

Environmentální rizika biodiverzity

Z5151



GEOGRAFICKÝ ÚSTAV
PŘÍRODOVĚDECKÁ FAKULTA MU

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<https://www.tiverton.bham.sch.uk/rainforest-mania/>

SYLABUS

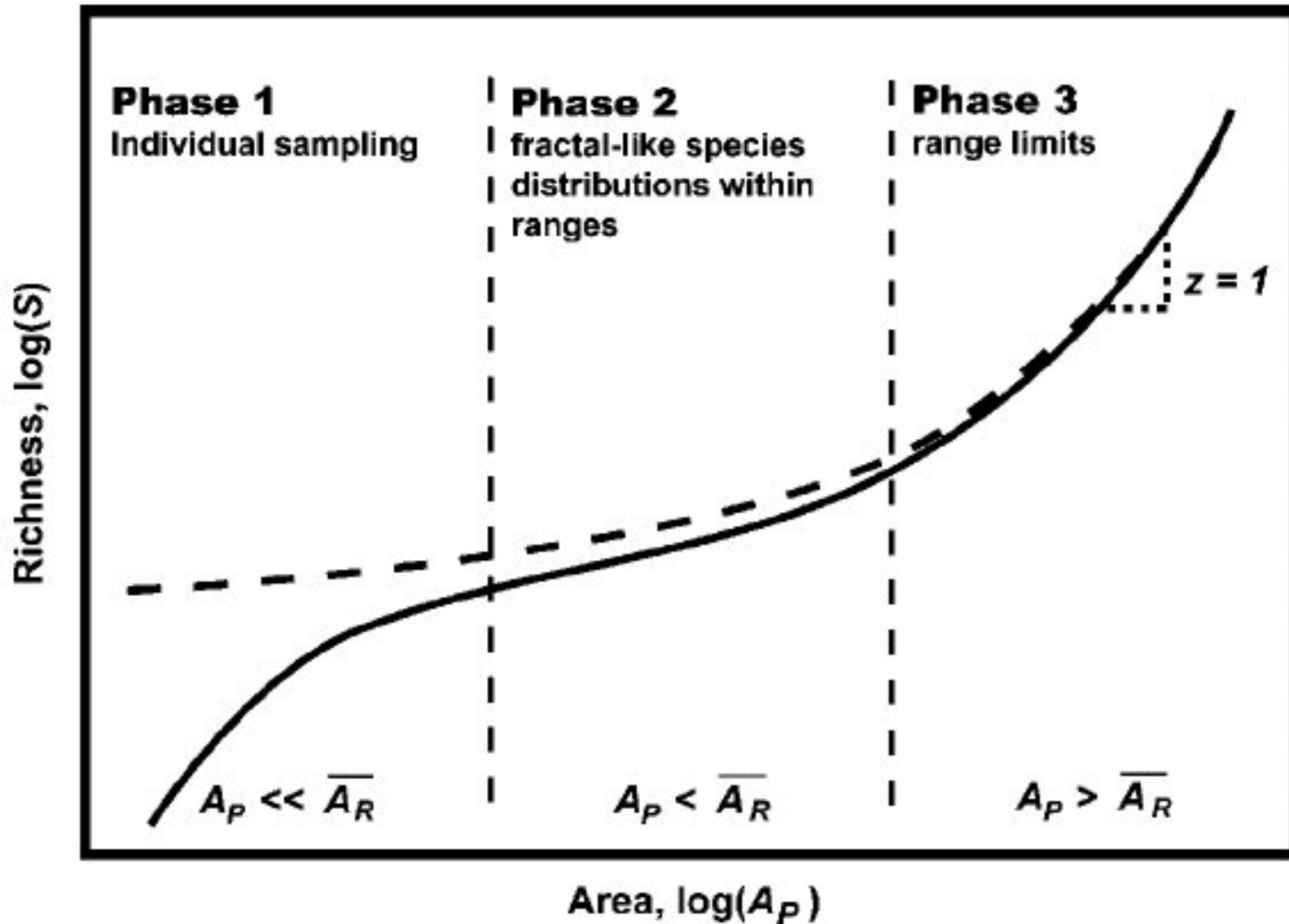
- 1) Úvod (struktura ekosystémů, biologická diverzita, ekologické procesy)
- 2) Biodiverzita – teorie, charakteristiky, řídicí faktory
- 3) Environmentální rizika (typologie); schéma DPSIR (Řídicí faktory, Tlaky, Stav, Dopady, Odezvy)
- 4) Biodiverzita – časo-prostorové aspekty**
- 5) Ekologie působení stresoru
- 6) Biodiverzita a ekosystémové procesy
- 7) Vztahy biodiverzity ke klimatu
- 8) Scénáře změn využití krajiny
- 9) Změny biotopů (Natura 2000, Ochrana stanovišť)
- 10) Vliv chemického znečištění na biodiverzitu
- 11) Biologické invaze
- 12) Ekosystémové služby
- 13) Analýza rizik pro biodiverzitu

OTÁZKY

- 6. masové vymírání (rychlost srovnatelná s dřívějšími vymíráními, bude záležet na délce trvání této dynamické změny – dříve perioda 60-100 mil. let – poslední před 65 mil. let
- ničení pralesa od prostředka a od krajů – rozdíly? vysvětlení?
- vymírání – vliv časové škály
- velikost zrna krajiny
- alfa, beta, gama diverzita vs. invaze
- 25-30 % produktivity spotřebovává lidská populace
- temperátní graslandy ☺
- funkční diverzita – zástupnost taxonů
- vody jsou ephemernější (vysychání/zazemění – méně ostrovního fenoménu
- původní bezlesé oblasti krajiny udržovány dříve požáry a býložravci (později extenzivní hospodaření) – to dnes ubývá

- přibývá bobrů, krkavců, vlků
- kaskádový efekt ubývání druhů
- snaha, aby změny nebyly tak rychlé

VZTAH POČTU DRUHŮ A PLOCHY



ALTERNATIVNÍ VYJÁDŘENÍ BIODIVERZITY

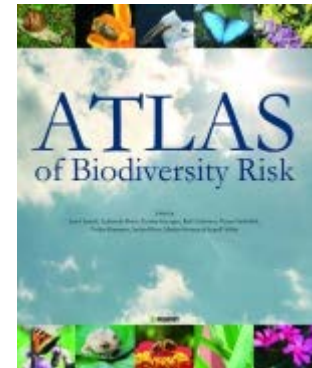
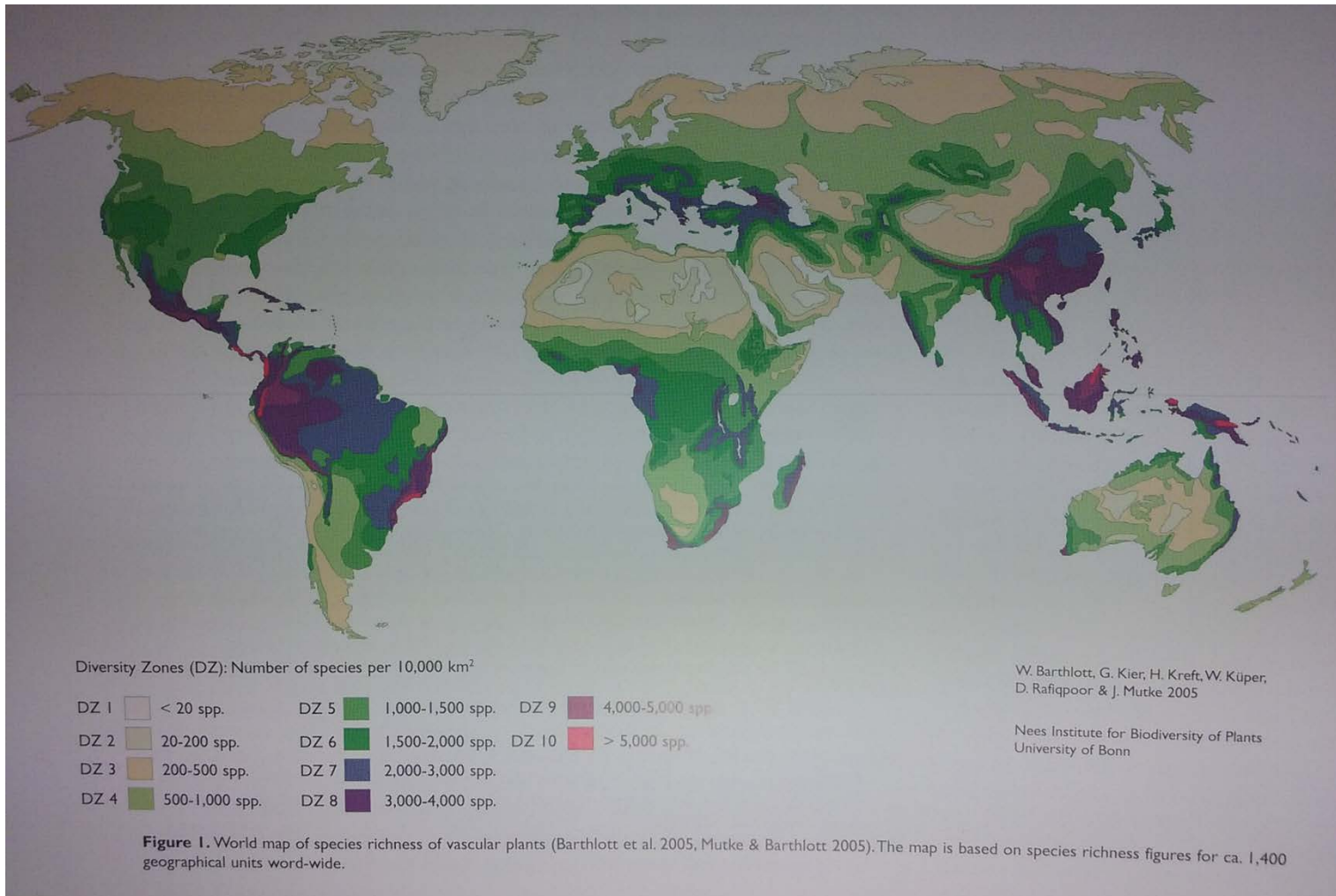
taxonomická
systematická/fylogenetická
obměna druhů (turnover)

PROCESY A SYNTÉZY

- distribuční vzorce (patterns) biodiverzity souvisejí se složitými dynamickými časo-prostorovými procesy
- například prediktabilita druhové bohatosti roste nejen se zvetšující se prostorovou škálou, ale také s délkou pozorování (temporal window of observation)
- negativní vztah mezi species-area a species-time (druhová bohatost roste s časem pomaleji v rámci větších prostorových jednotek)

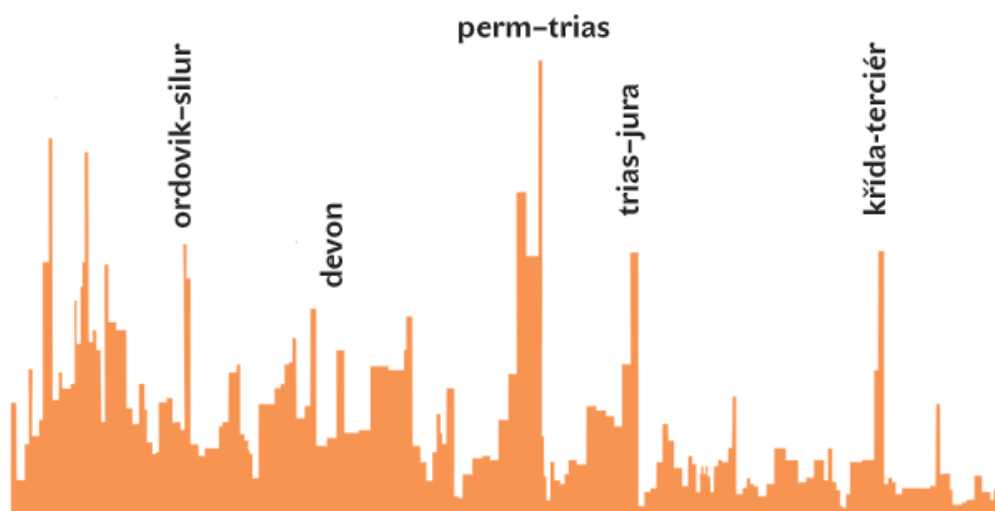
DIVERZITA V PROSTORU

Diverzita cévnatých rostlin



DIVERZITA V ČASE

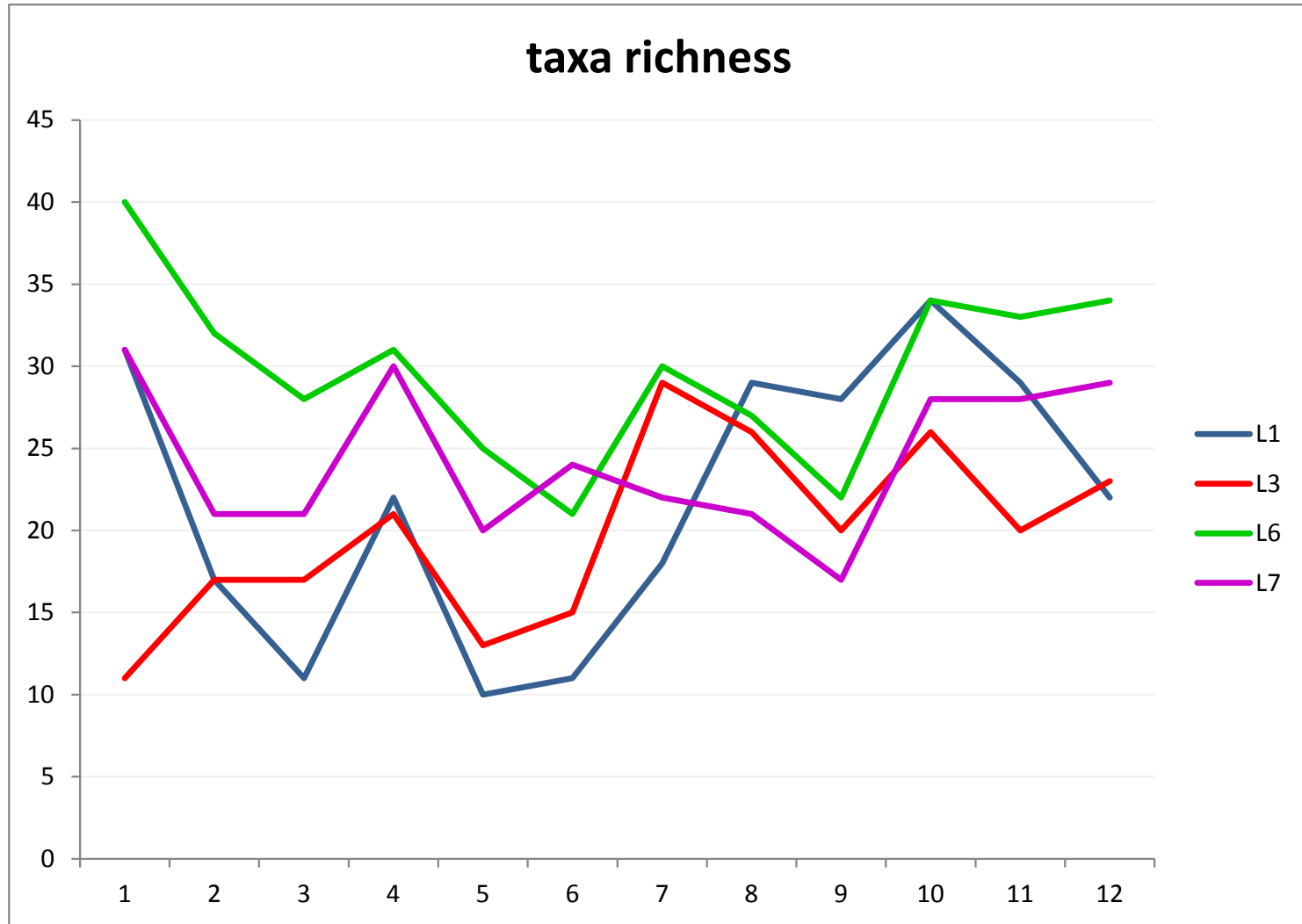
- kambrická exploze
- vymírání na konci permu
- vymírání na konci křídy



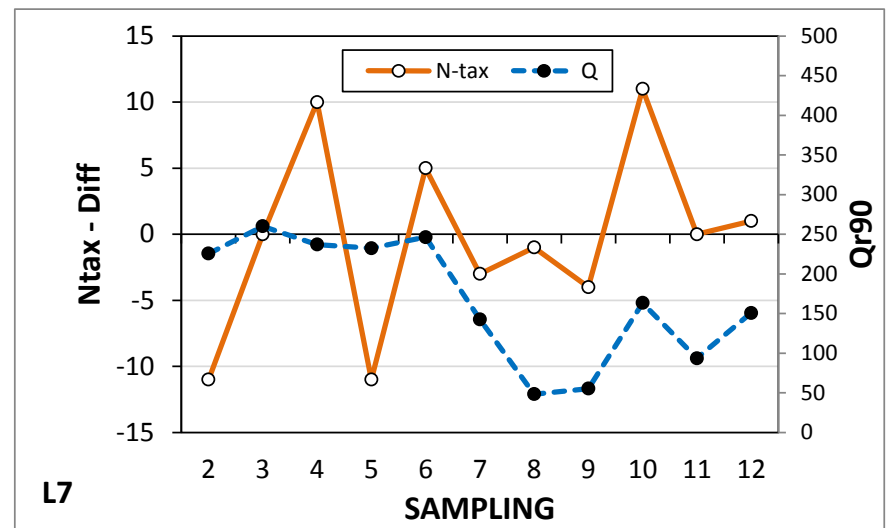
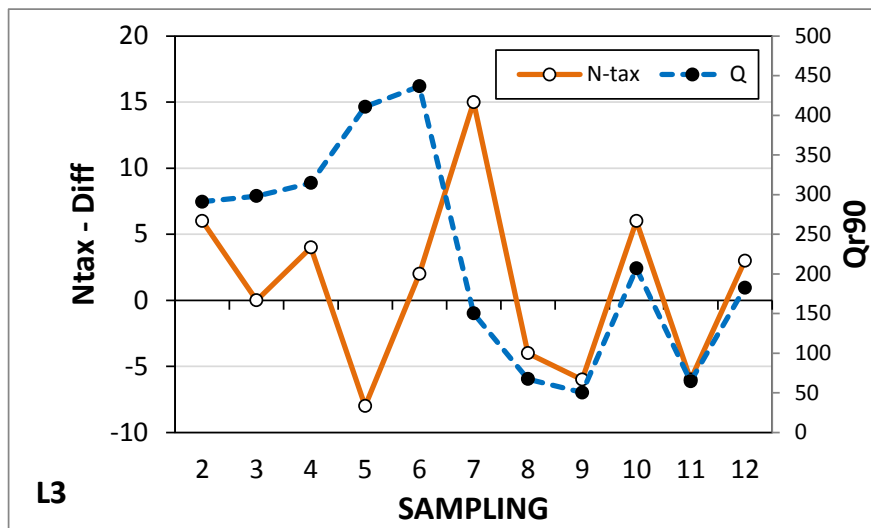
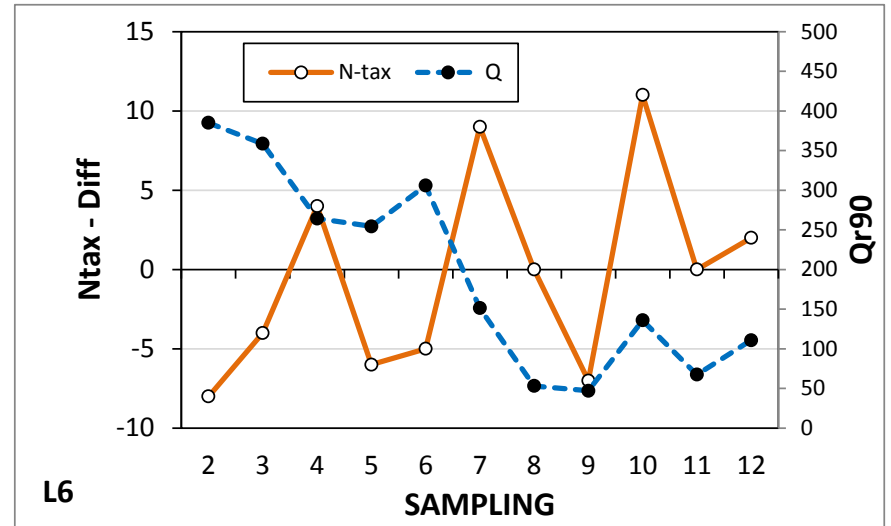
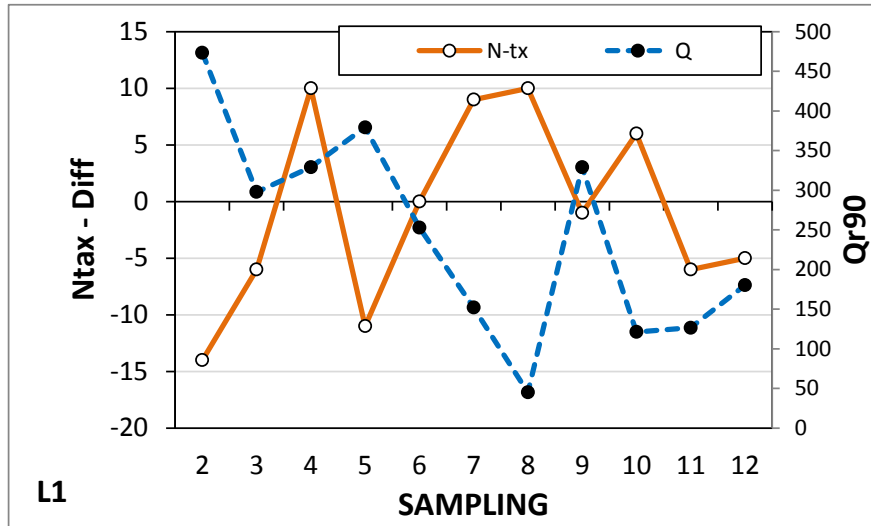
Procento vyhynulých fosilních mořských taxonů (svislá osa) z celkového počtu taxonů za libovolný časový úsek (podélná osa).

Geologický čas				
Eon	Éra	Perioda	Miliony let	
fanerozoikum	kenozoikum	kvartér (čtvrtohory)	0 – 3	
		neogén	3 – 23	
		paleogén	23 – 66	
	mezozoikum (druhohory)	křída	66 – 145	
		jura	145 – 201	
		trias	201 – 252	
	paleozoikum (prvohory)	perm	252 – 299	
		karbon	299 – 359	
		devon	359 – 419	
		silur	419 – 443	
		ordovik	443 – 485	
	kambrium	485 – 541		
	proterozoikum (starohory)			541 – 2500
	archaikum (prahory)			2500 – 4000
hadaikum			4000 – 4600	

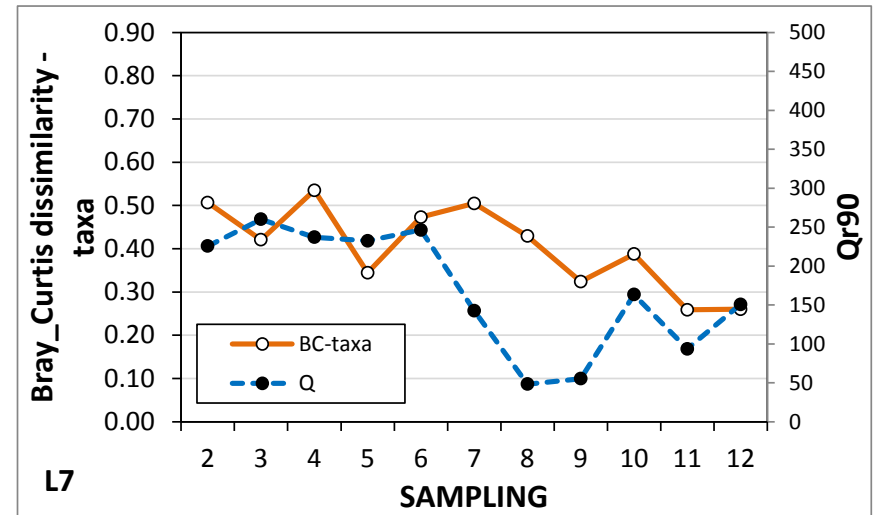
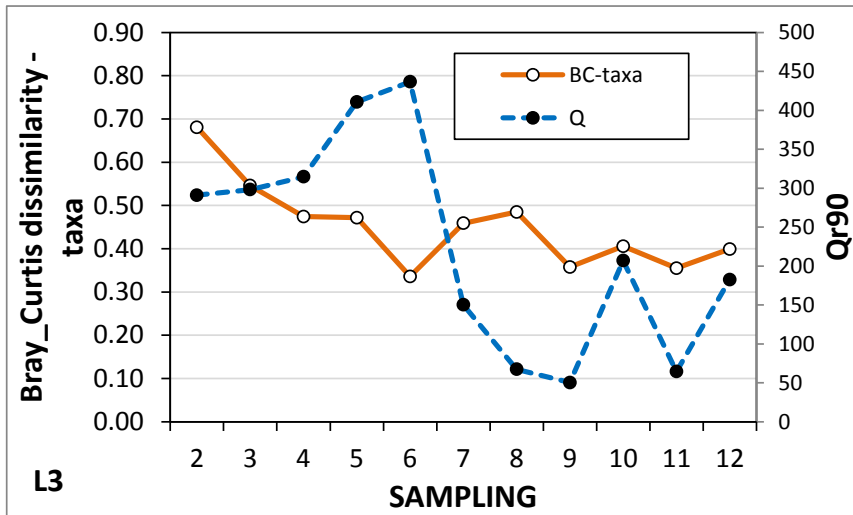
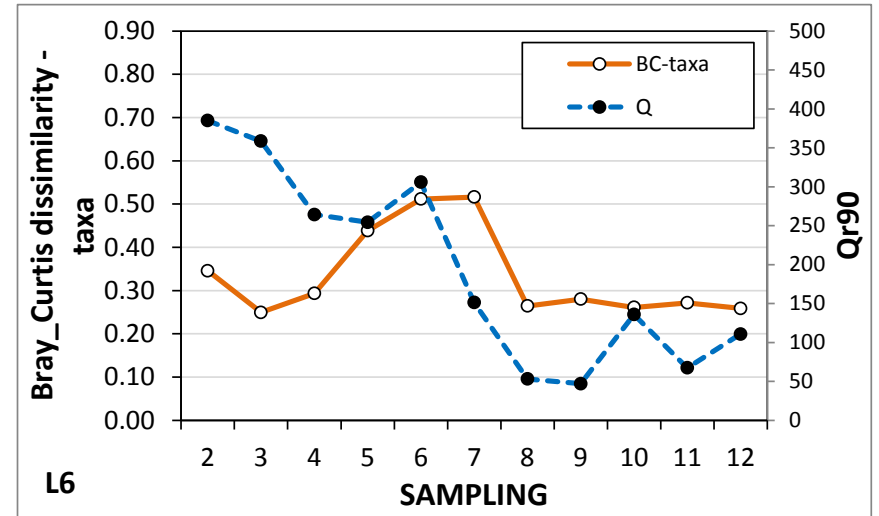
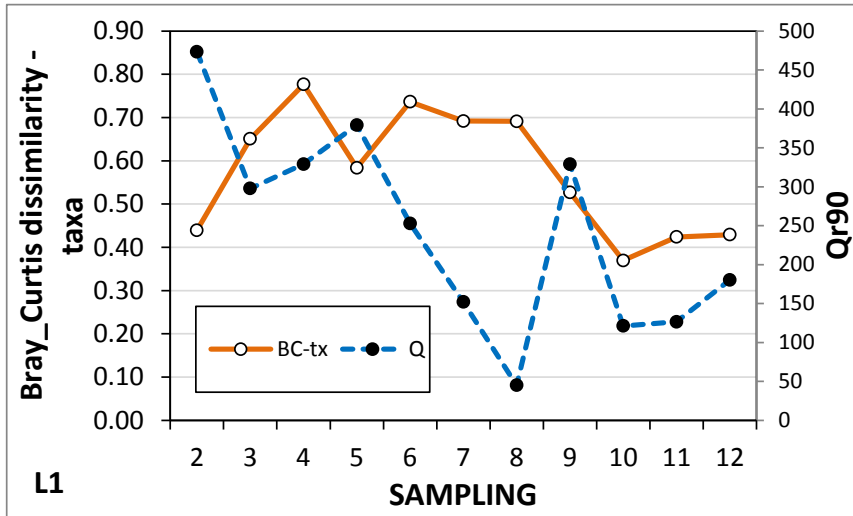
DIVERZITA V ČASE



DIVERZITA V ČASE

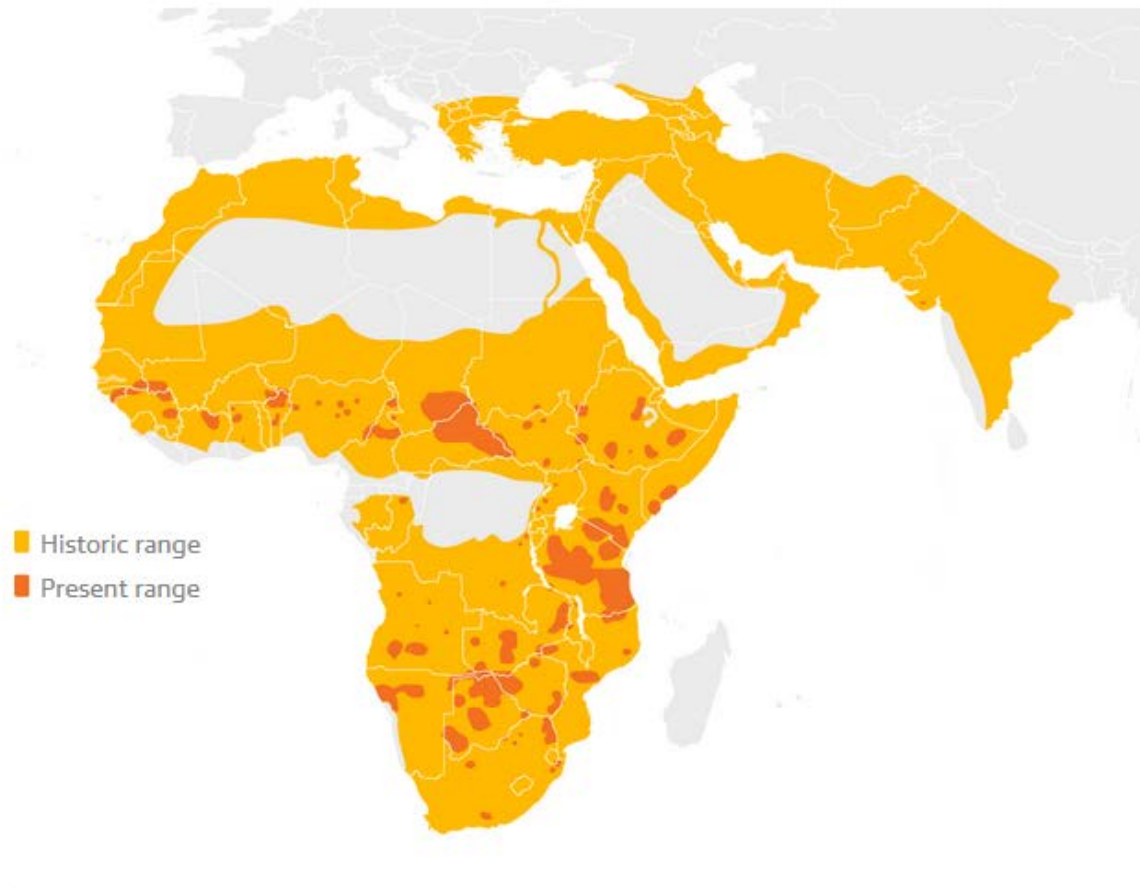


DIVERZITA V ČASE



DIVERZITA V ČASE

Current and historic distribution of lions



Guardian graphic | Source: PNAS

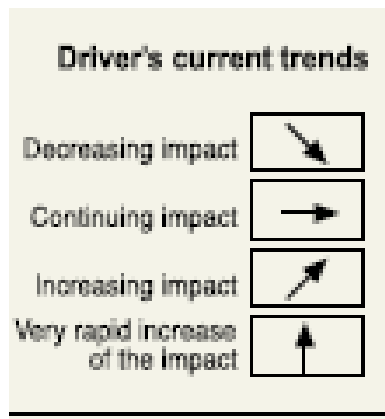
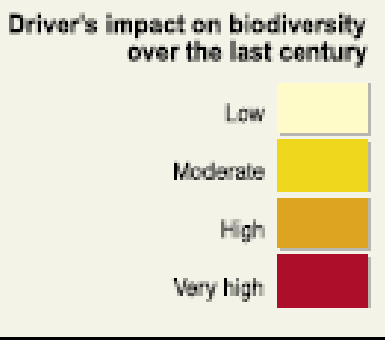
Historically lions lived across Africa, southern Europe, the Middle East, all the way up to Northwestern India. Today their habitat has been reduced to a few tiny pockets of the original area.

MILLENNIUM ECOSYSTEM ASSESSMENT

Ekosystémové hodnocení milénia

Figure 3. MAIN DIRECT DRIVERS

The cell color indicates the impact to date of each driver on biodiversity in each biome over the past 50–100 years. The arrows indicate the trend in the impact of the driver on biodiversity. Horizontal arrows indicate a continuation of the current level of impact; diagonal and vertical arrows indicate progressively increasing trends in impact. This Figure is based on expert opinion consistent with and based on the analysis of drivers of change in various chapters of the assessment report of the Condition and Trends Working Group. This Figure presents global impacts and trends that may be different from those in specific regions.



		Habitat change	Climate change	Invasive species	Over-exploitation	Pollution (nitrogen, phosphorus)
Forest	Boreal					
	Temperate					
	Tropical					
Dryland	Temperate grassland					
	Mediterranean					
	Tropical grassland and savanna					
	Desert					
Inland water						
Coastal						
Marine						
Island						
Mountain						
Polar						

barva – historický vliv
šipka - současný trend

Box 1.2. MEASURING AND ESTIMATING BIODIVERSITY: MORE THAN SPECIES RICHNESS

Measurements of biodiversity seldom capture all its dimensions, and the most common measure—species richness—is no exception. While this can serve as a valuable surrogate measure for other dimensions that are difficult to quantify, there are several limitations associated with an emphasis on species. First, what constitutes a species is not often well defined. Second, although native species richness and ecosystem functioning correlate well, there is considerable variability surrounding this relationship. Third, species may be taxonomically similar (in the same genus) but ecologically quite distinct. Fourth, species vary extraordinarily in abundance; for most biological communities, only a few are dominant, while many are rare.

Simply counting the number of species in an ecosystem does not take into consideration how variable each species might be or its contribution to ecosystem properties. For every species, several properties other than its taxonomy are more valuable for assessment and monitoring. These properties include measures of genetic and ecological variability, distribution and its role in ecosystem processes, dynamics, trophic position, and functional traits.

In practice, however, variability, dynamics, trophic position, and functional attributes of many species are poorly known. Thus it is both necessary and useful to use surrogate, proxy, or indicator

measures based on the taxonomy or genetic information.

Important attributes missed by species or taxon-based measures of diversity include:

- **abundance**—how much there is of any one type. For many provisioning services (such as food, fresh water, fiber), abundance matters more than the presence of a range of genetic varieties, species, or ecosystem types.

- **variation**—the number of different types over space and time. For understanding population persistence, the number of different varieties or races in a species or variation in genetic composition among individuals in a population provide more insight than species richness.

- **distribution**—where quantity or variation in biodiversity occurs. For many purposes, distribution and quantity are closely related and are therefore generally treated together under the heading of quantity. However, quantity may not always be sufficient for services: the location, and in particular its availability to the people that need it, will frequently be more critical than the absolute volume or biomass of a component of biodiversity.

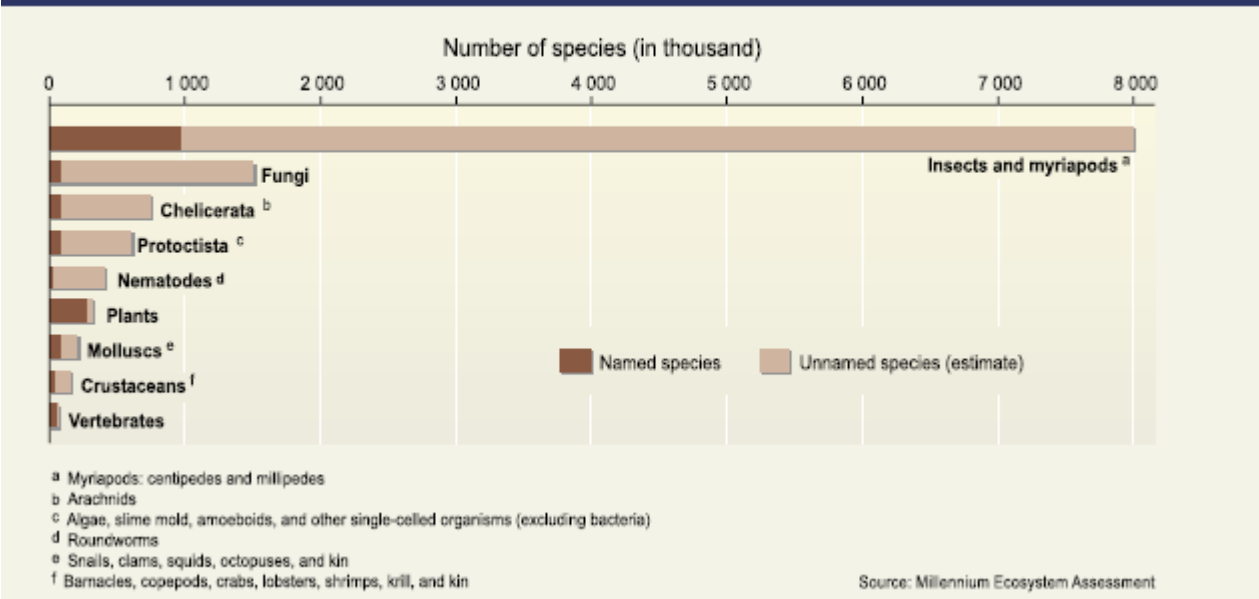
Finally, the importance of variability and quantity varies, depending on the level of biodiversity measured. (See Table.)

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Level	Importance of Variability	Importance of Quantity and Distribution
Genes	adaptive variability for production and resilience to environmental change, pathogens, and so on	local resistance and resilience
Populations	different populations retain local adaptation	local provisioning and regulating services, food, fresh water
Species	the ultimate reservoir of adaptive variability, representing option values	community and ecosystem interactions are enabled through the co-occurrence of species
Ecosystems	different ecosystems deliver a diversity of roles	the quantity and quality of service delivery depend on distribution and location

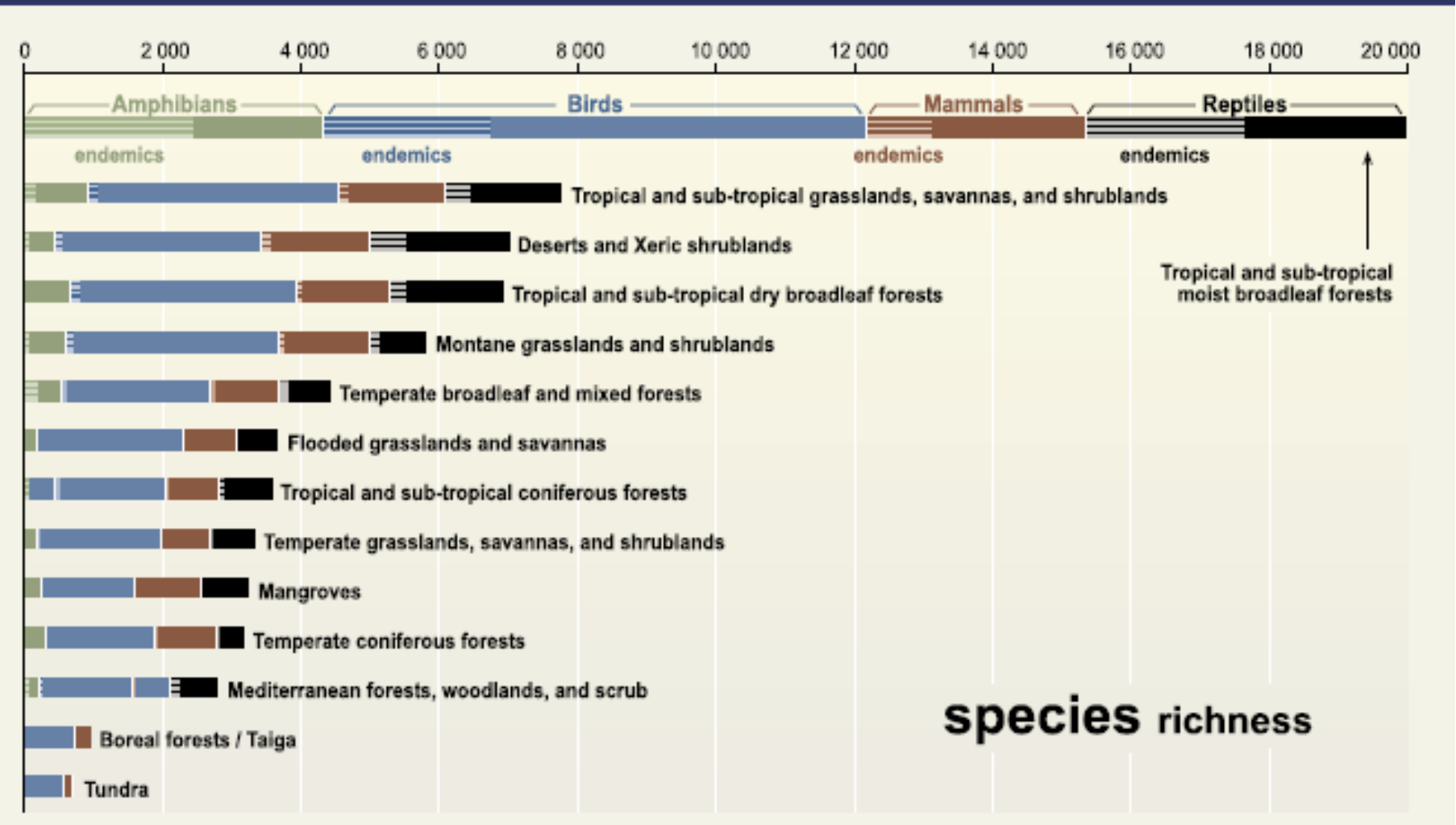
¹ Biomes represent broad habitat and vegetation types, span across biogeographic realms, and are useful units for assessing global biodiversity and ecosystem services because they stratify the globe into ecologically meaningful and contrasting classes. Throughout this report, and elsewhere in the MA, the 14 biomes of the WWF terrestrial biome classification are used, based on WWF terrestrial ecoregions (C4.2.2).

Figure 1.1. ESTIMATES OF PROPORTIONS AND NUMBERS OF NAMED SPECIES IN GROUPS OF EUKARYOTE SPECIES AND ESTIMATES OF PROPORTIONS OF THE TOTAL NUMBER OF SPECIES IN GROUPS OF EUKARYOTES (C4.2.3)



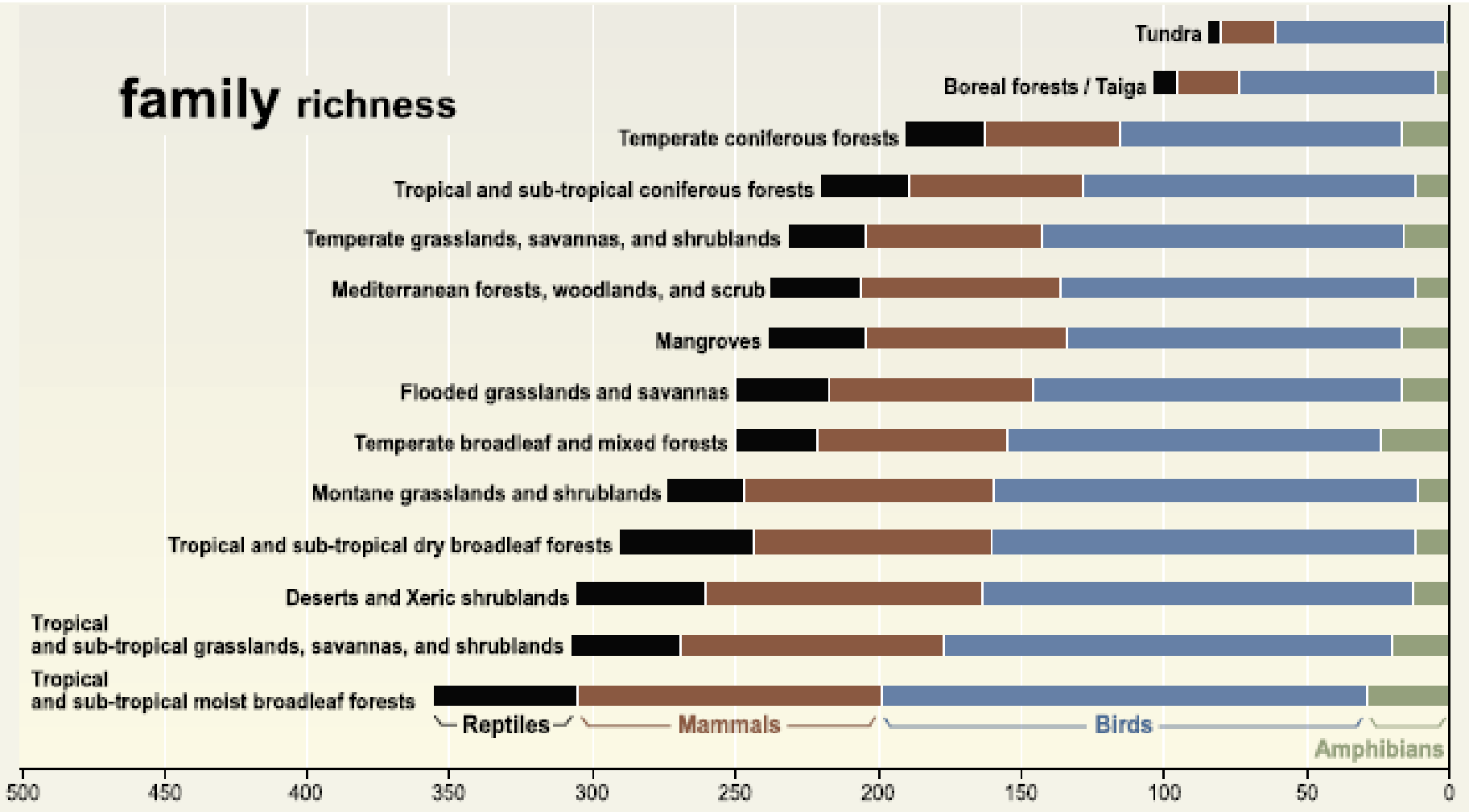
MILLENNIUM ECOSYSTEM ASSESSMENT

Figure 1.2. Comparisons for the 14 Terrestrial Biomes of the World in Terms of Species Richness, Family Richness, and Endemic Species (C4 Fig 4.7)



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family richness

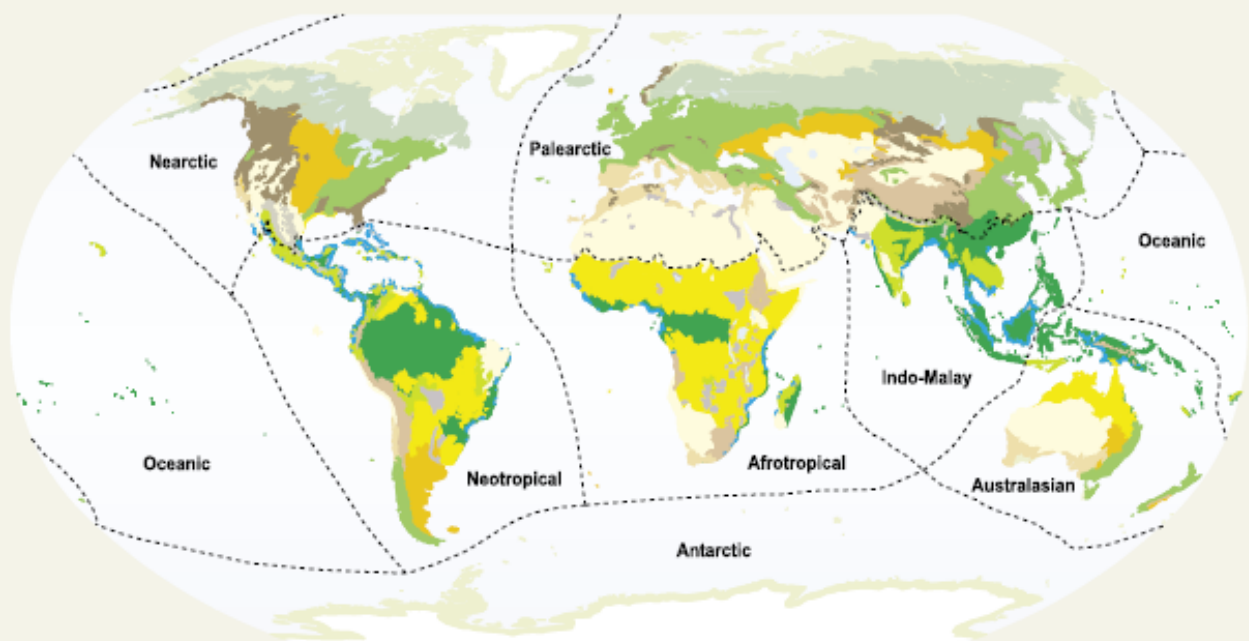


Source: Millennium Ecosystem Assessment

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Figure 1.3. THE 8 BIOGEOGRAPHICAL REALMS AND 14 BIOMES USED IN THE MA (C4 Figure C4.3)

Biogeographic realms are large spatial regions within which ecosystems share a broadly similar biological evolutionary history. Eight terrestrial biogeographic realms are typically recognized, corresponding roughly to continents. Although similar ecosystems (such as tropical moist forests) share similar processes and major vegetation types wherever they are found, their species composition varies markedly depending on the biogeographic realm in which they are found. Assessing biodiversity at the level of biogeographic realms is important because the realms display substantial variation in the extent of change, they face different drivers of change, and there may be differences in the options for mitigating or managing the drivers. Terrestrial biogeographic realms reflect freshwater biodiversity patterns reasonably well, but marine biogeographic realms are poorly known and largely undefined (C4.2.1).



- Terrestrial biomes**
- Tropical and sub-tropical moist broadleaf forests
 - Tropical and sub-tropical grasslands, savannas, and shrublands
 - Tropical and sub-tropical dry broadleaf forests
 - Temperate grasslands, savannas, and shrublands
 - Tropical and sub-tropical coniferous forests
 - Montane grasslands and shrublands
 - Temperate broadleaf and mixed forests
 - Flooded grasslands and savannas
 - Temperate coniferous forests
 - Mangroves
 - Boreal forests / Taiga
 - Deserts and Xeric shrublands
 - Tundra
 - Mediterranean forests, woodlands, and scrub
 - Rock and ice
 - Realm boundaries

Source: Millennium Ecosystem Assessment

MILLENNIUM ECOSYSTEM ASSESSMENT

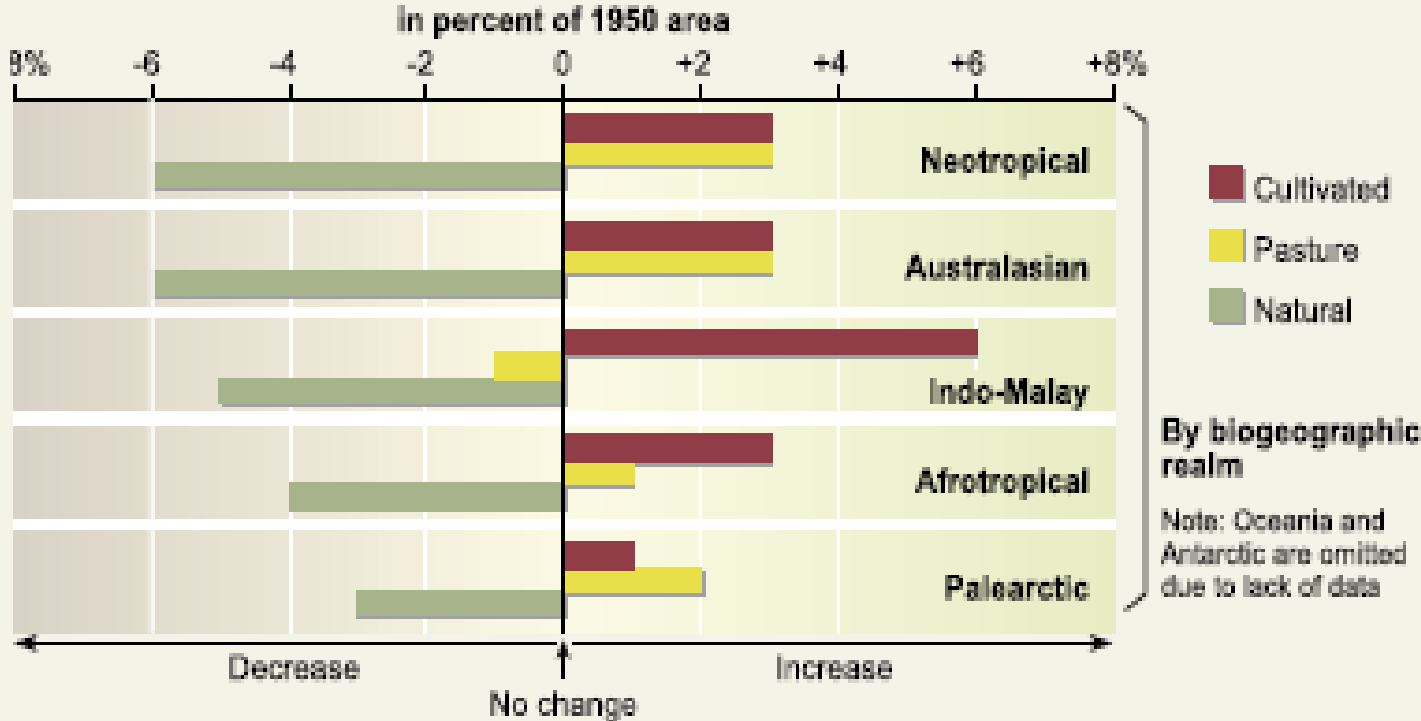
Table 1.1. ECOLOGICAL SURPRISES CAUSED BY COMPLEX INTERACTIONS

Voluntary or involuntary introductions or deletions of species often trigger unexpected alterations in the normal provision of ecosystem services by terrestrial, freshwater, and marine ecosystems. In all cases, the community and ecosystem alterations have been the consequence of indirect interactions among three or more species (C11, Table 11.2).

Study Case	Nature of the Interaction Involved	Ecosystem Service Consequences
Introductions		
<i>Top predators</i>		
Introduction of brown trout (<i>Salmo trutta</i>) in New Zealand for angling	trophic cascade, predator increased primary producers by decreasing herbivores	negative —increased eutrophication
Introduction of bass (<i>Cichla ocellaris</i>) in Gatun Lake, Panama	trophic cascade, top predator decreased control by predators of mosquito larvae	negative —decreased control of malaria vector
Introduction of pine marten (<i>Martes martes</i>) in the Balearic Islands, Spain	predator of frugivorous lizards (main seed dispersers)	negative —decreased diversity of frugivorous lizards due to extinction of native lizards on some islands; changes in dominant shrub (<i>Cneorum tricoccon</i>) distribution because marten replaced the frugivorous-dispersing role
<i>Intraguild predators</i>		
Egg parasitoid (<i>Anastatus kashmirensis</i>) to control gypsy moth (<i>Lymantria dispar</i>)	hyperparasitism (parasitoids that use parasitoids as hosts)	negative —disruption of biological control of pests; introduced parasitoid poses risk of hyperparasitism to other pest-regulating native parasitoids
<i>Gambusia</i> and <i>Lepomis</i> fish in rice fields to combat mosquitoes	intraguild predator (adult fish feed on juveniles as well as on mosquito larvae)	opposed to goal —decreased control of disease vector (mosquito)
<i>Intraguild preys</i>		
Opossum shrimp (<i>Mysis relicta</i>) in Canadian lakes to increase fish production	intraguild prey depletes shared zooplankton prey	opposed to goal —decreased salmonid fish production
<i>Apparent competitors</i>		
Rats (<i>Rattus</i> spp) and cats (<i>Felis catus</i>) in Stewart Island, New Zealand	rats induced high cat densities and increased predation on endangered flightless parrot (<i>Strigops habroptilus</i>)	negative —reduced diversity
<i>Herbivores</i>		
Zebra mussel (<i>Dreissena polymorpha</i>) in Great Lakes, United States	zebra mussel reduced phytoplankton and outcompeted native bivalves	negative —reduced diversity positive —increased water quality
<i>Mutualists</i>		
Myna bird (<i>Acridotheres tristis</i>) for worm pest control in Hawaiian sugarcane plantations	myna engaged in the dispersal of the exotic woody weed <i>Lantana camara</i>	negative —increased invasion by <i>Lantana</i> produced impenetrable thorny thickets; reduced agricultural crops and pasture carrying capacity and sometimes increased fire risk; displaced habitat of native birds

Figure 3.1. PERCENTAGE CHANGE 1950–90 IN LAND AREA OF BIOGEOGRAPHIC REALMS REMAINING IN NATURAL CONDITION OR UNDER CULTIVATION AND PASTURE

Two biogeographic realms are omitted due to lack of data: Oceania and Antarctic. In the Nearctic, the amount of land under cultivation and pasture has stabilized, with no net change in cover since 1950.



Source: Millennium Ecosystem Assessment

MILLENNIUM ASSESSMENT REPORTS

Key Messages

- The most important direct drivers of biodiversity loss and ecosystem service changes are **habitat change** (such as land use changes, physical modification of rivers or water withdrawal from rivers, loss of coral reefs, and damage to sea floors due to trawling), **climate change, invasive alien species, overexploitation, and pollution.**

MILLENNIUM ASSESSMENT REPORTS

Key Messages

- Short-term goals and targets are not sufficient for the conservation and sustainable use of biodiversity and ecosystems. Given the characteristic response times for political, socioeconomic, and ecological systems, longer-term goals and targets (such as for 2050) are needed to guide policy and actions.
- Science can help ensure that decisions are made with the best available information, but ultimately the future of biodiversity will be determined by society.

INFORMAČNÍ ZDROJE

Fauna Europea

<https://fauna-eu.org/>



museum für naturkunde
berlin

FAUNA EUROPAEA
ALL EUROPEAN ANIMAL SPECIES ONLINE

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We are still having problems with the search feature. Unfortunately we cannot give a timeline when the advanced search will be fixed.

Welcome to Fauna Europaea

Fauna Europaea is Europe's main zoological taxonomic index. Scientific names and distributions of all living, currently known, multicellular, European land and freshwater animal species are available in one authoritative database.

INFORMAČNÍ ZDROJE

Freshwater Ecology

www.freshwaterecology.info



Login

Username
Password

Search

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- » **Macro-invertebrates**
- » **Macrophytes**
- » **Diatoms**
- » **Phytoplankton**
- » Quick search
- » Taxa Entry Tool (TET)
- » Taxa Validation Tool (TVT)

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Database info

Last database update: 24.10.2016

Welcome

Welcome to the **freshwaterecology.info** database. Here you can find autecological characteristics, ecological preferences and biological traits as well as distribution patterns of **more than 20,000 European freshwater organisms** belonging to **fish, macro-invertebrates, macrophytes, diatoms and phytoplankton**.

The ecology data feature **distributional parameters** (e.g. ecoregional distribution or endemism, etc.), **regional parameters** (e.g. stream zonation or altitudinal preference, etc.), **habitat parameters** (e.g. temperature or substrate preference, etc.) or **life related parameters** (e.g. feeding type or life duration, etc.) and others. All ecological parameters can be **individually combined and queried**.

Organism groups



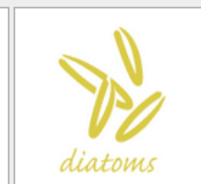
fish



macro-invertebrates



macrophytes



diatoms



phytoplankton

Query your preferred organism group. Query more than one ecological parameter. Define special interests and features.

Tools



quick search



standardised
taxalist



taxa validation
and export

Find your freshwater organism and its ecological preferences (» Quick Search).

Create your standardised taxalist for each of the organism groups and enter data for up to 230 samples (» TET - Taxa Entry Tool).

Upload your taxalist, validate it and export your taxa including selected ecological parameters (» TVT - Taxa Validation Tool).

INFORMAČNÍ ZDROJE

Pladias (Plant Diversity Analysis and Synthesis Centre)

www.pladias.cz

PLADIAS Druhy Vegetace Data Kontakty PLADIAS Centre of Excellence Login

Databáze české flóry a vegetace

● ○ ○ ○ ○

Pladias
Tato webová stránka obsahuje kriticky revidovaná data o české flóře a vegetaci, která připravila Masarykova univerzita, Botanický ústav Akademie věd ČR a Jihočeská univerzita.

Druhy
Vyhledávejte vlastnosti druhů, mapy, obrázky a další.

Vegetace
Vyhledávejte informace o vegetačních jednotkách, mapy a fotografie.

Data
Stáhněte volně přístupná data, např. kompletní seznam druhů, Červený seznam a ekologické indikační hodnoty.

[pokračovat >](#) [pokračovat >](#) [pokračovat >](#)

Pladias (Plant Diversity Analysis and Synthesis Centre) je výzkumné centrum financované Grantovou agenturou České republiky v letech 2014–2018 v rámci programu na podporu excelence v základním výzkumu. Centrum sdružuje výzkumné kapacity zabývající se diverzitou flóry a vegetace z brněnské Masarykovy univerzity, Botanického ústavu AV ČR a Jihočeské univerzity v Českých Budějovicích. Hlavními cíli centra je výzkum druhové, fylogenetické a funkční diverzity současných flór, příčin jejího vzniku, procesů

OCHRANA DIVERZITY

Informační systém Úmluvy o biologické rozmanitosti

<http://chm.nature.cz/>



The screenshot shows the homepage of the CHM (Clearing-House Mechanism) website. At the top, there is a navigation bar with links for 'Fotogalerie', 'AOPK ČR', 'MŽP', 'EC CHM', and 'Biodiversity CHM', along with flags for the Czech Republic and the United Kingdom. The main header features the CHM logo (a globe with a green leaf) and the title 'Informační systém Úmluvy o biologické rozmanitosti' in red. Below the header is a search bar with a 'Search' button. A green navigation bar contains menu items: 'ÚMLUVA O BIODIVERZITĚ »', 'NAGOJSKÝ PROTOKOL – ABS »', 'DALŠÍ MEZINÁRODNÍ ZÁVAZKY »', 'STRATEGICKÉ DOKUMENTY »', and 'AKTUALITY'. The main content area is divided into three columns. The left column has a sidebar with 'O WEBU', 'KONTAKTY', and 'KE STAŽENÍ'. The middle column features a large image collage with a central text box that reads 'Nagojský Protokol – ABS'. The right column has a section titled 'CO JE CHM' with a brief description: 'CHM CBD je zkratka pro anglický termín Clearing-House Mechanism of the Convention on Biological Diversity (Informační systém Úmluvy o biologické rozmanitosti)'. At the bottom left, there are sections for 'NOVINKY Z WEBU CBD' and 'NOVINKY Z EKOLISTU'.

Fotogalerie | AOPK ČR | MŽP | EC CHM | Biodiversity CHM  

 Informační systém Úmluvy o biologické rozmanitosti

Search

ÚMLUVA O BIODIVERZITĚ » NAGOJSKÝ PROTOKOL – ABS » DALŠÍ MEZINÁRODNÍ ZÁVAZKY » STRATEGICKÉ DOKUMENTY » AKTUALITY

O WEBU
KONTAKTY
KE STAŽENÍ

 **NOVINKY Z WEBU CBD**

Indian tea estate gets world's first 'elephant-friendly' tag 18.9.2018
Every Flower Needs a Bee 18.9.2018
Science: More than 4 billion birds stream overhead during fall migration [Report] 18.9.2018

 **NOVINKY Z EKOLISTU**

Indie se stala první... 11


Nagojský Protokol – ABS

CO JE CHM

CHM CBD je zkratka pro anglický termín Clearing-House Mechanism of the Convention on Biological Diversity (Informační systém Úmluvy o biologické rozmanitosti).

OCHRANA DIVERZITY

Červený seznam IUCN (Mezinárodní svaz ochrany přírody)

<https://newredlist.iucnredlist.org/>

The screenshot displays the IUCN Red List website interface. At the top, there is a navigation bar with links for 'Current Red List website 2018-1', 'Login / Register', 'Contact', 'Terms of use', and 'English'. Below this is a red header section containing the IUCN Red List logo and the text 'THE IUCN RED LIST OF THREATENED SPECIES™'. To the right of the logo are navigation tabs: 'About', 'Assessment process', 'Resources & Publications', and 'Support us'. A search bar is located below the header, with the placeholder text 'Names - common, scientific, regions etc...' and a search icon. An 'Advanced' button is positioned to the right of the search bar. Below the search bar, the section 'AMAZING SPECIES' is visible, featuring a grid of four species cards. Each card includes a photograph of the species, its taxonomic classification, common name, scientific name, distribution, conservation status, and a trend indicator.

Species Name	Scientific Name	Conservation Status	Trend
Ocean Turf Grass	<i>Halophila beccarii</i>	VU	Decreasing
Yangtze Giant Softshell Turtle	<i>Rafetus swinhoei</i>	CR	Decreasing
Crau Plain Grasshopper	<i>Prionotropis rhodanica</i>	CR	Decreasing
<i>Heritiera globosa</i>		EN	Decreasing

Amazing species

OCHRANA BIOTOPŮ

Natura 2000

<https://newredlist.iucnredlist.org/>

NATURA 2000
AOPK ČR

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Co je Natura 2000

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Co je Natura 2000

obecné představení soustavy Natura 2000 19.9.2006. [☰](#) [☱](#) [☲](#)

Ochrana lokalit soustavy Natura 2000

zde se dozvíte o legislativních podkladech péče, plánech péče, managementu, omezeních hospodaření a jiných ekonomických aktivit v lokalitách NATURA 2000 23.12.2005. [☰](#) [☱](#) [☲](#)

Území soustavy Natura 2000

Ptačí oblasti

Území soustavy Natura 2000 vyhlášené k ochraně ptáků podle Směrnice Rady Evropských společenství ze dne 2. dubna 1979 o ochraně volně žijících ptáků (2009/147/EHS).

Evropsky významné lokality

Území soustavy Natura 2000

OCHRANA BIOTOPŮ

Natura 2000 je soustava chráněných území, které vytvářejí na svém území podle jednotných principů všechny státy Evropské unie. Cílem této soustavy je zabezpečit ochranu těch druhů živočichů, rostlin a typů přírodních stanovišť, které jsou z evropského pohledu nejcennější, nejvíce ohrožené, vzácné či omezené svým výskytem jen na určitou oblast (endemické).

- 1) směrnice 2009/147/ES (nahradila směrnicí 79/409/EHS), o ochraně volně žijících ptáků („směrnice o ptácích“)
- 2) směrnice 92/43/EHS, o ochraně přírodních stanovišť, volně žijících živočichů a planě rostoucích rostlin („směrnice o stanovištích“)

OCHRANA DIVERZITY

Červený seznam IUCN

Červený seznam IUCN eviduje celosvětově téměř 17 tisíc druhů ohrožených vyhynutím. V rámci živočichů je to 21% savců, 12 % ptáků, 31 % plazů, 30 % obojživelníků a 37 % ryb.

Jen v Evropě je to dle evropského červeného seznamu ohroženo 23 % obojživelníků, 19 % plazů, 15 % savců a 13 % ptáků.

www.veronica.cz

VYMÍRÁNÍ DRUHŮ

<https://video.aktualne.cz/dvtv/storch-planeta-je-v-krizi-je-ohrozena-podstata-civilizace-vy/r~8a08272a78fb11e7bc2d0025900fea04/>

<https://www.youtube.com/watch?v=ELNMF-kPhoo>

<http://forumochranyprirody.cz/zijeme-v-dobe-sesteho-masoveho-vymirani-aneb-krize-biodiverzity-ve-svete-u-nas>

https://www.youtube.com/watch?time_continue=18&v=ELNMF-kPhoo

Hallmann CA, Sorg M, Jongejans E, Siepel H, Hofland N, Schwan H, et al. (2017) More than 75 percent decline over 27 years in total flying insect biomass in protected areas. PLoS ONE 12(10): e0185809. <https://doi.org/10.1371/journal.pone.0185809>