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ENV015 Udržitelný rozvoj I

- úvod do problematiky a globální výzvy

esf evropský sociální fond v ČR
EVROPSKÁ UNIE
MINISTERSTVO ŠKOLSTVÍ, MLÁDEŽE A TĚLOVÝCHOVY
OP Vzdělávání pro konkurenceschopnost
UNIVERSITAS MASARYKIANA BRUNENSIS
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

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Úvod

evropský sociální fond v ČR
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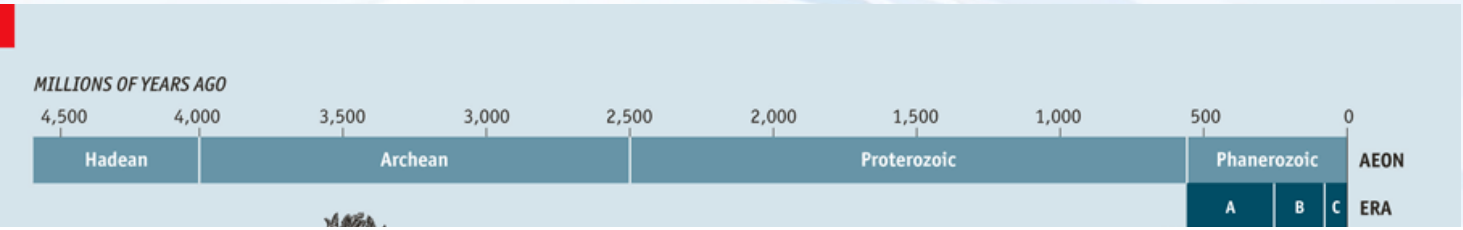
Starohory - čtvrtohory...



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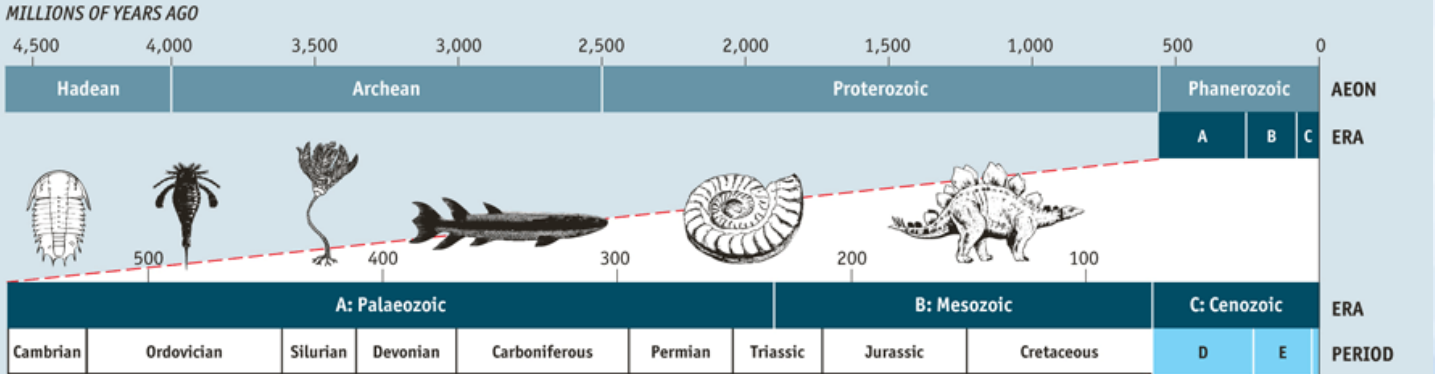

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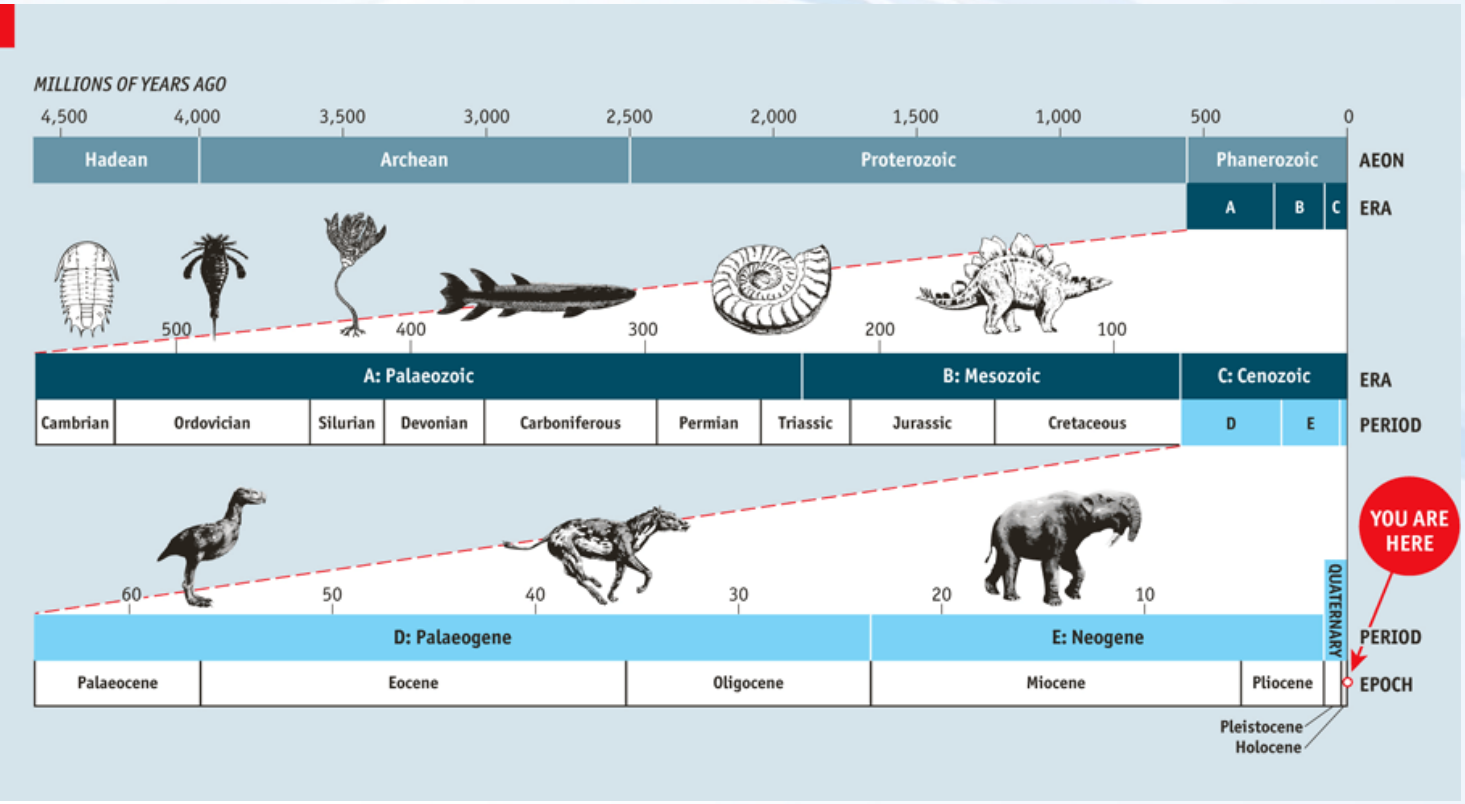

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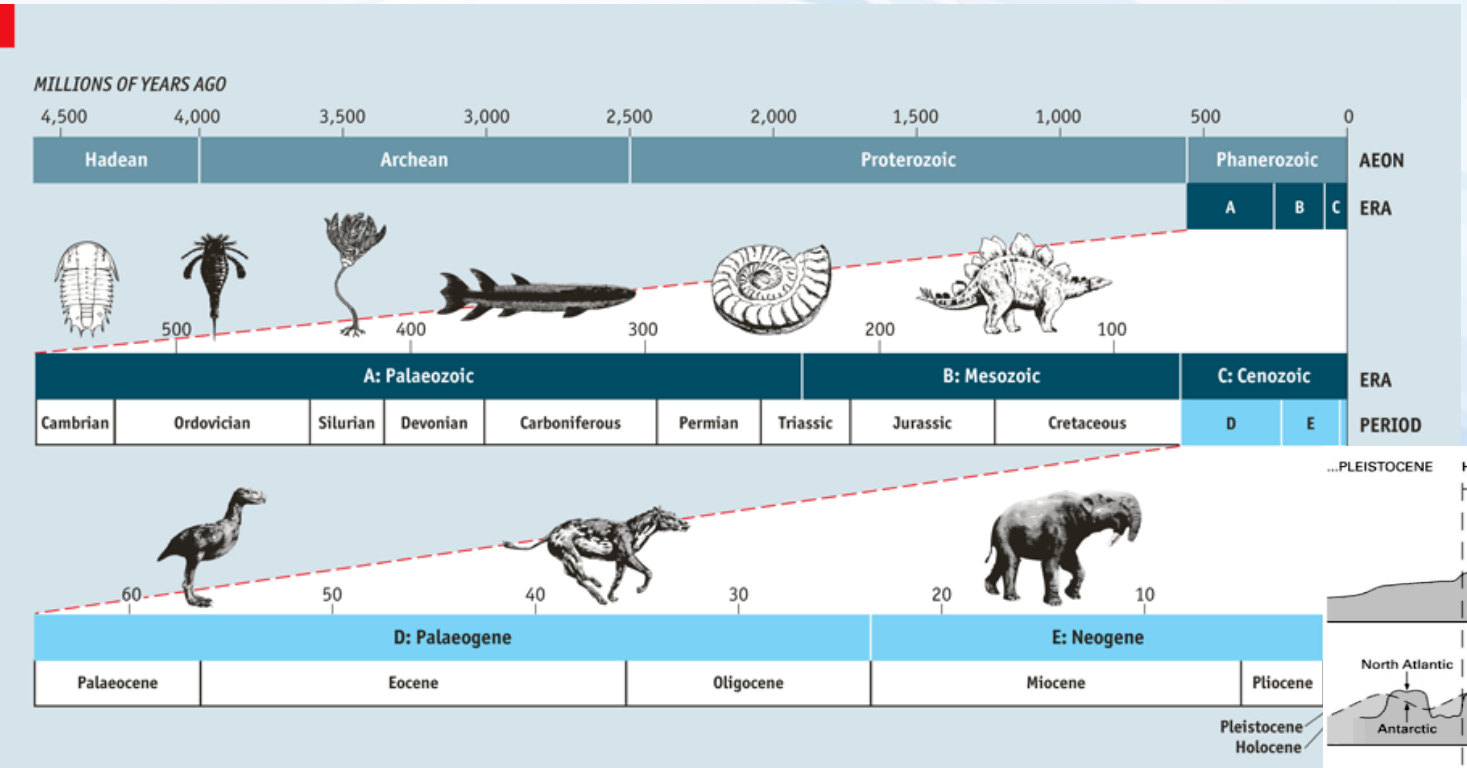
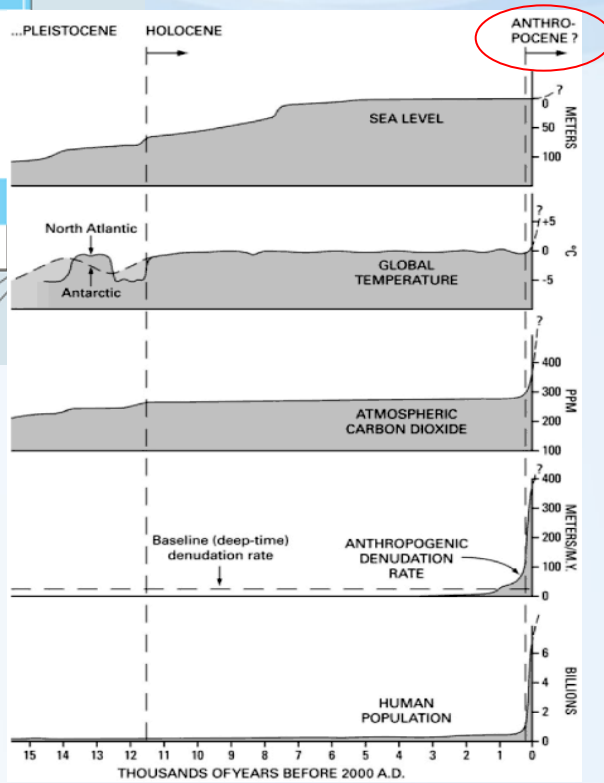




Geology of mankind

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

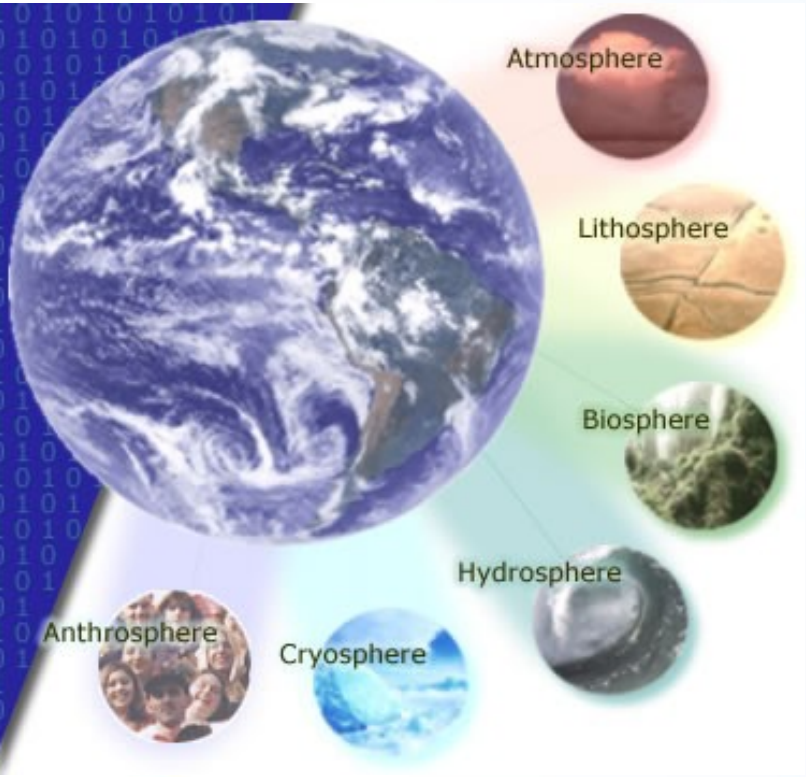
referring to the "anthropozoic era". And in 1926, V. I. Vernadsky acknowledged the increasing impact of mankind: "The direction in which the processes of evolution must proceed, namely towards increasing consciousness and thought, and forms having greater and greater influence on their

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.

Is Earth in a new geological phase thanks to us?

- 10 November 2014 by Jan Zalasiewicz
- Magazine issue 2994. Subscribe and save
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It may be time for science to recognise Earth's new era – one shaped by humans. So argues a geologist involved in defining new phases in geological time

WHAT is the legacy that short-lived humanity will leave to an almost eternal Earth? The casual observer might point to tourist sights such as the once mighty city of Angkor, now lying ruined amid the Cambodian jungle, or what survives of the great monuments of ancient Egypt.

They are wonderful, of course, but there is another way to address that question. A little-known working group, part of the International Commission on Stratigraphy, recently met to consider if the human imprint on Earth is now so great, and likely to be detectable for so long, that it deserves to be regarded as a geological epoch in its own right. That would be our real legacy.

Such discussion is not new. George Perkins Marsh, North America's first conservationist, wrote of humans changing the face of the Earth. In 1873 the Italian geologist Antonio Stoppani coined the term Anthropozoic –the era in which humans change the course of geological history. Most geologists declared the idea nonsense. The constructions of civilisation may look impressive, they said, but must surely be trivial when set against the collisions of continents and the growth and disappearance of the oceans. When humans disappear, the world will resume its course, and few of our monuments will be left.

But over the past few decades it has become clear that human activities can have geologically far-reaching effects. Science writer Andrew Revkin suggested we were living in what he called the Anthrocene; John Curnutt of the US Geological Survey, awed at the transplanting of species across the globe, proposed the Homogenocene; marine biologist Daniel Pauly saw the oceans' future as one of slime and jellyfish as a result of overfishing and pollution, and invented the Myxocene.

But it was one of the world's most respected scientists, the Nobel-prizewinning atmospheric chemist Paul Crutzen, who proved most influential. He argued that the Holocene, the geological epoch of post-glacial stability in which civilisation arose, had ended and been replaced by the Anthropocene, an epoch shaped by humans.

The idea took off. The term was used as if it were a formal epoch. It isn't – but

(Image: Andrzej Krauze)

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Vliv člověka na své okolí

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

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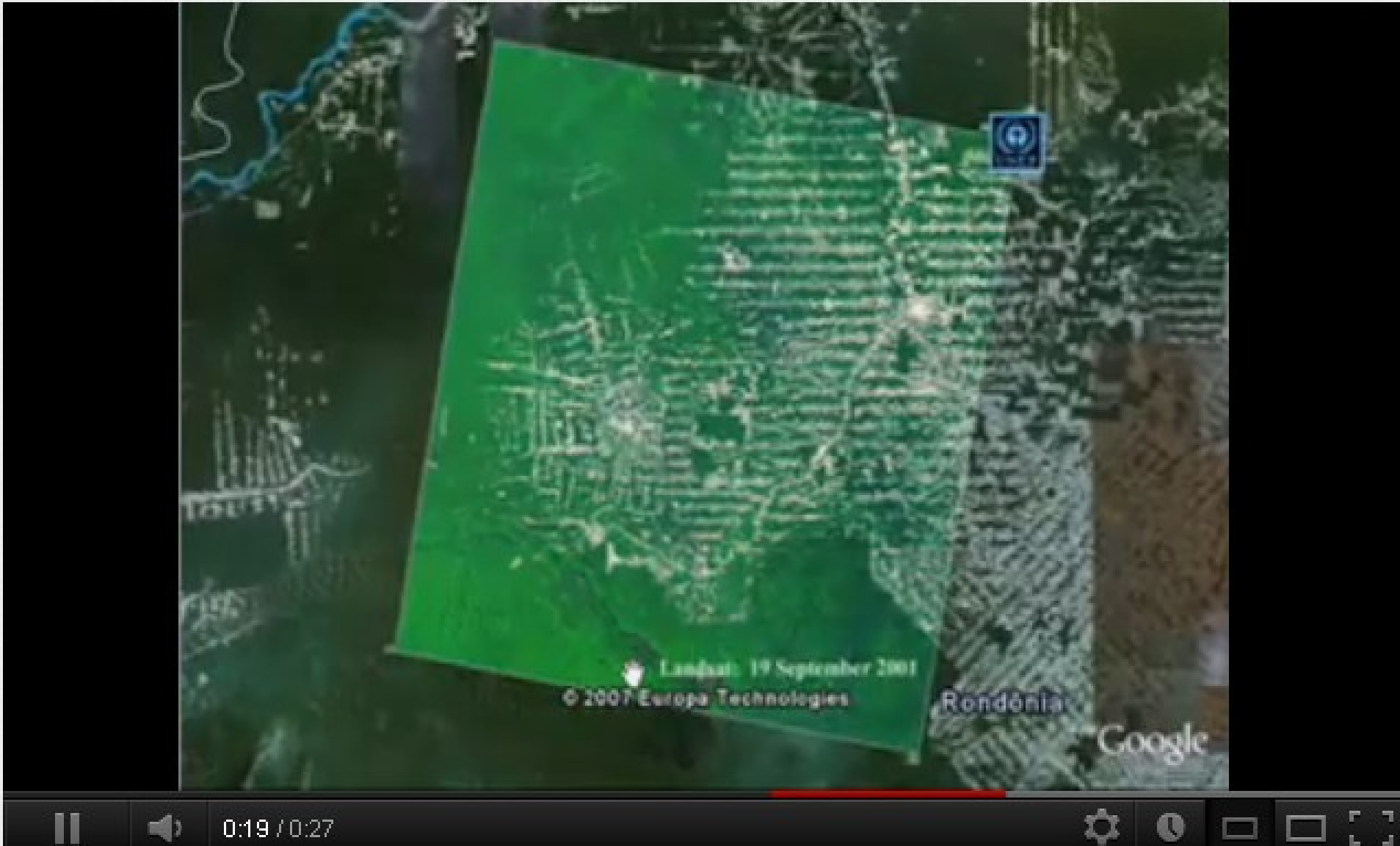
Vliv člověka na své okolí

? 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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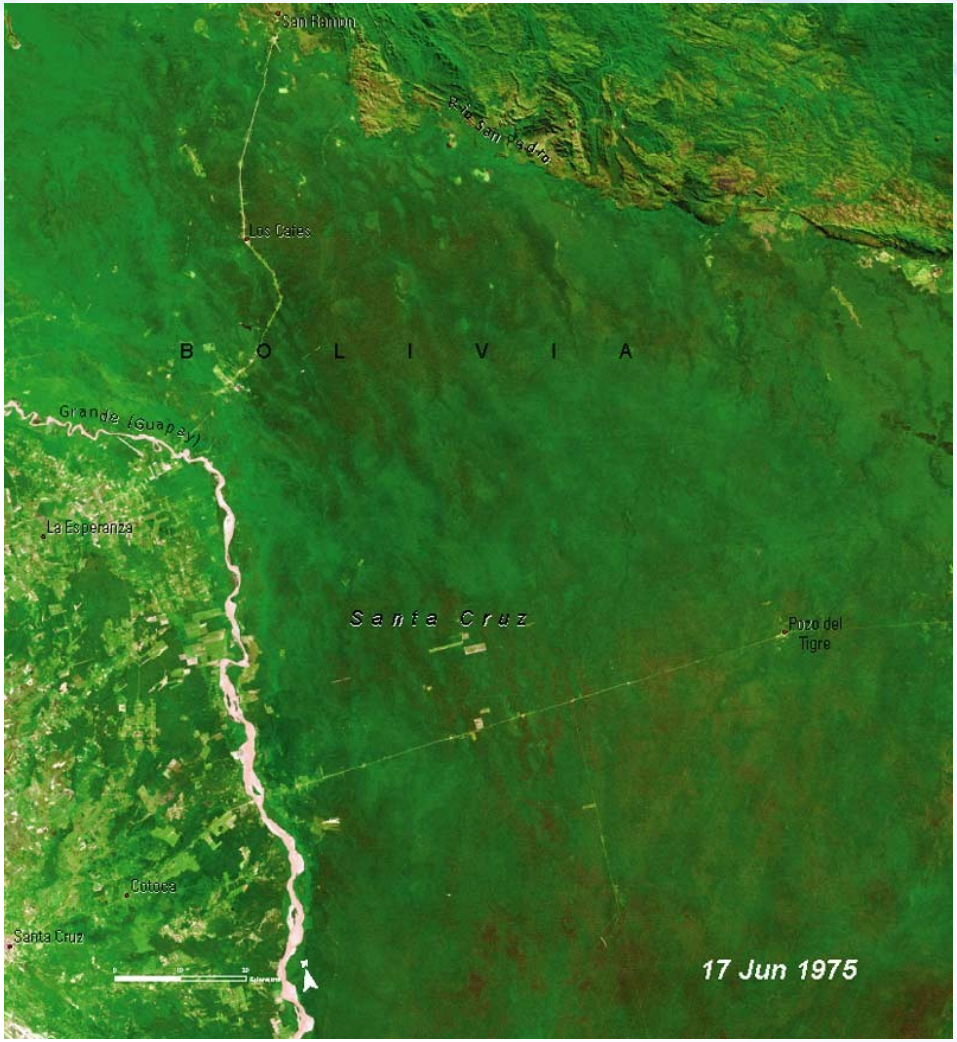
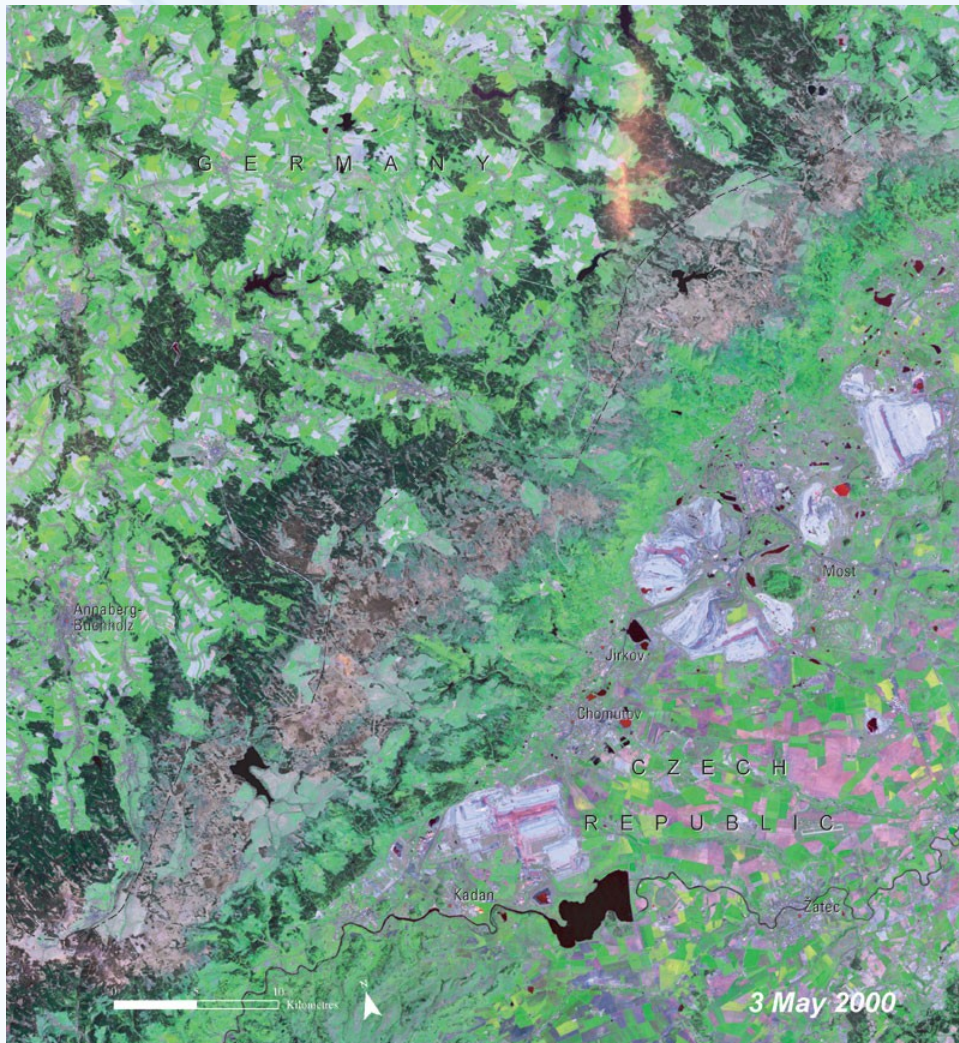
Santa Cruz, Bolívie

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



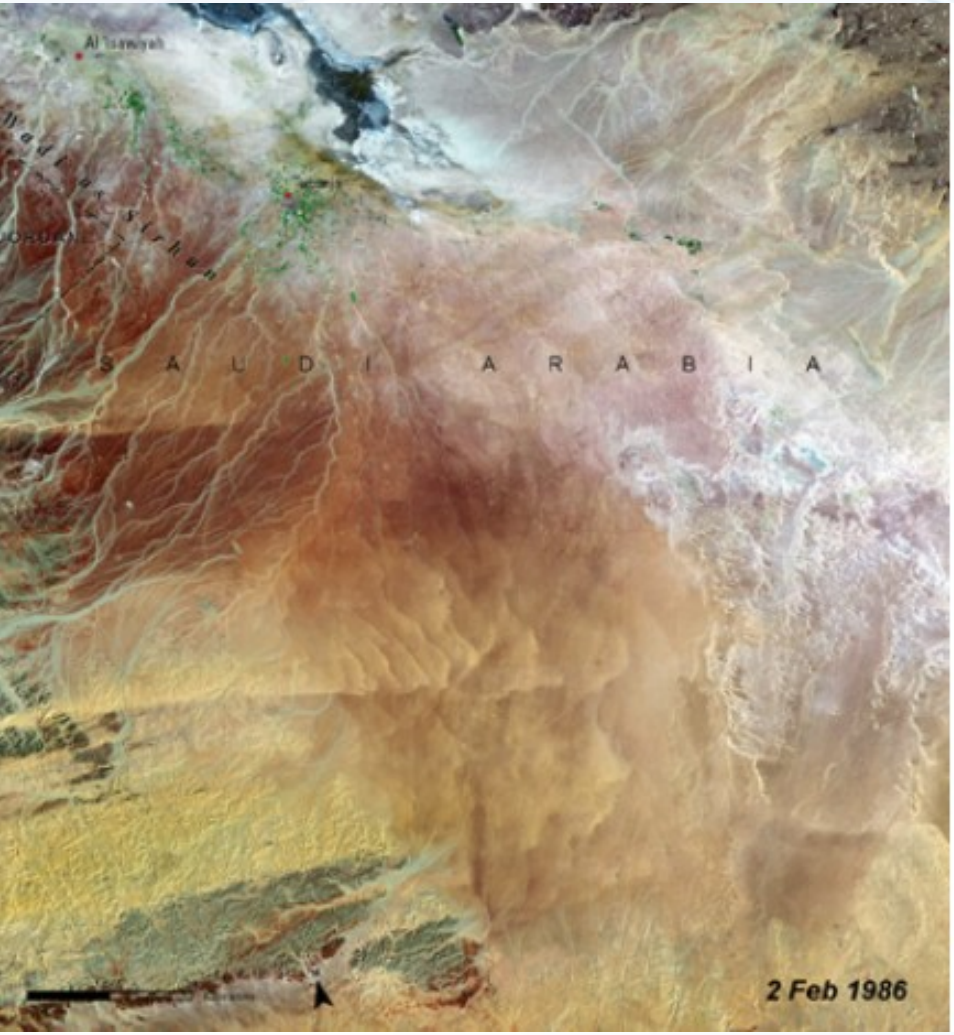
Černý trojúhelník, ČR-Německo

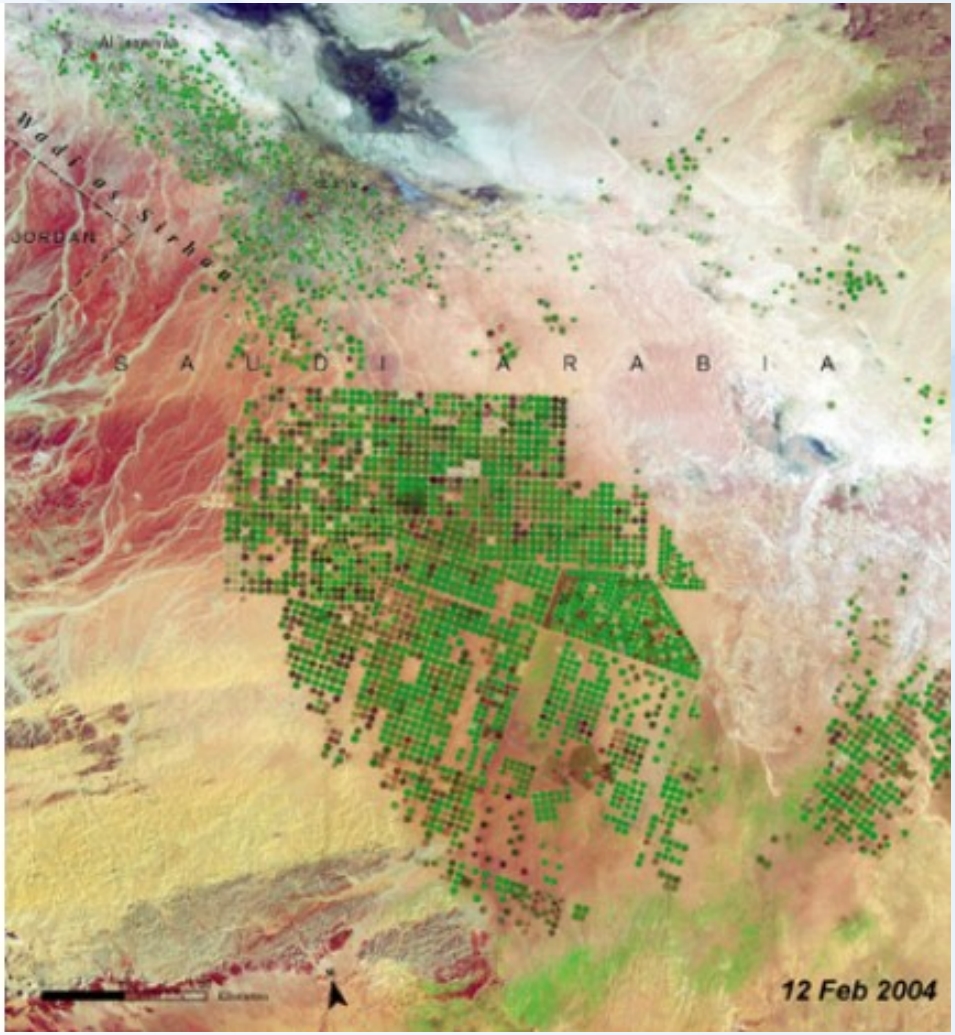
Oblast na rozhraní ČR, Německa a Polska s intenzivní povrchovou těžbou uhlí. Doly jsou šedivou barvou, hnědavý pás na hranici ČR-SRN zobrazuje deforestaci vlivem imisí. Zelený pás v podkrušnohoří zobrazuje remediované a obnovované oblasti – po zavedení čistších technologií

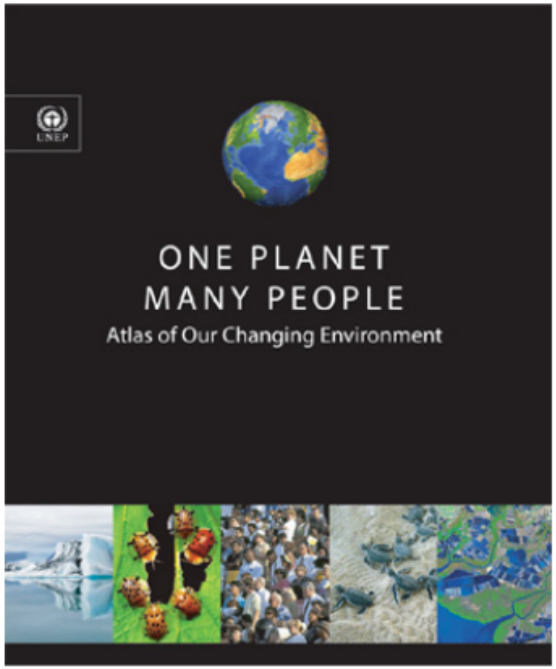


Al'Isawiyah , Saudská Arábie

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.

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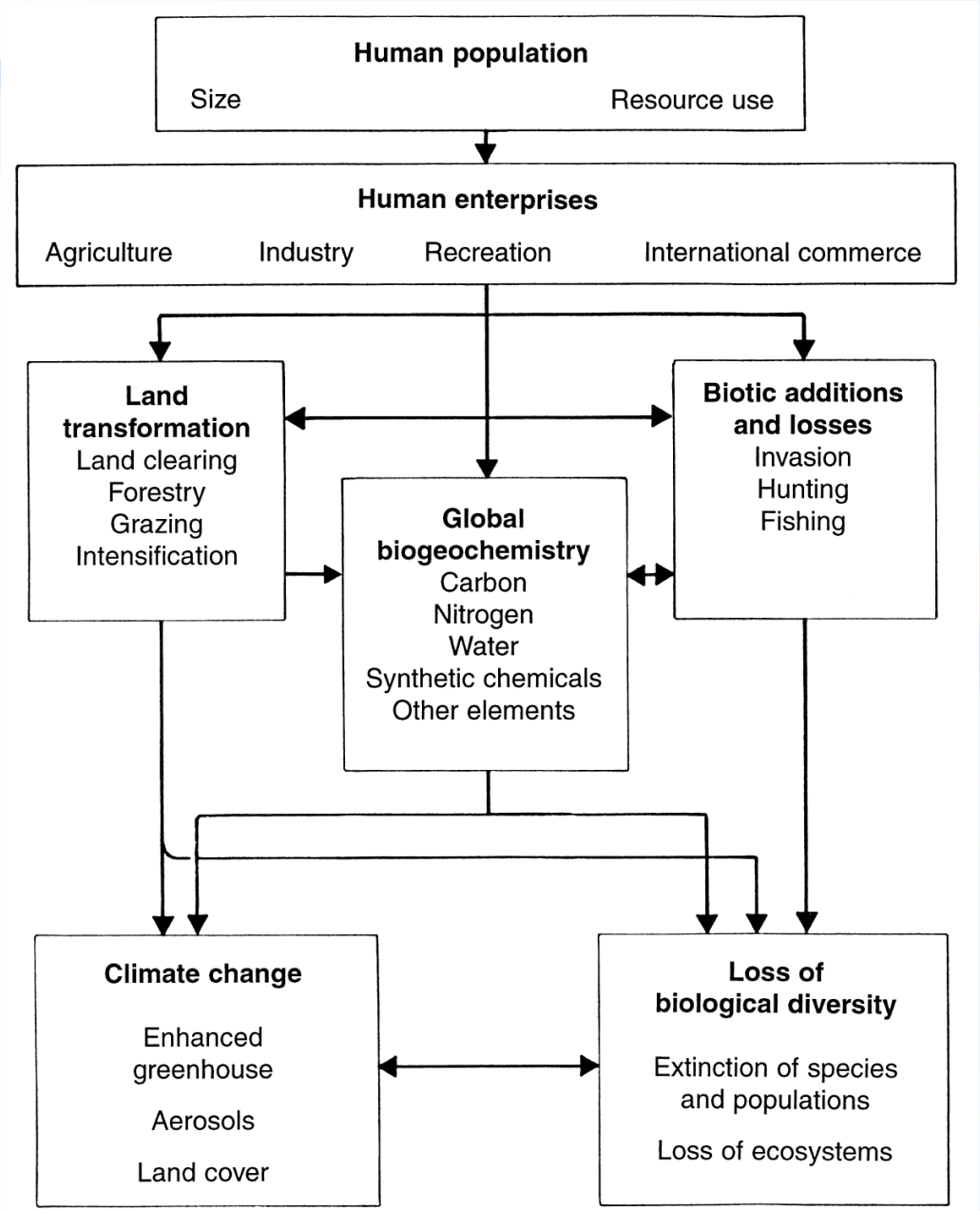
Atlas Hotspots

Show All entries Search:

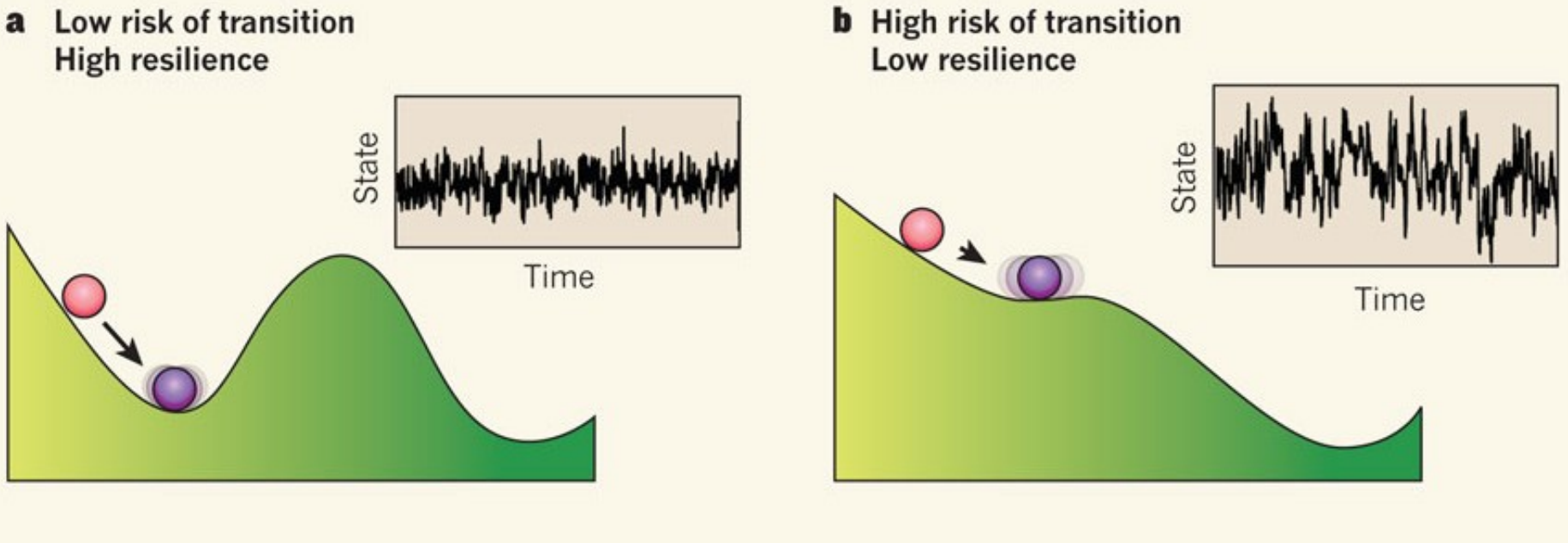
Site Name	Country	Major Theme	Site Rating	Site Views	Site Detail
Al'Isawiyah	Saudi Arabia	Ecosystems	4	6021	↗
Almeria	Spain	Ecosystems	2.97	17172	↗
Angangueo	Mexico	Ecosystems	5	697	↗



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

Proč nás to zajímá?

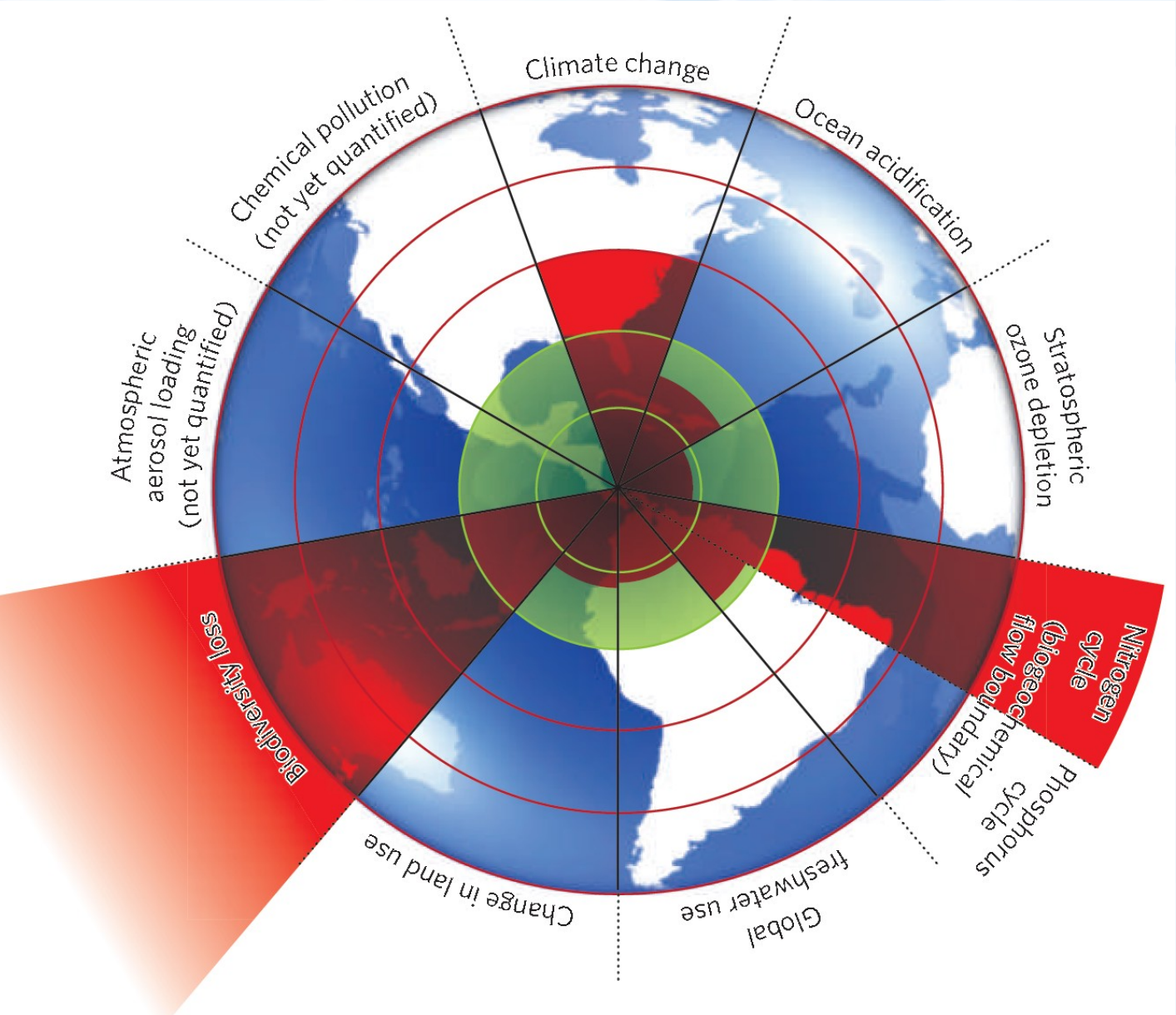
- příliš rozsáhlé změny parametrů Zemského systému mohou destabilizovat kritické biofyzikální systémy (př. ekosystémy)
- to může spustit náhlé nebo nevratné nelineární změny v ŽP, což by bylo zhoubné nejen pro kvalitu života lidí



Meze planety

- výzvy pro lidský um, intelekt a svědomí

Překročení hranic?



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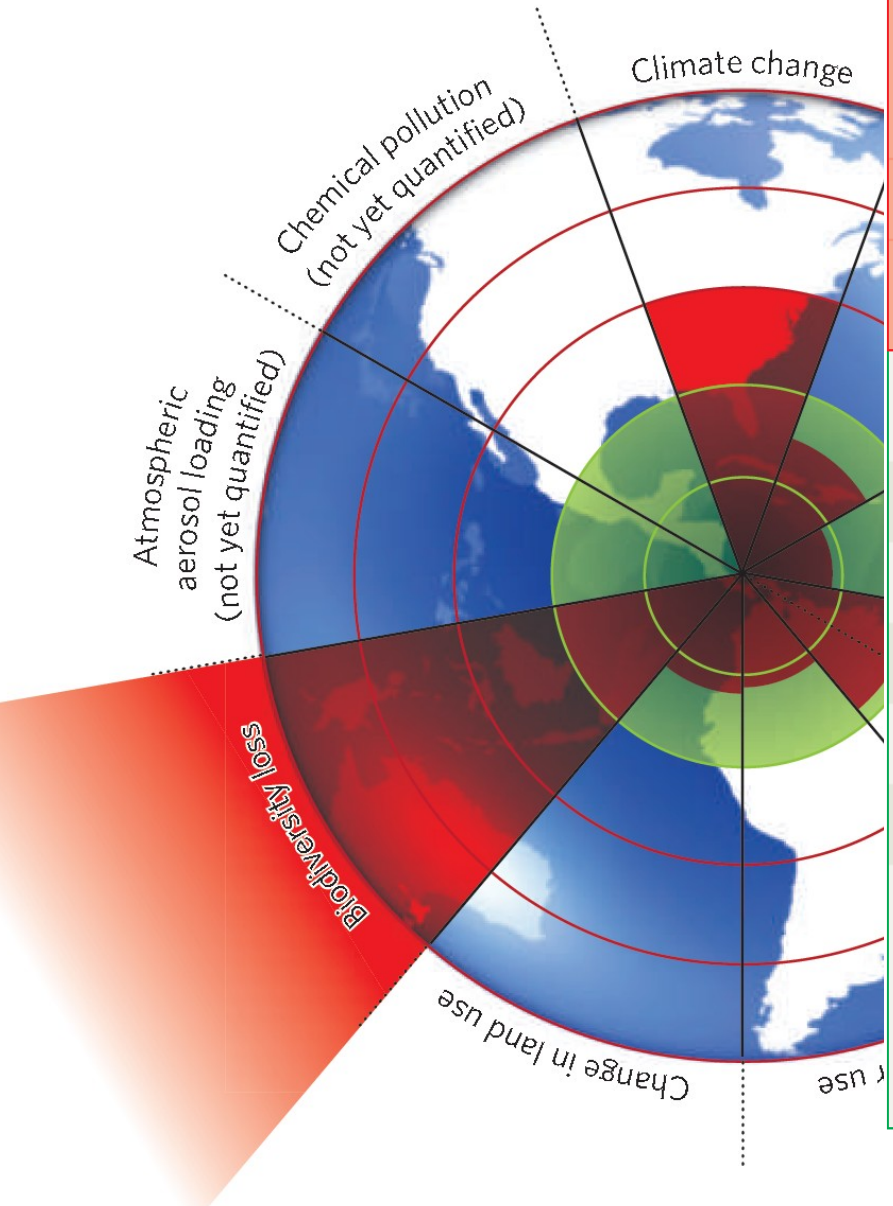
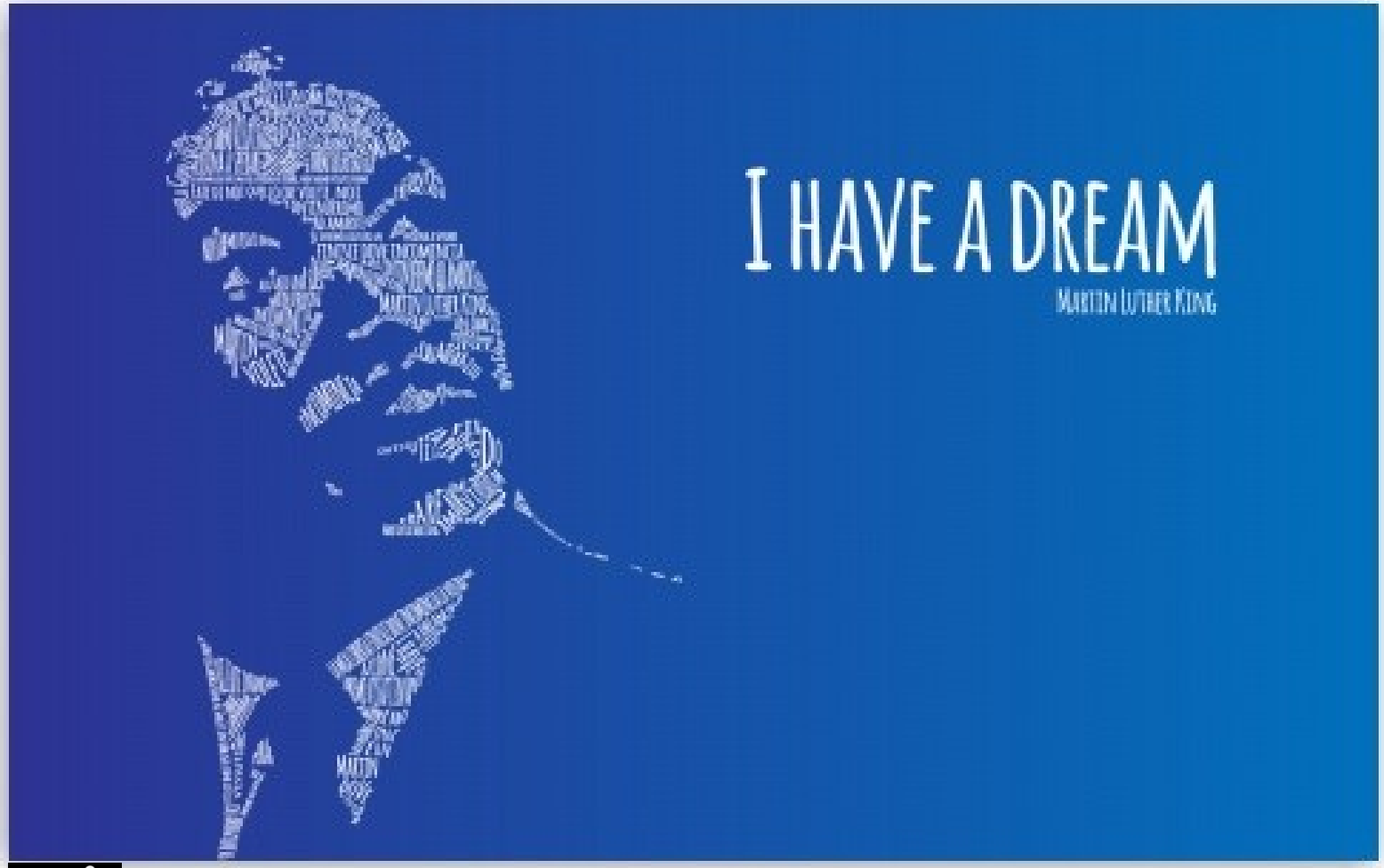


PLANETARY BOUNDARIES

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		



https://www.youtube.com/watch?v=MxC5a7Qrstk

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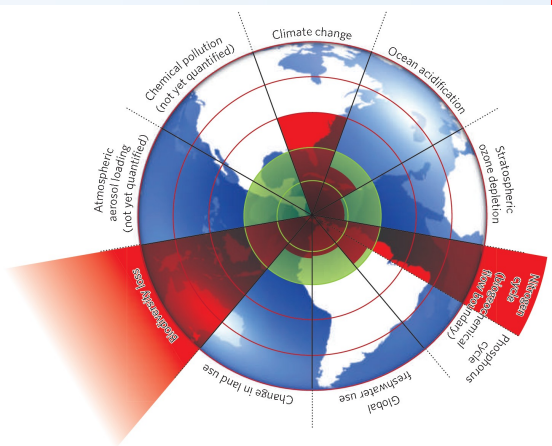
I. Ztráta biodiverzity

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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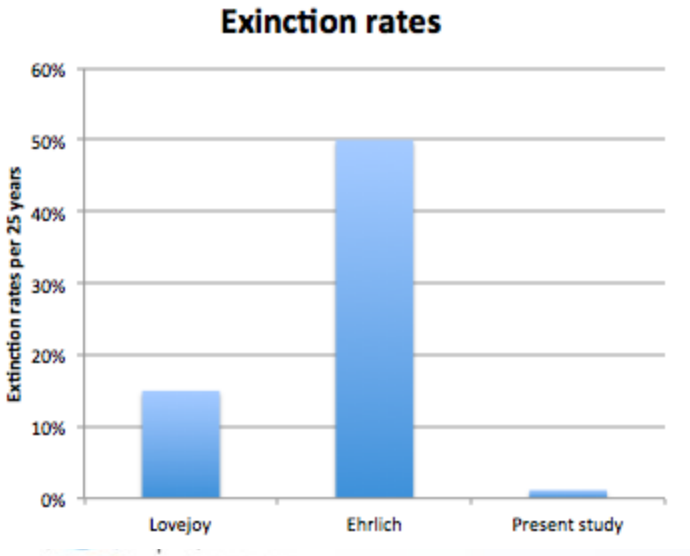

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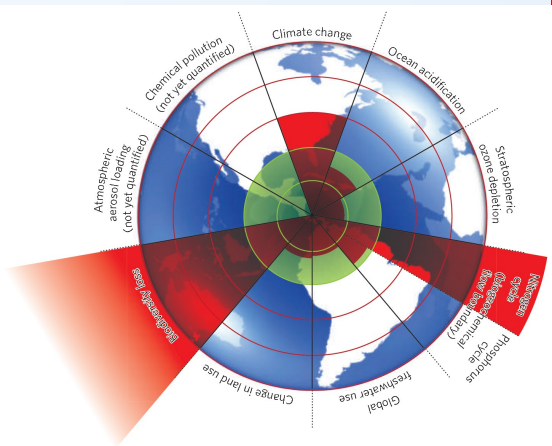


- vymírání obratlovců v minulém století 114 x rychlejší než přirozená rychlost

0

UPFRONT 24 June 2015

IUCN list shows no new extinctions – but they loom large

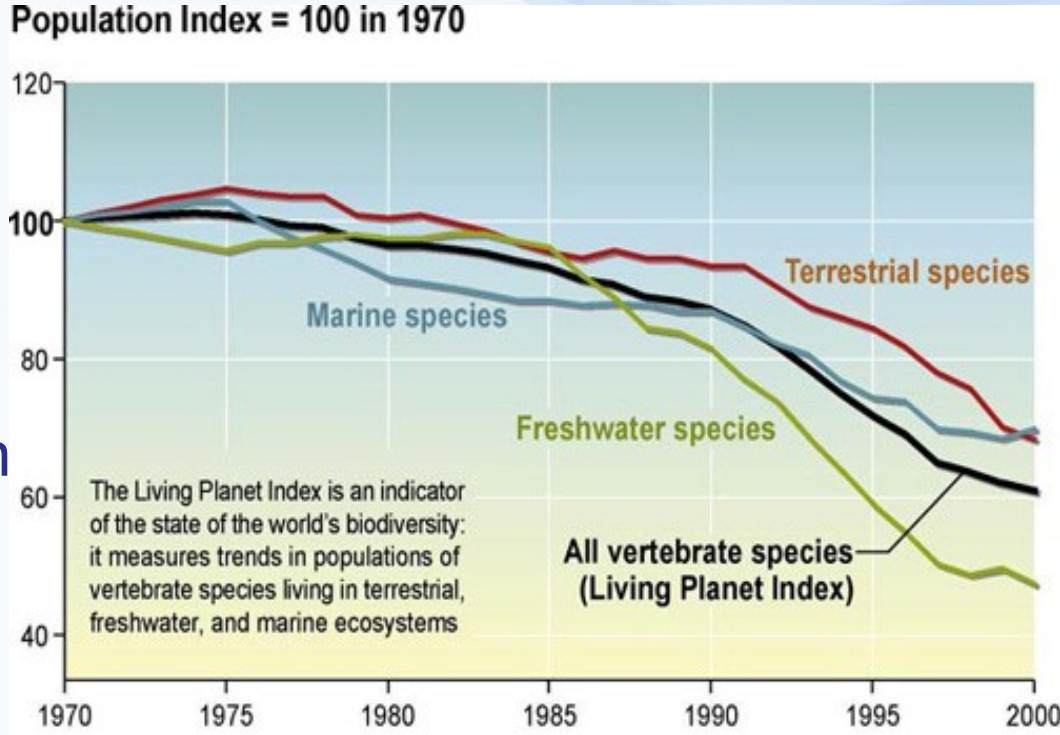
Species need protection *(Image: Tui De Roy/Minden Pictures)*

GOOD news or bad? The latest update to the IUCN Red List of Threatened Species shows that many species are in decline – but contains no additions to the extinct category.

Almost 23,000 of nearly 80,000 species that the IUCN has information on are threatened with extinction. In the update, 14 species have been moved into the critically endangered category

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



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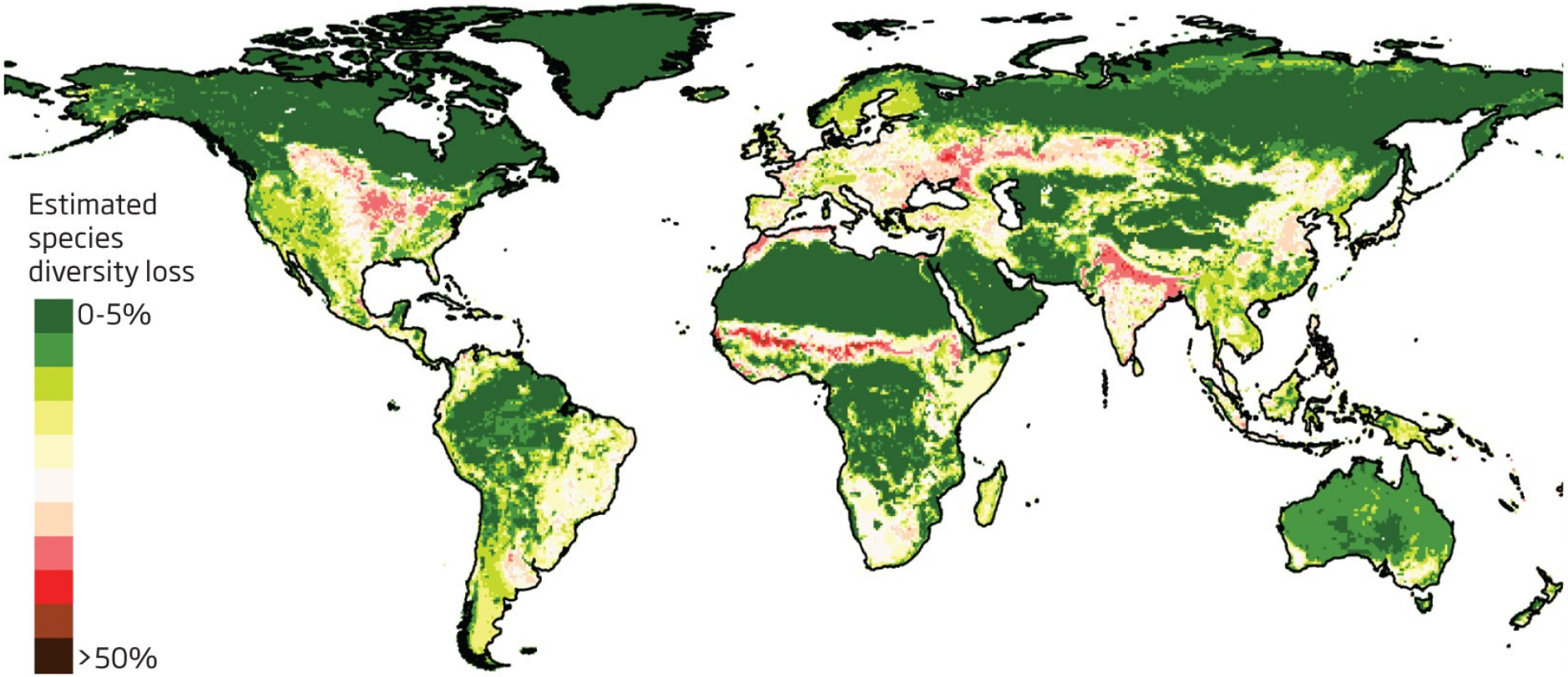
The damage so far

In the last 500 years the number of species in each ecosystem has dropped by 16 per cent on average



Threatened species

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

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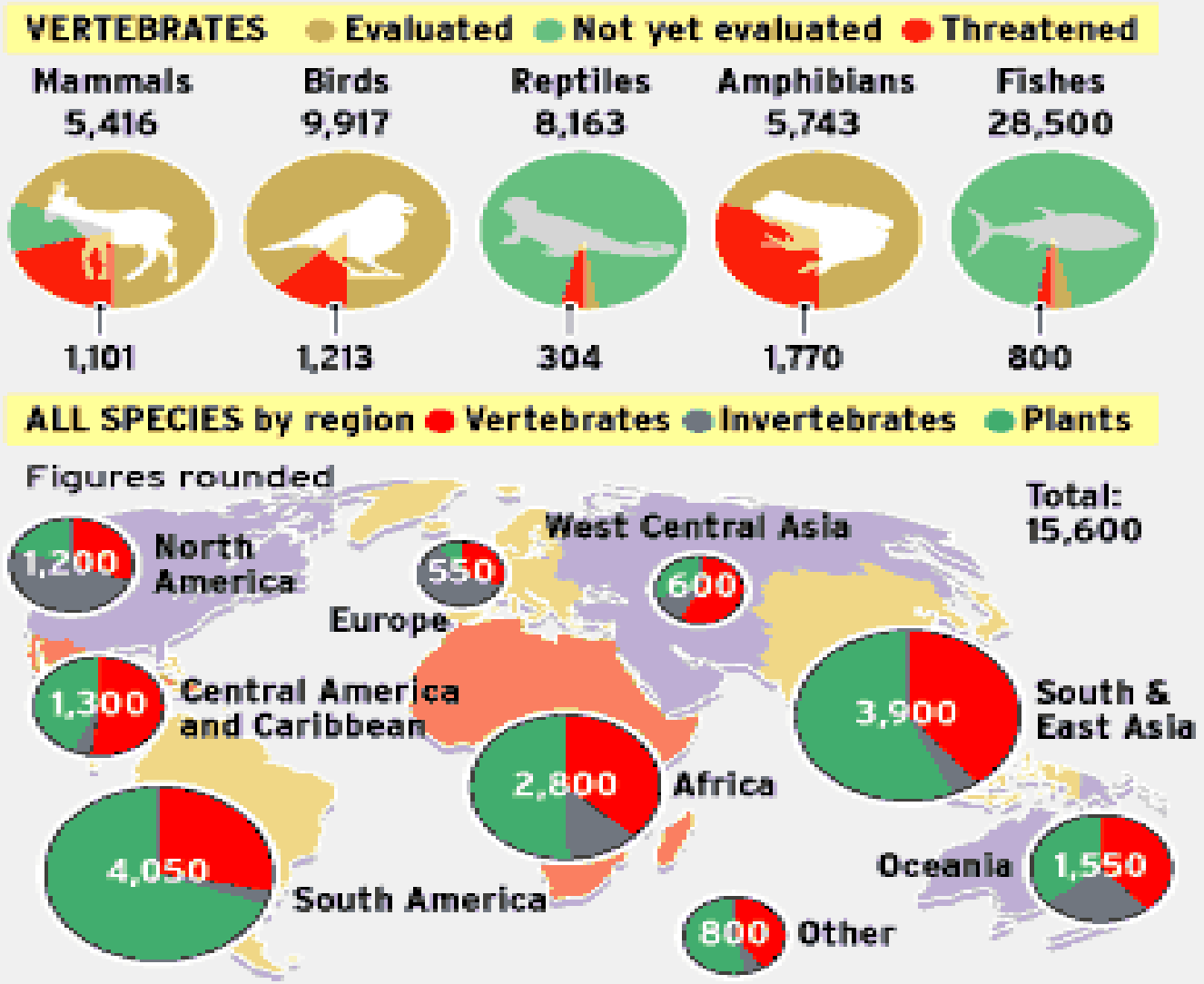
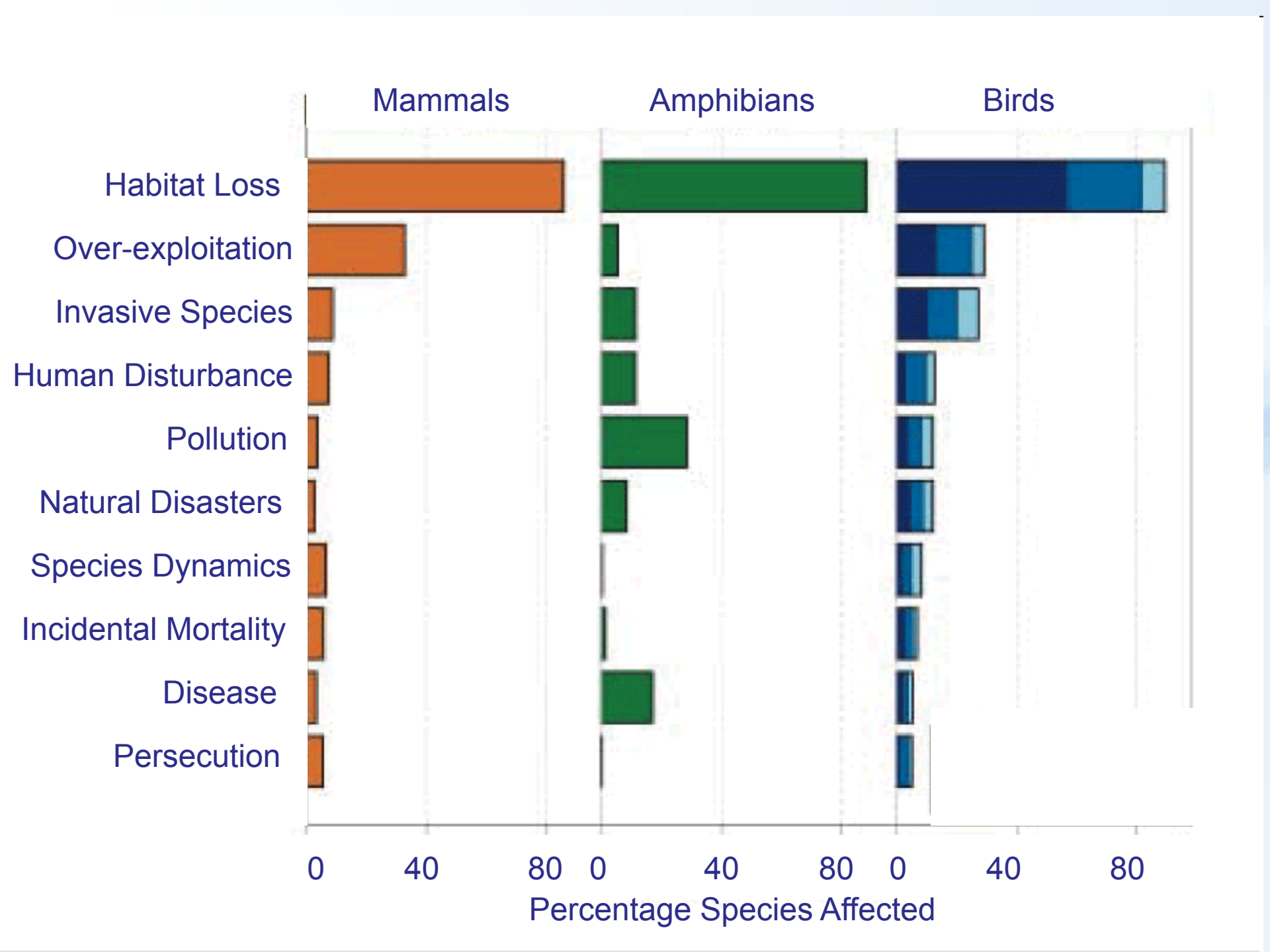


SOURCE: IUCN World Conservation Union

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
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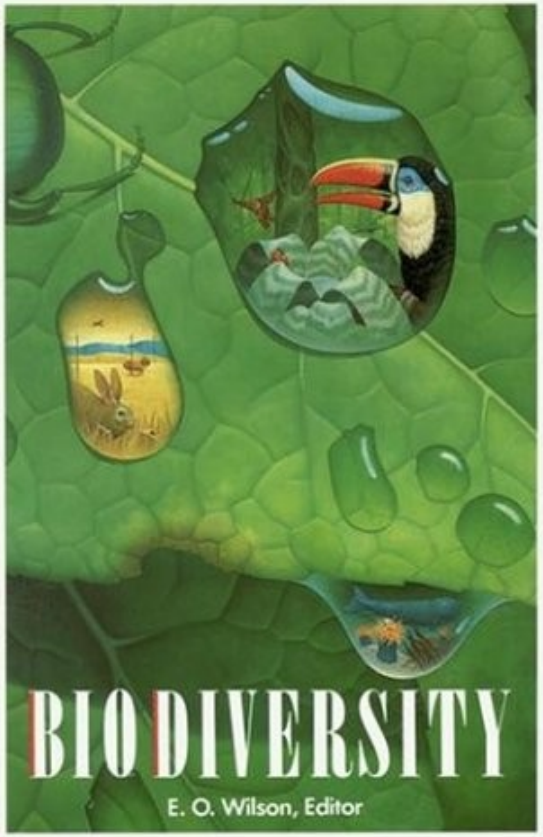
0
40
80
Percentage Species Affected



2010 International Year of Biodiversity

Biodiverzita x původní obyvatelé pralesa

Dva pohledy

„přírodní národy = ušlechtilí divoši chránící své ŽP“

x

„přírodní národy neničí své ŽP protože nemají technologie“

Kde je pravda?

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Biodiverzita x původní obyvatelé pralesa

- aktuální poznatky svědčí pro první tezi:
- deforestace Amazonského pralesa (2000 – dnes) v oblastech spravovaných kmeny Yanomami či Kayapo odpovídala 0,6 %, ostatní (státní) oblasti pak 7 %
- v Guatemale je tento rozdíl až 20%
- „*tragedie obecní pastviny*“ zde neplatí
    - jedná se o „majetek“ komunity, kde platí určitá pravidla sdílení a hospodaření
- problém nastává při intervenci zvenčí – vláda či ochranáři
- „ochrana“zakázáním lovu „*bushmeat*“ vede k zvýšení chudoby místních obyvatel a prodeji jejich dětí do otroctví
- řešení?

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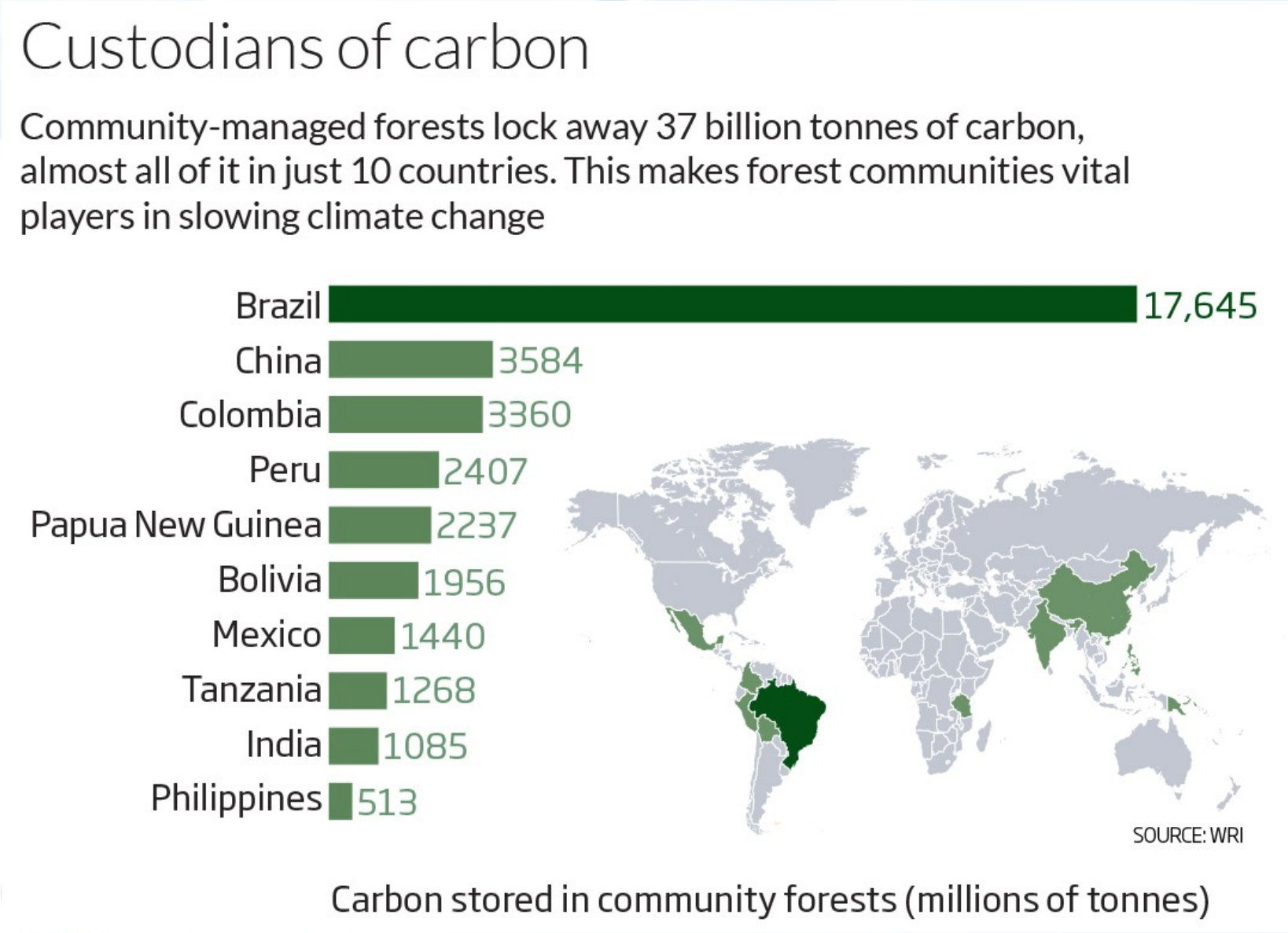
- řešení – předat oblasti pralesa do správy obyvatelům, kteří tam (po miliony let) žijí a jsou na funkčních ekosystémech bytostně závislí

Komunitně spravovaný prales x CO_2



Invazivní druhy

- šíření díky nepřítomnosti přirozených nepřátel či kompetitorů v novém prostředí
- problém pokud likvidují původní druhy či činí ekonomické škody

Invazivní druhy

- řešení – najít přirozeného nepřítele, který ale nebude napadat jiné podobné druhy

Aktuálně.cz

ZPRÁVY

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Proti rozpínavé rostlině nasazují Britové japonský hmyz

9. 3. 2010 22:05

Křídlatka rozpoutala invazi v celé Evropě, Británie ji chce zastavit dalším cizím druhem

Londýn - Křídlatka japonská (Reynoutria japonica) je metr až dva a půl metru vysoká rostlina, která byla do Evropy dovezena v devatenáctém století coby okrasná květina.

Místo toho však starý kontinent získal jeden ze svých nejznámějších invazních druhů, tedy rostlinu, která zde nemá

Biocontrol triumphs

The use of biocontrol against invasive weeds goes back more than a century. Outside Europe, 70 countries have introduced agents against more than 130 problem weeds and many have been spectacularly successful.

Rubbervine

Madagascan rubber vine (*Cryptostegia grandiflora*) was introduced to Australia in the 19th century as a garden plant. By the 1980s it infested more than 40,000 square kilometres, smothering trees and threatening tropical ecosystems. The leaf-destroying rust fungus *Maravalia cryptostegiae* was released in 1995, with dramatic and rapid results. Rubber vine is now almost completely under control – years sooner than predicted.

Water hyacinth

South America's water hyacinth (*Eichhornia crassipes*) is one of the world's worst aquatic weeds, clogging waterways on several continents. In Africa, one of the worst infestations was in Lake Victoria. Two species of *Neochetina* weevils (pictured below), released in the 1990s, cleared 80 per cent of weed in less than three years, possibly with a little help from El Niño.

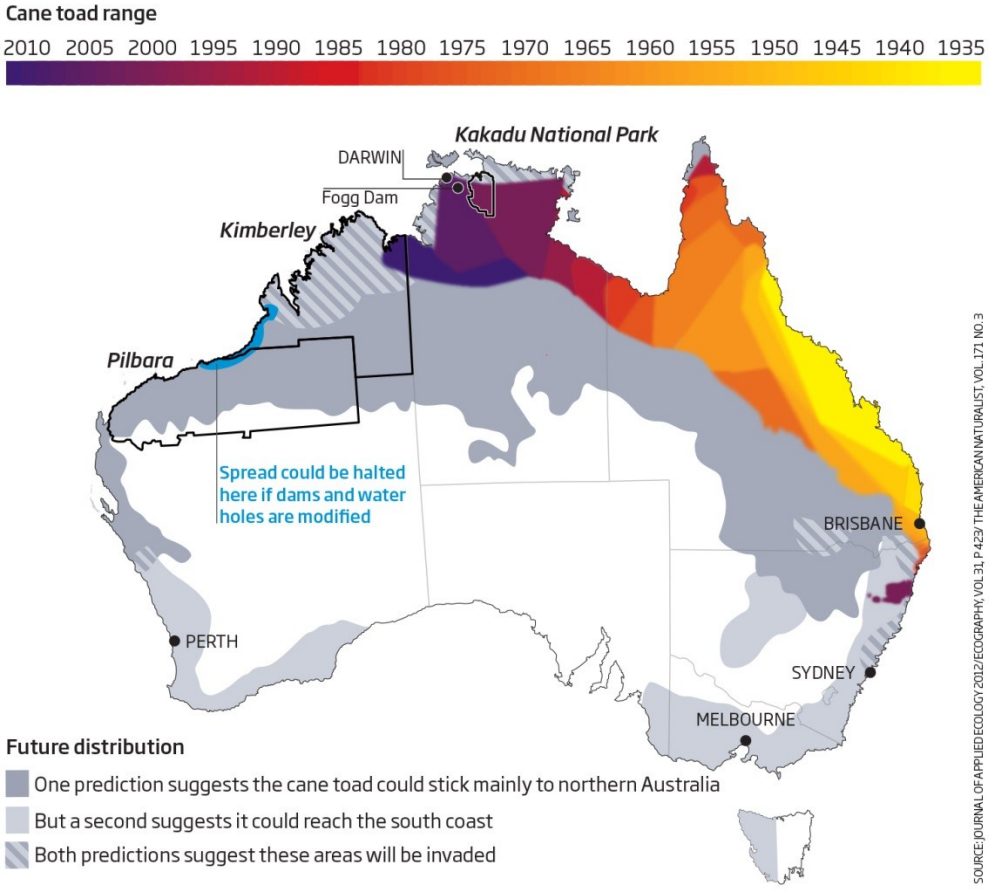
Purple loosestrife

European purple loosestrife (*Lythrum salicaria*) is another ornamental plant gone bad. In the US and Canada, it ousts native plants and animals from wetland habitats. After assessing more than 100 loosestrife-eating insects, two leaf-eating beetles (*Galerucella calmariensis* and *Galerucella pusilla*) were released in the west and midwest US. They destroyed 95 per cent of the weed within five years.

Ropucha obrovská – hrozba či přínos?

Faster and faster

Cane toads spread slowly for the first 50 years after their introduction on the east coast of Australia, but are now racing ever faster across the north of the country. Predictions of how far they will spread in the future vary



Winners and losers

The effect of cane toads on Australia's native wildlife varies greatly.

Birds

Little impact. Seem to either ignore the toads, eat only the non-toxic bits or tolerate the toxins.

Snails

A cane toad delicacy, but the two don't overlap in spatial extent very much so numbers haven't fallen greatly.

Snakes

Varies. Some are immune to the cane toad's toxin, but those that aren't have seen local population crashes. The most vulnerable species seem to be evolving not to eat toads.

Freshwater crocodiles

In some places there have been mass die-offs, but in other areas they seem unaffected. It's not clear why.

Saltwater crocodiles

Relatively resistant to cane toad toxin.

Goannas

Badly affected initially, with 95 per cent killed as the toad invasion sweeps through a region. Later populations seem not to eat the toads – it's not clear if this is a learned, or evolved, response.

Native frogs

Little change overall. The negative effects, such as tadpoles dying when they eat cane toad eggs, seem to be balanced by positive effects such as predator reduction. However, the toads carry a parasite deadly to the magnificent tree frog.

Quolls

Massively affected, with large-scale local population crashes. But some survive. And they can easily be taught not to eat the toads.

Blue-tongued skinks

Virtually disappear when the toads arrive.

Fish

Learn to avoid cane toad tadpoles.

Frill-necked lizards

In some areas they die out, in others they don't.

Problém evolučních pastí

- vytvoření takového prostředí, ve kterém instinktivní chování živočichů (i celých populací) vede k záhubě (v krajním případě)

„ *Do you prefer the thing that's worse for you?*“

Junk food

Albatrosses and other seabirds are drawn to bottle tops, cigarette lighters, golf balls and other plastic rubbish floating on the ocean. Mistaking them for food, the birds swallow them, often to regurgitate to their chicks. Many subsequently die, full but starving.

(Image: Rebecca Hosking/FLPA)

Mirages

Many aquatic insects need to lay their eggs in water and so have evolved vision sensitive to the polarised light that signals a water surface. Unfortunately, glass buildings, cars, road surfaces and solar panels often polarise light in the same way, leading billions of insects to lay their precious eggs on barren ground.

(Image: Achim Mittler, Frankfurt am Main/Flickr/Getty)

Beetle beer goggles

Some brown beer bottles have an uncanny similarity to the colour, sheen and texture of female giant jewel beetles. Males have been known to try to copulate with them in a futile embrace.

(Image: AlamyCelebrity/Alamy)

Turn, turtle!

Newly hatched turtles instinctively head for the horizon. Unfortunately, street lights often bamboozle them into heading away from the sea, towards busy tourist resorts where they are crushed to death.

(Image: Jeff Greenberg/Alamy)

Pytláctví x x terorismus

The price of a tusk

The purchasing power of one tusk in the Democratic Republic of the Congo

Average weight **3.8kg**

Bush value/kg **$100**

Retail value/kg (Asia) **$3000**

SOURCE: BORNFREEUSA.ORG

Centrum pro výzkum toxických látek v prostředí

Pytláctví x x terorismus

Seven deadly regions for Africa's elephants

Crime and conflict are fuelling the ivory trade in seven regions of Africa, as groups use it to bankroll their activites

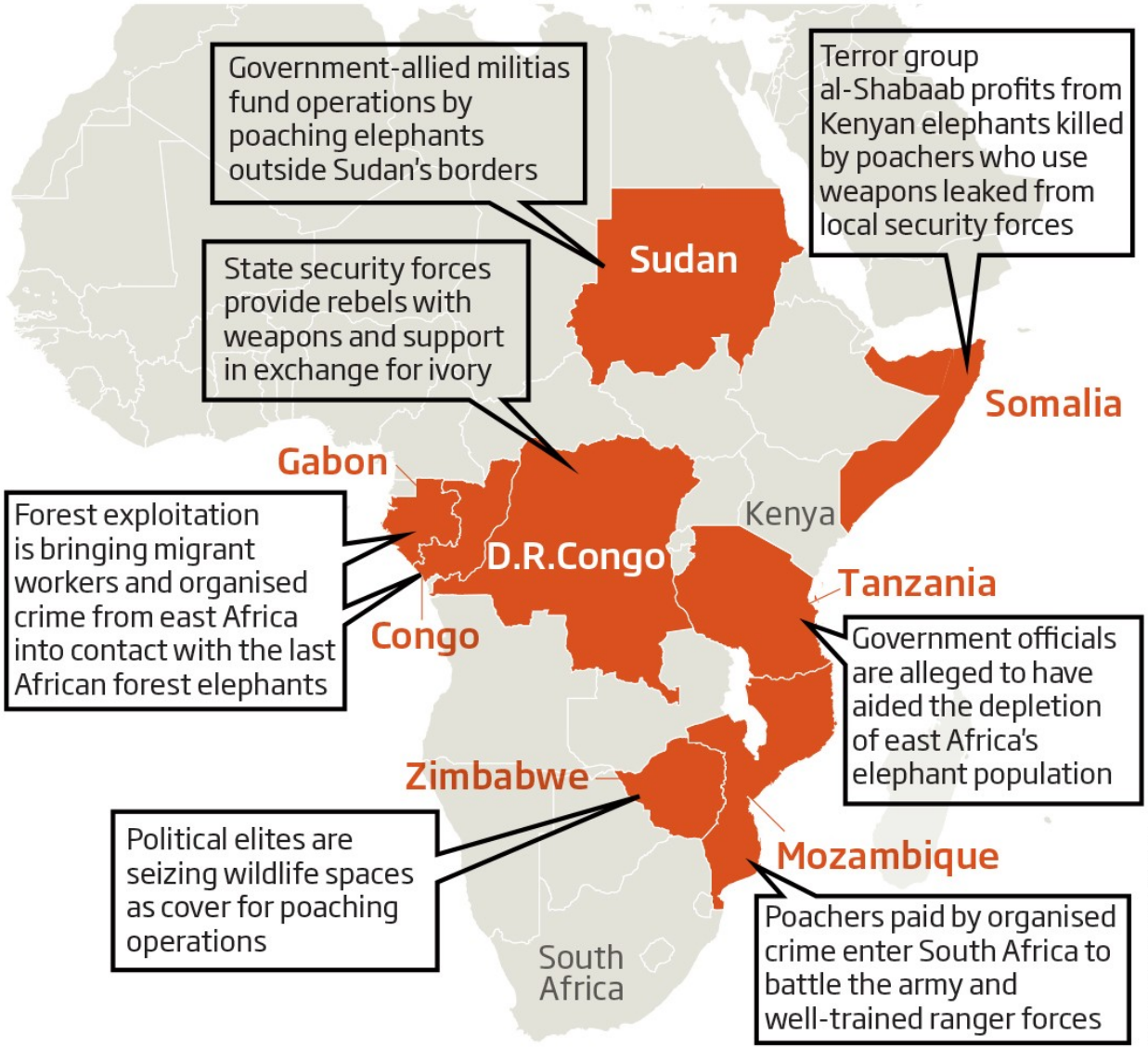


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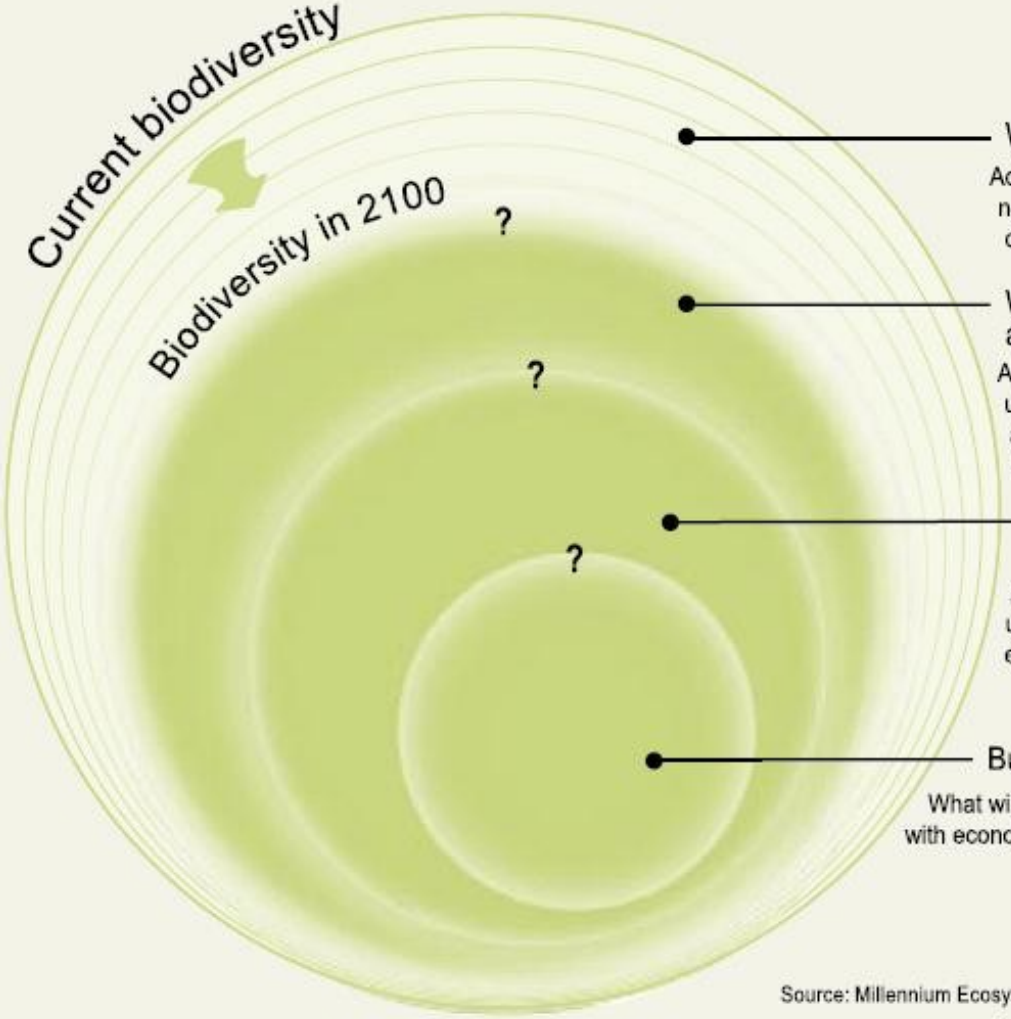
Figure 2. How Much Biodiversity Will Remain a Century from Now under Different Value Frameworks?

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