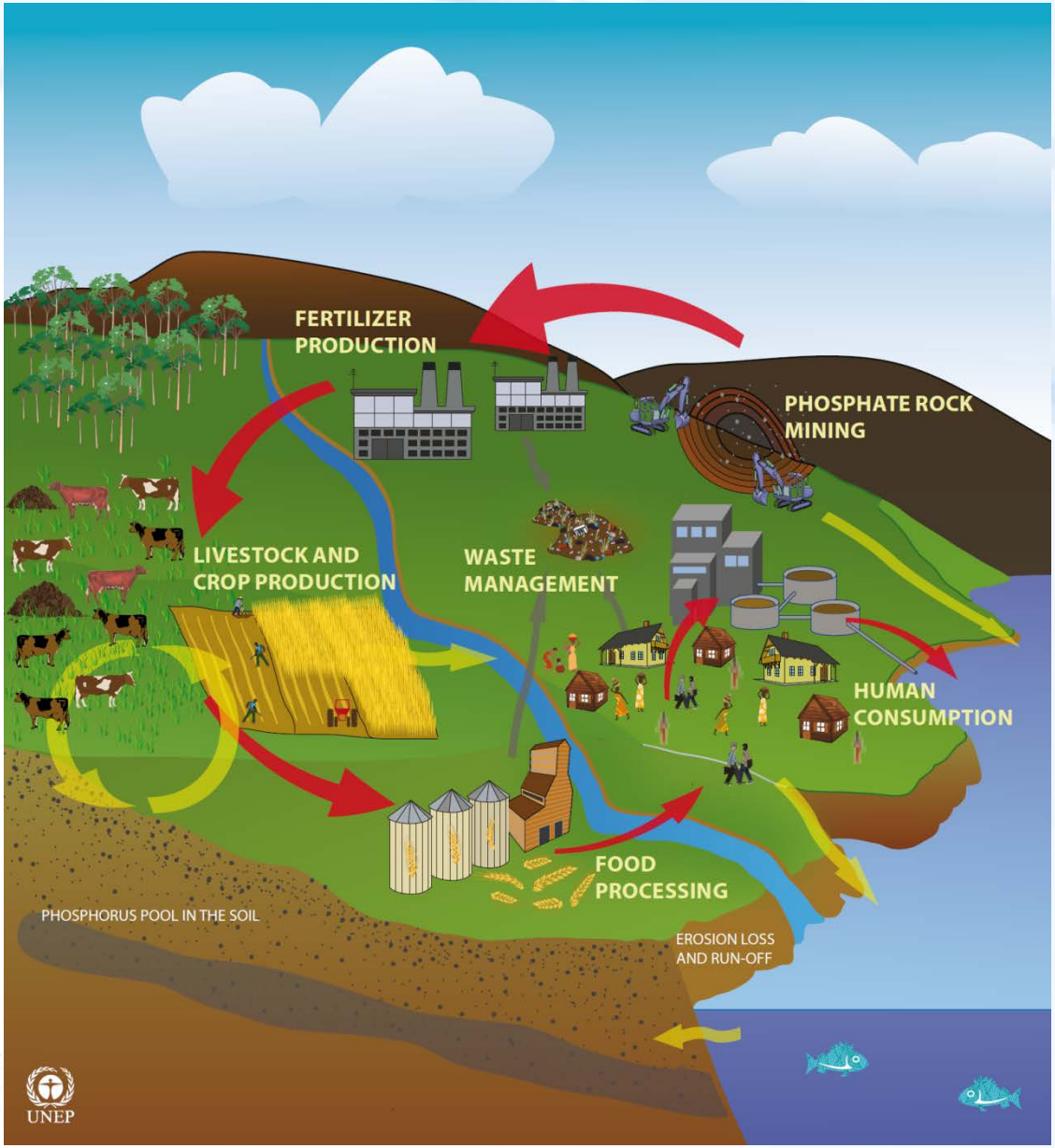
# Dusík

- primární důvod výroby reaktivních forem N ?
- většina končí ve vodě - eutrofizace
- či v atmosféře - $N_2O$ je významný skleníkový plyn
- nebezpečné je celkové snižování pružnosti planetárních subsystémů v důsledku vnášení velkého množství reaktivního N do Zemského systému

# Fosfor – přirozený cyklus

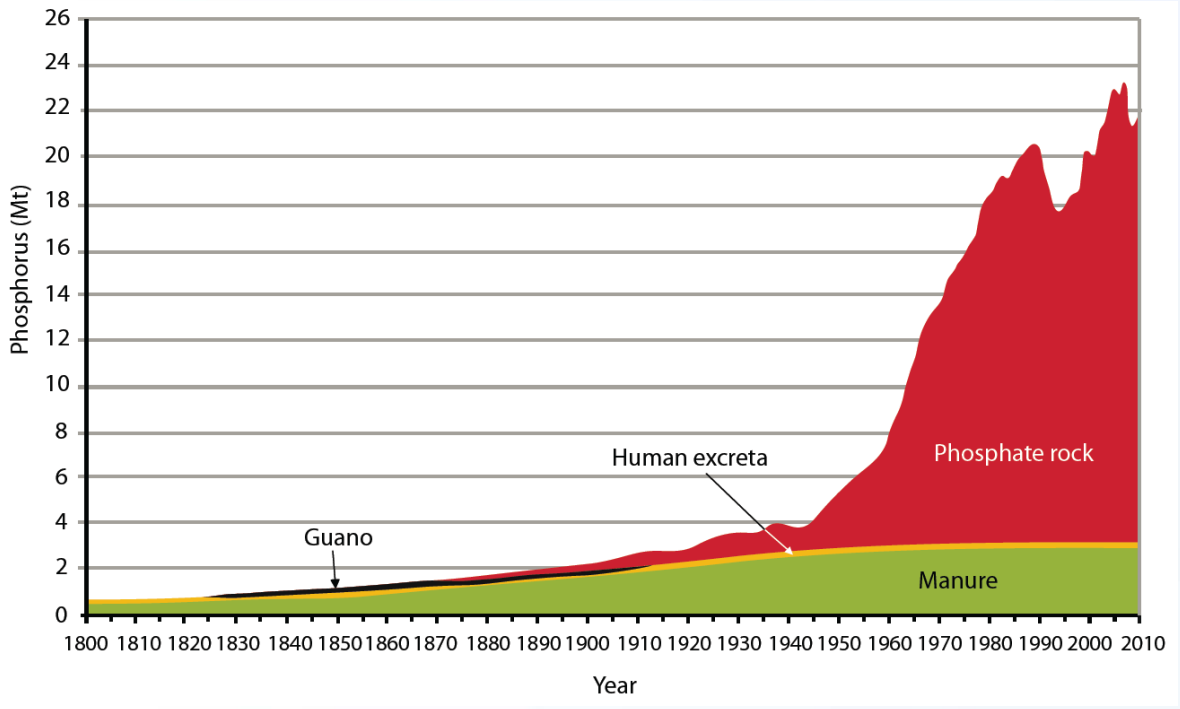


# Fosfor – cyklus ovlivněný člověkem

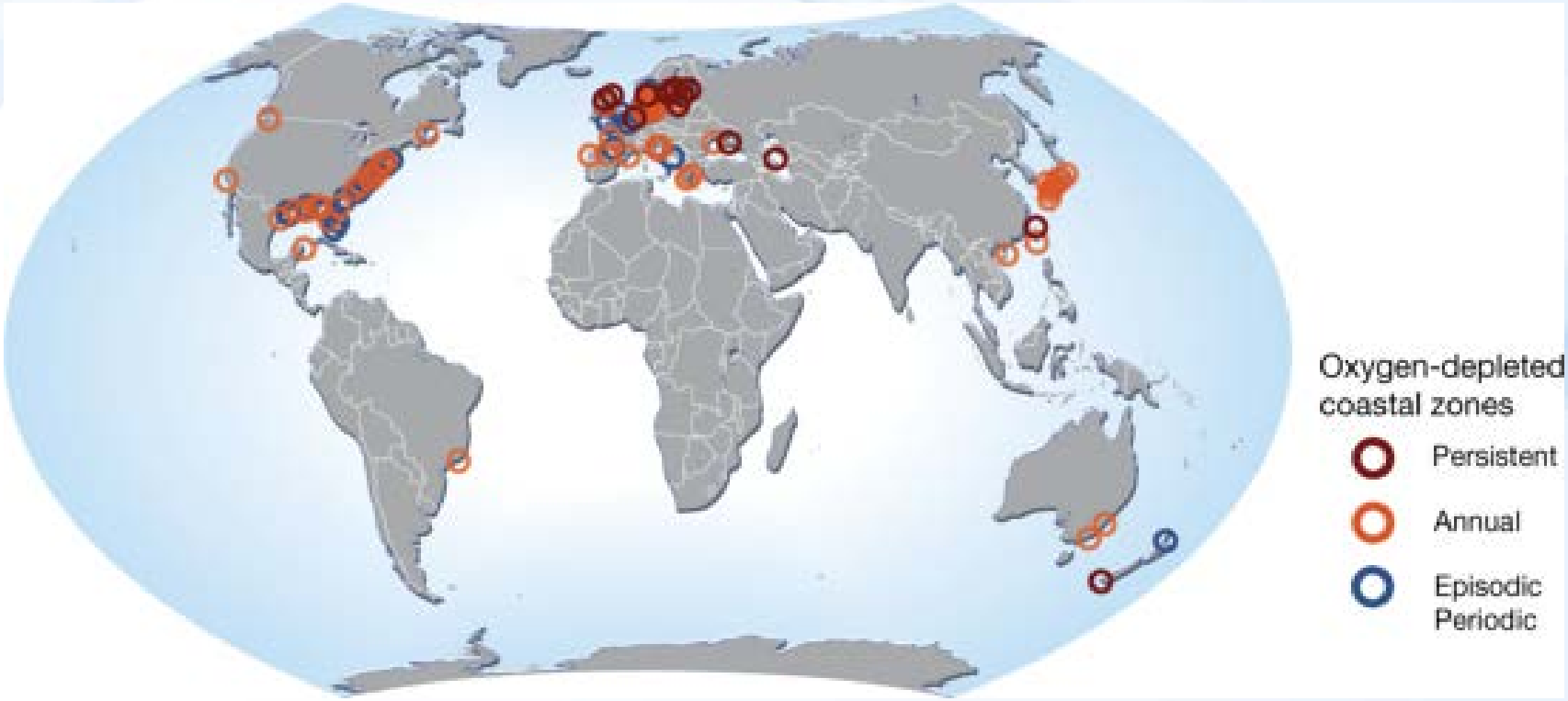


# Fosfor

- primární zdroj P v ekosystému – zvětrávání či těžba apatitu
- lidskou činností proudí do oceánů 8-9x větší množství P než přirozeně
- z 20 $Mt_N$/yr průmyslového fosforu skončí polovina v mořích
- přítok P do oceánů zvyšuje riziko anoxických událostí, práh nastání této události je ale zatím nejasný



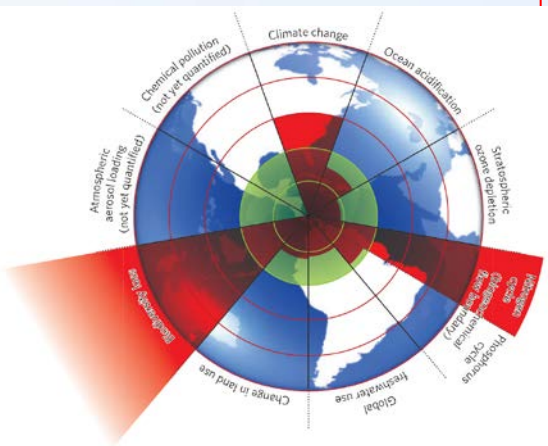
# Fosfor


Oxygen-depleted coastal zones
Persistent
Annual
Episodic
Periodic

# V. Úbytek stratosférického ozónu

| Earth System process | Control variable | Threshold avoided or influenced by slow variable | Planetary Boundary (zone of uncertainty) | State of knowledge* |
|---|---|---|---|---|
| Stratospheric ozone depletion | Stratospheric $O_3$ concentration, DU | Severe and irreversible UV-B radiation effects on human health and ecosystems. | <5% reduction from pre-industrial level of 290 DU (5%–10%) | 1. Ample scientific evidence.<br>2. Threshold well established.<br>3. Boundary position implicitly agreed and respected. |

**Boundary:** Average conc. of stratospheric $O_3$ no lower than 276 Dobson units
**Current level:** 283 Dobson units
**Diagnosis:** Safe, and improving

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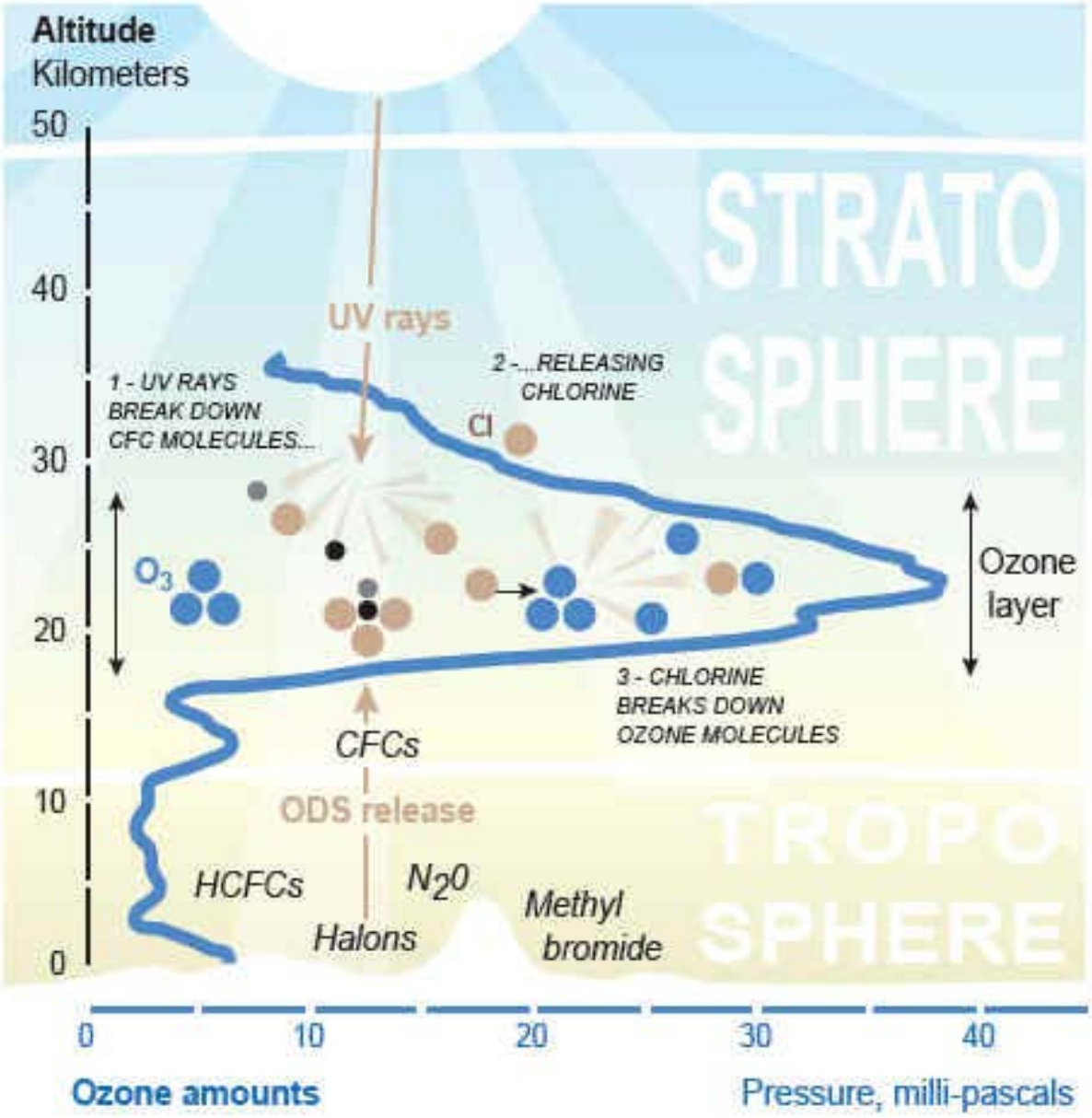
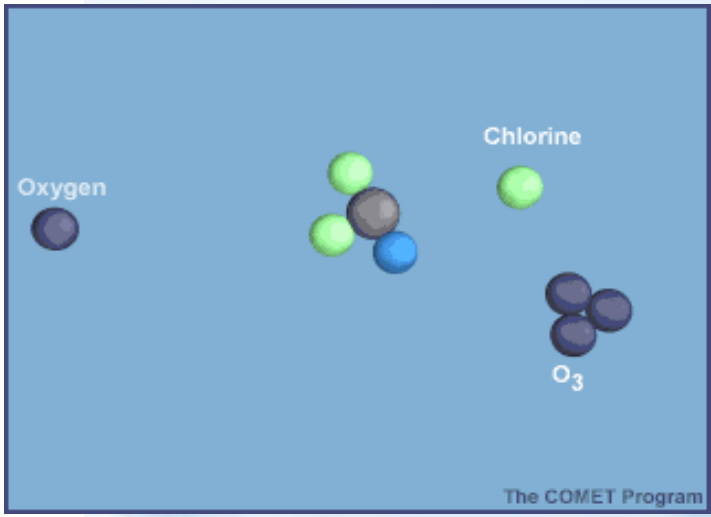
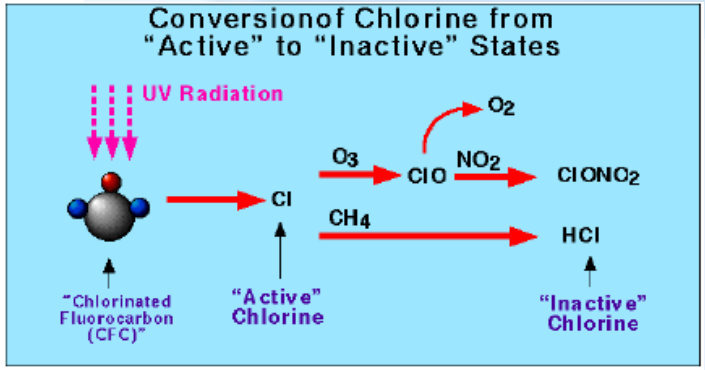
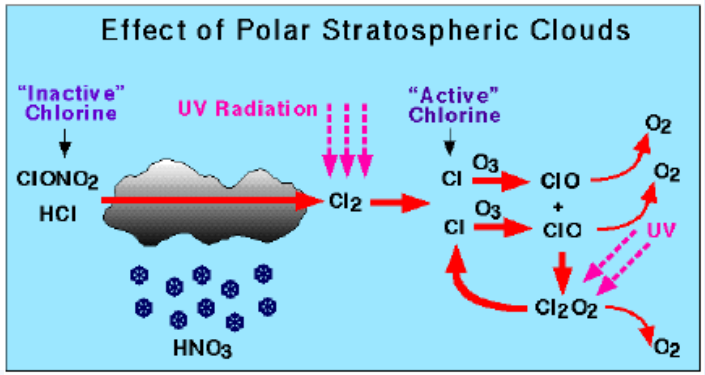
# The Ozone Hole

# CHEMICAL OZONE DESTRUCTION PROCESS IN THE STRATOSPHERE

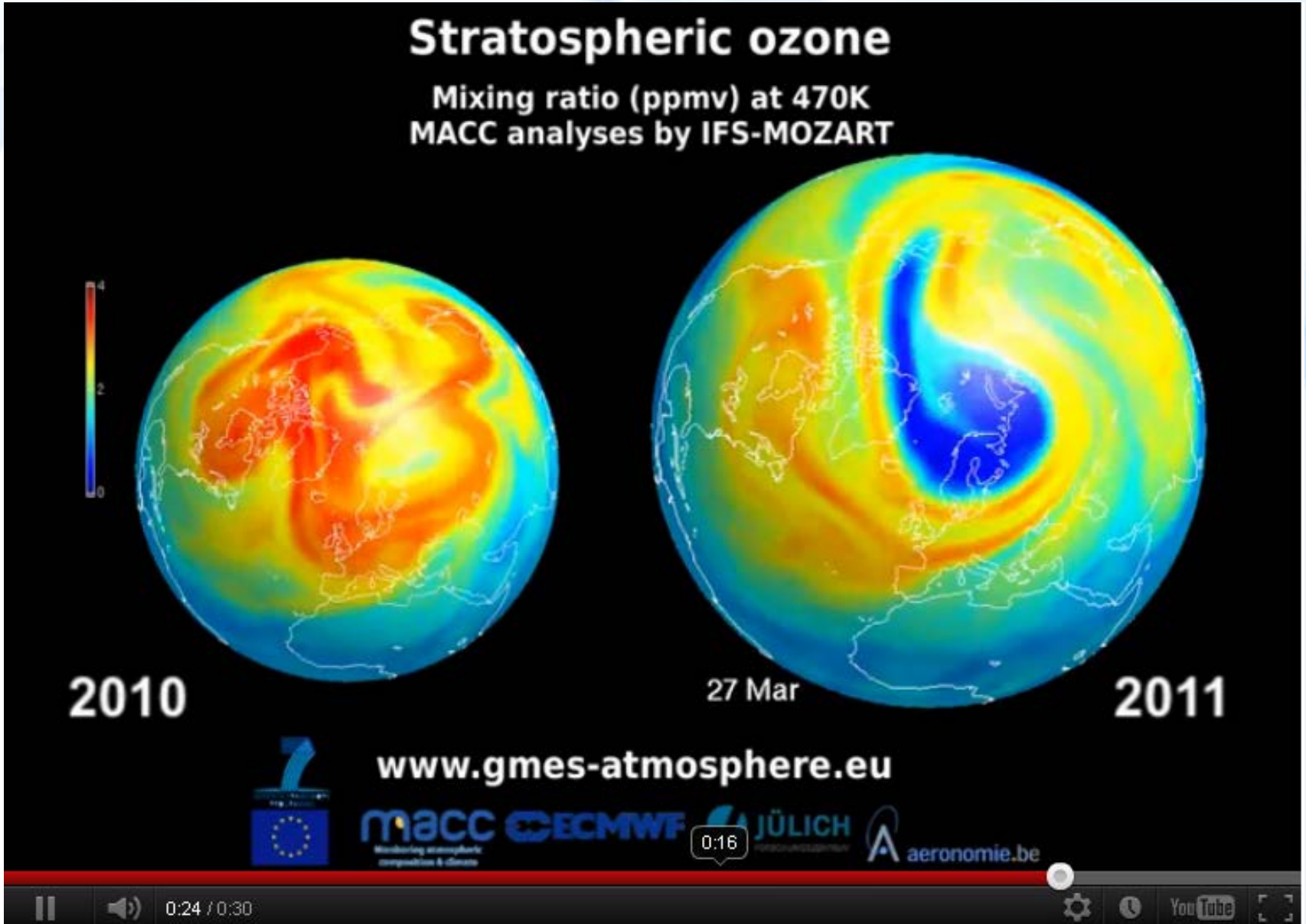


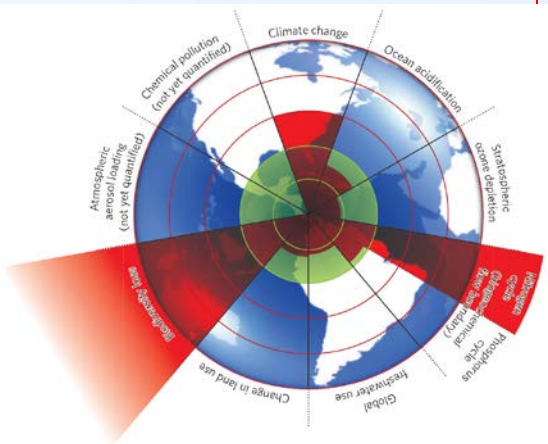
# Úbytek stratosférického $O_3$ nad Arktidou



# VI. Okyselování oceánů

| Earth System process | Control variable | Threshold avoided or influenced by slow variable | Planetary Boundary (zone of uncertainty) | State of knowledge* |
|---|---|---|---|---|
| Ocean acidification | Carbonate ion concentration, average global surface ocean saturation state with respect to aragonite ($\Omega_{arag}$) | Conversion of coral reefs to algal-dominated systems. Regional elimination of some aragonite- and high-magnesium calcite-forming marine biota Slow variable affecting marine carbon sink. | Sustain ≥80% of the pre-industrial aragonite saturation state of mean surface ocean, including natural diel and seasonal variability (≥80%–≥70%) | 1. Geophysical processes well known. 2. Threshold likely. 3. Boundary position uncertain due to unclear ecosystem response. |

**Boundary:** Global average aragonite "saturation ratio" no lower than 2.75:1
**Pre-industrial level:** 3.44:1
**Current level:** 2.90:1
**Diagnosis:** Safe for now, but some oceans will cross threshold by mid-century

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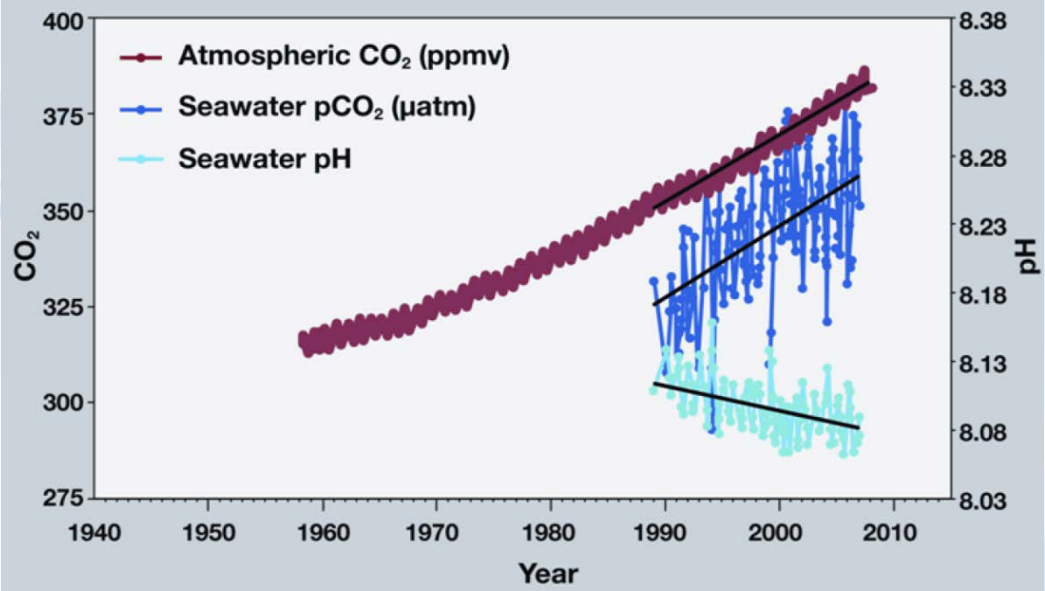
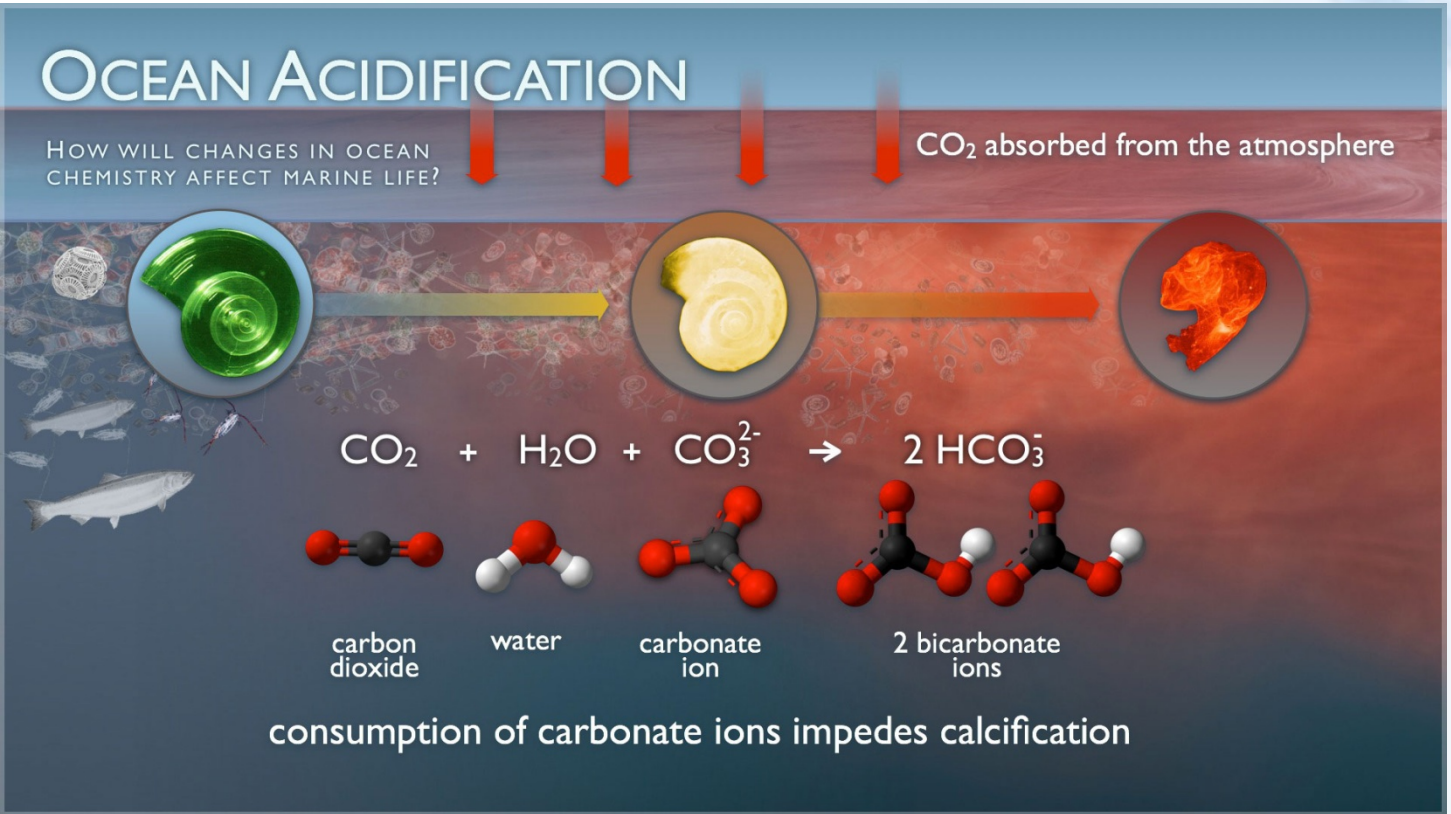
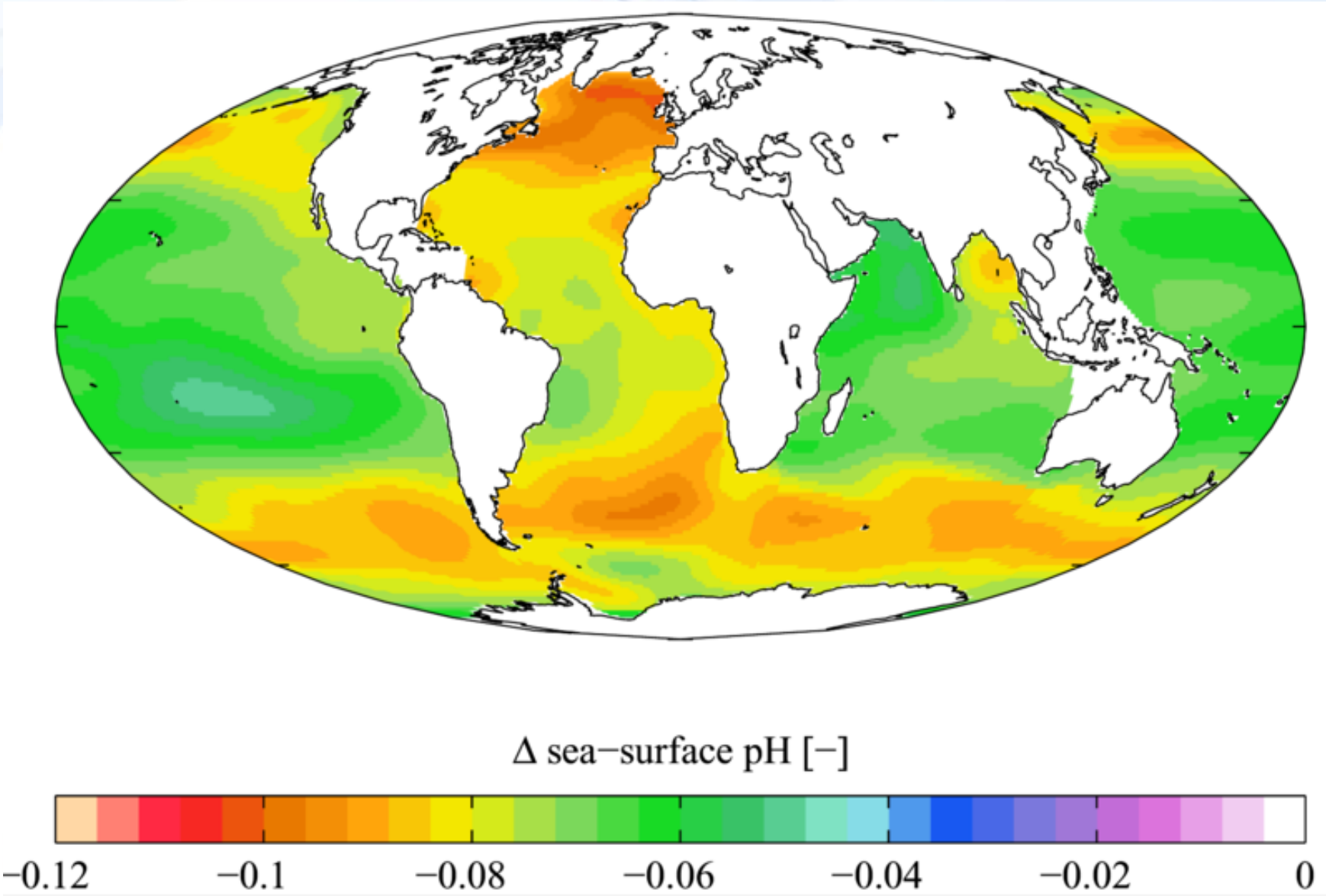
# Okyselování oceánů

- čím je způsobené?



# Změna pH oceánů 1700-2000



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## Natural lab shows sea's acid path

By Richard Black
Environment correspondent, BBC News website

Scientists study conditions at the bottom of the Mediterranean Sea

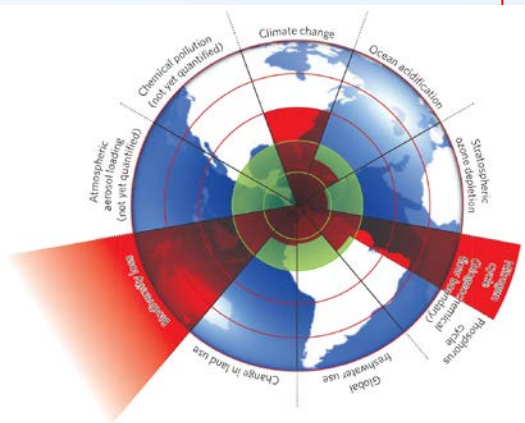
**Natural carbon dioxide vents on the sea floor are showing scientists how carbon emissions will affect marine life.**

Dissolved $CO_2$ makes water more acidic, and around the vents, researchers saw a fall in species numbers, and snails with their

# VII. Globální spotřeba vody

| Earth System process | Control variable | Threshold avoided or influenced by slow variable | Planetary Boundary (zone of uncertainty) | State of knowledge* |
|---|---|---|---|---|
| Global freshwater use | Consumptive blue water use, $km^3$ $yr^{-1}$ | Could affect regional climate patterns (e.g., monsoon behavior).<br><br>Primarily slow variable affecting moisture feedback, biomass production, carbon uptake by terrestrial systems and reducing biodiversity | <4000 $km^3$ $yr^{-1}$ (4000–6000 $km^3$ $yr^{-1}$) | 1. Scientific evidence of ecosystem response but incomplete and fragmented.<br>2. Slow variable, regional or subsystem thresholds exist.<br>3. Proposed boundary value is a global aggregate, spatial distribution determines regional thresholds |

**Boundary:** No more than 4000 $km^3$ of fresh water consumed per year
**Current level:** 2600 $km^3$ per year
**Diagnosis:** Boundary will be approached by mid-century

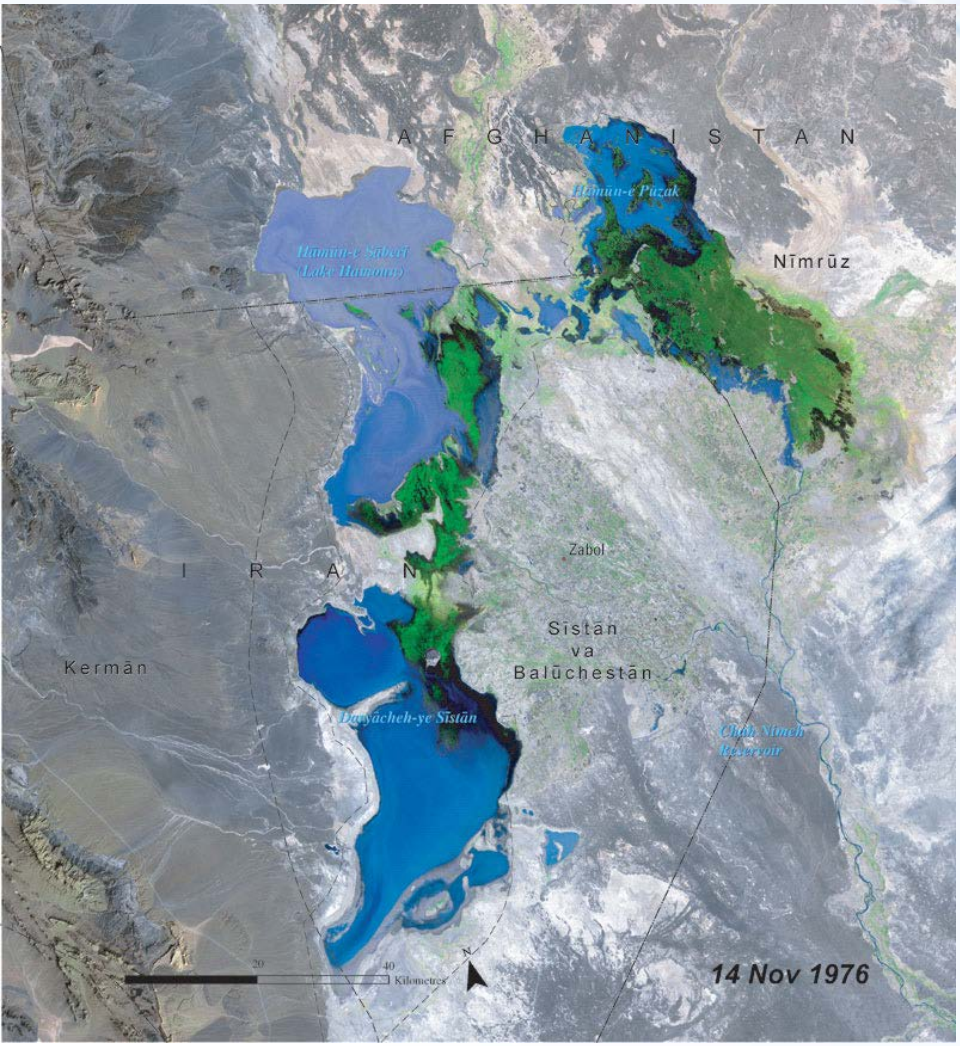


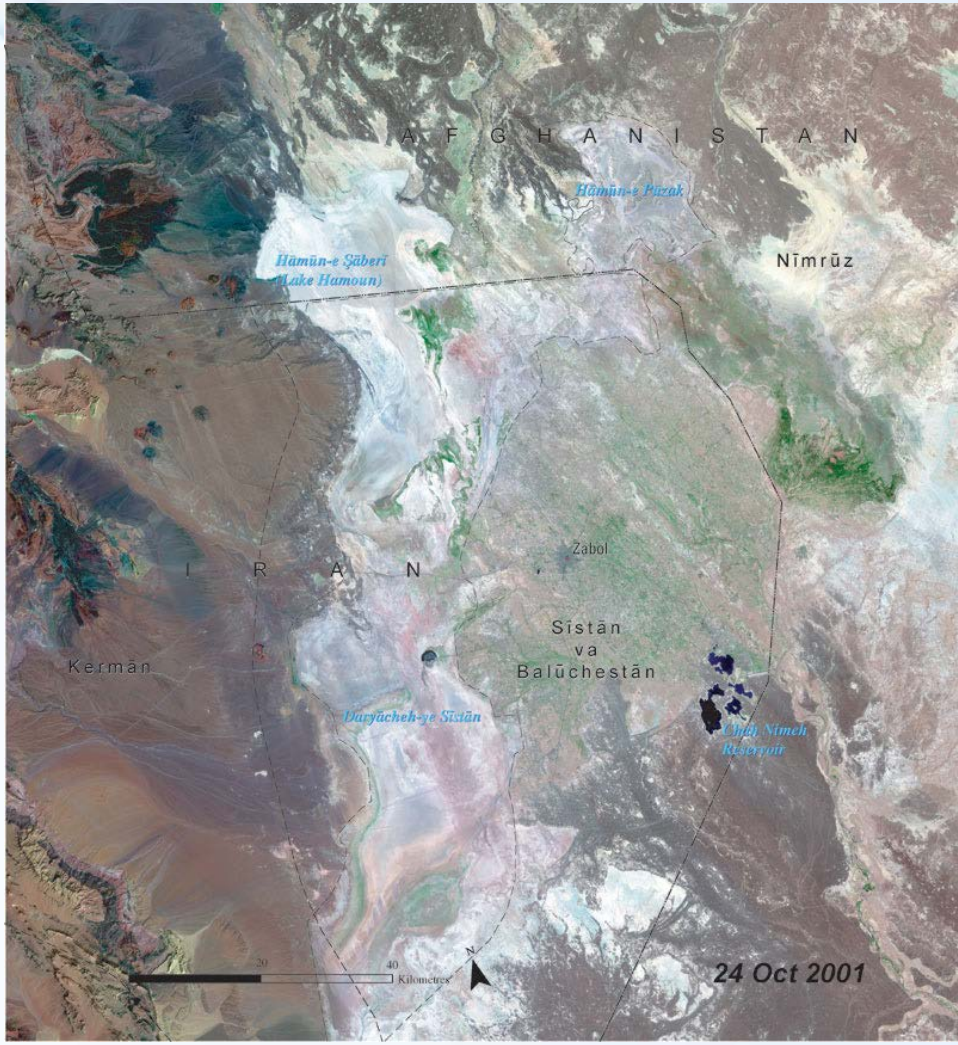
# Nedostatek sladké vody

- člověk je dominantní silou měnící globálně tok vody v řekách
- přibližně 25 % vody z povodí vůbec nedoteče do oceánů
- vážné důsledky pro stav biodiverzity, produkci potravin, zdravotní rizika, snižování pružnosti ter. a aqua. ekosystémů

# Aralské Jezero – Kazachstán, Uzbekistán

# Lake Hamoun – Irán, Afghanistán

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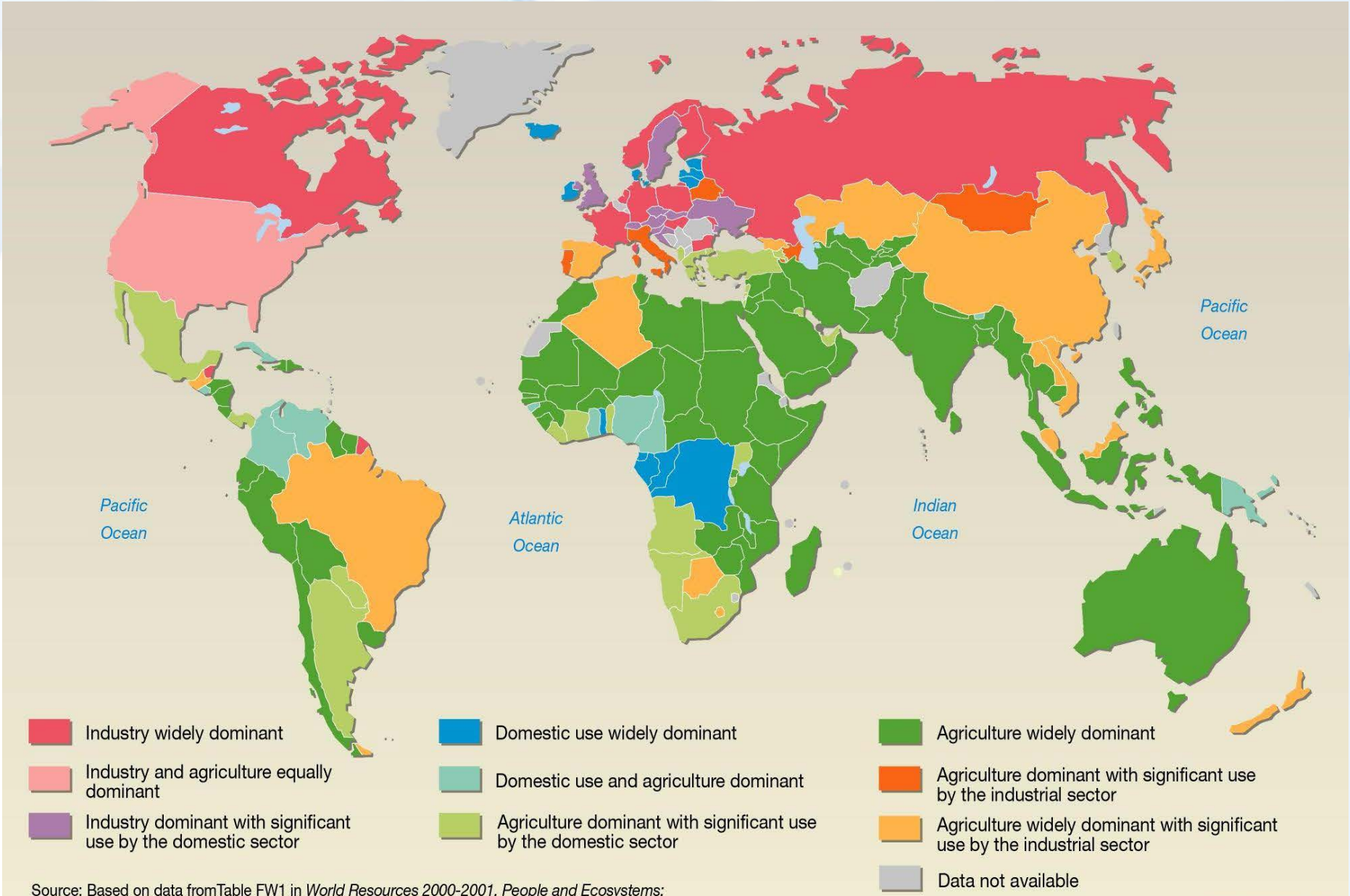
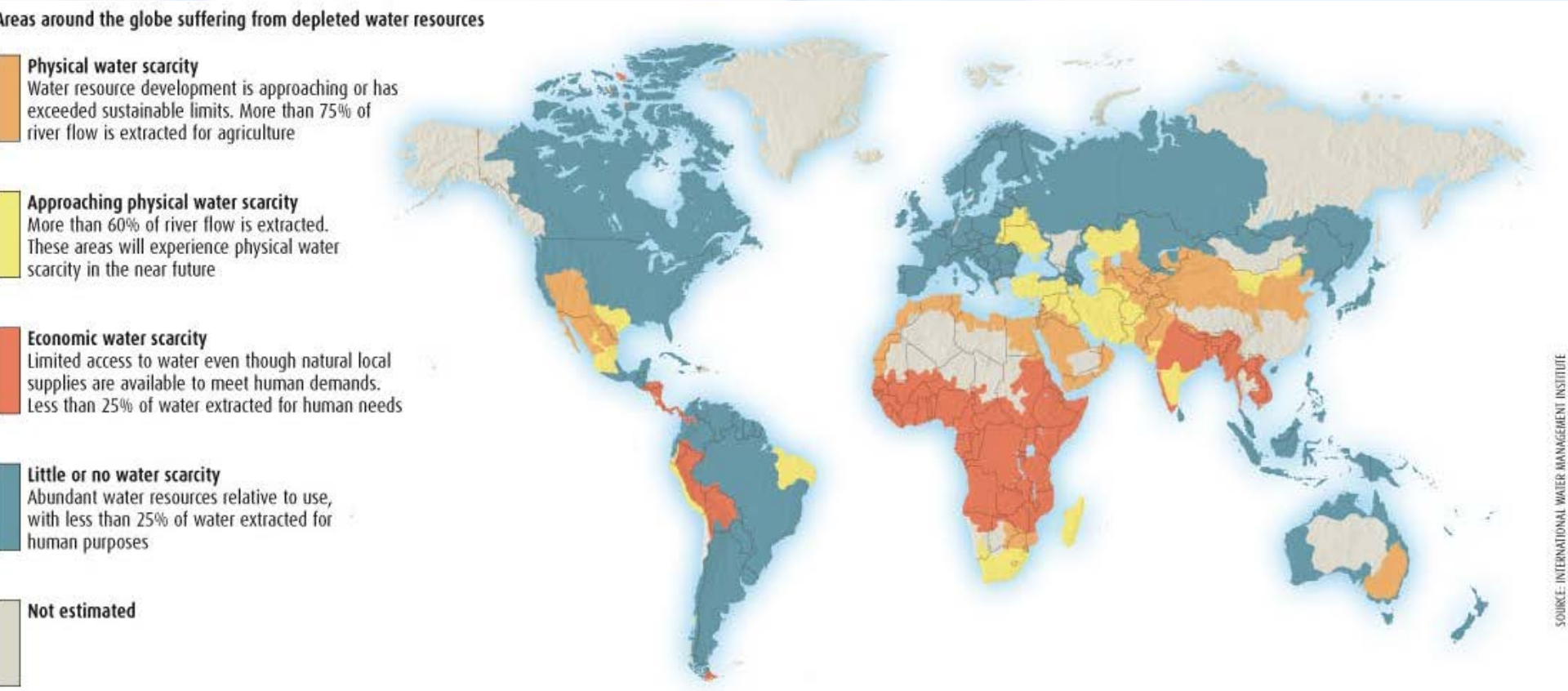
# Odvětví spotřeby vody




Source: Based on data fromTable FW1 in *World Resources 2000-2001, People and Ecosystems: The Fraying Web of Life*, World Resources Institute (WRI), Washington DC, 2000.

PHILIPPE REKACEWICZ
MARCH 2002

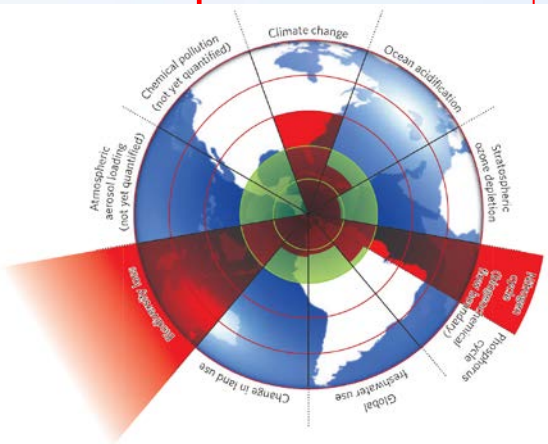
# Oblasti a příčiny nedostatku vody



# VIII. Změna využívání krajiny

| Earth System process | Control variable | Threshold avoided or influenced by slow variable | Planetary Boundary (zone of uncertainty) | State of knowledge* |
|---|---|---|---|---|
| Land-system change | Percentage of global land cover converted to cropland | Trigger of irreversible and widespread conversion of biomes to undesired states.<br><br>Primarily acts as a slow variable affecting carbon storage and resilience via changes in biodiversity and landscape heterogeneity | ≤15% of global ice-free land surface converted to cropland (15%–20%) | 1. Ample scientific evidence of impacts of land-cover change on ecosystems, largely local and regional.<br>2. Slow variable, global threshold unlikely but regional thresholds likely.<br>3. Boundary is a global aggregate with high uncertainty, regional distribution of land-system change is critical. |

**Boundary:** No more than 15 % of ice-free land to be used for crops
**Current level:** 12 %
**Diagnosis:** Boundary will be approached by mid-century

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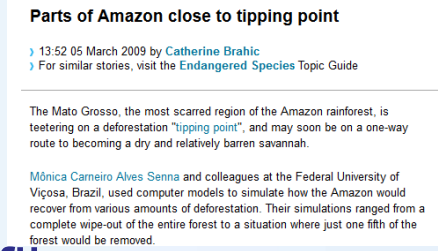
# Změna využívání krajiny



**Parts of Amazon close to tipping point**

13:52 05 March 2009 by Catherine Brahic
For similar stories, visit the Endangered Species Topic Guide

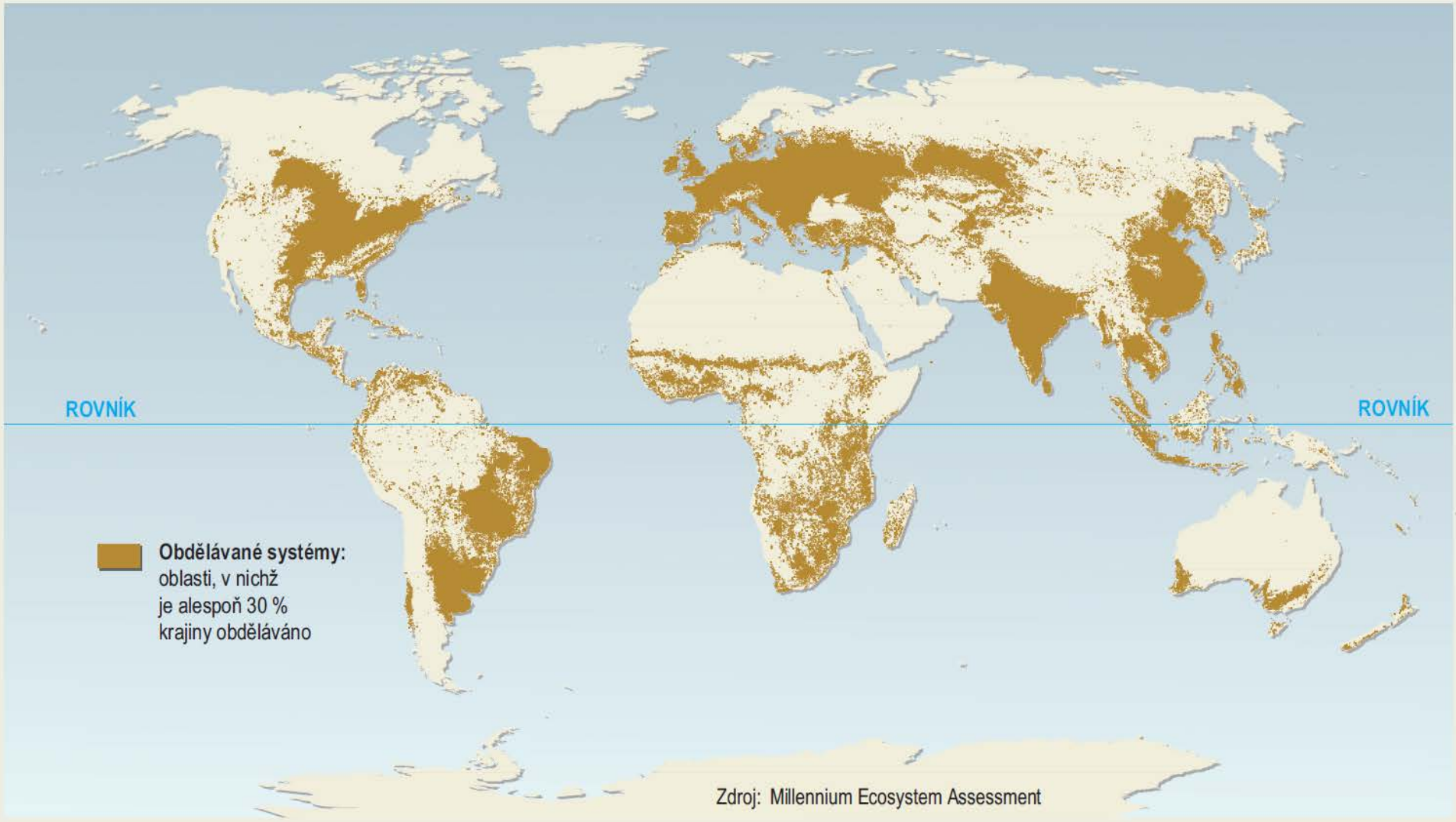
The Mato Grosso, the most scarred region of the Amazon rainforest, is teetering on a deforestation "tipping point", and may soon be on a one-way route to becoming a dry and relatively barren savannah.

Mônica Carneiro Alves Senna and colleagues at the Federal University of Viçosa, Brazil, used computer models to simulate how the Amazon would recover from various amounts of deforestation. Their simulations ranged from a complete wipe-out of the entire forest to a situation where just one fifth of the forest would be removed.

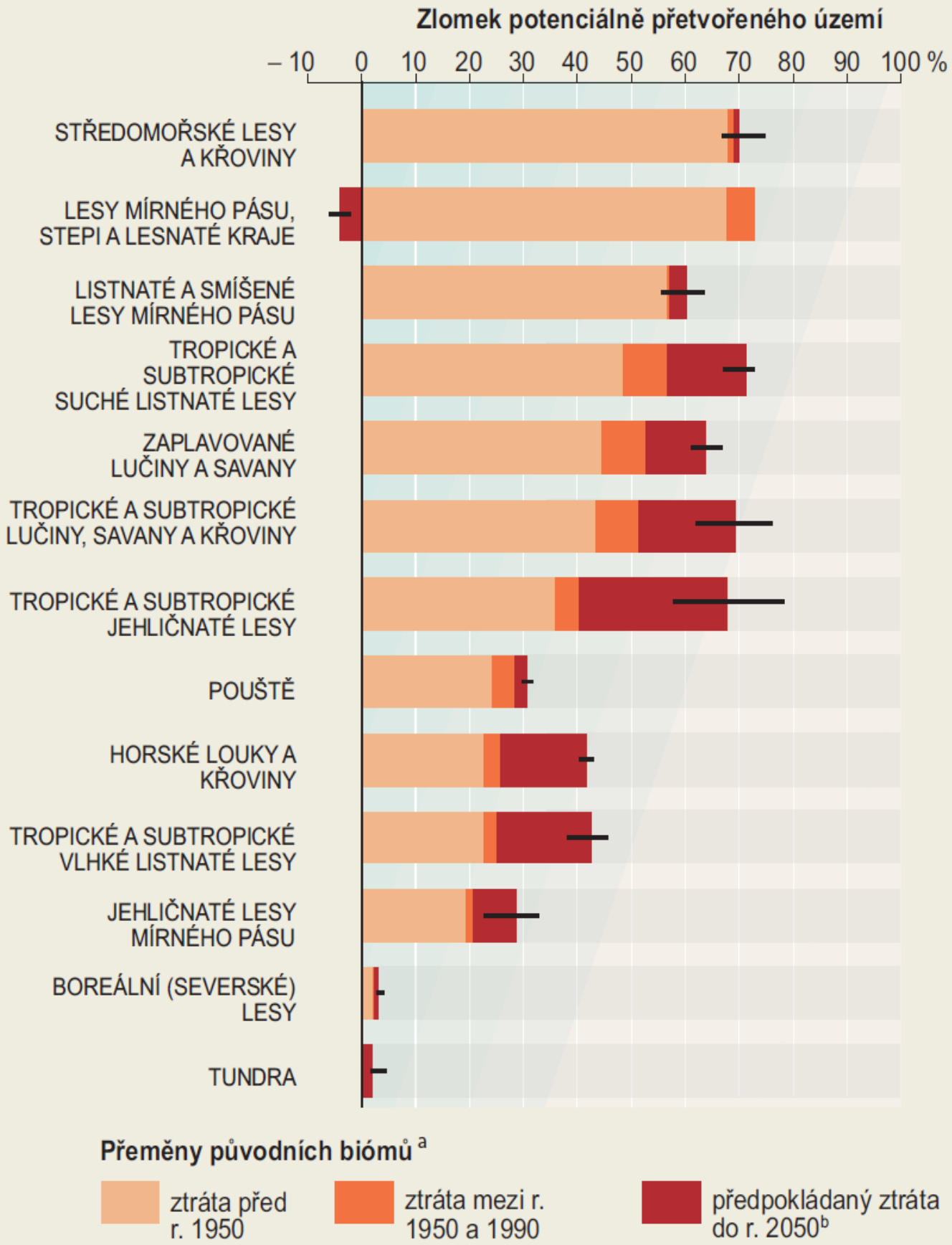
- poháněno expanzí zemědělství a jeho intenzifikace
- posledních 50 let byly lesní a další ekosystémy měněny na zemědělskou půdu rychlostí 0,8% ročně
- hlavní síla řídící ztrátu ekosystémových funkcí a služeb (např. produkce potravin a cyklus vody), ztrátu biodiverzity a podkopává lidský blahobyt a dlouhodobou udržitelnost
- maximální únosná míra přeměny ekosystémů na zeměd. půdu je přibližně 15 % nezaledněné plochy souše – v současnosti je to 12 %
- při překročení únosné míry využívání v určitém regionu může dojít k náhlé změně charakteru krajiny
- **např. nadkritická přeměna Amazonských pralesů na zemědělské plochy či pastviny může „skokově“ změnit celý charakter povodí na polosuchou savanu**

# Graf 1: Rozloha obhospodařovaných systémů v roce 2000

Obhospodařované systémy pokrývají 24 % suchozemského povrchu.



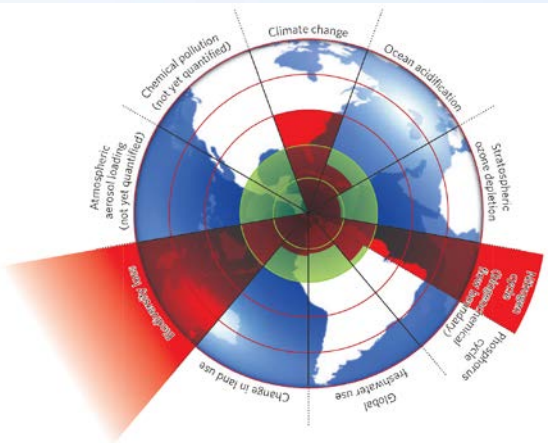
# PŘEMĚNA SUCHOZEMSKÝCH BIOMŮ



# IX. Chemické znečištění

| Earth System process | Control variable | Threshold avoided or influenced by slow variable | Planetary Boundary (zone of uncertainty) | State of knowledge* |
|---|---|---|---|---|
| Chemical pollution | For example, emissions, concentrations, or effects on ecosystem and Earth System functioning of persistent organic pollutants (POPs), plastics, endocrine disruptors, heavy metals, and nuclear wastes. | Thresholds leading to unacceptable impacts on human health and ecosystem functioning possible but largely unknown.<br><br>May act as a slow variable undermining resilience and increase risk of crossing other thresholds. | To be determined | 1. Ample scientific evidence on individual chemicals but lacks an aggregate, global-level analysis.<br>2. Slow variable, large-scale thresholds unknown.<br>3. Unable to suggest boundary yet. |

**Boundary:** Not yet identified

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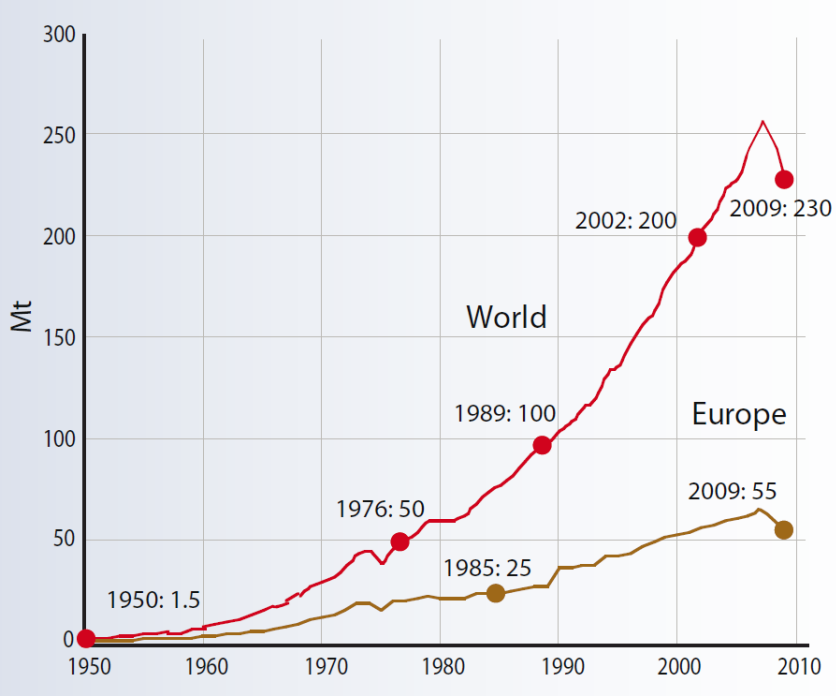
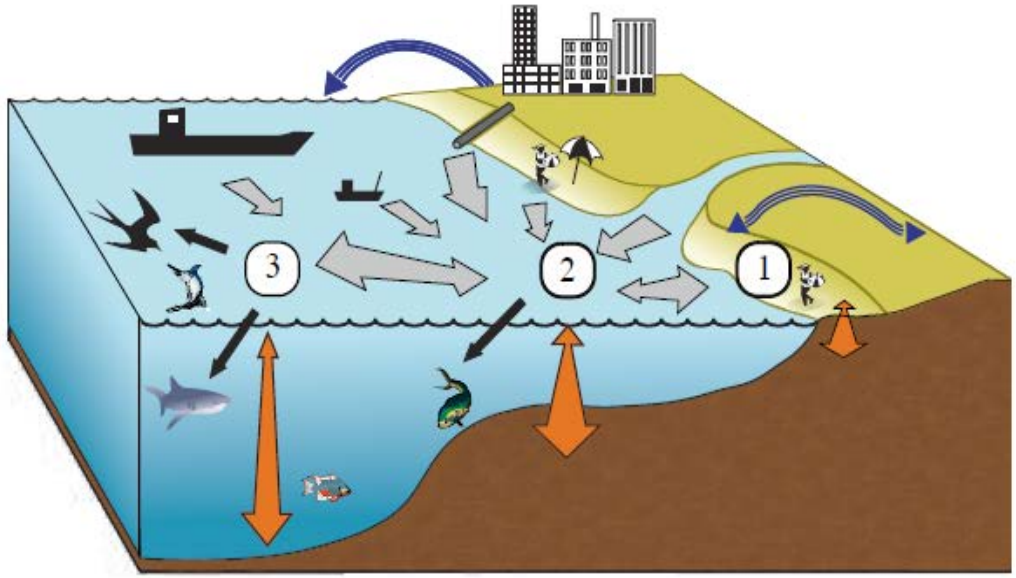
# Plastikové kousky v ŽP

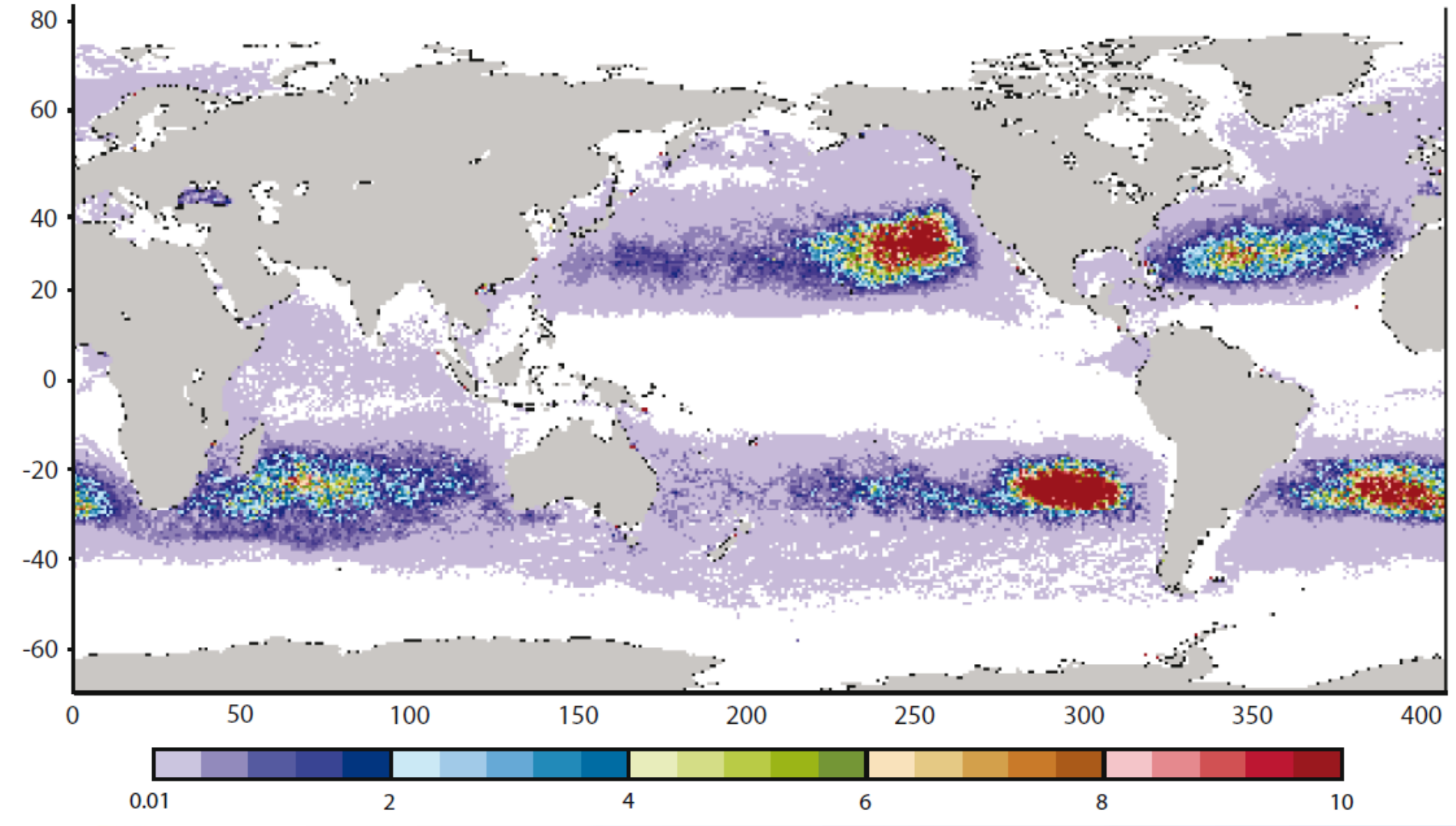



Main sources and movement pathways for plastic in the marine environment.
Most plastic accumulates on beaches (1), in coastal waters and their sediments (2), and in the open ocean (3). Dark blue arrows depict wind-blown litter; grey arrows water-borne litter; orange arrows vertical movement through the water column, including burial in sediments; and black arrows ingestion by marine organisms.

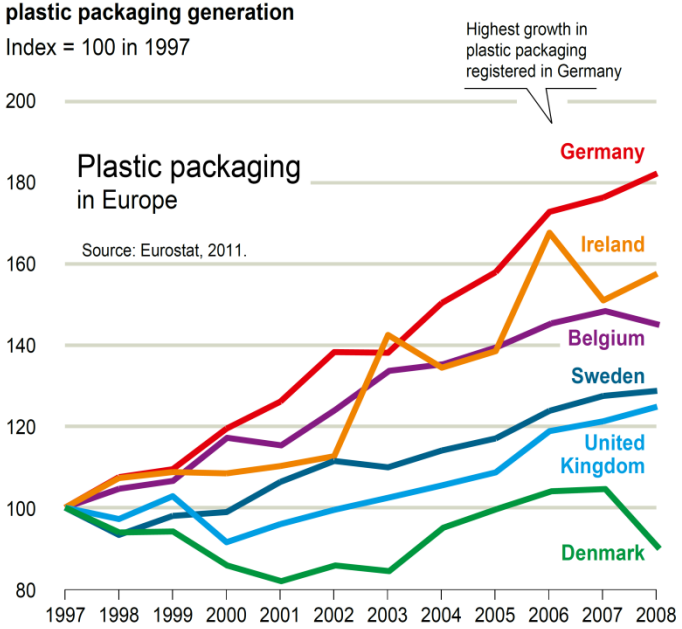
Growing plastic production
- include thermoplastics, polyurethanes, thermosets, elastomers, adhesives, coatings and sealants, and polypropylene fibres. PET, PA and polyacryl fibres are not included

# Místa největší koncentrace zbytků



**Trend for weight of plastic packaging generation**

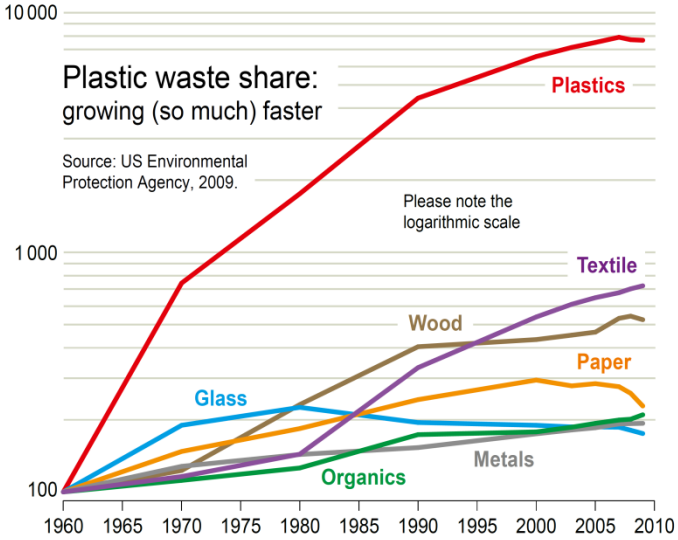
Index = 100 in 1997

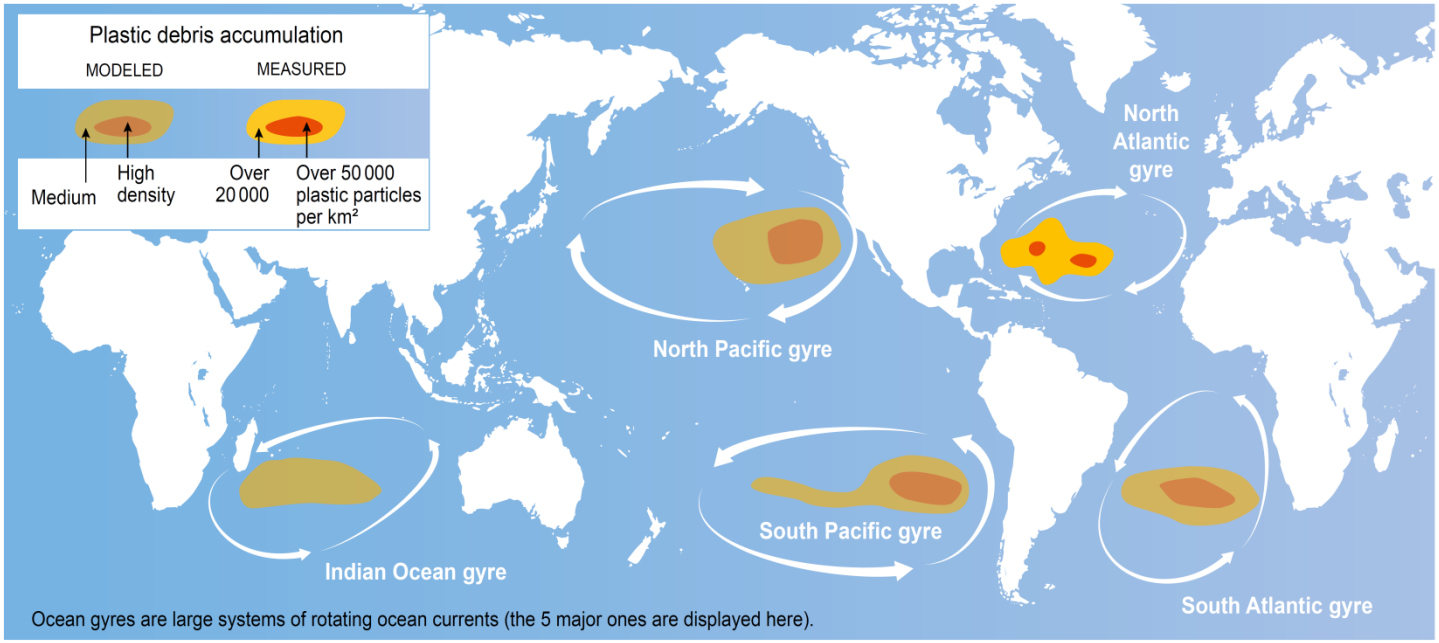



**Trend for waste streams in US municipal waste output**

Index = 100 in 1960

Please note indexed values only help to compare trends (plastic share displays the highest growth rate, but not the largest share of total waste output).



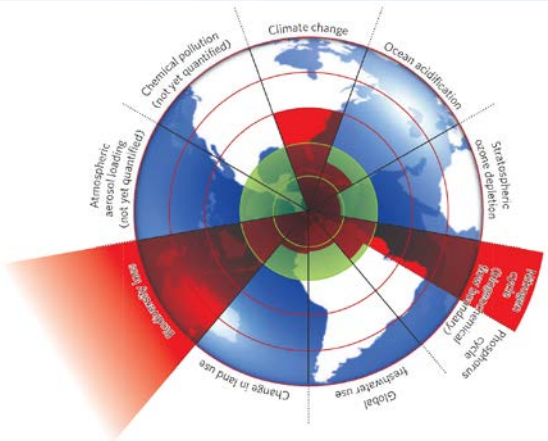

Sources: Nickolai Maximenko et al. cited in Tracking Ocean Debris, IPRC Climate, Newsletter of the International Pacific Research Center, 2008; Kara Lavender Law et al., Plastic Accumulation in the North Atlantic Subtropical Gyre, Science, September 2010; US National Oceanic and Atmospheric Administration (NOAA) Marine Debris Program, 2010; www.5gyres.org.


the north pacific tropical gyre
0:03 / 2:43

# X. Emise atmosférických aerosolů

| Earth System process | Control variable | Threshold avoided or influenced by slow variable | Planetary Boundary (zone of uncertainty) | State of knowledge* |
|---|---|---|---|---|
| Atmospheric aerosol loading | Overall particulate concentration in the atmosphere, on a regional basis | Disruption of monsoon systems. Human-health effects. Interacts with climate change and freshwater boundaries. | To be determined | 1. Ample scientific evidence. 2. Global threshold behavior unknown. 3. Unable to suggest boundary yet. |

**Boundary:** Not yet identified

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# Emise atmosférických aerosolů - důsledky

1) ***Ovlivnění klimatického systému***
2) ***Škodlivé účinky na lidské zdraví***

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**Air pollution is stunting India's monsoon**

› 12:16 30 September 2011 by **Michael Marshall**
› For similar stories, visit the **Climate Change** Topic Guide

India has been drying out for half a century, and air pollution thousands of kilometres away is partly to blame.

The monsoon has been weakening since the 1950s. Indian air pollution has been blamed, but now it seems that emissions further afield are also a factor.

"The summer monsoon provides up to 80 per cent of total annual rainfall in south Asia, and supports 20 per cent of the world's population," says Yi Ming of Princeton University in New Jersey. With his colleagues, Ming used climate models to assess how different factors changed the monsoon.

The monsoon is brought by large-scale wind patterns that transport heat between the northern and southern hemispheres. For half the year the

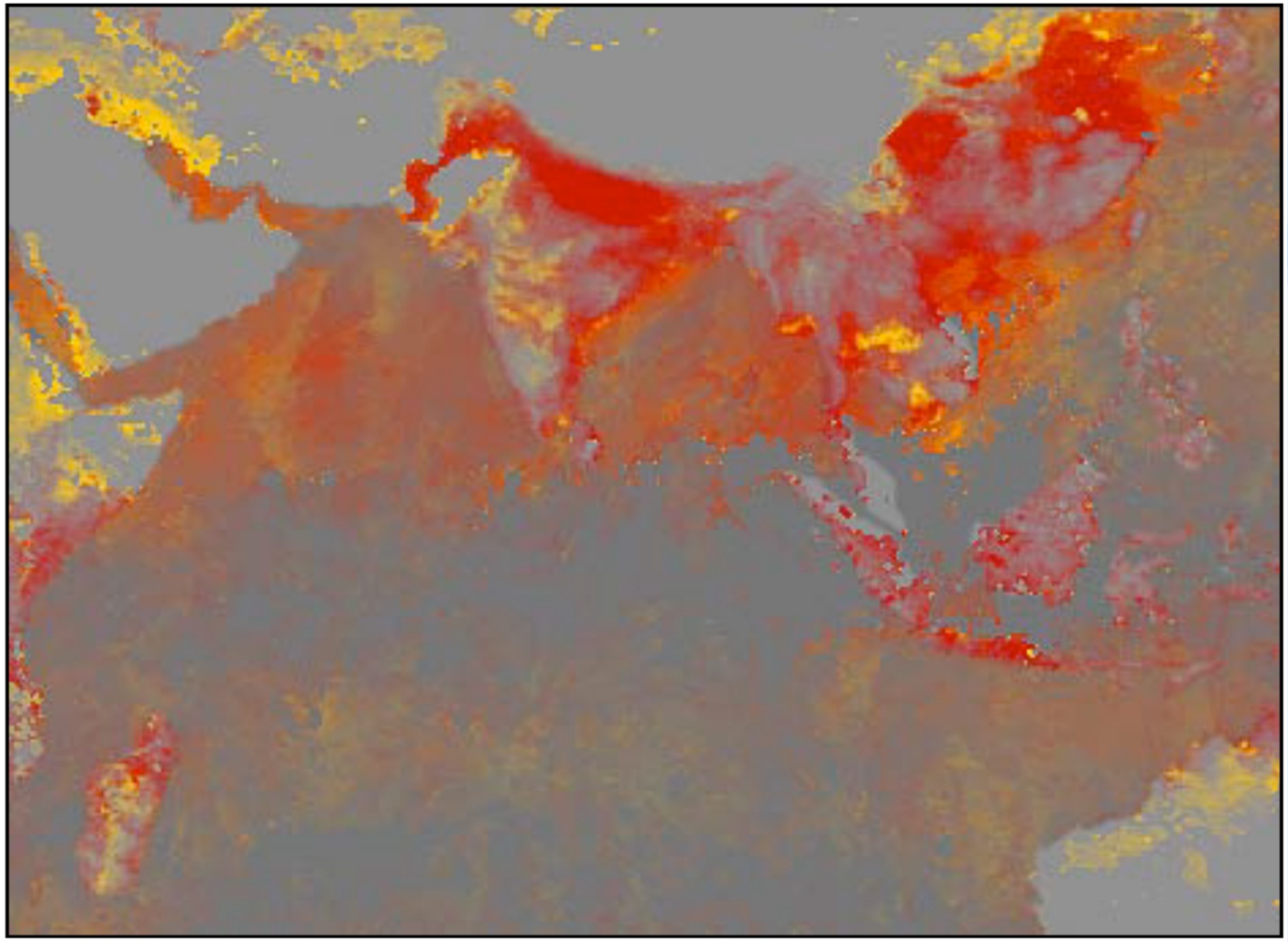
**ad 1)** globální koncentrace aerosolů je od prům. rev. dvojnásobná

**aerosoly ovlivňují**:

- radiační rovnováhu planety zvýšeným odrazem do vesmíru
- hydrologický cyklus změnou mechanizmu tvorby srážek
- **cirkulaci asijských monzunů**
  - aerosoly nad Indo-Ganžskou plání více zahřívají atmosféru, zatímco dochází k ochlazování povrchu
  - dochází tak k posunu srážek do oblasti Himalájí a změnu časového rozvržení

# Znečištění atmosféry nad indickým oc.

8-12.12. 2004
zlatá barva – větší částice (písek, soli)
červená barva – menší částice (spalování fosilních paliv či vegetace)



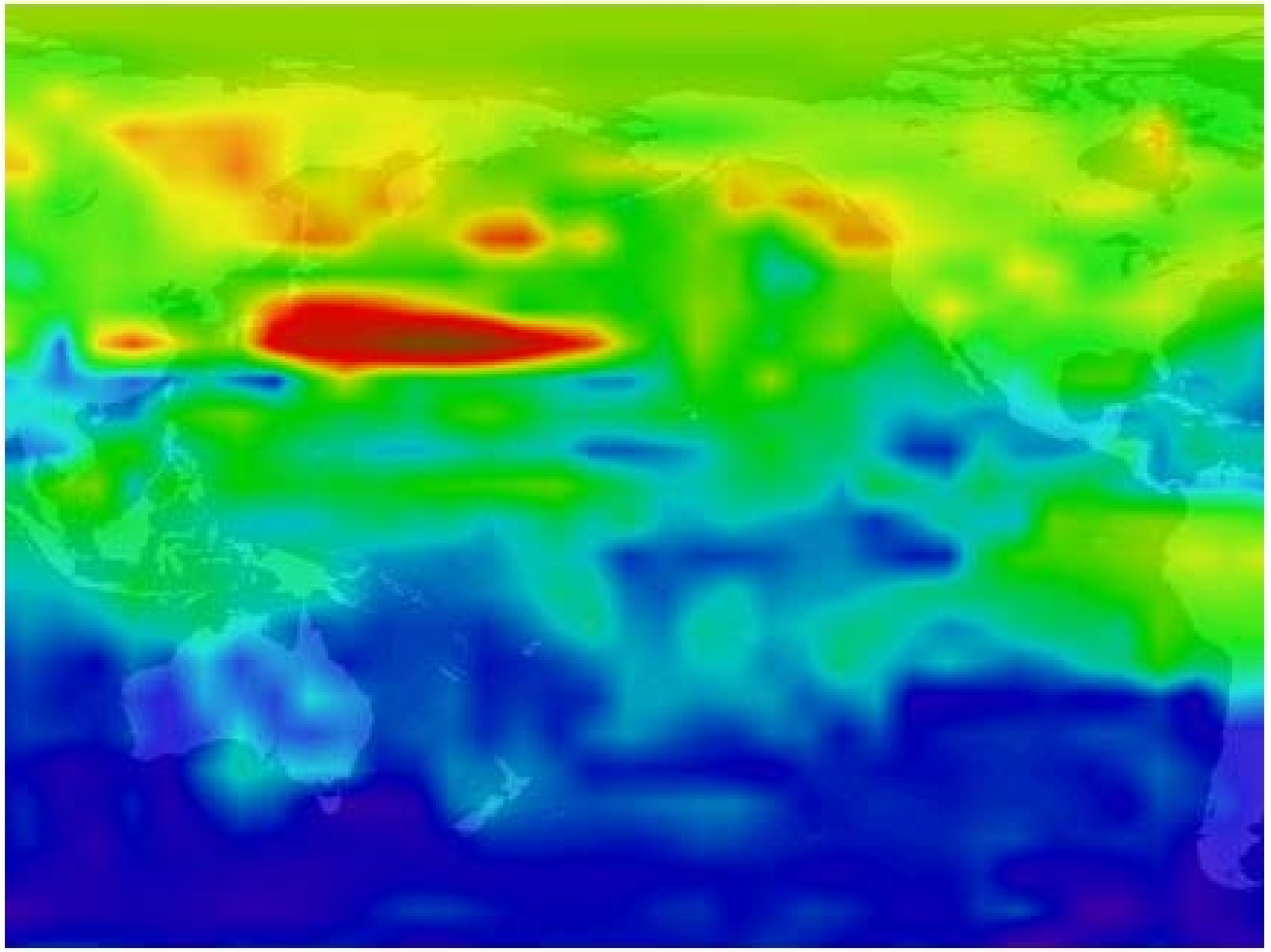
# Znečištění atmosféry pod Himalájemi

7.11.2007
smog nad Pákistánem a Indií


16.12.2004
smog nad tokem Gangy

# Globální přenos znečištění

přenos oblaku CO z Číny do USA – květen 2000



(b) March 12, 2000

# Emise atmosférických aerosolů - důsledky

1) ***Ovlivnění klimatického systému***
2) ***Škodlivé účinky na lidské zdraví***

**ad 2)** částice $PM_{2,5}$ zodpovídají za:

- 3 % úmrtí na kardiovaskulární choroby
- 5 % tracheální, bronchiální a plicní rakoviny
- 1% úmrtí akutních respiračních onemocnění dětí

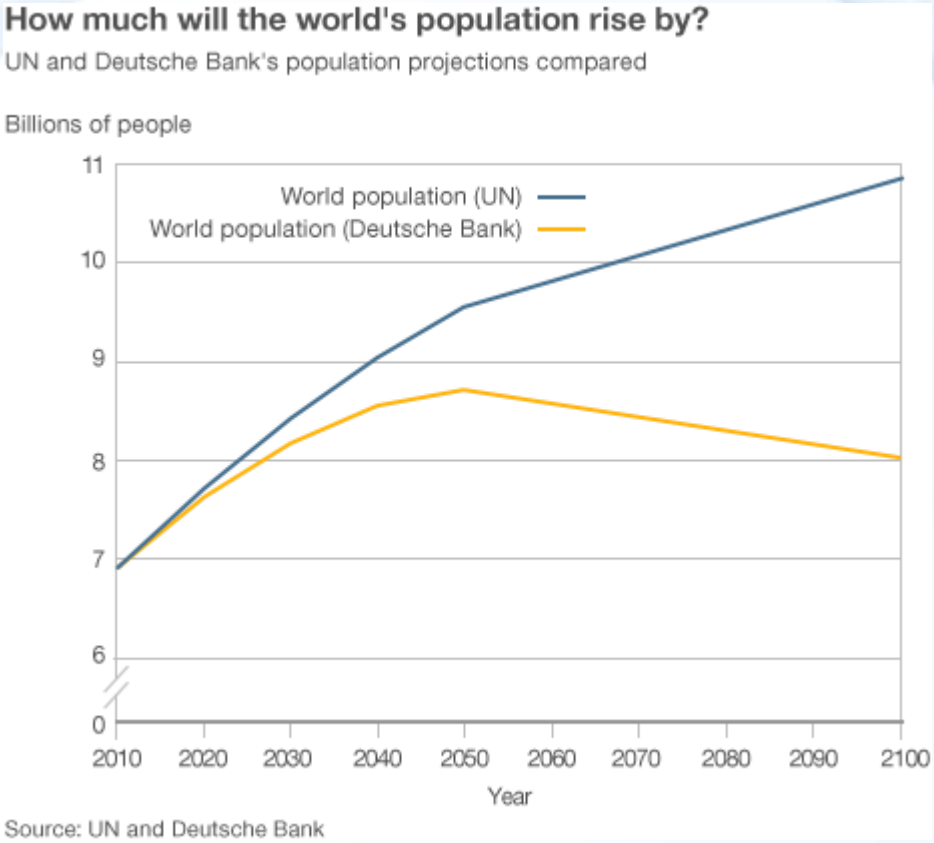
- $0{,}8 \cdot 10^6$ předčasných úmrtí/rok kvůli průmyslovému zneč.
- $1{,}6 \cdot 10^6$ předčasných úmrtí/rok kvůli vnitřnímu zakouření
- $0{,}3 \cdot 10^6$ předčasných úmrtí/rok prašností v povolání
  - většina případů v rozvojových Asijských zemích

# Jak se k této situaci postavit?

# Jak se k této situaci postavit?


**Ve světě, kde lidé trpí hladem, žízní, chudobou... (?)**

# Počet obyvatel - vývoj





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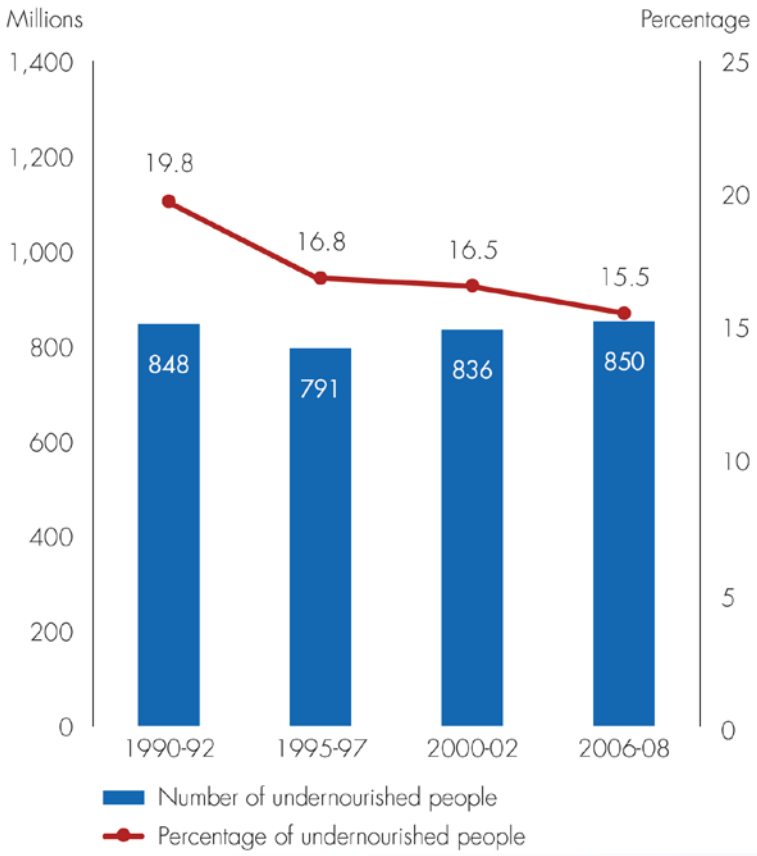
# Nedostatek potravy – současný stav

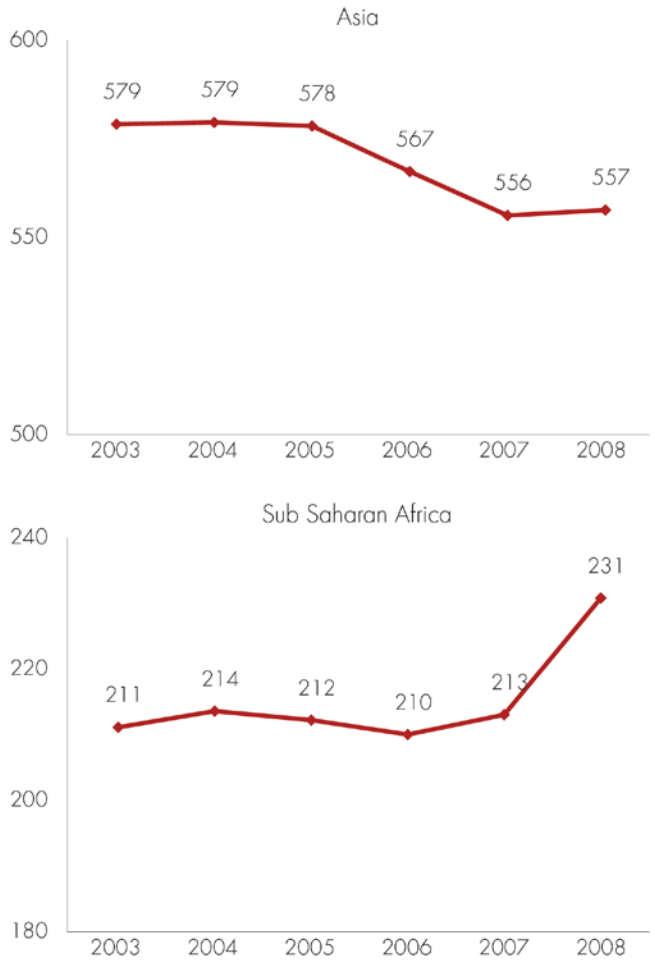
## The numbers of malnourished have stabilized since 1990

Number and proportion of people in the developing regions who are undernourished 1990-92, 1995-97, 2000-02 and 2006-08



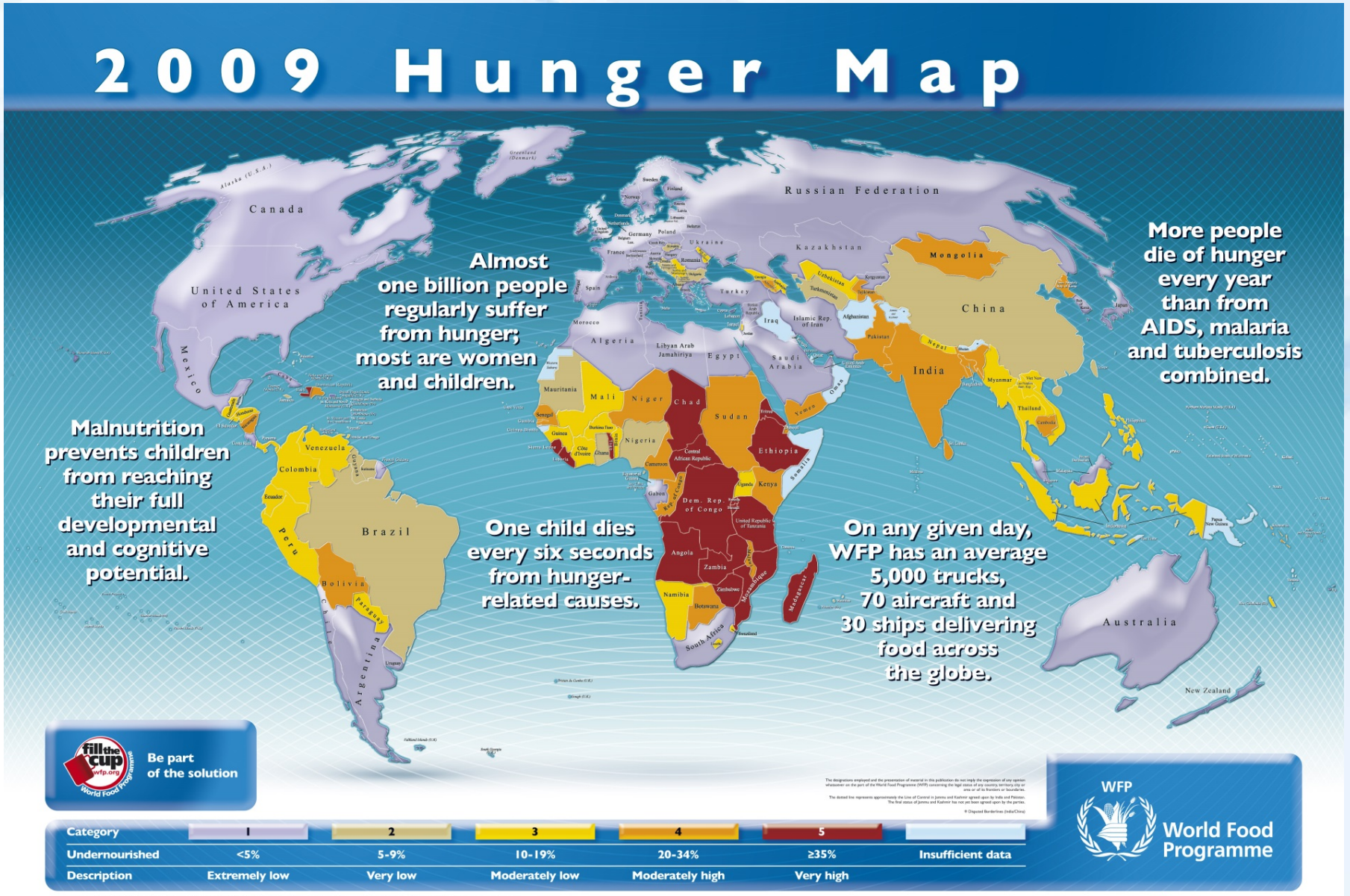

## Countries in sub-Saharan Africa were the hardest hit by the food and financial crises

Number of undernourished people, 2003-2008 (Millions)




Centrum pro výzkum toxických látek v prostředí

# Nedostatek potravy – současný stav



# STOPTHEHUNGER.com



## World Hunger

| | |
|---|---|
| 7,176,725,041 | current total **world population** |
| 898,139,570 | **undernourished** people in the world right now |
| 1,579,478,802 | **overweight** people in the world right now |
| 526,492,934 | **obese** people in the world right now |
| 16,283 | people who **died of hunger today** |
| 7,551,816 | people who **died of hunger this year** |

## Economics

| | |
|---|---|
| $ 253,378,128 | money spent **due to obesity** related diseases in the USA **today** |
| $ 62,609,837 | spending on **food purchased and then tossed** by US households today |
| $ 2,911,231 | spending on global **food aid** today |
| $ 18,927,594 | amount that would allow to **feed the hungry** today |
| $ 100,653,291 | **spending on weight-loss** programs and products in the USA today |
| $ 872,451 | food aid budget spent on domestic **processing and shipping** today |
| $ 509,695 | revenue for four large **US agribusiness corporations** derived from food aid programs today |
| $ 24,754,648 | spending on **pet food** in Europe and USA today |

# OBESITY WORLDWIDE

**1.5 BILLION** ADULTS ARE OVERWEIGHT

**65%** OF THE WORLD'S POPULATION LIVE IN COUNTRIES WHERE THEY ARE *MORE LIKELY TO DIE FROM OBESITY* THAN MALNUTRITION

**25%** HIGHER HEALTH CARE COSTS COMPARED TO A PERSON OF AVERAGE WEIGHT

**BY THE NUMBERS:**

200 MILLION MEN & 300 MILLION WOMEN ARE OBESE.

THAT'S MORE THAN **10%** OF THE ADULT POPULATION

YOU NEED TO BURN **3500 CALORIES** TO DROP *A SINGLE POUND* OF BODY FAT

*That's about 9 hours on the elliptical*

**43 MILLION CHILDREN UNDER 5 ARE OVERWEIGHT**
*That's almost 7%!*

**WORLD'S FATTEST COUNTRIES**

| | |
|---|---|
| NAURU 94.5% overweight | FSM Federated States of Micronesia 91.1% overweight |
| COOK ISLANDS 90.9% overweight | TONGA 90.8% overweight |
| NIUE 81.7% overweight | SAMOA 80.4% overweight |
| PALAU 78.4% overweight | KUWAIT 74.2% overweight |
| USA 74.1% overweight | KIRIBATI 73.6% overweight |

*In Japan, about **one-in-every-20** adult women is obese, compared to **one-in-10** in the Netherlands, **one-in-four** in Jordan, **one-in-three** in the United States and Mexico, and **up to seven-in-10 in Tonga.***

**AND THE PROBLEM IS GROWING**

| OBESITY IN 1980 | OBESITY IN 2008 |
|---|---|
| 7.9% OF WOMEN | 13.8% OF WOMEN |
| 4.8% OF MEN | 9.8% OF MEN |

*Overweight and obese are defined as abnormal or excessive fat accumulation that may impair health.*

**$300 BILLION** ANNUAL HEALTH CARE COSTS FOR OBESITY IN THE U.S. AND CANADA

SEVERELY OBESE PEOPLE DIE UP TO **10 YEARS SOONER** THAN THOSE OF NORMAL WEIGHT

INFOGRAPHIC BROUGHT TO YOU BY ACTOSINJURYLAWYERS.COM
CREATED BY OBUMEDIA.COM

## BMI=KG/M²

Body mass index (BMI) is a simple index of weight-for-height that is commonly used to classify overweight and obesity in adults. To determine your BMI, divide your weight in kilograms by the square of your height in meters.

*(For those that don't do metric, that's your weight in pounds x 703, divided by your height in inches squared, or 703Lb/I²)*

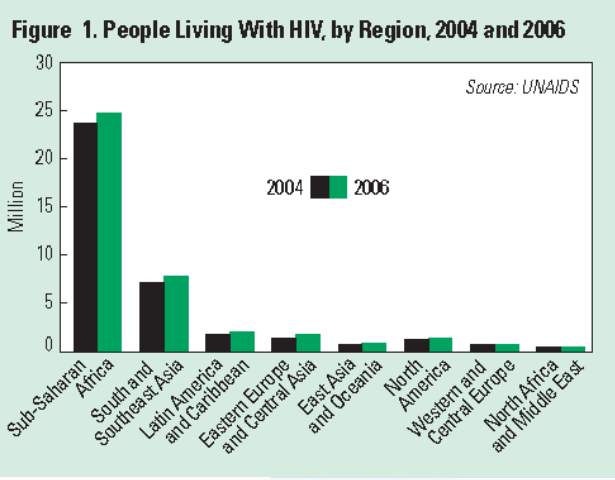
| WHAT'S YOUR BMI? | >25 | >30 | >35 | >40 |
|---|---|---|---|---|
| | Overweight | Class I Obese* | Class II Obese | Class III Obese |

*As Asian populations develop negative health consequences at a lower BMI than Caucasians, some nations have redefined obesity for the Japanese, obesity is any BMI greater than 25. China uses a BMI of greater than 28.

**SOURCES:** www.hirehealthmedia.com/world-obesity-stats-2010/; www.bbc.co.uk/news/health-12357385; www.infoplease.com/world/statistics/obesity.html; www.who.int/mediacentre/factsheets/fs311/en/index2.html; www.pbs.org/newshour/rundown/2011/08/obesity-rates-rising-worldwide-us-could-hit-50-by-2030.html; www.sciencedaily.com/releases/2011/03/110303210612.htm; www.calorieperhour.com/tutorial_pound.php; http://theheart.blogs.cnn.com/2011/08/25/study-world-is-getting-fatter-needs-to-stop/; www.dailypaark.com/blog.asp?post=the_10_worst_foods_of_2010; http://www.prb.org/Articles/2011/agingpopulationclocks.aspx

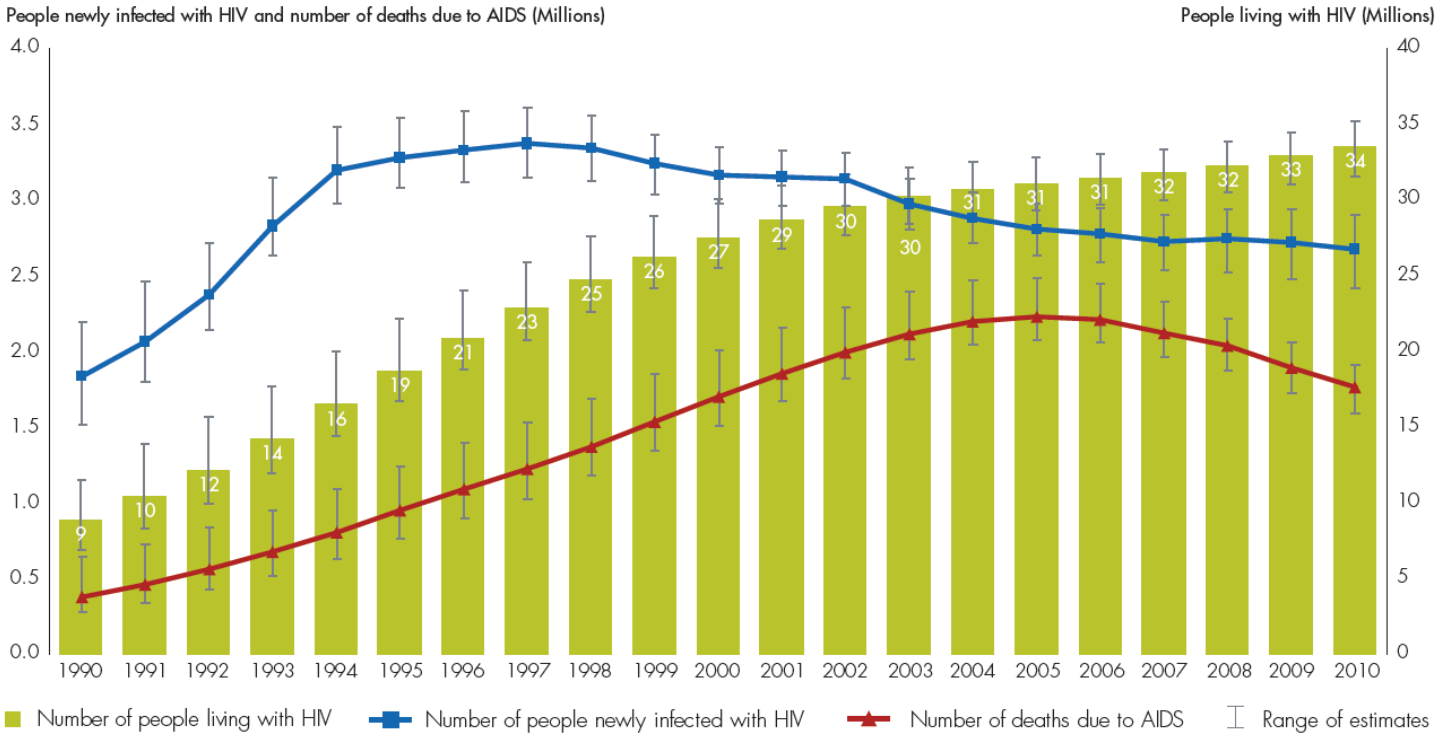
# AIDS

- situace se zlepšuje!



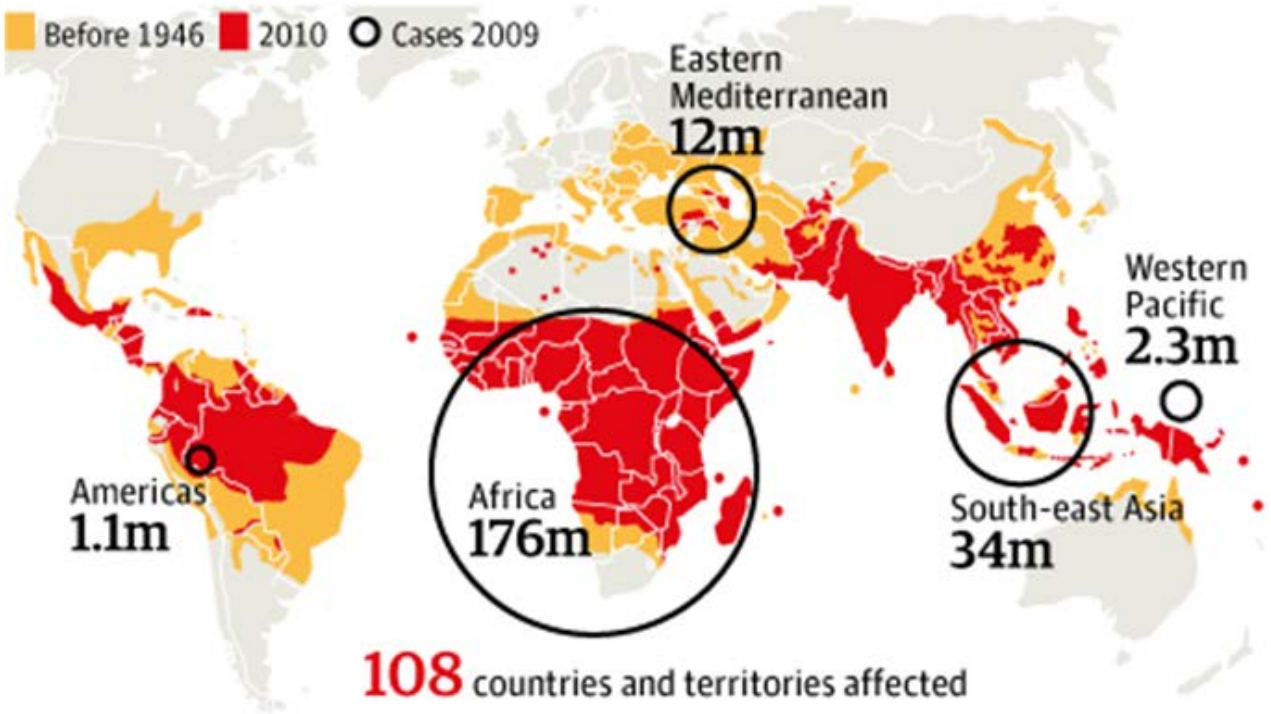

## More people than ever are living with HIV due to fewer AIDS-related deaths and the continued large number of new infections

Number of people living with HIV, number of people newly infected with HIV and number of AIDS deaths in the world (Millions), 1990-2010

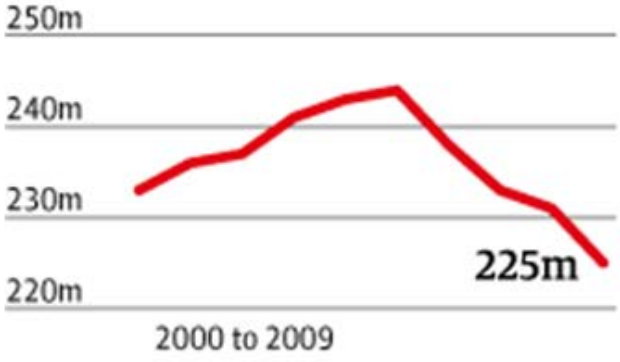


# The fight against malaria

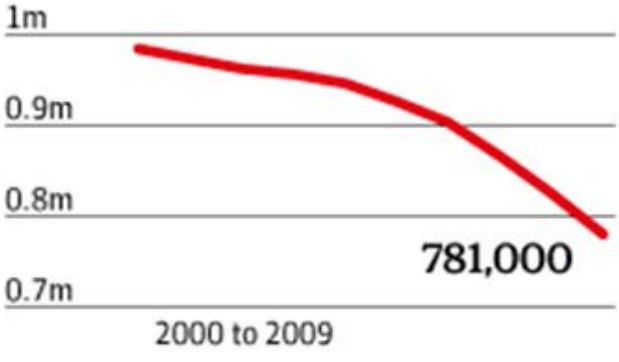
## Affected countries




## Cases worldwide




## Deaths worldwide




SOURCES: WHO, ROLL BACK MALARIA PARTNERSHIP, REUTERS

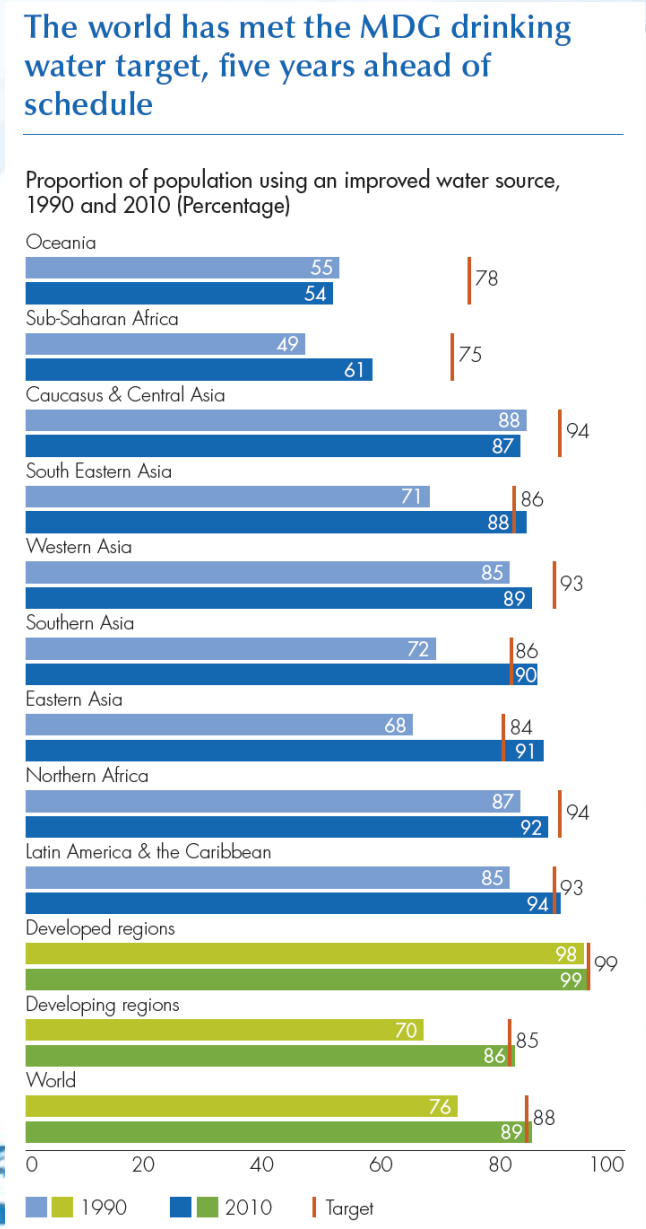
# Nemoci spojené s vodou

| choroba | počet případů | ztracená léta (v tisících) | odhadovaná úmrtnost (v tisících) | souvislost s vodou |
|---|---|---|---|---|
| průjem | 4 miliardy | 62 000 (54 000) [b] | 1800 (1700) [b] | voda znečištěna lidskými výkaly |
| malárie | 300–500 milionů | 46 500 | 1300 | přenáší komáři rodu Anopheles |
| schisostomóza | 200 milionů | 1700 | 15 | přenáší mořští měkkýši |
| dengue a krvácivá dengue | dengue 50–100 milionů a krvácivá 500 tisíc | 616 | 19 | přenáší komáři rodu Aedes |
| onchocerkóza (říční slepota) | 18 milionů | 484 | 0 | přenáší muchničky |
| tyfus a paratyfové horečky | 17 milionů | | | znečištěná voda, potraviny, záplavy |
| trachom | 150 milionů, z toho 6 milionů slepých | 2300 | 0 | nedostatek základní hygieny |
| cholera | 140–184 tisíc [b] | | 5–28 [a] | voda a potraviny znečištěny lidskými výkaly |
| drakunkulóza (guinejská nemoc) | 96 tisíc | | | znečištěná voda |

[a] Vyšší hodnota je za rok 2001.

[b] Průjem je nemoc přenášená vodou, ale ne všechen průjem se pojí ke znečištěné vodě. Údaje v závorkách se vztahují k průjmu ze znečištěné vody.

# Situace se zlepšuje



# Situace se zlepšuje, ale ne dostatečně

## The world has met the MDG drinking water target, five years ahead of schedule

Proportion of population using an improved water source, 1990 and 2010 (Percentage)

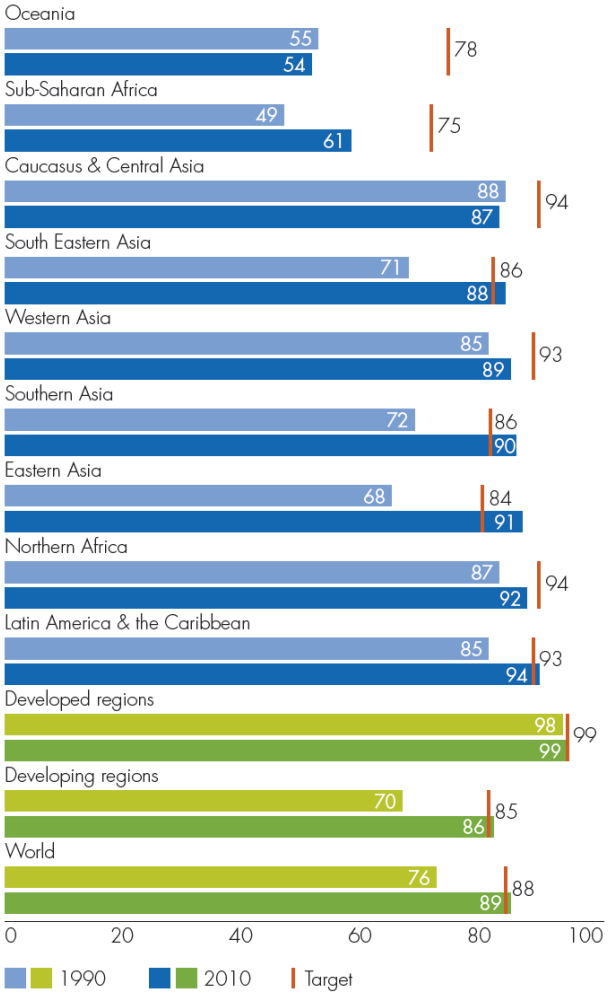
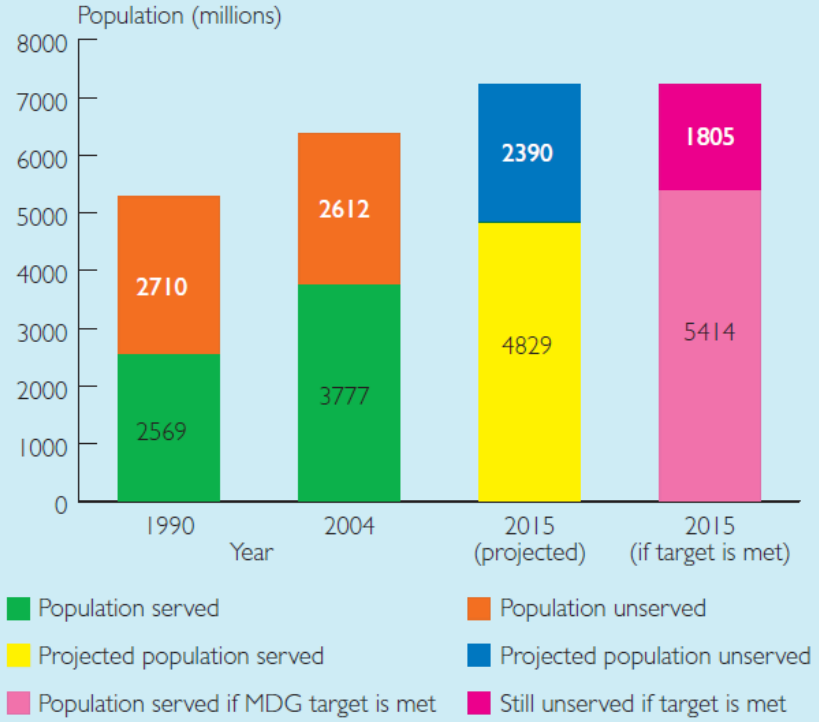



Figure 2
World population with and without access to improved sanitation in 1990, 2004 and 2015




**> The number of people without improved sanitation decreased by only 98 million between 1990 and 2004.**

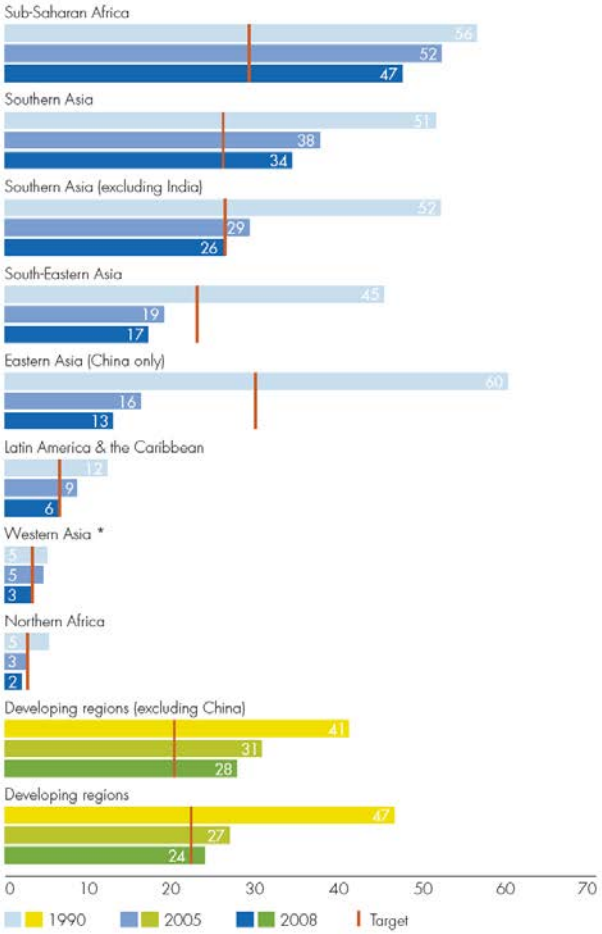
**> The global MDG sanitation target will be missed by more than half a billion people if the trend 1990–2004 continues up to 2015.**

# Chudoba – situace se zlepšuje

**TARGET**
Halve, between 1990 and 2015, the proportion of people whose income is less than $1 a day

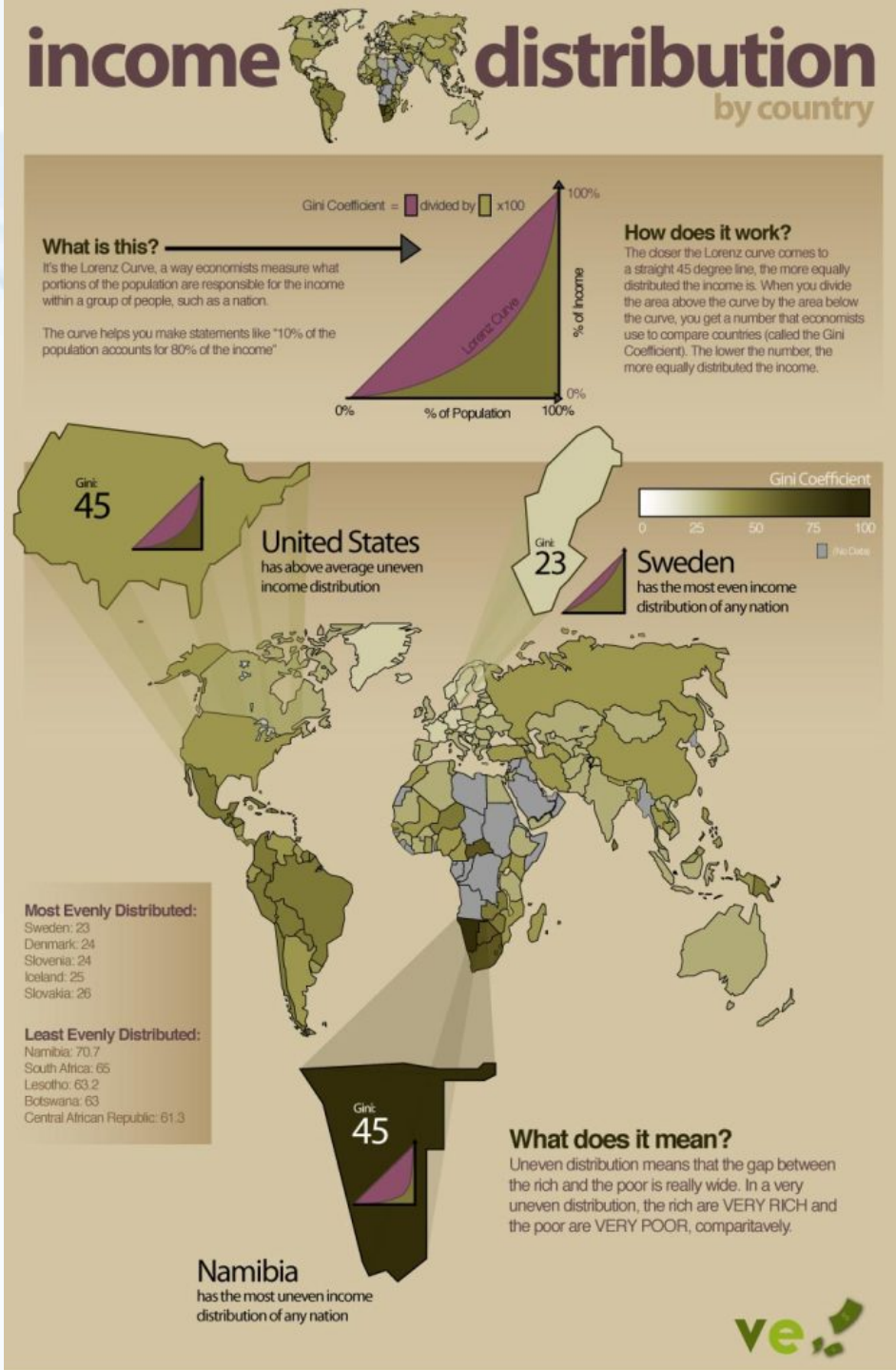
## Extreme poverty falls in every region

Proportion of people living on less than $1.25 a day, 1990, 2005 and 2008 (Percentage)




* The aggregate value is based on 5 of 13 countries in the region.

**Note:** No sufficient country data are available to calculate the aggregate values for Oceania.



# Jak se k této situaci postavit?

# Jak se k této situaci postavit?


**Aby lidé netrpěli hladem, žízní, chudobou v důsledku neočekávaných změn Zemského systému?**