Filo Chordata

011 0212 Zoologia Aplicada...

Prof. Alexandre Reis Percequillo

Origem, diversidade dos cordados e impactos de atividades antrópicas

Ofidismo

Roedores e morcegos: importância biológica e impactos nas atividades humanas

Filo Chordata

Diversidade

Posição Filogenética

Morfologia

Biologia

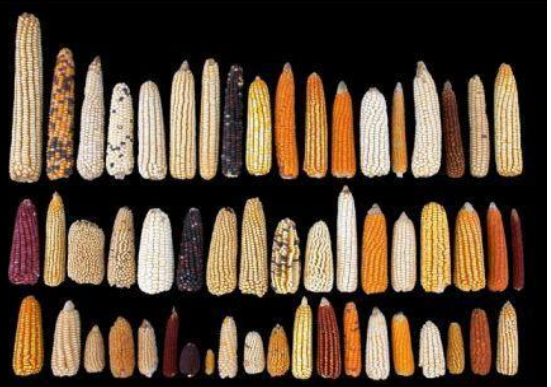
Diversidade dos cordados e Importância/Impactos

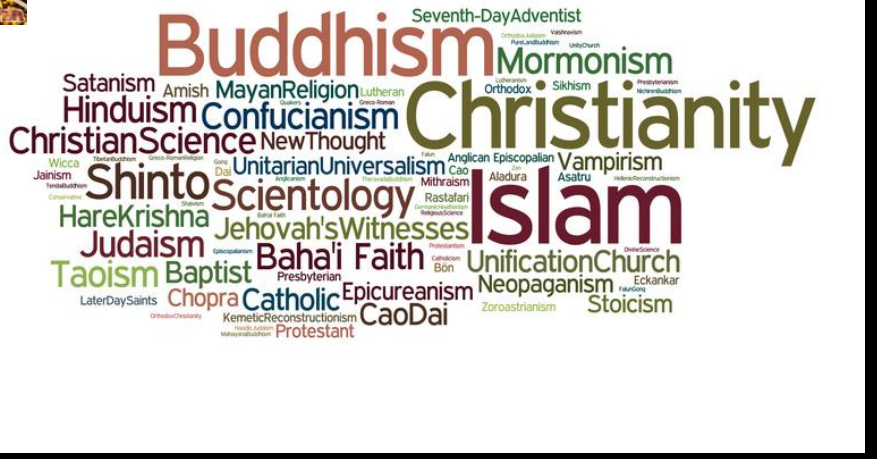
O que é diversidade?

"Variety, miscellany, assortment, mixture, mix, mélange, range, array, multiplicity; variation, variance, diversification, heterogeneity, difference, contrast" (Thesaurus)

"The state of being diverse; variety; a range of different things" (Dictionary)

Diversidade





O que é diversidade biológica ou biodiversidade?

"The variability among living organisms from all sources including, *inter alia*, terrestrial, marine and other aquatic ecosystems and the ecological complexes of which they are part; this includes diversity within species, between species and of ecosystems" (CBD, 1992)

"The totality of genes, species, and ecosystems in a region" (Global Biodiversity Strategy; World Resources Institute et al., 1992)

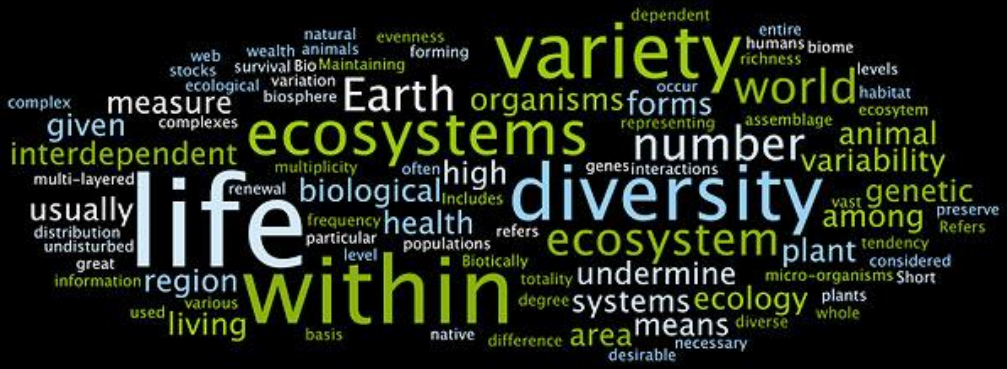
Componentes da diversidade

Diversity within the species is the genetic diversity

Diversity between the species is the species, taxonomic or organismic diversity

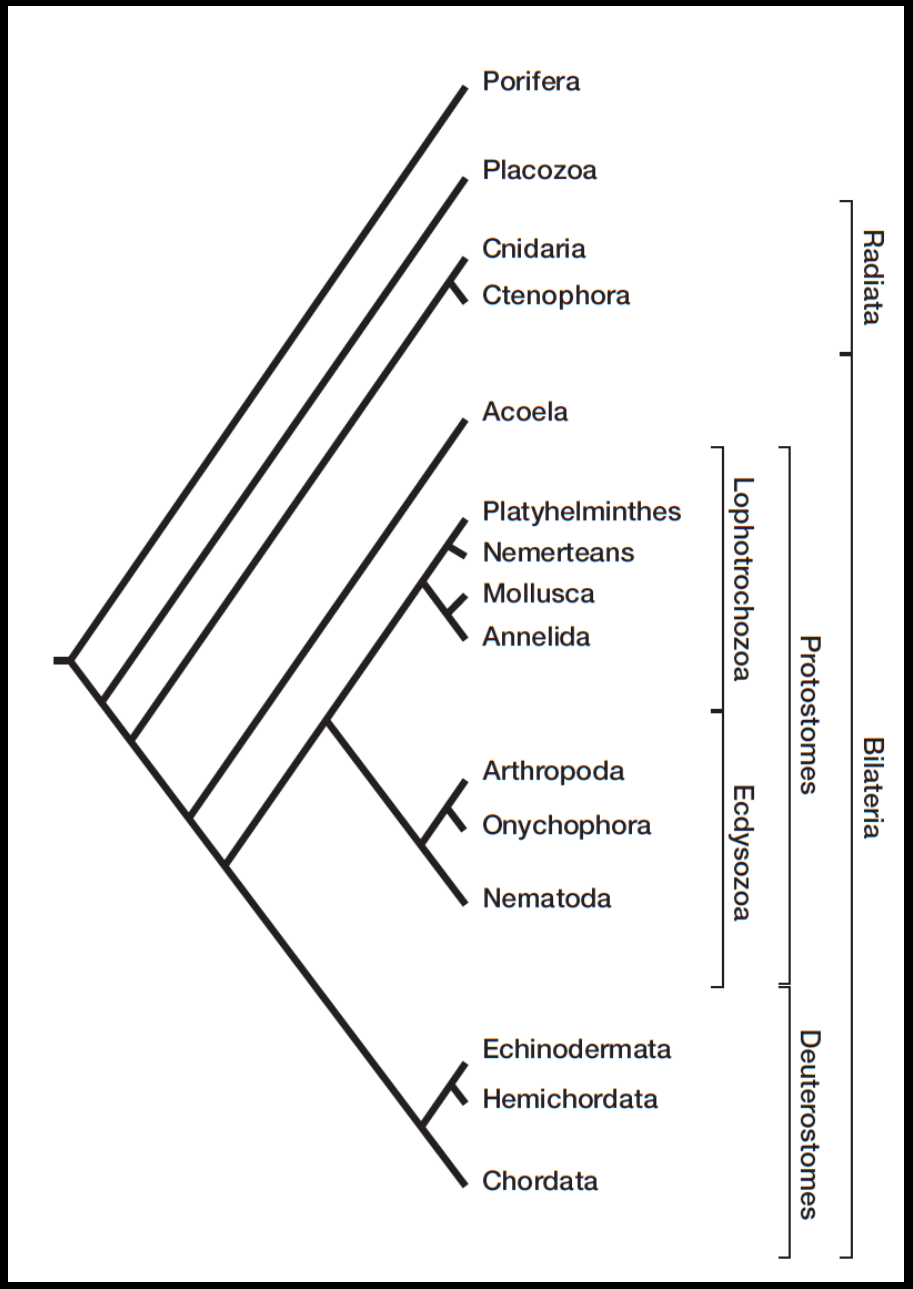
Diversity on the ecosystems is the ecological or habitat diversity

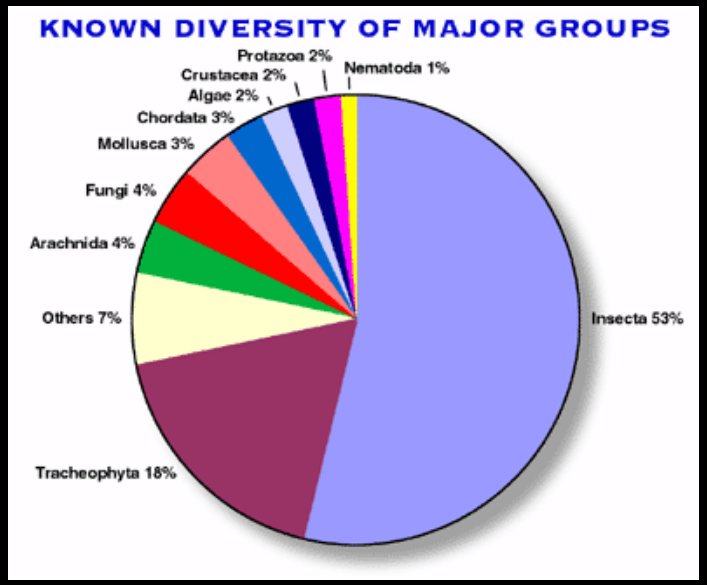
Biodiversidade

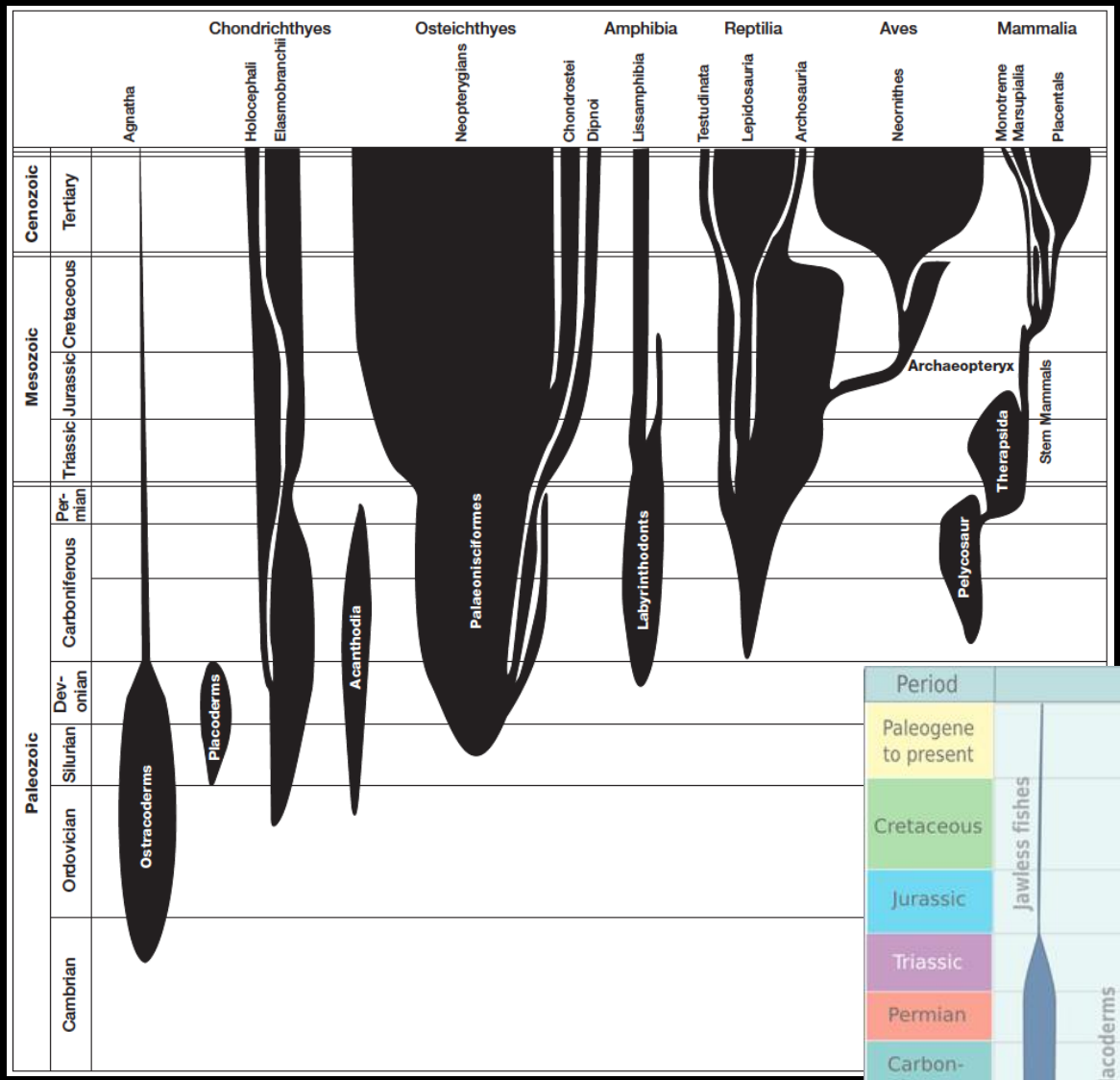


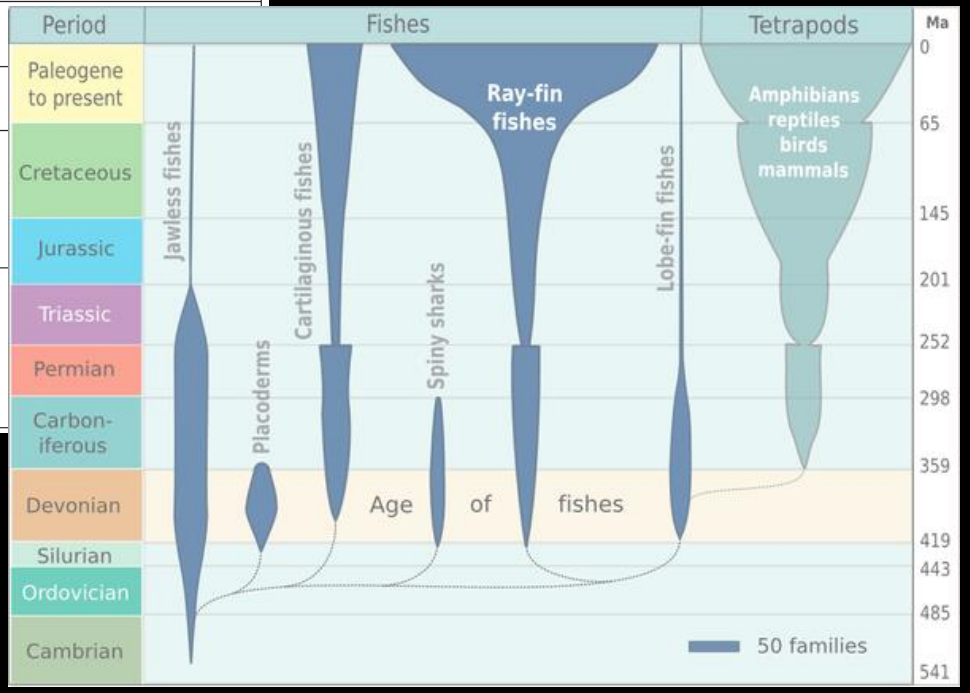
species

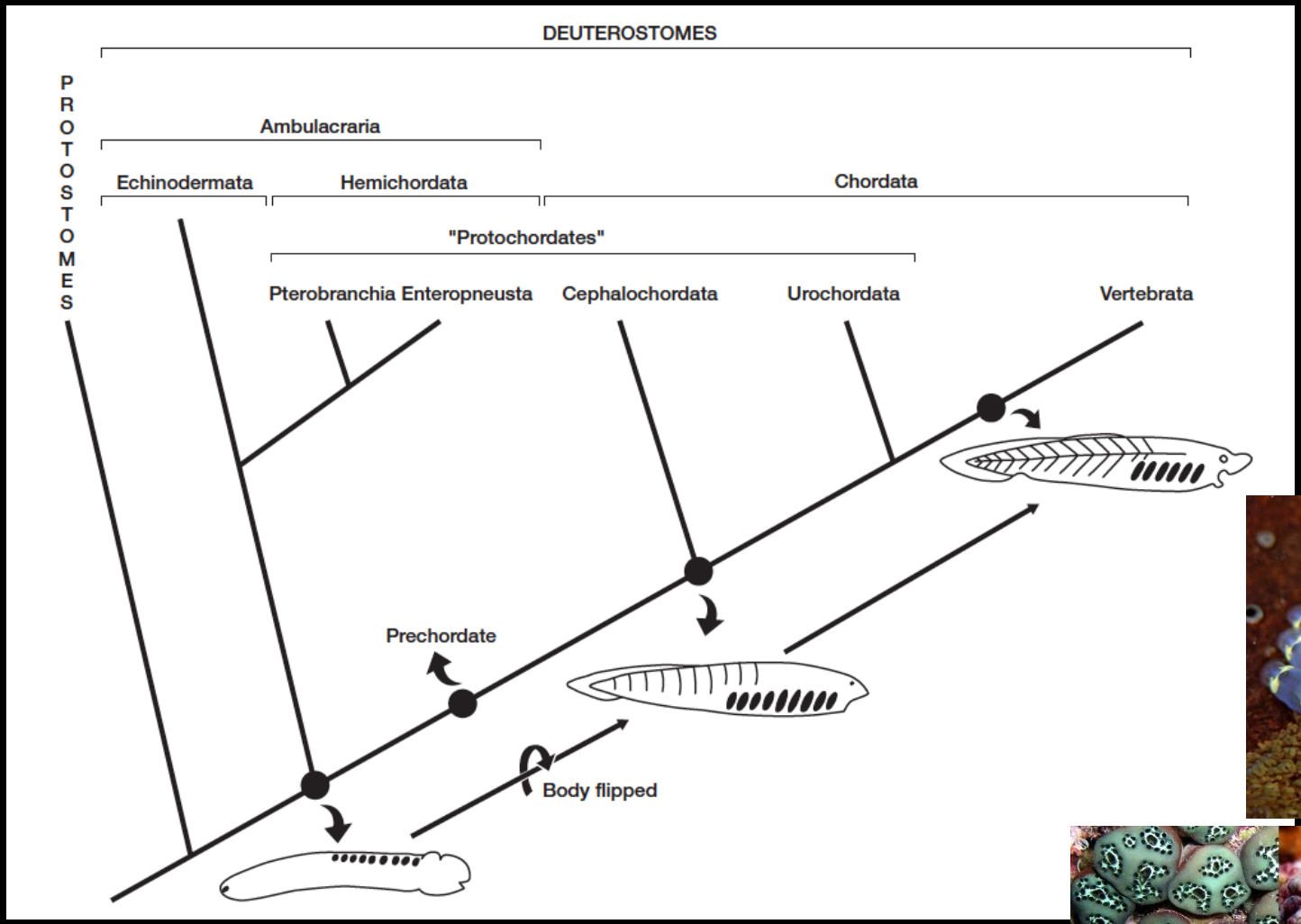
Diversidade de Cordados






Chondrichthyes
Osteichthyes
Amphibia
Reptilia
Aves
Mammalia
Agnatha
Holocephali
Elasmobranchii
Neopterygians
Chondrostei
Dipnoi
Lissamphibia
Testudinata
Lepidosauria
Archosauria
Neornithes
Monotreme
Marsupialia
Placentals
Cenozoic
Tertiary
Mesozoic
Cretaceous
Jurassic
Triassic
Paleozoic
Per-mian
Carboniferous
Dev-onian
Silurian
Ordovician
Cambrian
Archaeopteryx
Therapsida
Stem Mammals
Pelycosaur
Ostracoderms
Placoderms
Acanthodia
Palaeonisciformes
Labyrinthodonts


Period
Fishes
Tetrapods
Ma
Paleogene to present
Cretaceous
Jurassic
Triassic
Permian
Carbon-iferous
Devonian
Silurian
Ordovician
Cambrian
Jawless fishes
Placoderms
Cartilaginous fishes
Spiny sharks
Ray-fin fishes
Lobe-fin fishes
Amphibians reptiles birds mammals
Age of fishes
50 families
0
65
145
201
252
298
359
419
443
485
541


DEUTEROSTOMES
PROTOSTOMES
Ambulacraria
Echinodermata
Hemichordata
Chordata
"Protochordates"
Pterobranchia
Enteropneusta
Cephalochordata
Urochordata
Vertebrata
Prechordate
Body flipped

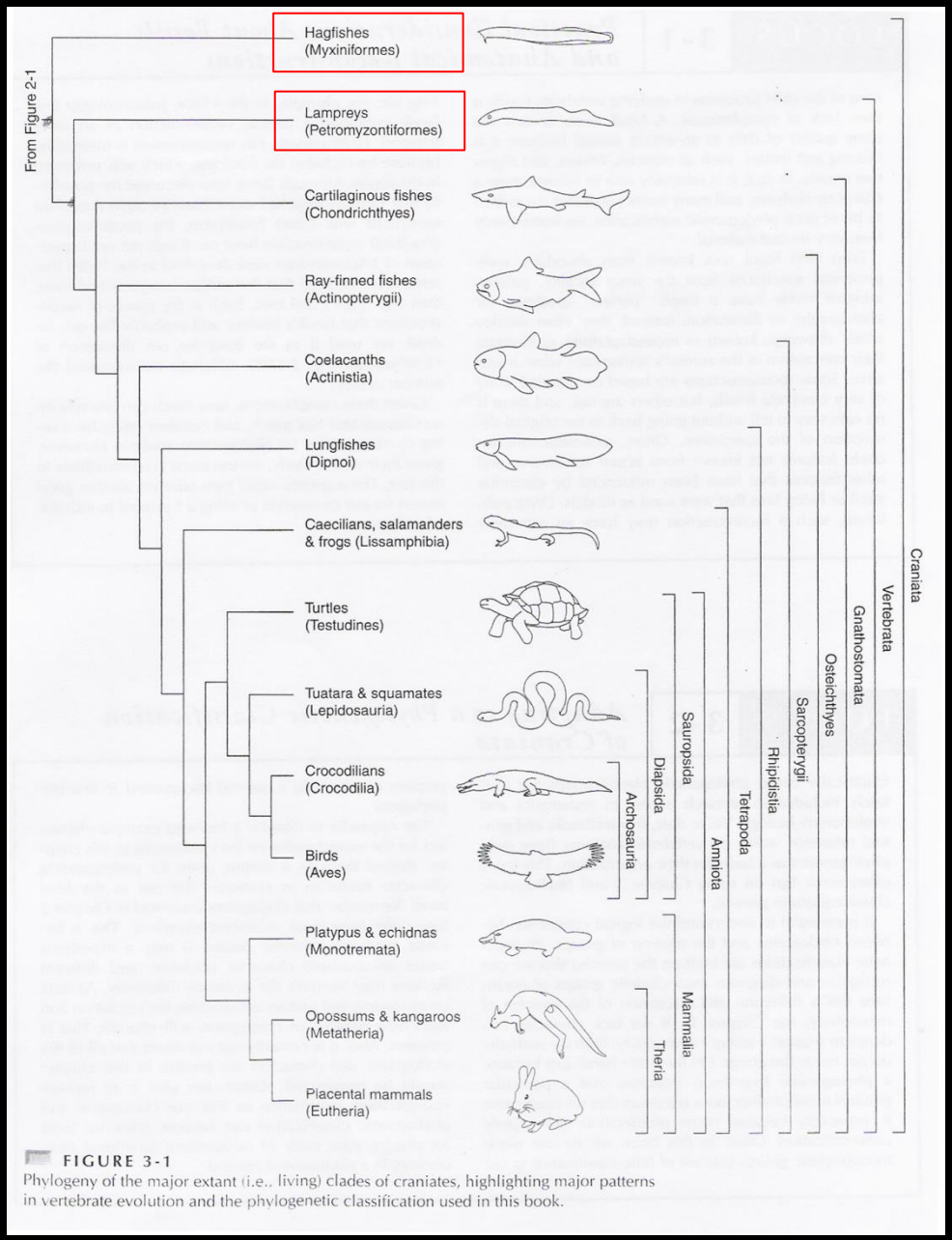
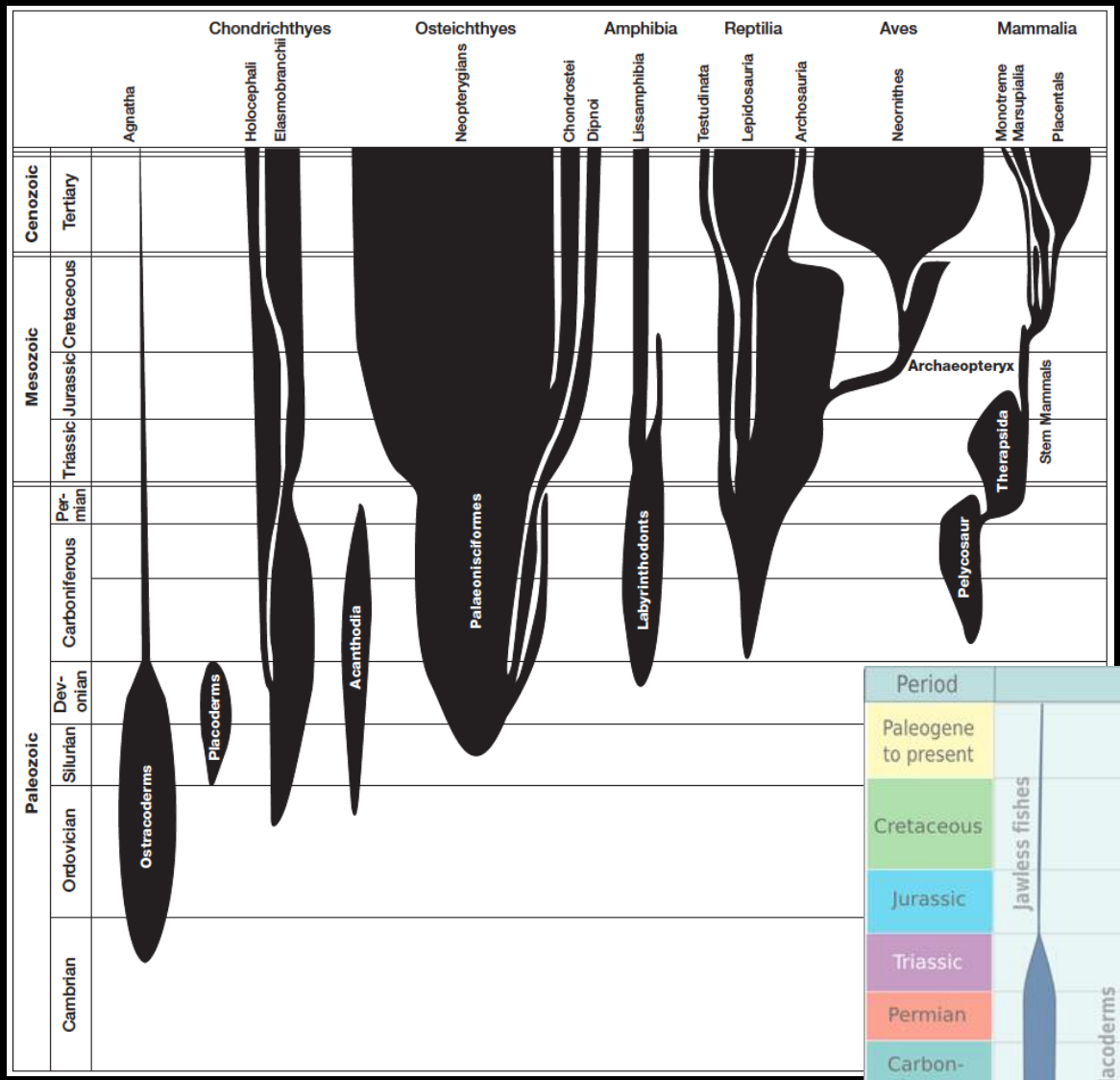
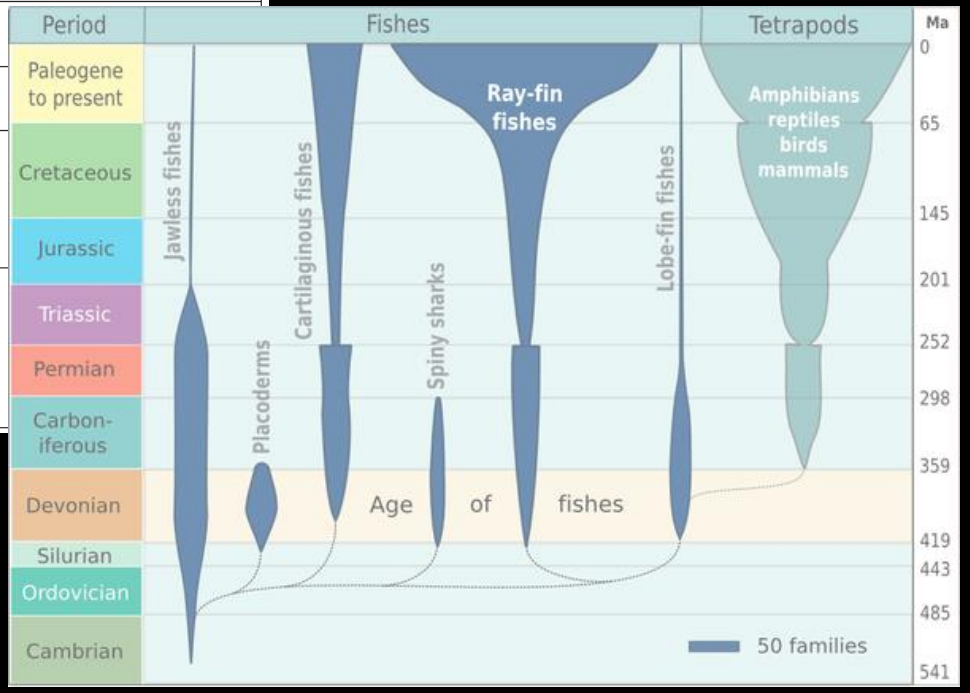


FIGURE 3-1
Phylogeny of the major extant (i.e., living) clades of craniates, highlighting major patterns in vertebrate evolution and the phylogenetic classification used in this book.


Chondrichthyes
Osteichthyes
Amphibia
Reptilia
Aves
Mammalia
Agnatha
Holocephali
Elasmobranchii
Neopterygians
Chondrostei
Dipnoi
Lissamphibia
Testudinata
Lepidosauria
Archosauria
Neornithes
Monotreme
Marsupialia
Placentals
Cenozoic
Tertiary
Mesozoic
Cretaceous
Jurassic
Triassic
Paleozoic
Per-mian
Carboniferous
Dev-onian
Silurian
Ordovician
Cambrian
Archaeopteryx
Therapsida
Stem Mammals
Pelycosaur
Ostracoderms
Placoderms
Acanthodia
Palaeonisciformes
Labyrinthodonts


Period
Fishes
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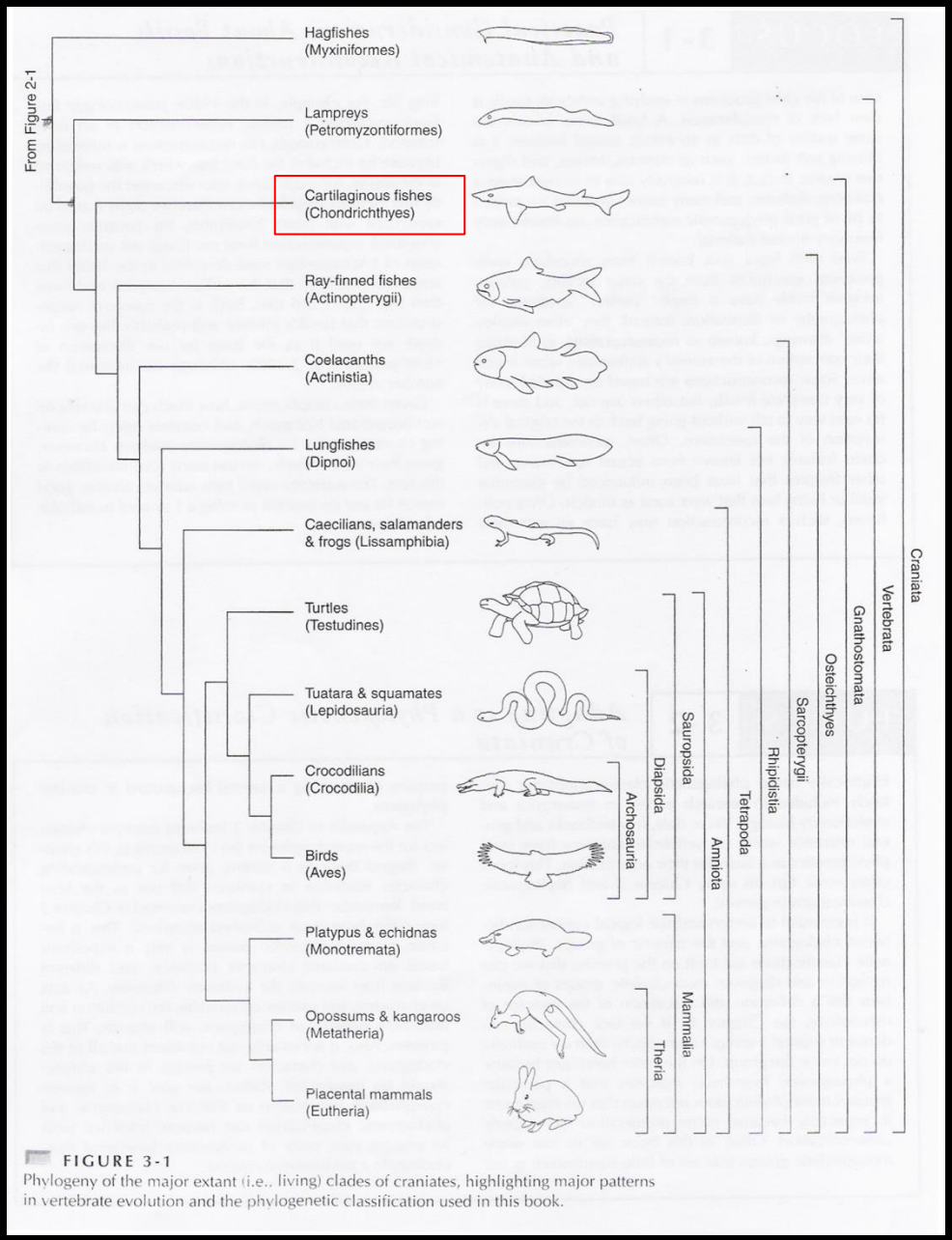

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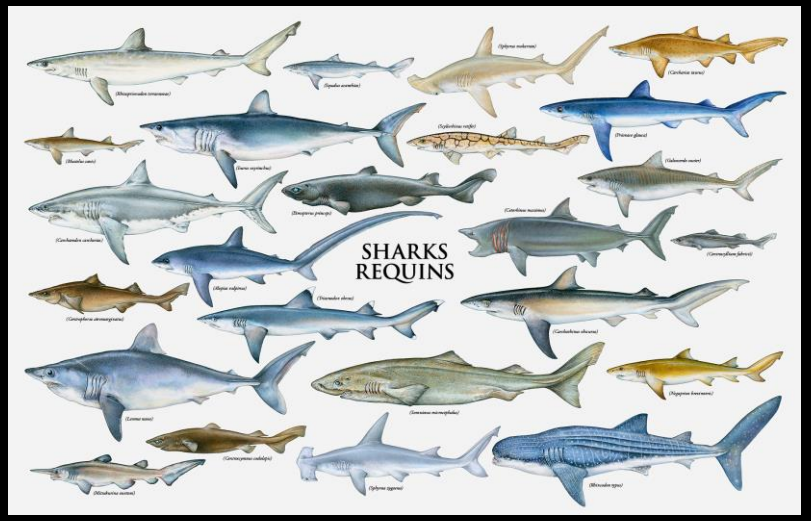
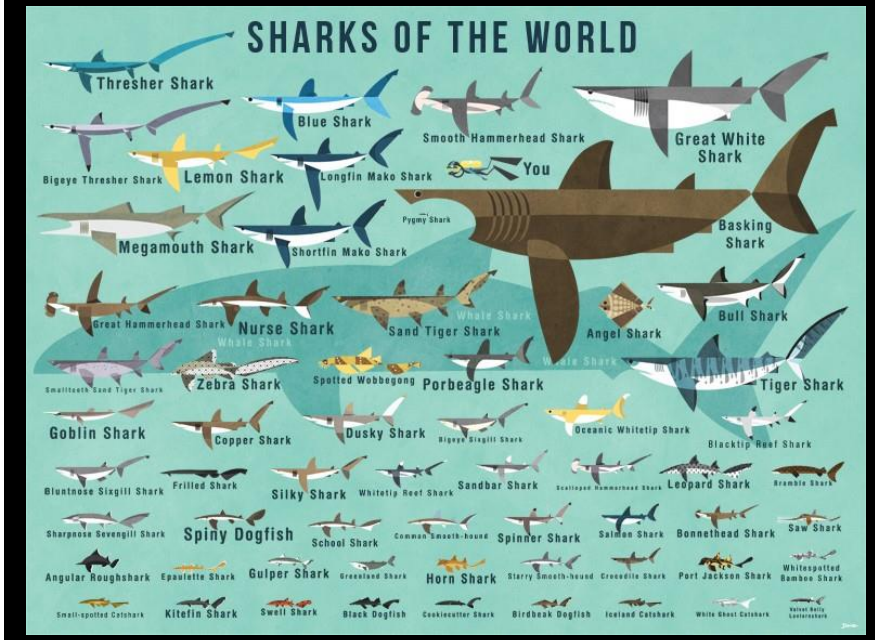
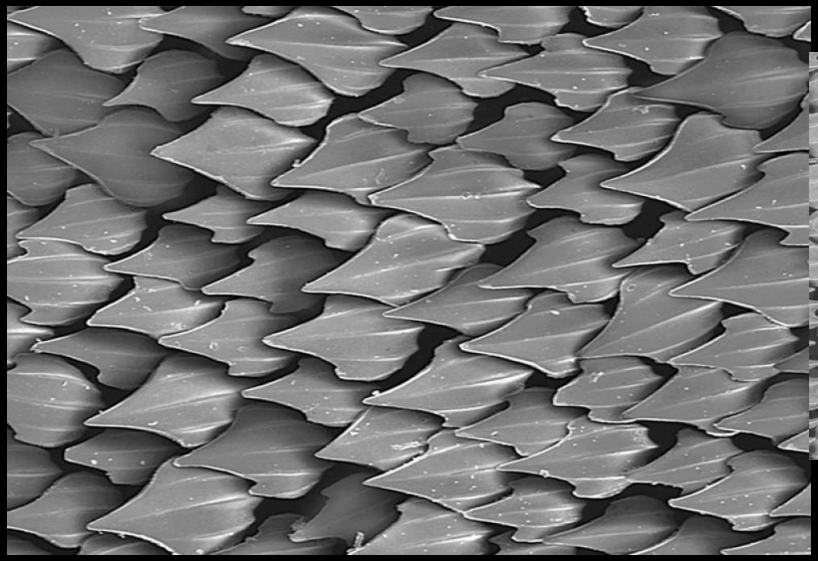
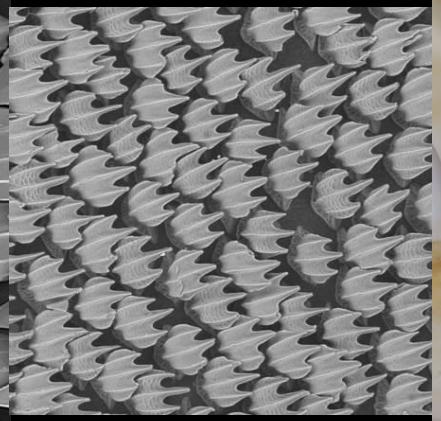
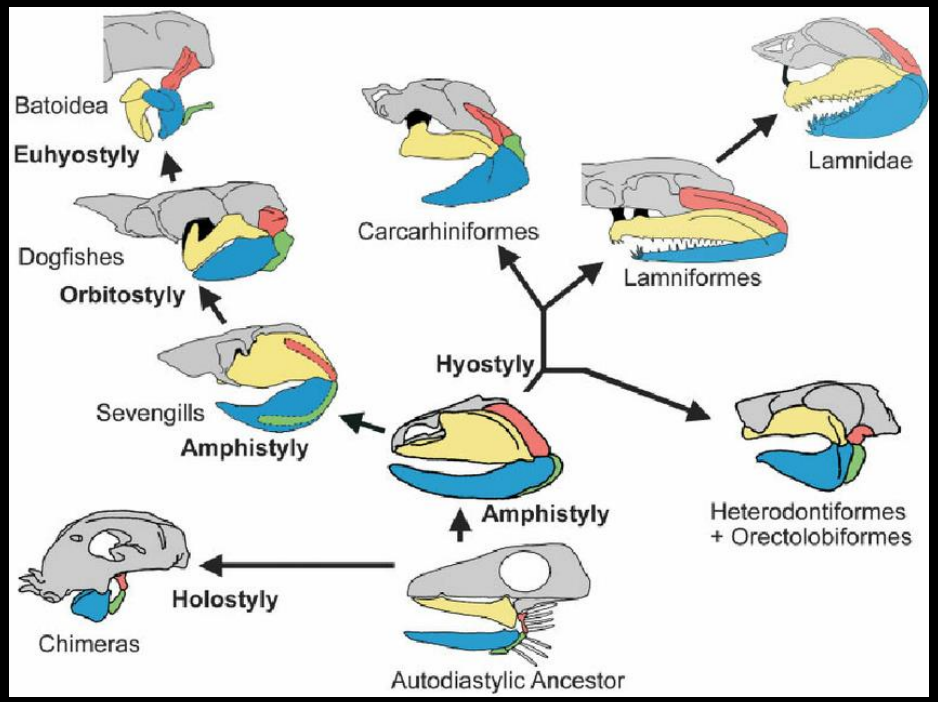


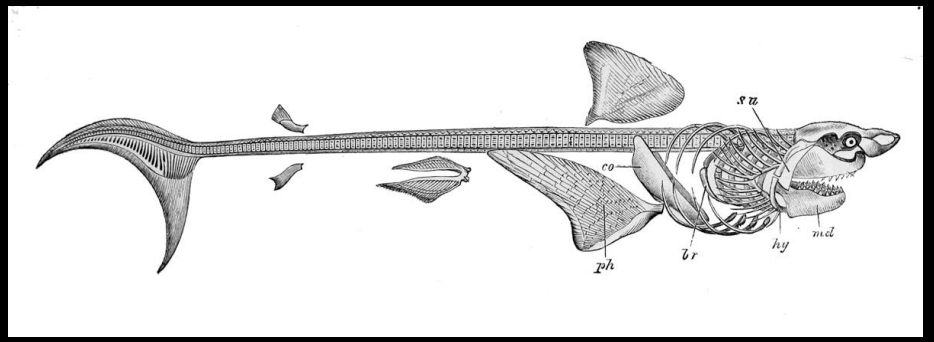


Peixes Cartilaginosos
Chondrichthyes






Batoidea
Euhyostyly
Dogfishes
Orbitostyly
Sevengills
Amphistyly
Chimeras
Holostyly
Carcarhiniformes
Lamnidae
Lamniformes
Hyostyly
Heterodontiformes
+ Orectolobiformes
Amphistyly
Autodiastylic Ancestor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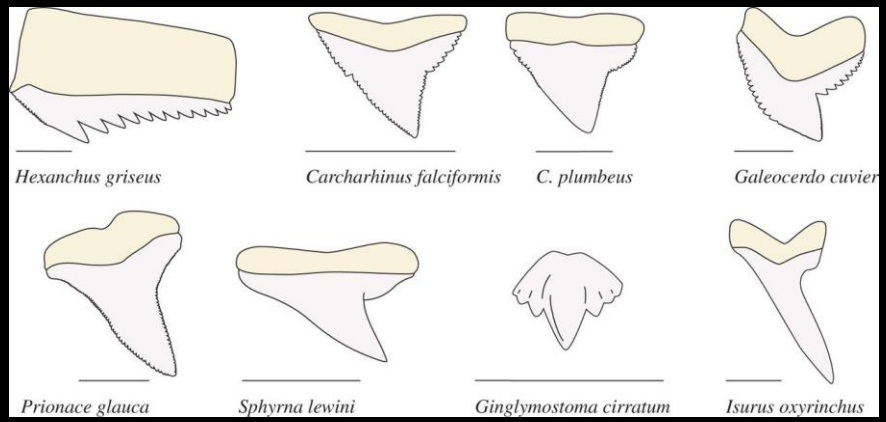
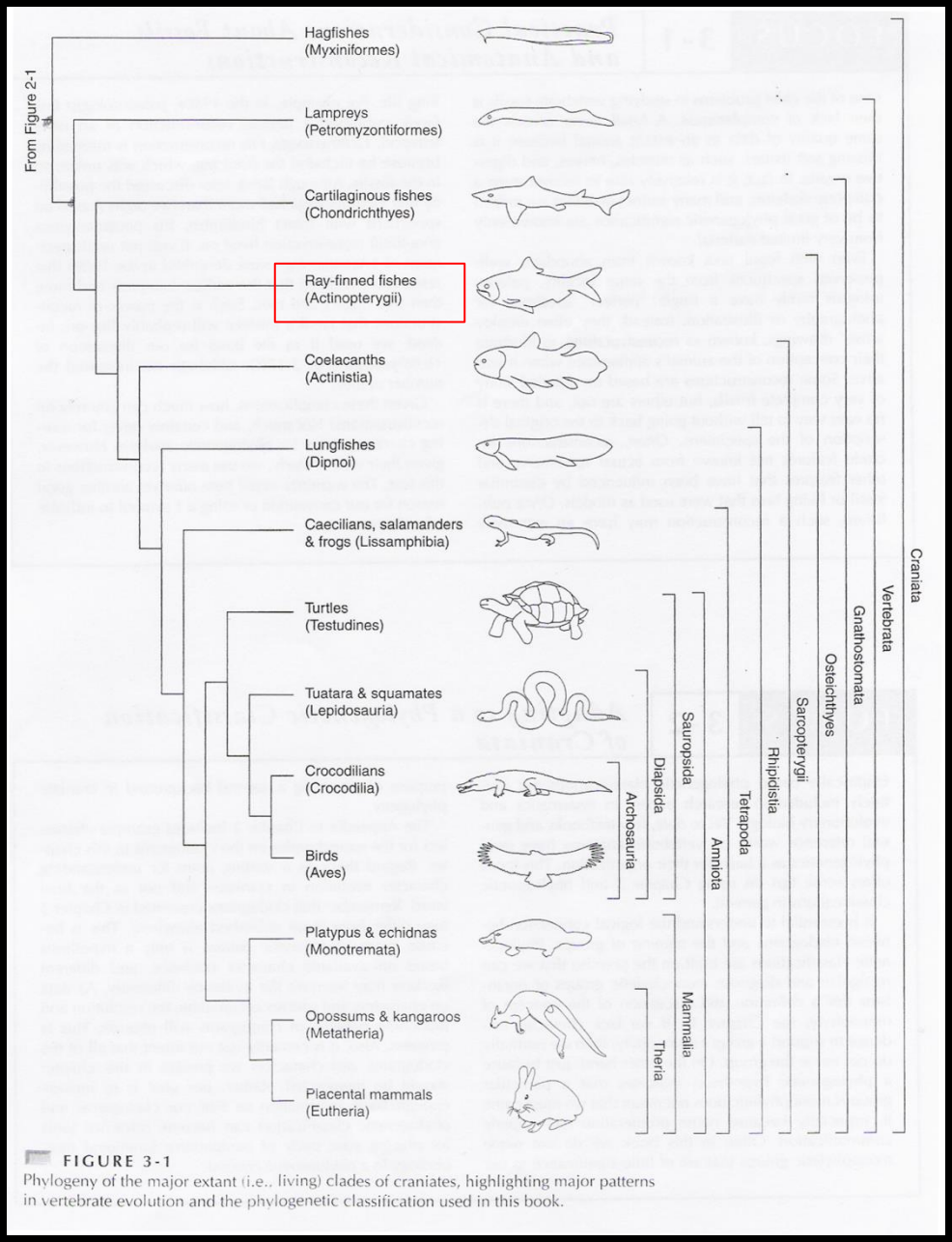

Hexanchus griseus
Carcharhinus falciformis
C. plumbeus
Galeocerdo cuvier
Prionace glauca
Sphyrna lewini
Ginglymostoma cirratum
Isurus oxyrinchus



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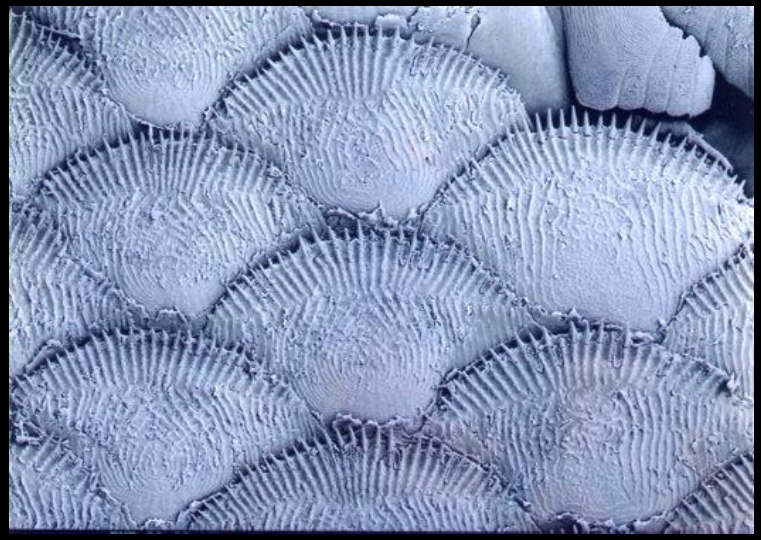
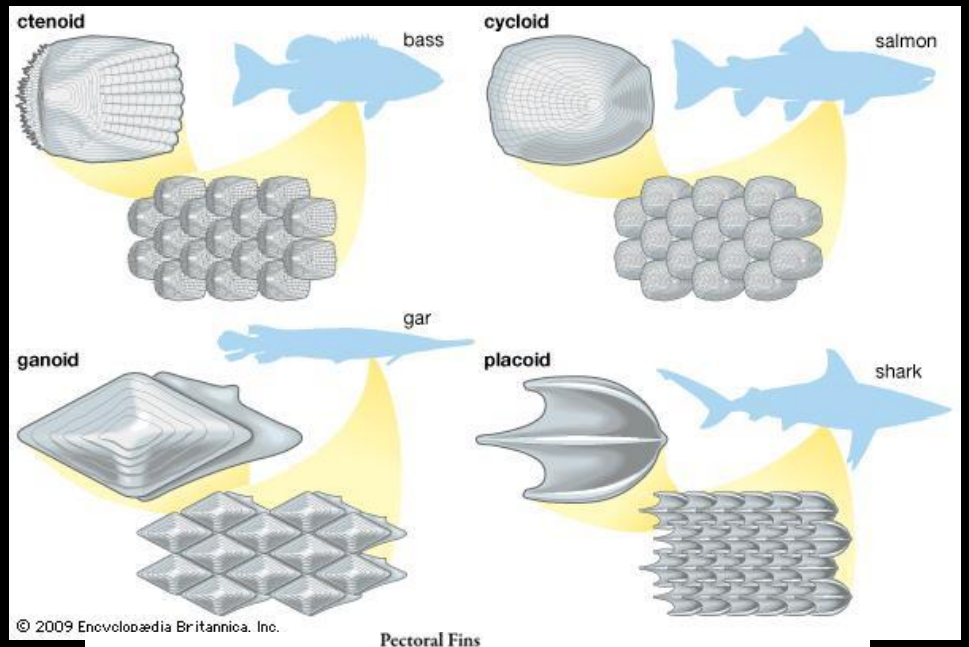
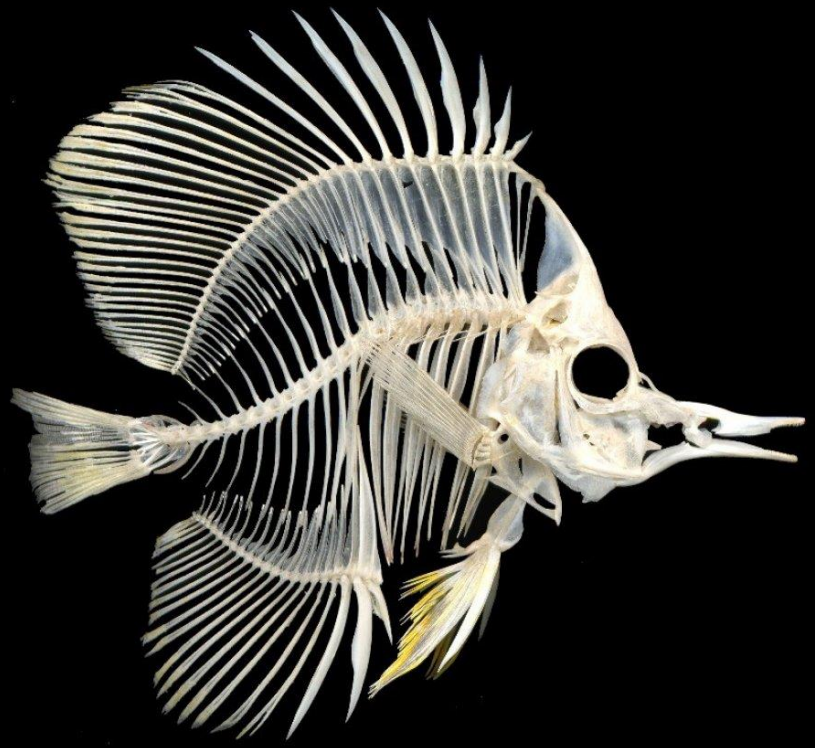
Peixes de nadadeiras raiadas
Actinopterygii

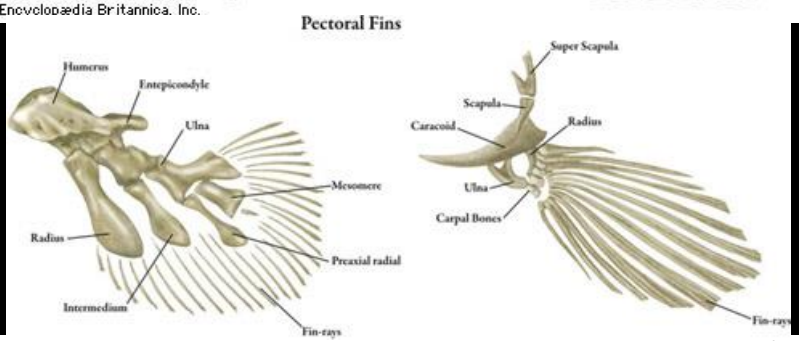


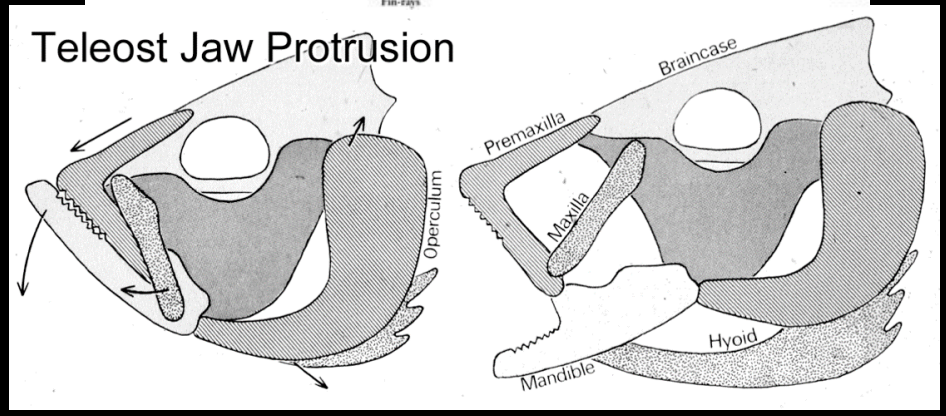


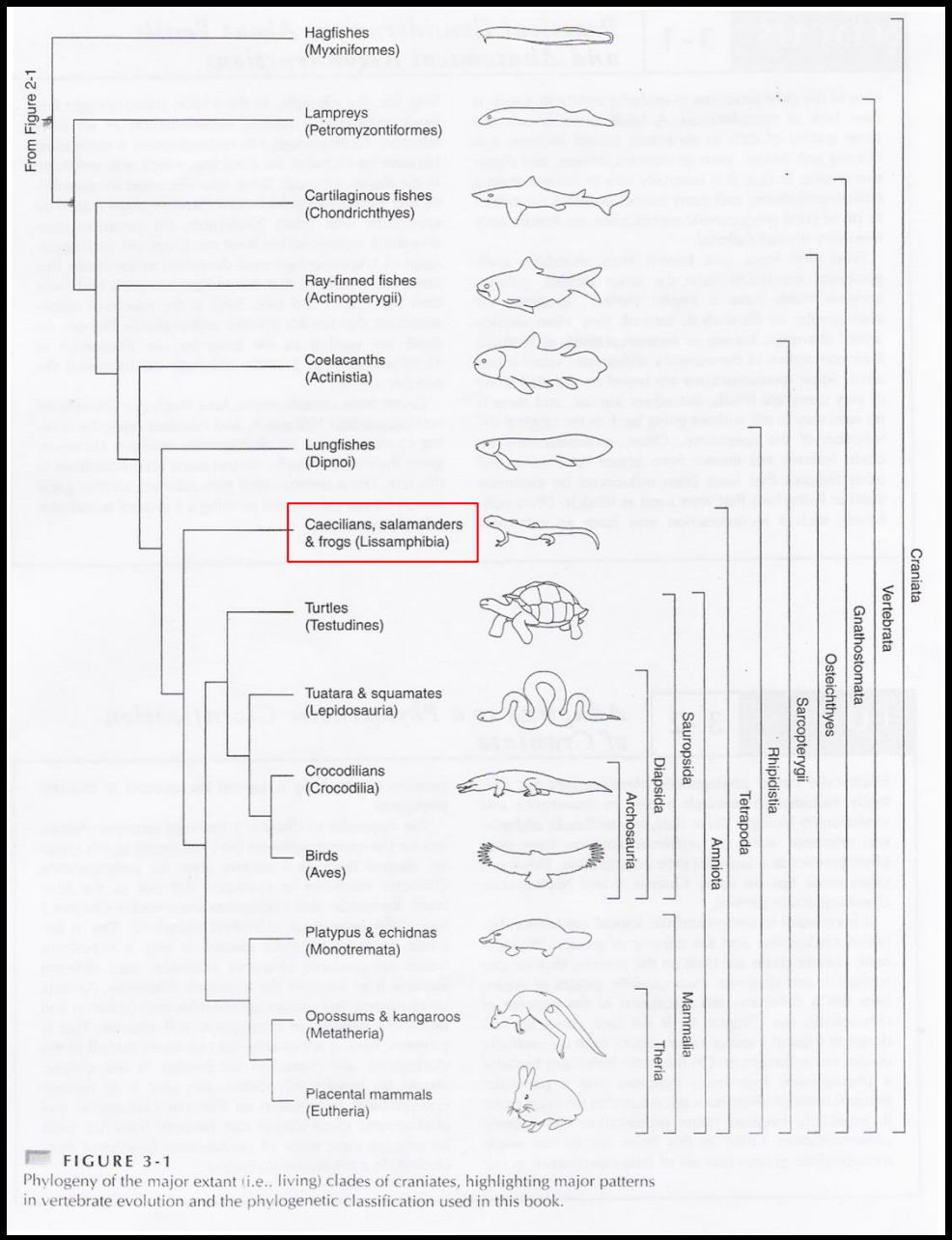



ctenoid
bass
cycloid
salmon
gar
ganoid
placoid
shark
© 2009 Encyclopædia Britannica, Inc.




Pectoral Fins
Humerus
Entepicondyle
Ulna
Mesomere
Radius
Preaxial radial
Intermedium
Fin-rays
Super Scapula
Scapula
Caracoid
Radius
Ulna
Carpal Bones
Fin-rays


Teleost Jaw Protrusion
Operculum
Braincase
Premaxilla
Maxilla
Hyoid
Mandible



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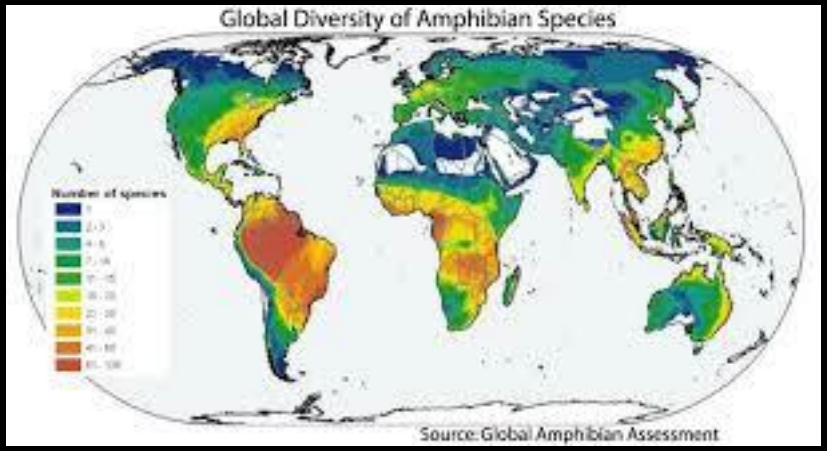
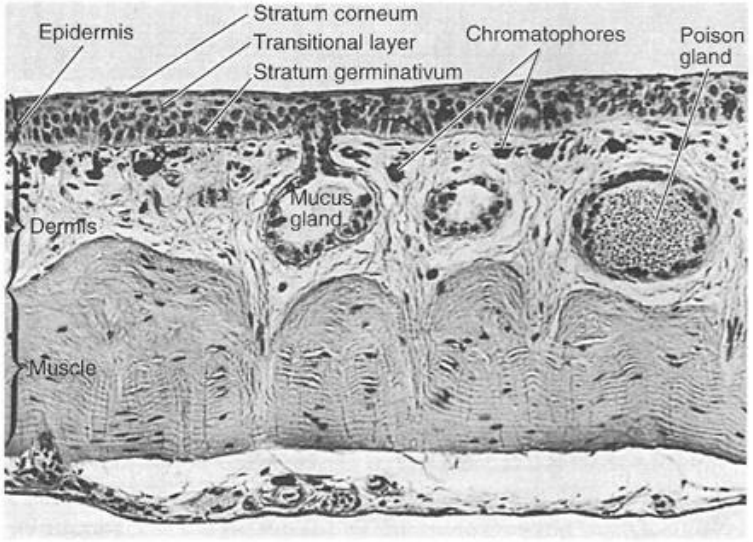


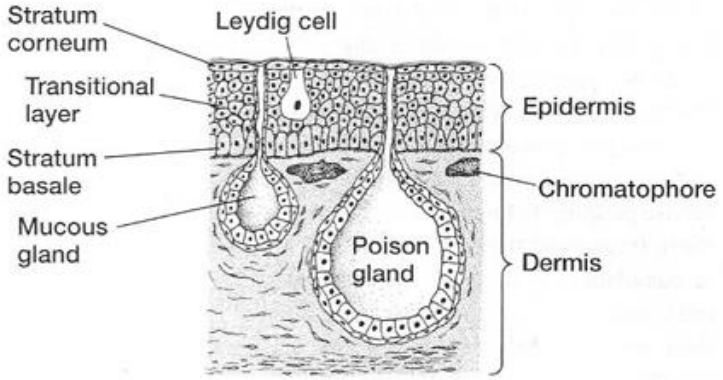
Sapos, salamandras e cecílias
Lissamphibia

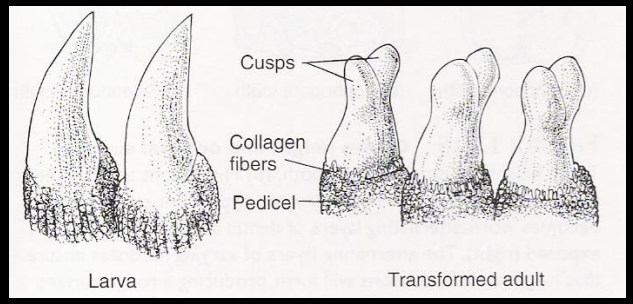


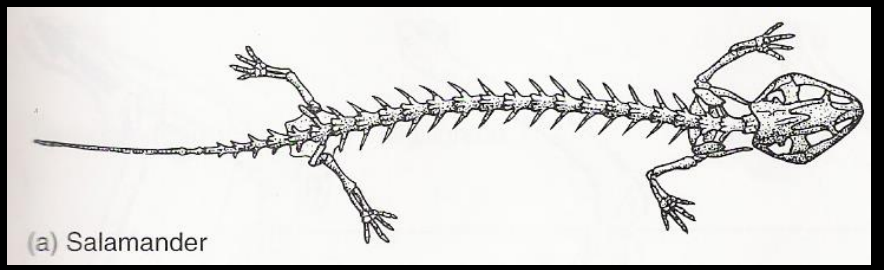










Anura or **Salientia** (frogs)

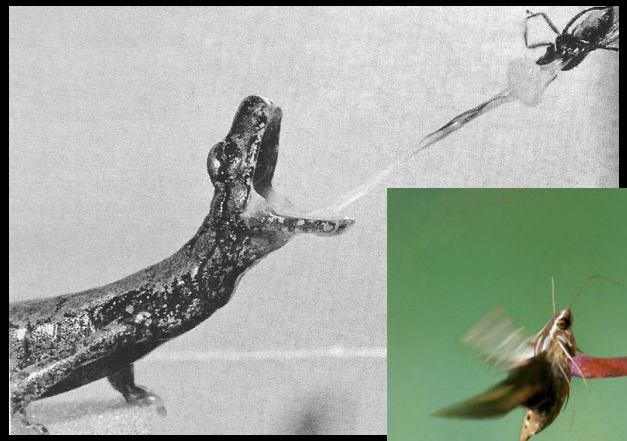
5858 species; cosmopolitan.

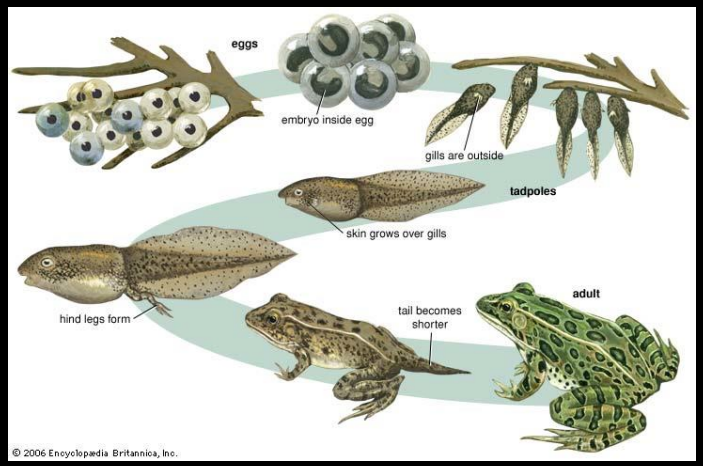
Urodela or **Caudata** (salamanders)

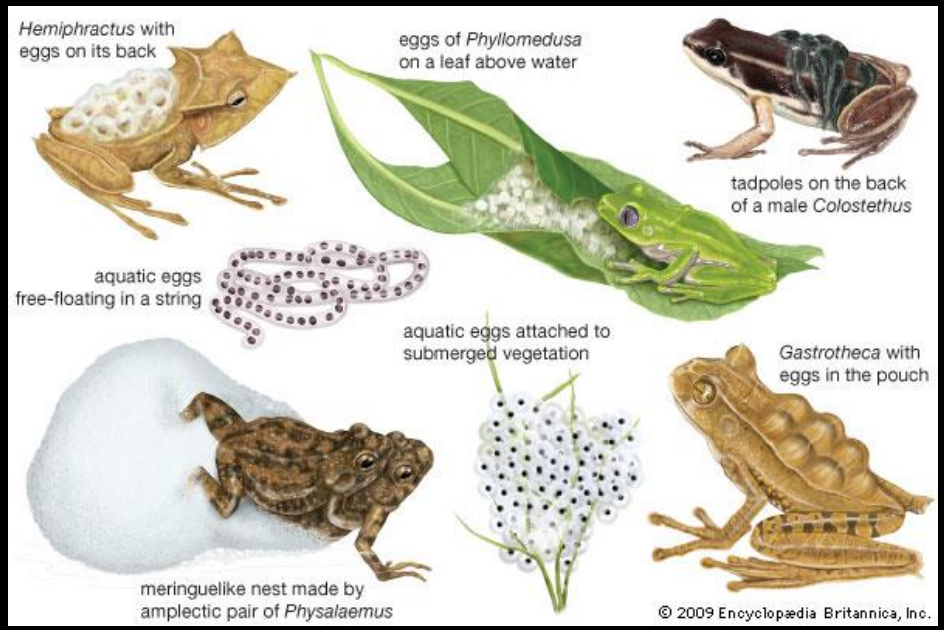
597 species; predominantly holartic.

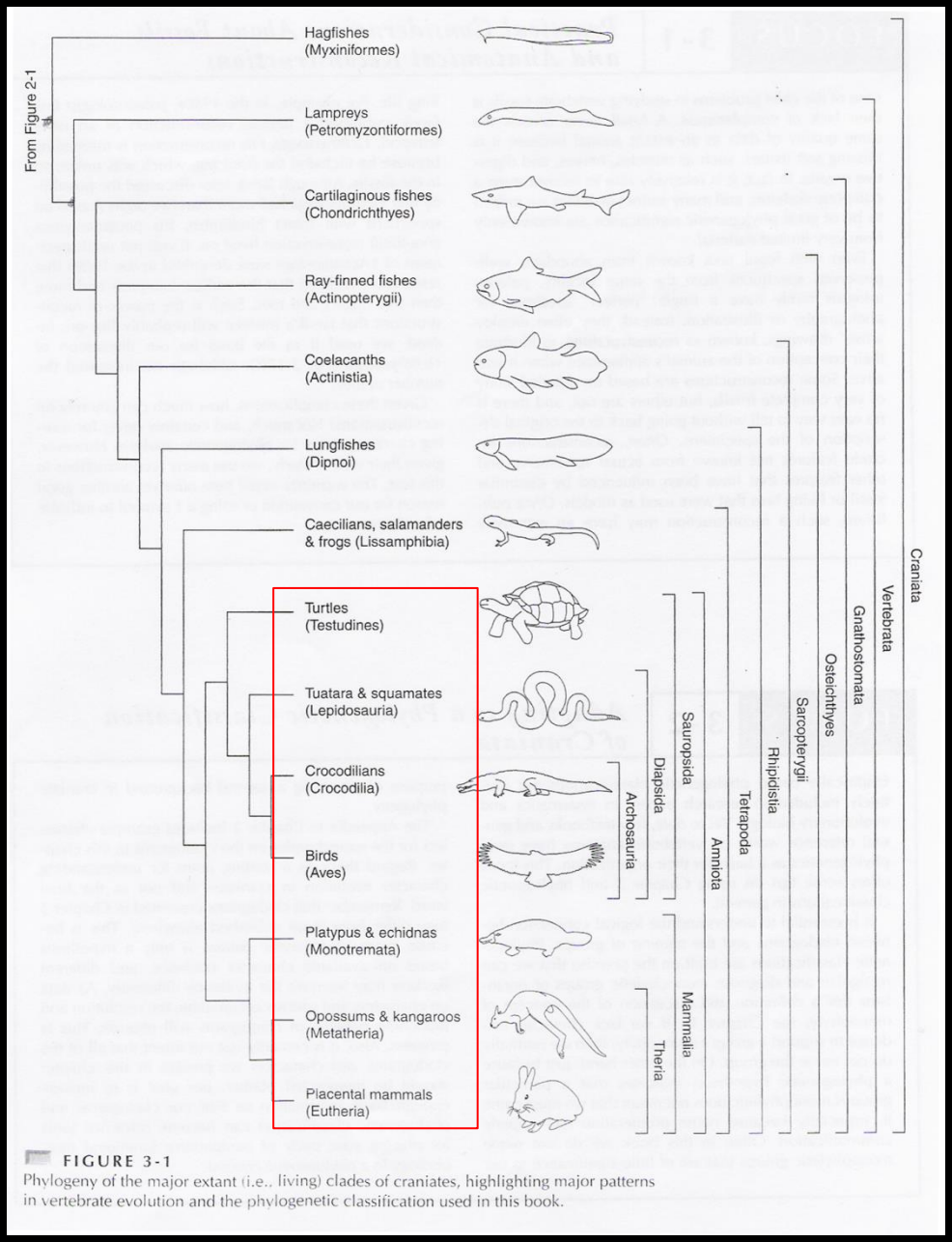
Gymnophiona or **Apoda** (Caecilians)

183 species; pan-tropical




eggs
embryo inside egg
gills are outside
tadpoles
skin grows over gills
hind legs form
tail becomes shorter
adult
© 2006 Encyclopædia Britannica, Inc.


Hemiphractus with eggs on its back
eggs of Phyllomedusa on a leaf above water
tadpoles on the back of a male Colostethus
aquatic eggs free-floating in a string
aquatic eggs attached to submerged vegetation
Gastrotheca with eggs in the pouch
meringuelike nest made by amplectic pair of Physalaemus
© 2009 Encyclopædia Britannica, Inc.



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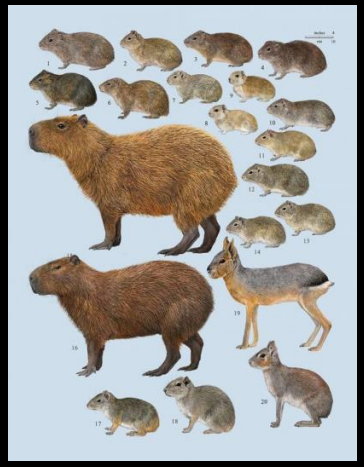

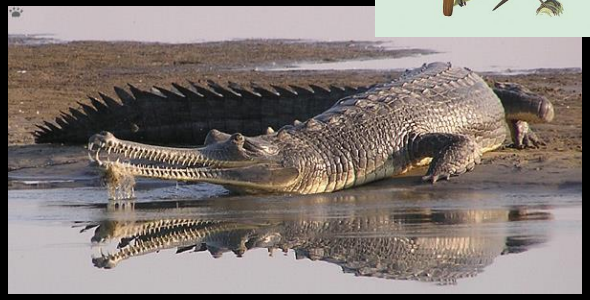

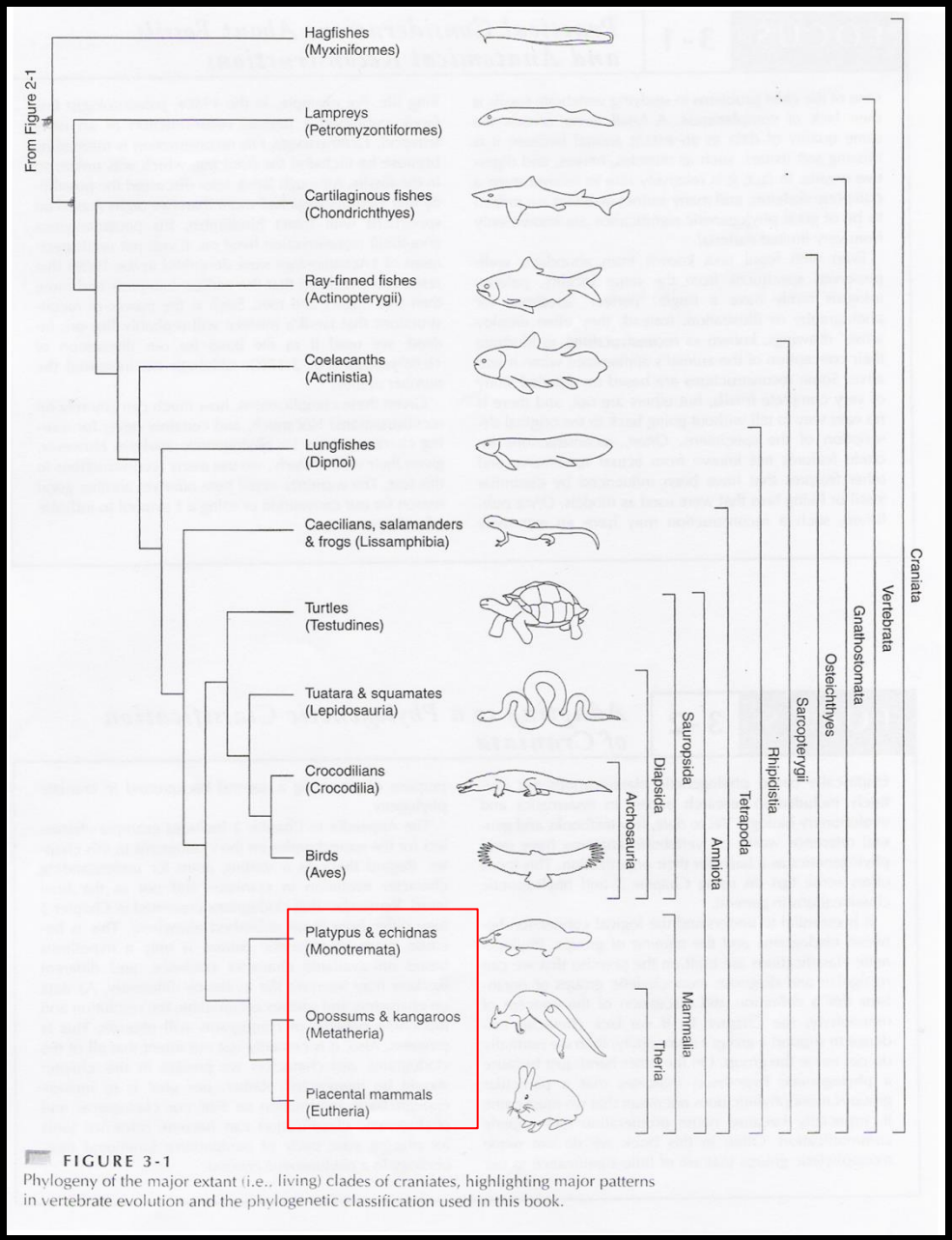

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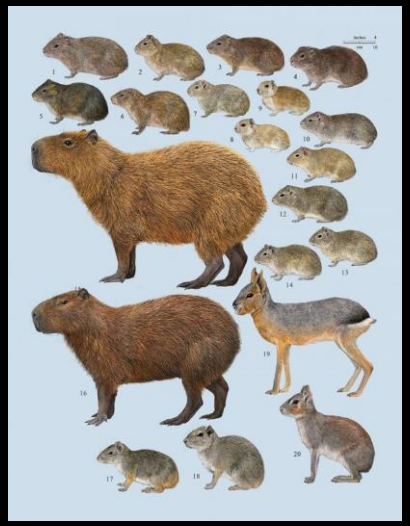
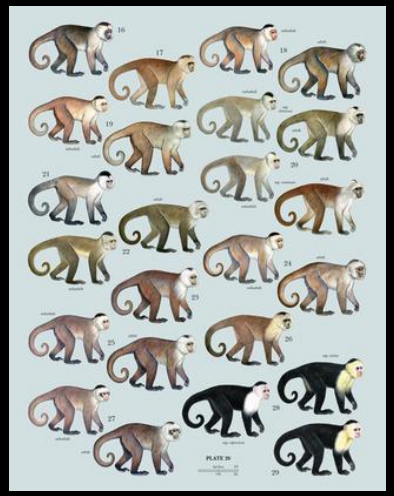
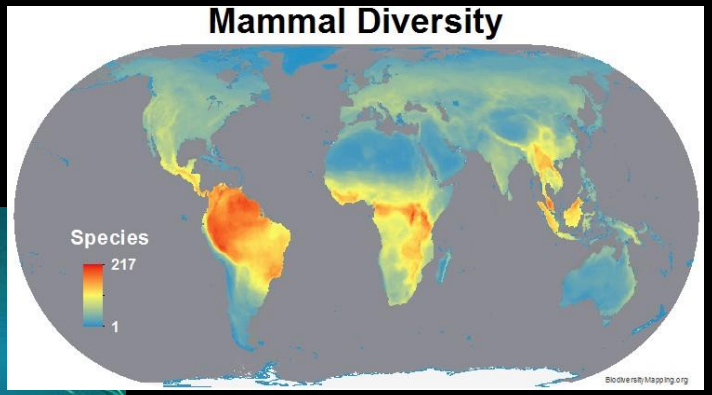




Mamíferos
Mammalia

Monotremata

5 espécies

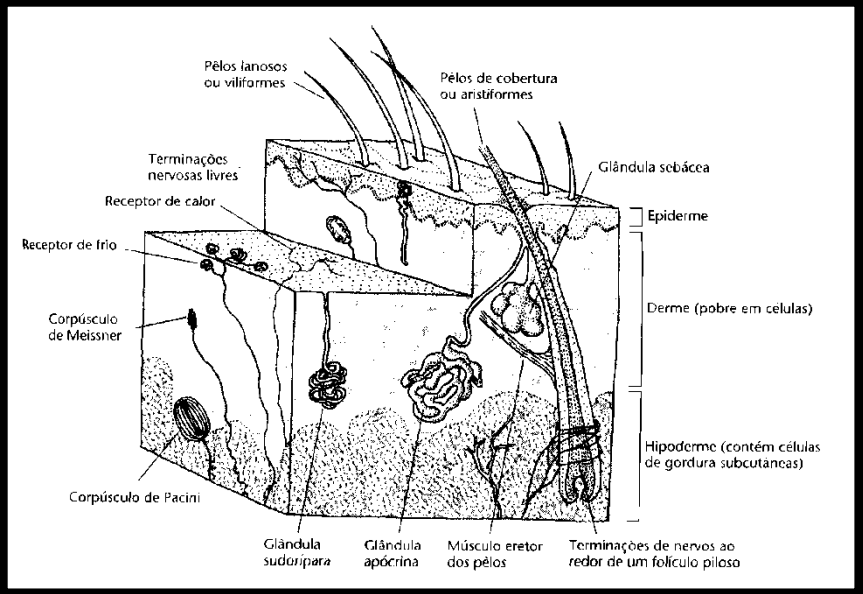


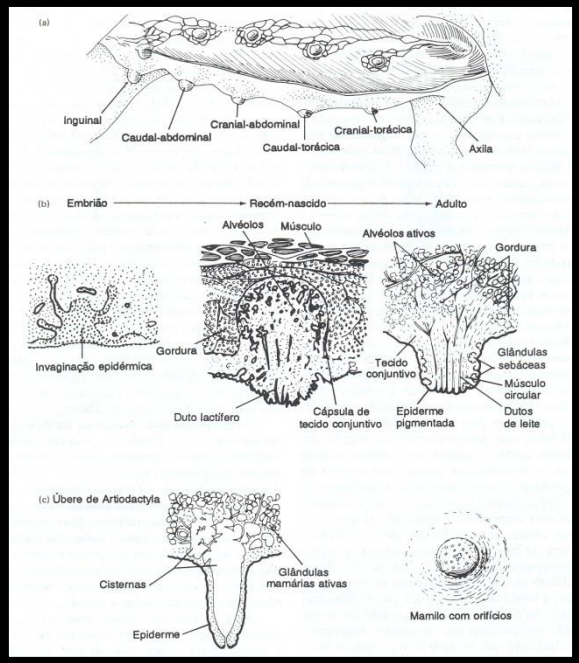
Metatheria (marsupiais)

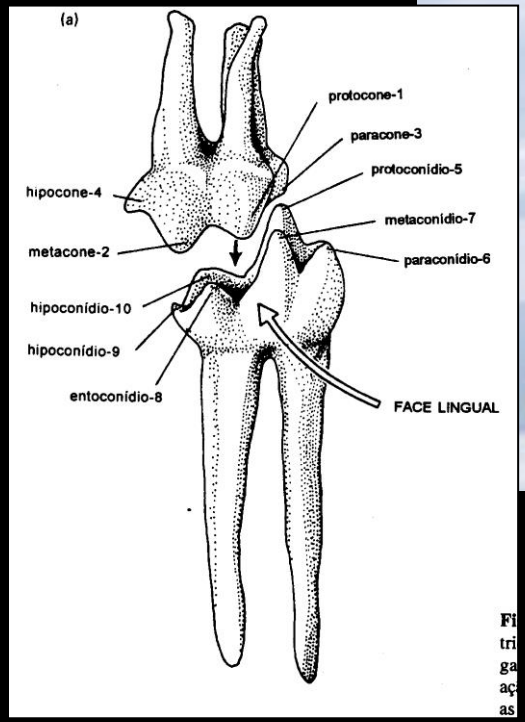
339 espécies

Eutheria (placentários)

5072 espécies







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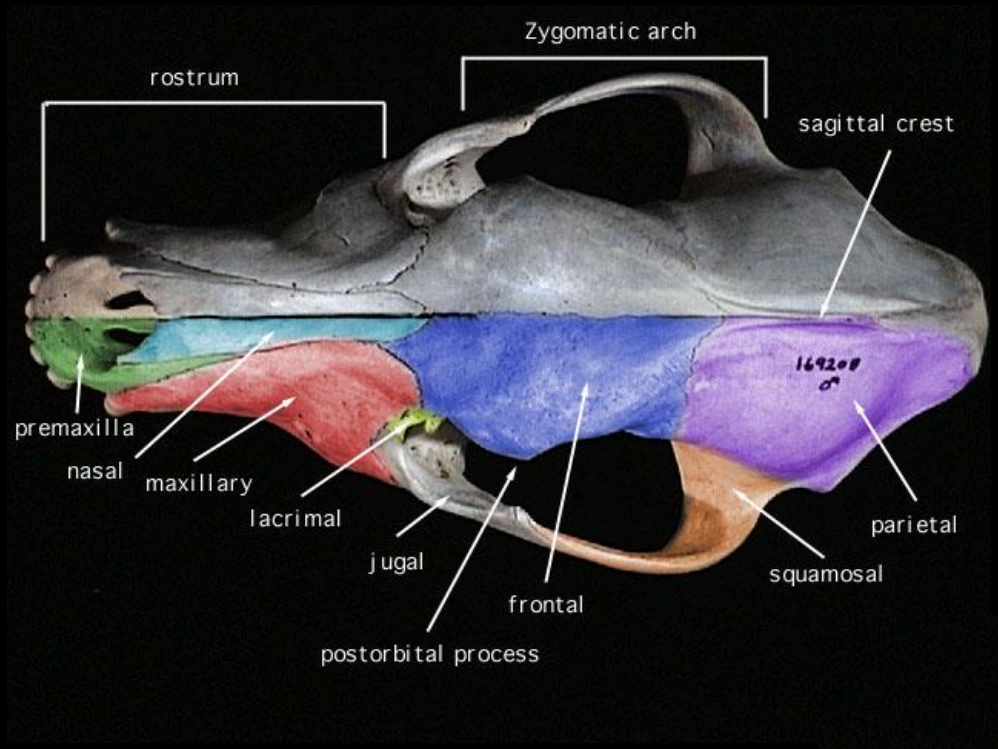
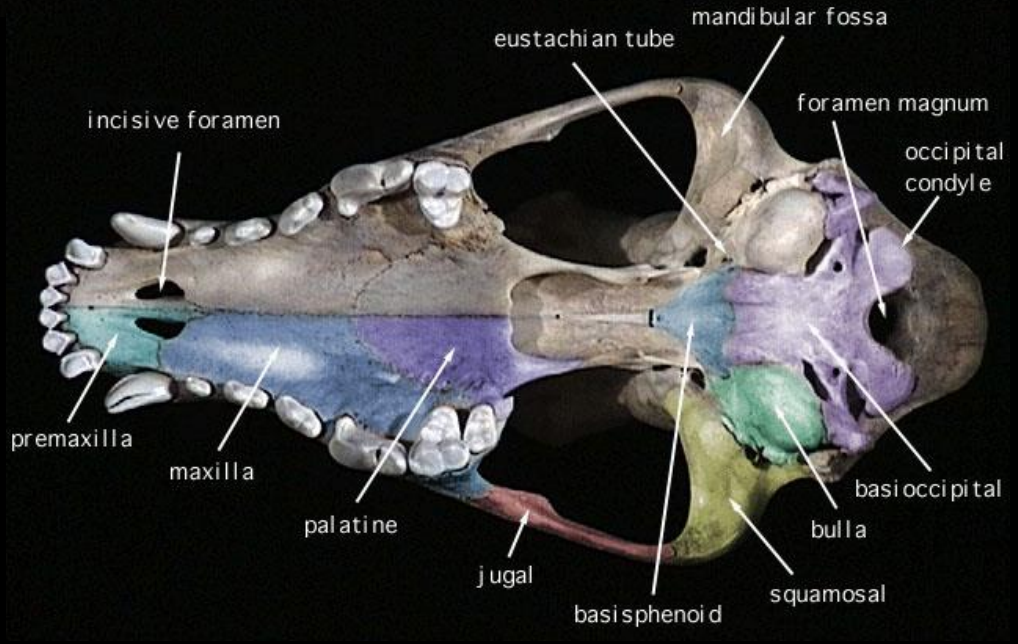

Zygomatic arch
rostrum
sagittal crest
premaxilla
nasal
maxillary
lacrimal
jugal
frontal
postorbital process
squamosal
parietal


mandibular fossa
eustachian tube
foramen magnum
incisive foramen
occipital condyle
premaxilla
maxilla
palatine
jugal
basisphenoid
squamosal
bulla
basioccipital

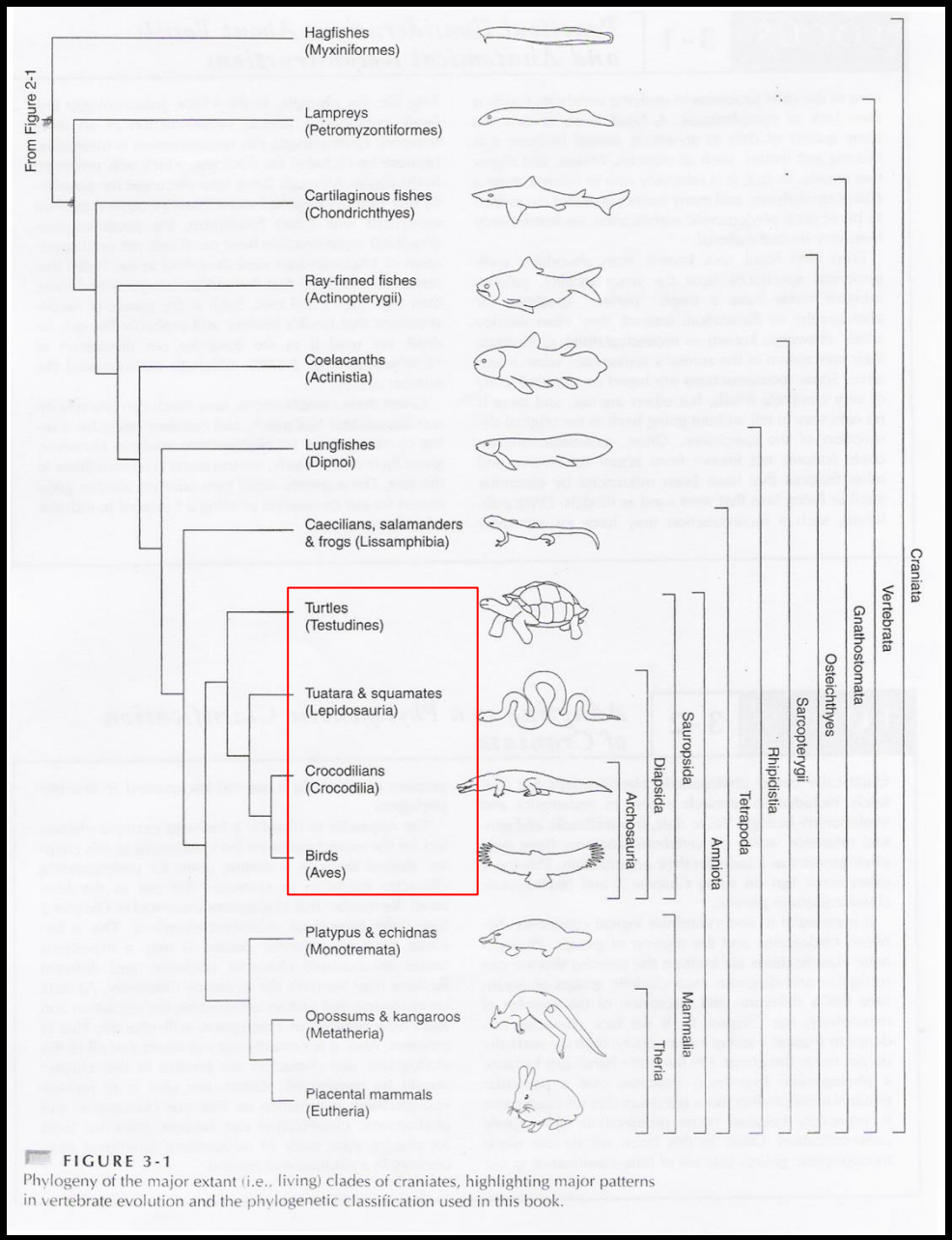
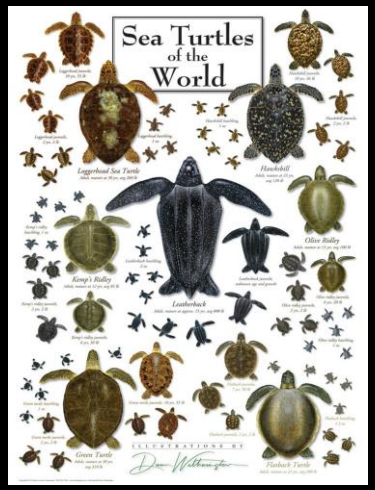
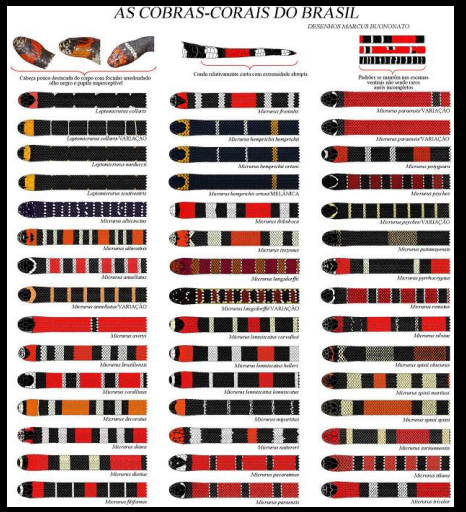


FIGURE 3-1
Phylogeny of the major extant (i.e., living) clades of craniates, highlighting major patterns in vertebrate evolution and the phylogenetic classification used in this book.





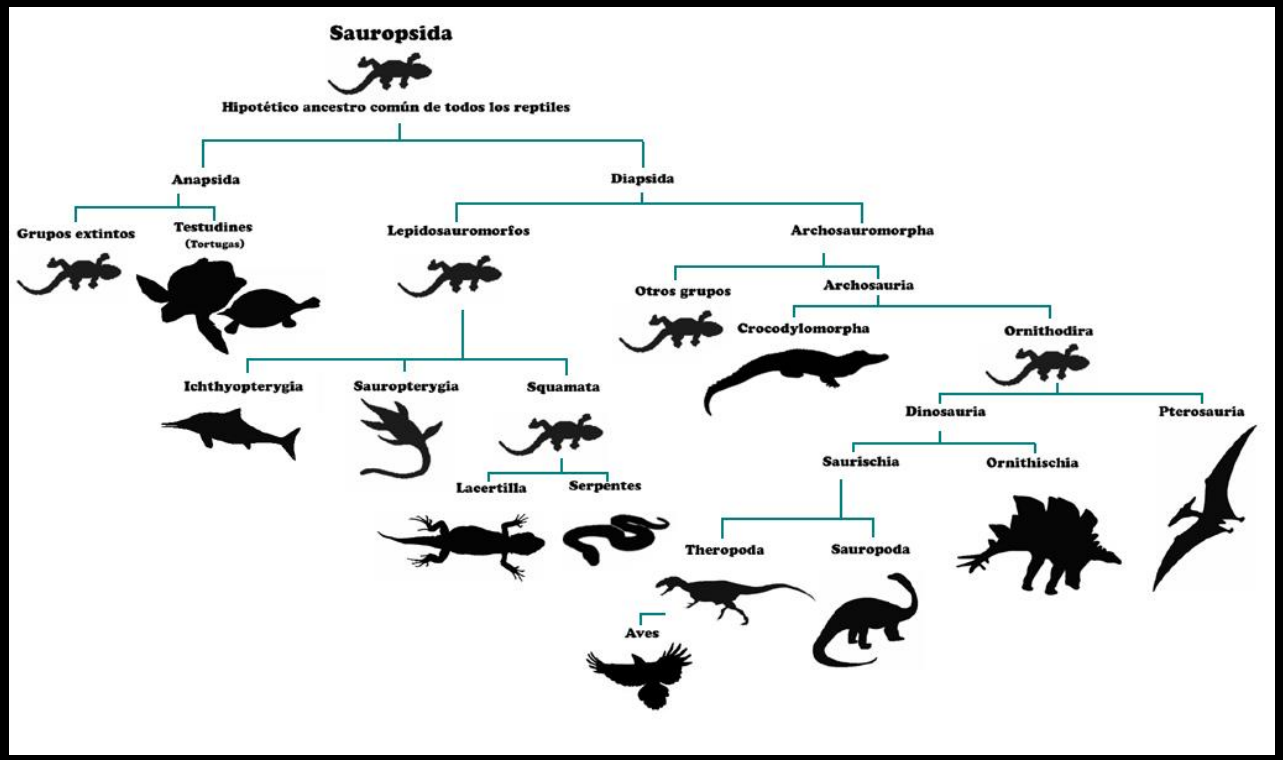
Sauropsida

Chelonia, Testudines: Tartarugas

Lepidosauria: Sphenodontia: tuatara; Squamata: lagartos, serpentes, cobras de duas cabeças

Archosauria: Crocodylia: crocodilos, gaviais e jacarés

Archosauria: Aves: aves e pássaros



Chelonia
Tartarugas, jabutis e cágados

Testudines
341 espécies

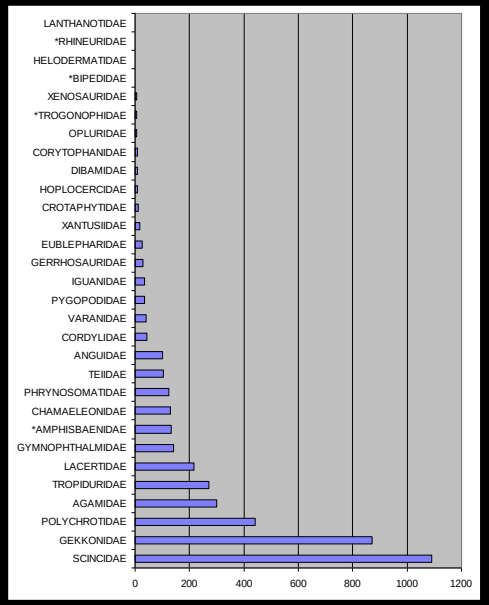
Lepidosauria

Serpentes
4038 espécies

Amphisbaenia
201 espécies

“Lizards”
7310 espécies

Squamata

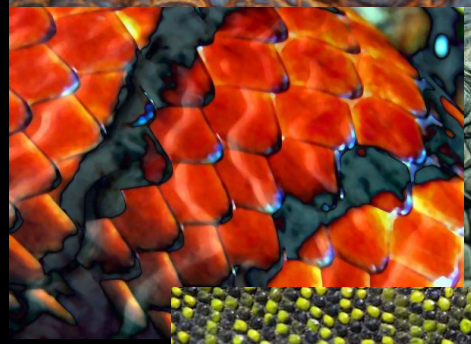


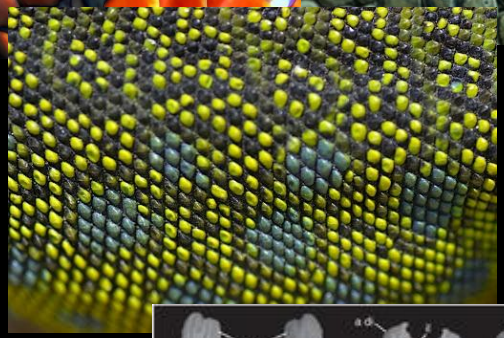
Sphenodontia

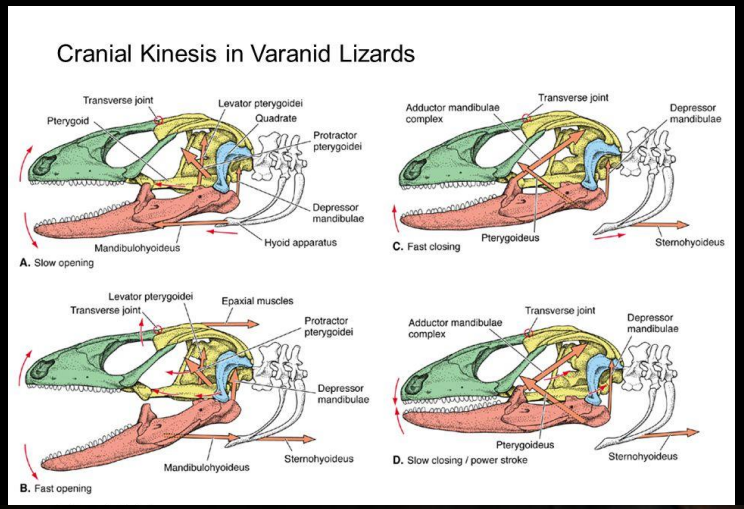
Rhynchocephalia
1 espécie

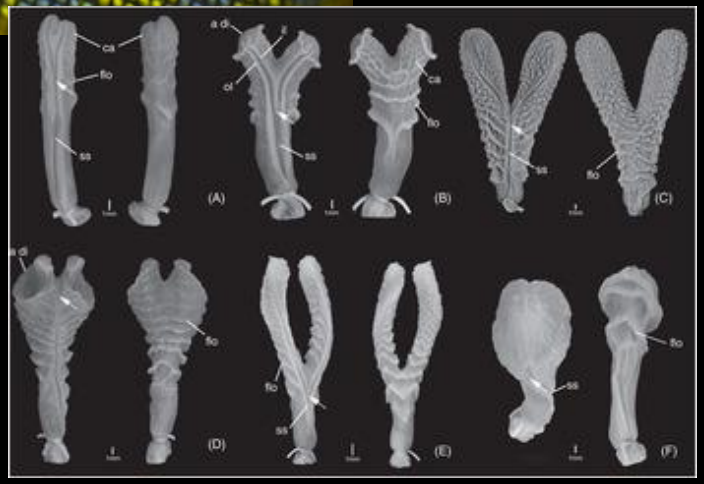
Crocodylia

Crocodylia
25 espécies



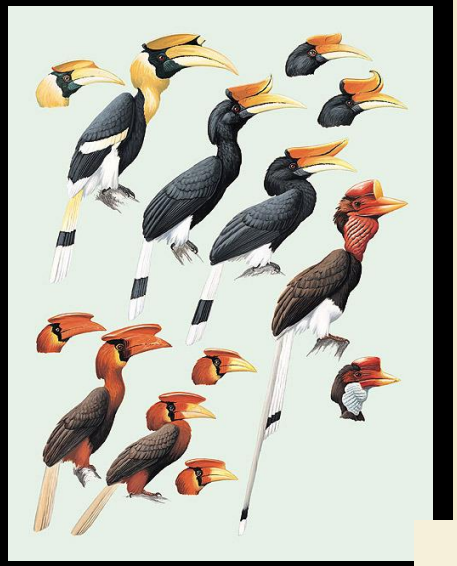


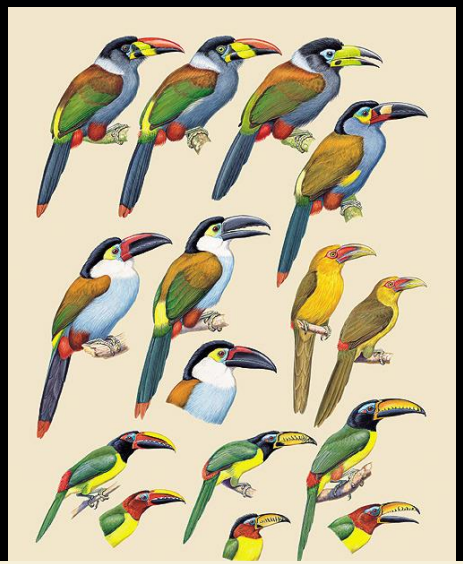

Cranial Kinesis in Varanid Lizards
Transverse joint
Levator pterygoidei
Pterygoid
Quadrate
Protractor pterygoidei
Depressor mandibulae
Mandibulohyoideus
Hyoid apparatus
A. Slow opening
Adductor mandibulae complex
Transverse joint
Depressor mandibulae
Pterygoideus
Sternohyoideus
C. Fast closing
Levator pterygoidei
Epaxial muscles
Transverse joint
Protractor pterygoidei
Depressor mandibulae
Mandibulohyoideus
Sternohyoideus
B. Fast opening
Adductor mandibulae complex
Transverse joint
Depressor mandibulae
Pterygoideus
Sternohyoideus
D. Slow closing / power stroke

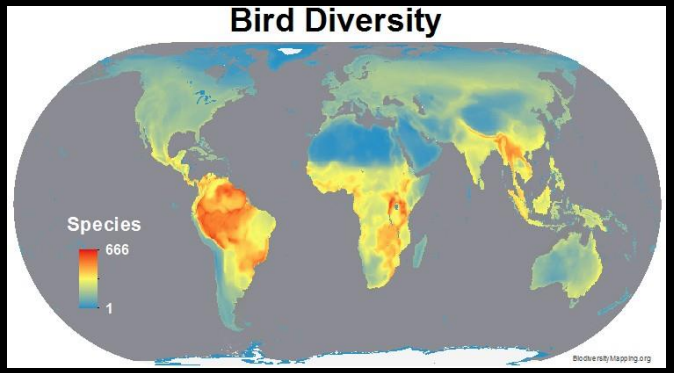

(A)
(B)
(C)
(D)
(E)
(F)

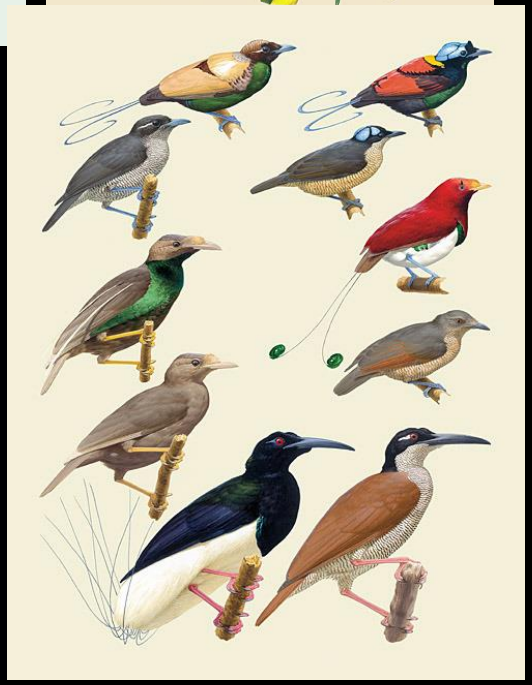
9693 - 10610 espécies
19676 - 20988 subespécies

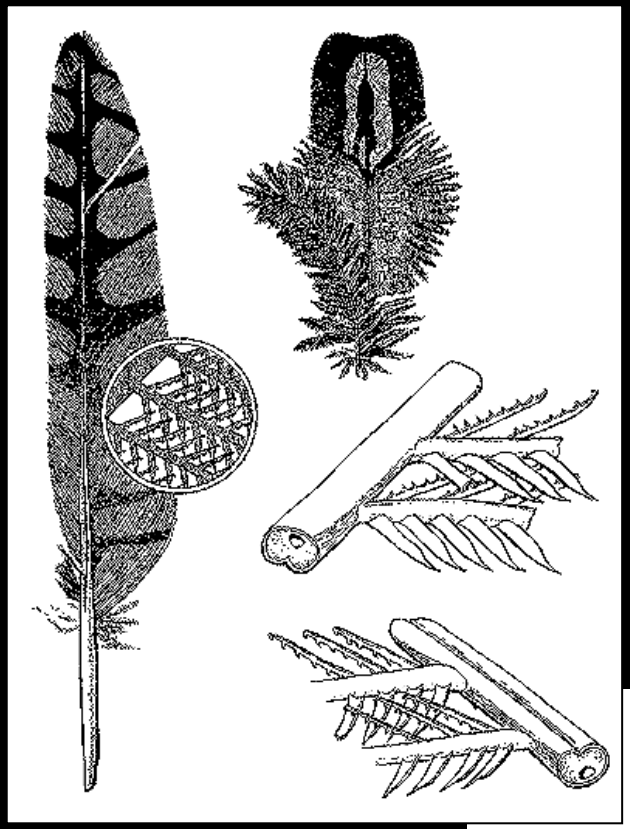
Aves

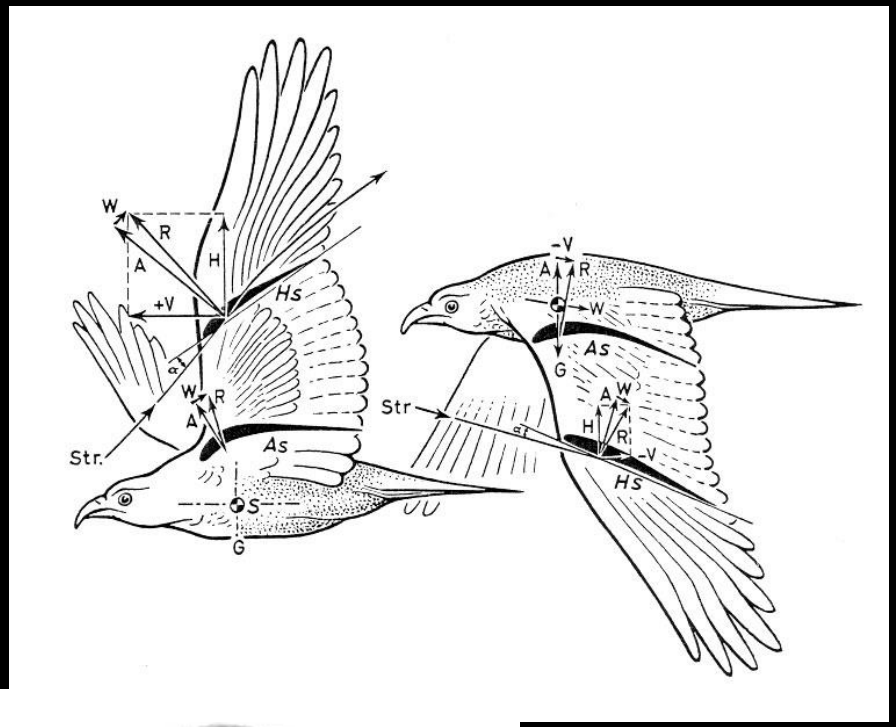


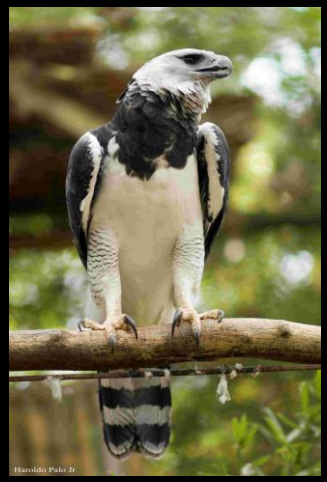


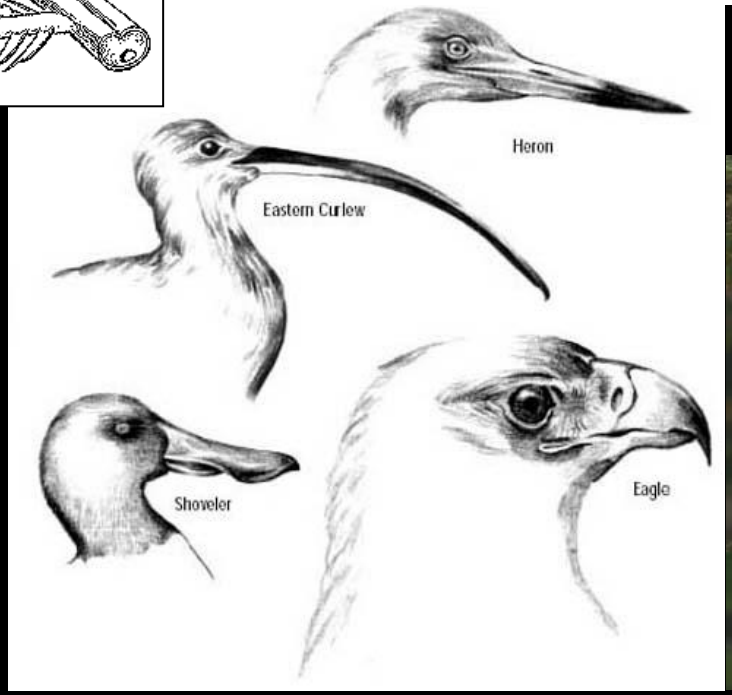






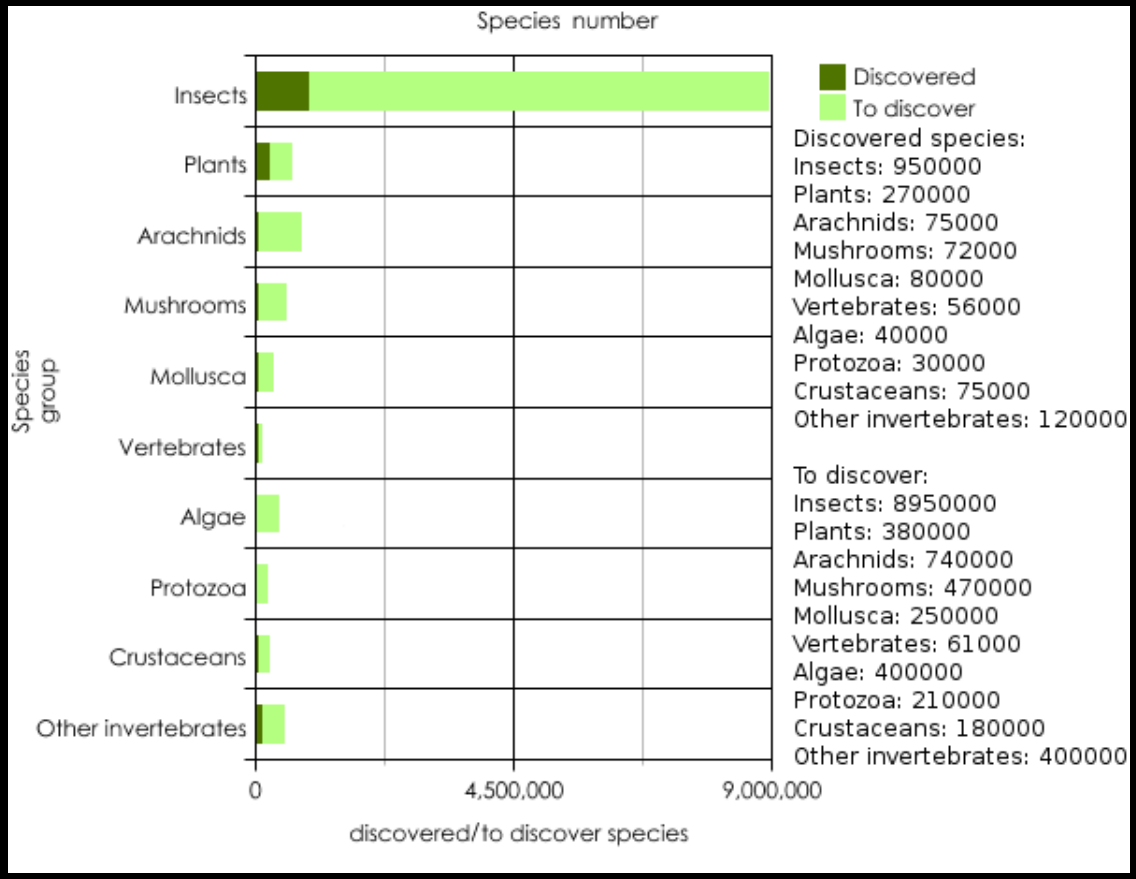

W
R
A
H
+V
Hs
Str.
As
G
-V
Str



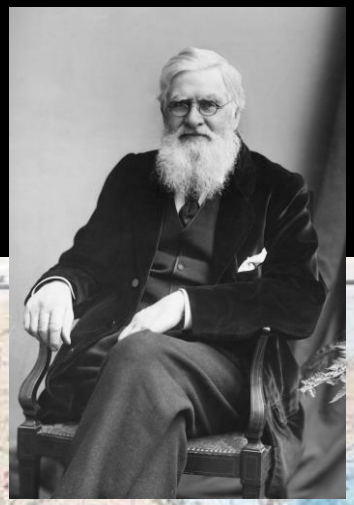

Heron
Eastern Curlew
Shoveler
Eagle

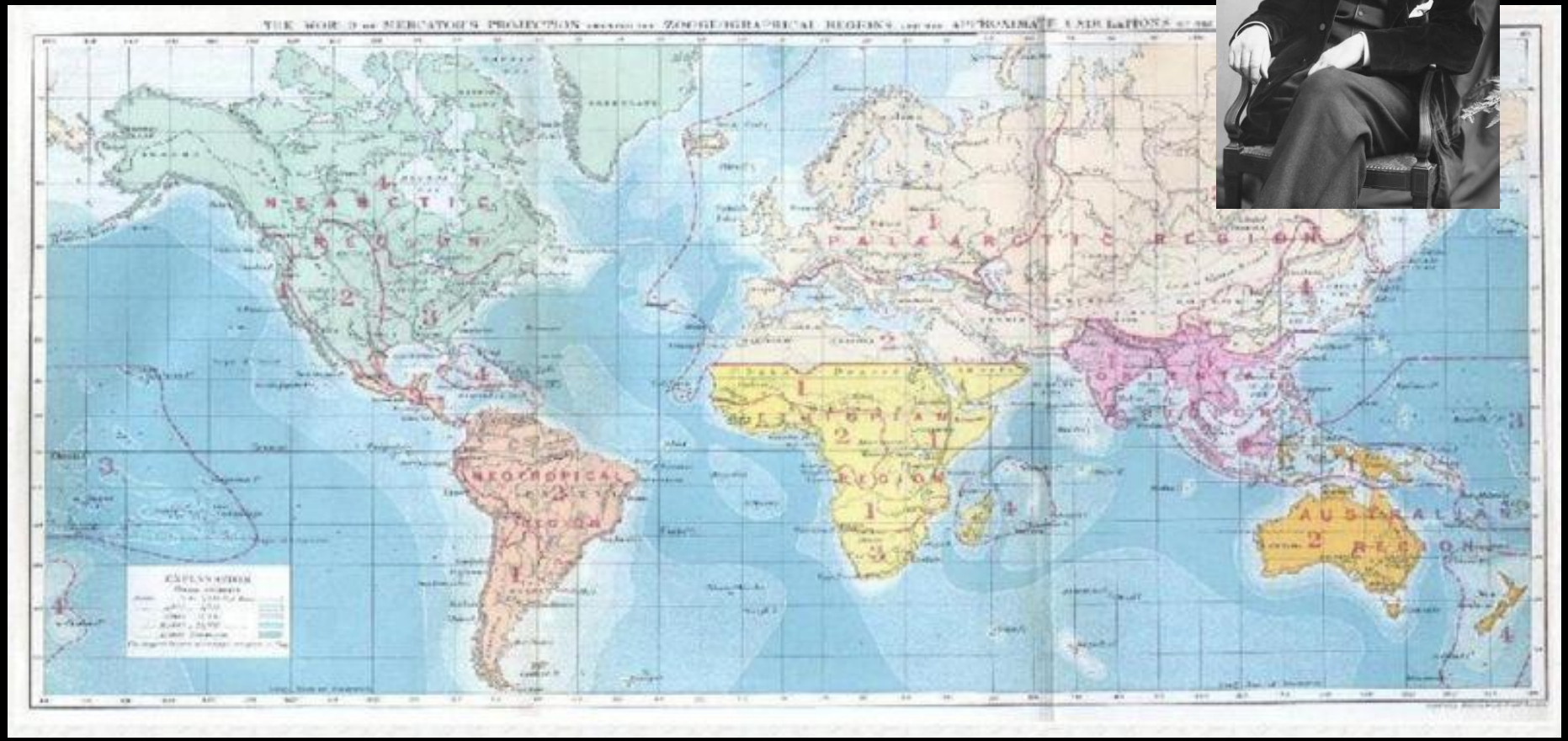
Total number of species (estimated): 7–100 millions (identified and unidentified), including:
5–10 million bacteria;
74,000–120,000 fungi;
Of the *identified* eukaryote species we have:
1.6 million, including:
- 297,326 plants, including:
  - 15,000 mosses,
  - 13,025 Ferns and horsetails,
  - 980 gymnosperms,
  - 258,650 angiosperms,
    - 199,350 dicotyledons,
    - 59,300 monocotyledons,
  - 9,671 Red and green algae,
- 28,849 fungi & other non-animals:
  - 10,000 lichens,
  - 16,000 mushrooms,
  - 2,849 brown algae,
- 1,250,000 animals, including:
  - 1,203,375 invertebrates:
    - 950,000 insects,
    - 81,000 mollusks,
    - 40,000 crustaceans,
    - 2,175 corals,
    - 130,200 others;
  - 59,811 vertebrates:
    - 29,300 fish,
    - 6,199 amphibians,
    - 8,240 reptiles,
    - 9,956 birds,
    - 5,416 mammals.

Quantas espécies existem?

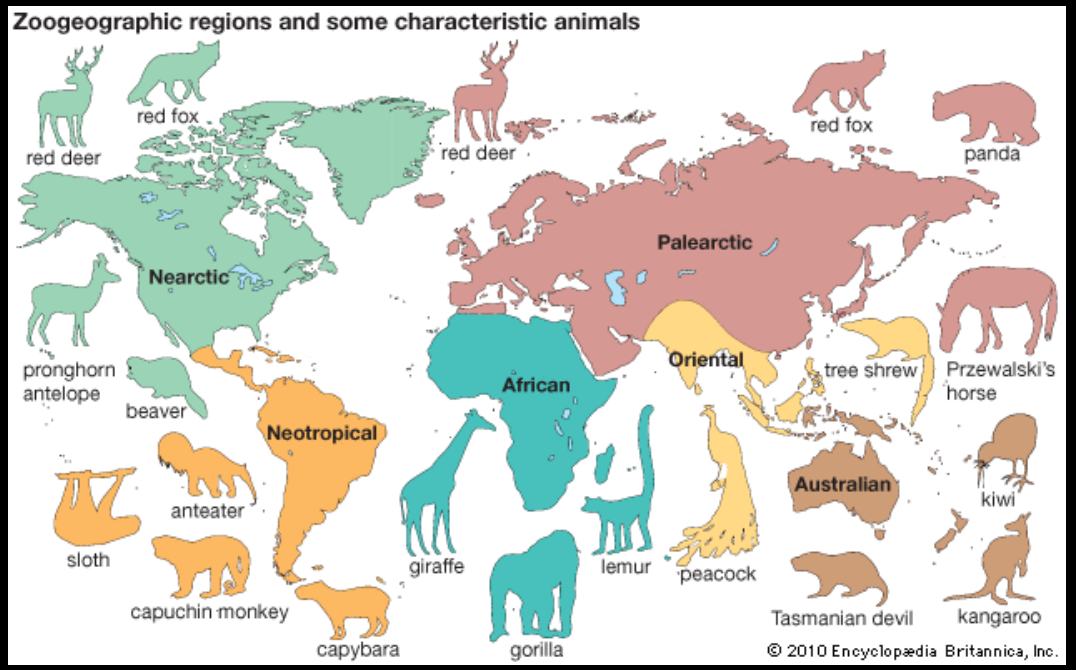


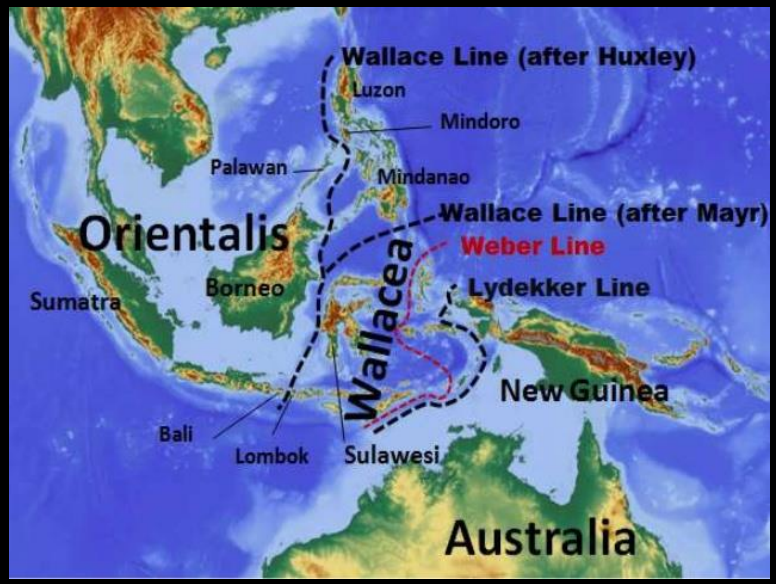
Distribuição da Biodiversidade





Distribuição da Biodiversidade





Distribuição da Biodiversidade

Hotspots is a biogeographic region with significant levels of biodiversity that is under threat from humans.

Key concepts: irreplaceability and threat (Myers et al., 2000)

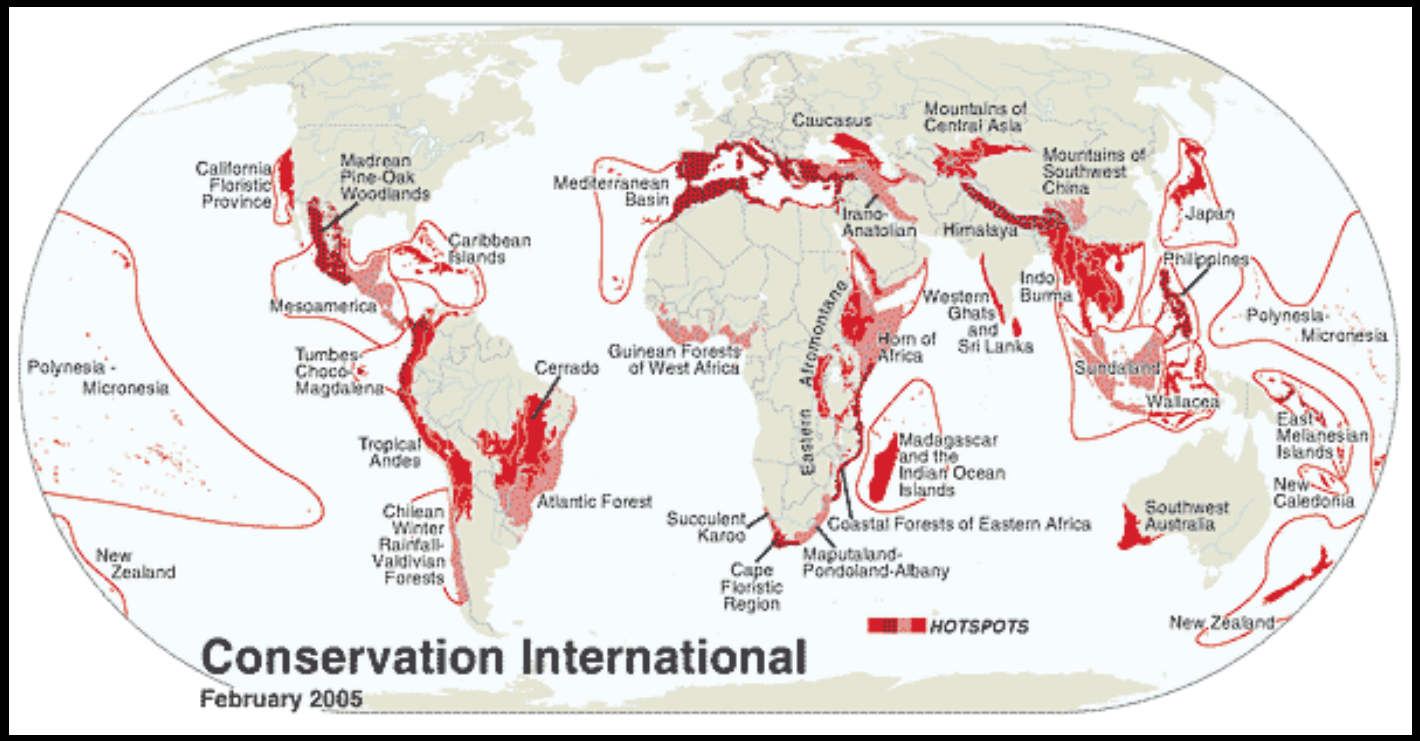


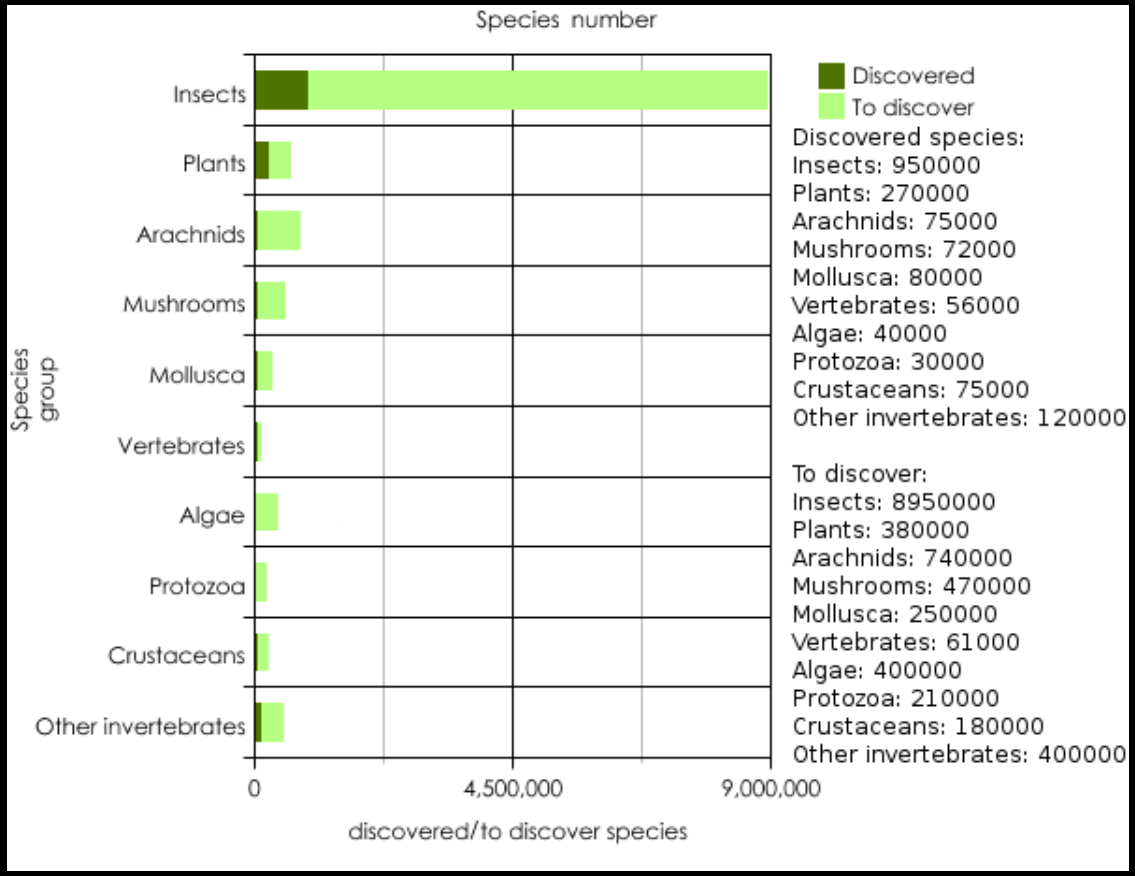
Table 19.1 Characteristics of 25 of the highest ranked biodiversity hotspots.

Hotspot	Original extent of vegetation (km^2)	Percent remaining original vegetation	No. of plant species	No. of endemic plant species	No. of vertebrate species	No. of endemic vertebrate species
Tropical Andes	1,258,000	25.0	30,000	15,000	3389	1567
Mesoamerica	1,155,000	20.0	17,000	2941	2859	1159
Caribbean	263,500	11.3	13,000	6550	1518	779
Brazil's Atlantic Forest	1,227,600	7.5	20,000	8000	1361	567
Turnbes/Choco/Western Ecuador	260,600	24.2	11,000	2750	1625	418
Brazil's Cerrado	1,783,200	20.0	22,000	10,000	1268	117
Chile/Valdivian Forest	300,000	30.0	3892	1957	335	61
California	324,000	24.7	3488	2124	584	71
Madagascar	594,150	9.9	13,000	11,600	987	771
Eastern Afromontane and Coastal Forests of East Africa	30,000	6.7	11,598	4106	1019	121
Guinean West African Forests	1,265,000	10.0	9000	1800	1320	270
Cape Floristic Province	74,000	24.3	9000	6210	562	53
Succulent Karoo	112,000	26.8	6356	2439	472	45
Mediterranean Basin	2,362,000	4.7	22,500	11,700	770	235
Caucasus	500,000	10.0	6400	1600	632	59
Sundaland	1,600,000	7.8	25,000	15,000	1800	701
Wallacea	347,000	15.0	10,000	1500	1142	529
Philippines	300,800	3.0	9253	6091	1093	518
Indo-Burma and Himalaya	2,060,000	4.9	23,500	10,160	2185	528
Southwest China	800,000	8.0	12,000	3500	1141	178
Western Ghats/Sri Lanka	182,500	6.8	5916	3049	1073	355
SW Australia	309,850	10.8	5571	2948	456	100
New Caledonia	18,600	28.0	3270	2432	190	84
New Zealand	270,500	22.0	2300	1865	217	136
Polynesia/Micronesia	46,000	21.8	5330	3074	342	223

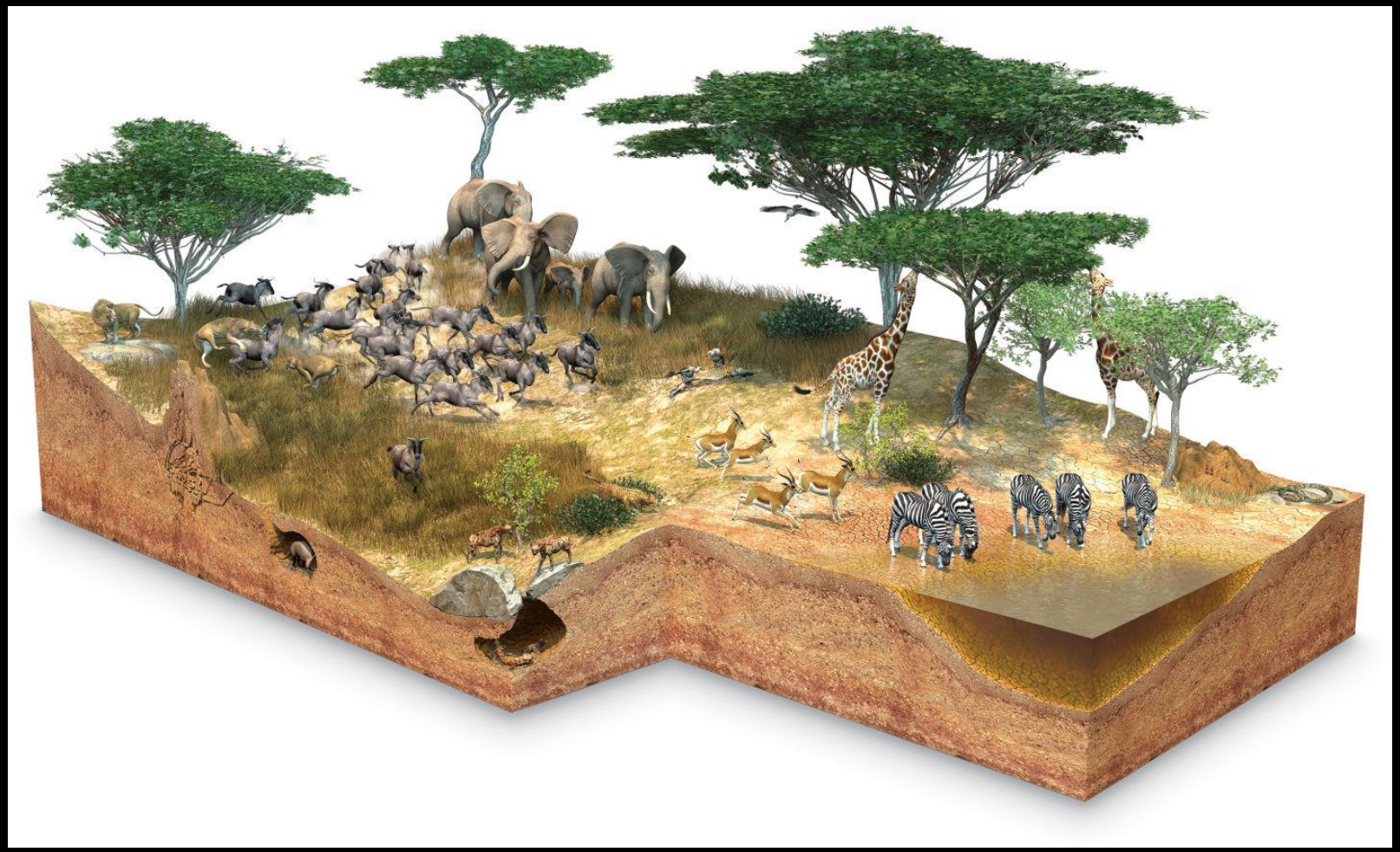
NOTE: There are approximately 300,000 described plant species on Earth, and approximately 28,595 described vertebrate species (excluding fish). Fishes are not included in the vertebrate tally. The eight hottest hotspots are shown in boldface type. Figure 19.10 shows a map of these regions.

(From www.biodiversityhotspots.org.)

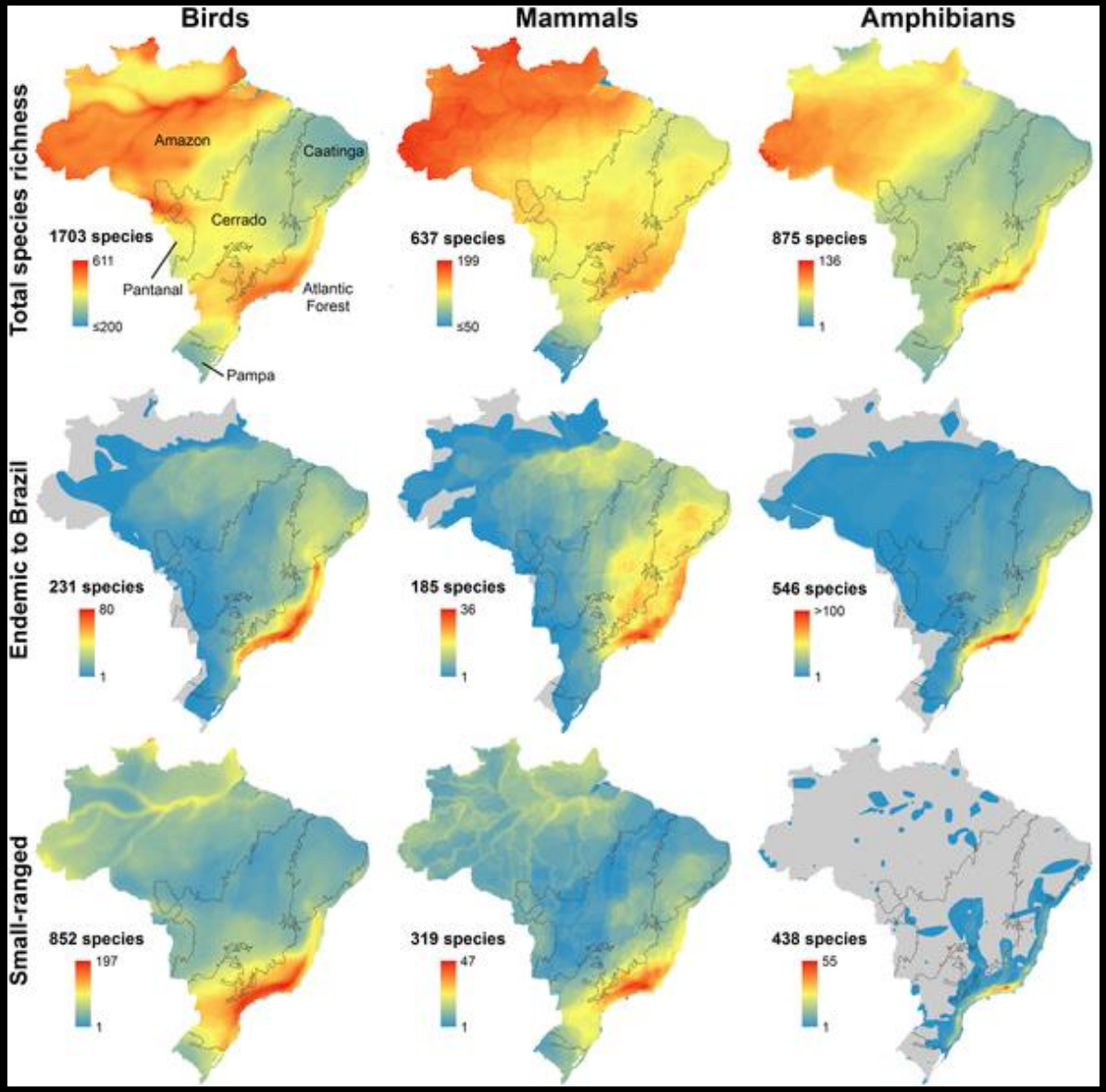
Porque é tão importante saber a diversidade de um grupo que representa apenas 3% dos organismos viventes?



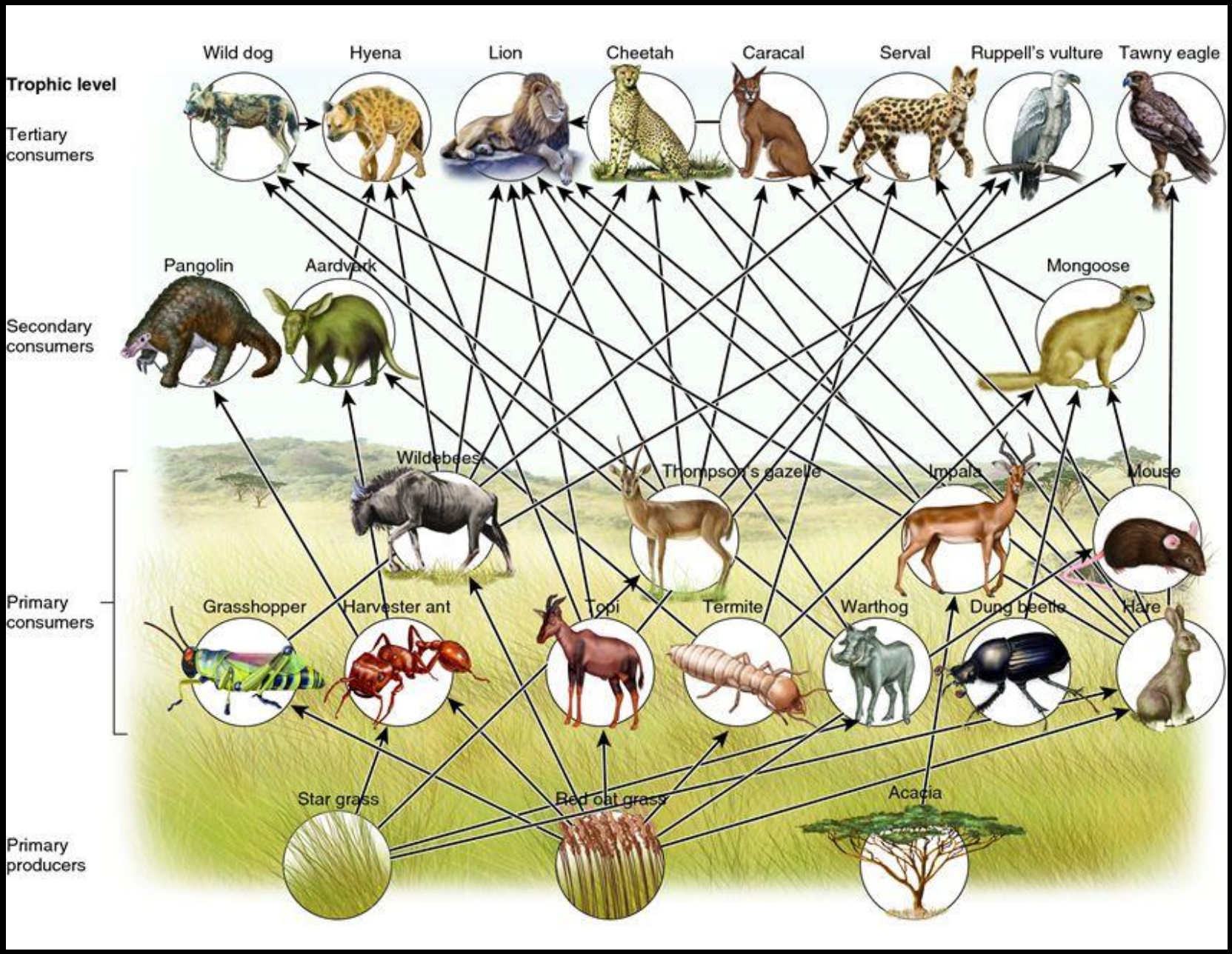
Grupo conspícuo



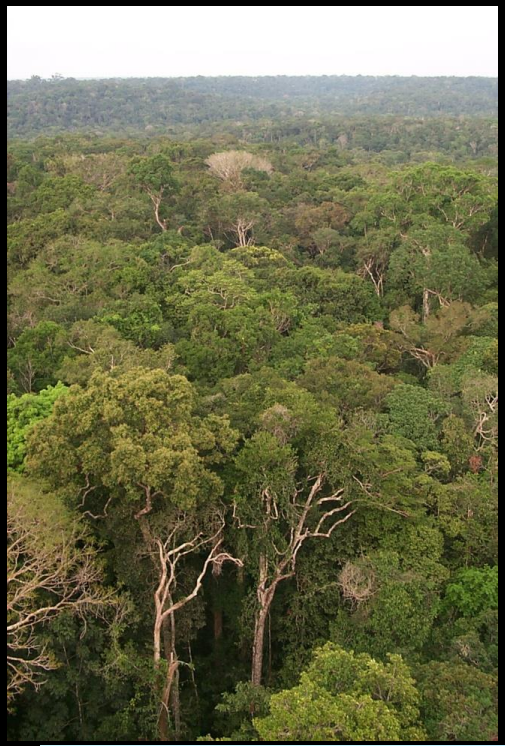
Diversidade relativamente bem conhecida



Interações ecológicas são melhor conhecidas



Grande associação a biomas e hábitats



12 orders

36 families

399 species

Porque é tão importante saber a diversidade de um grupo que representa apenas 3% dos organismos viventes?

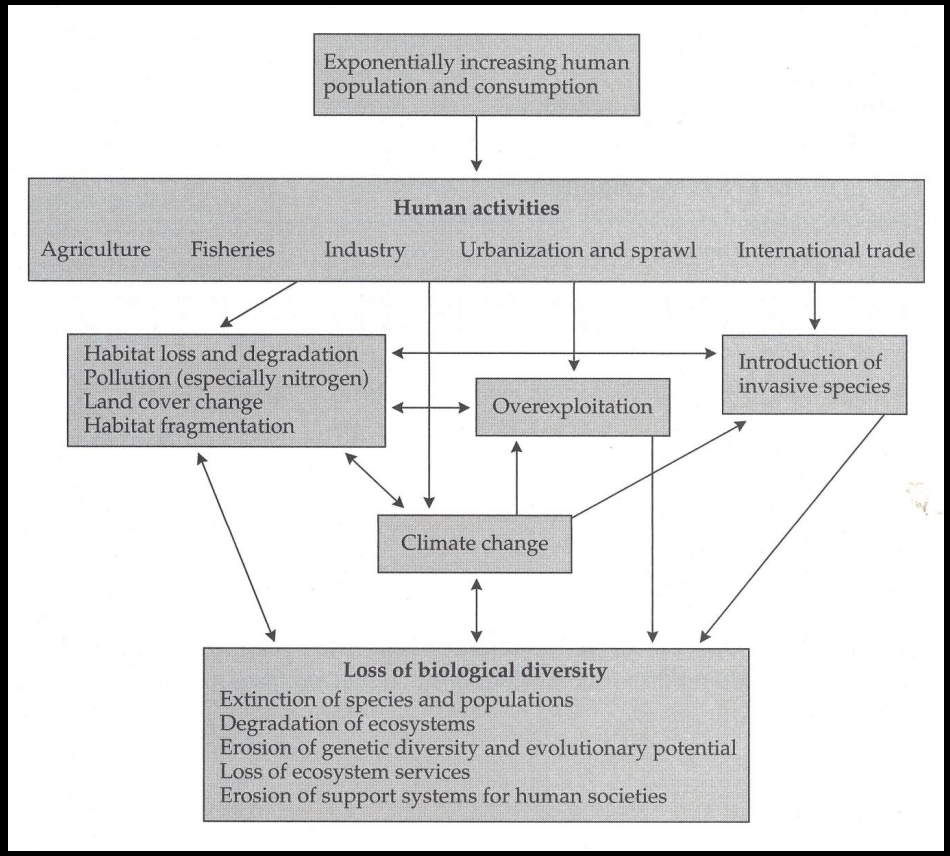
Bons indicadores

Paisagens conservadas

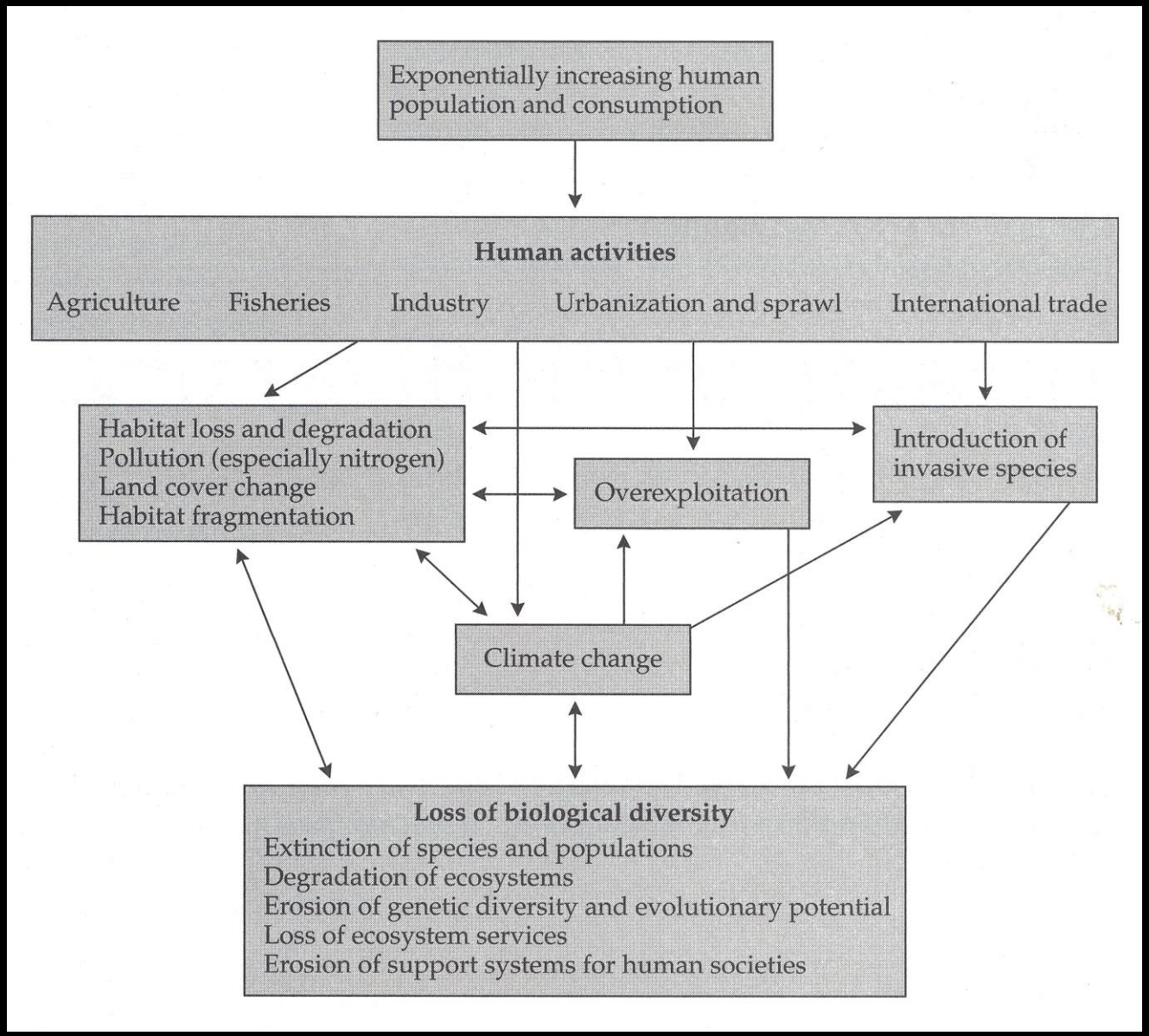
Paisagens antropizadas

Identificar e diagnosticar:

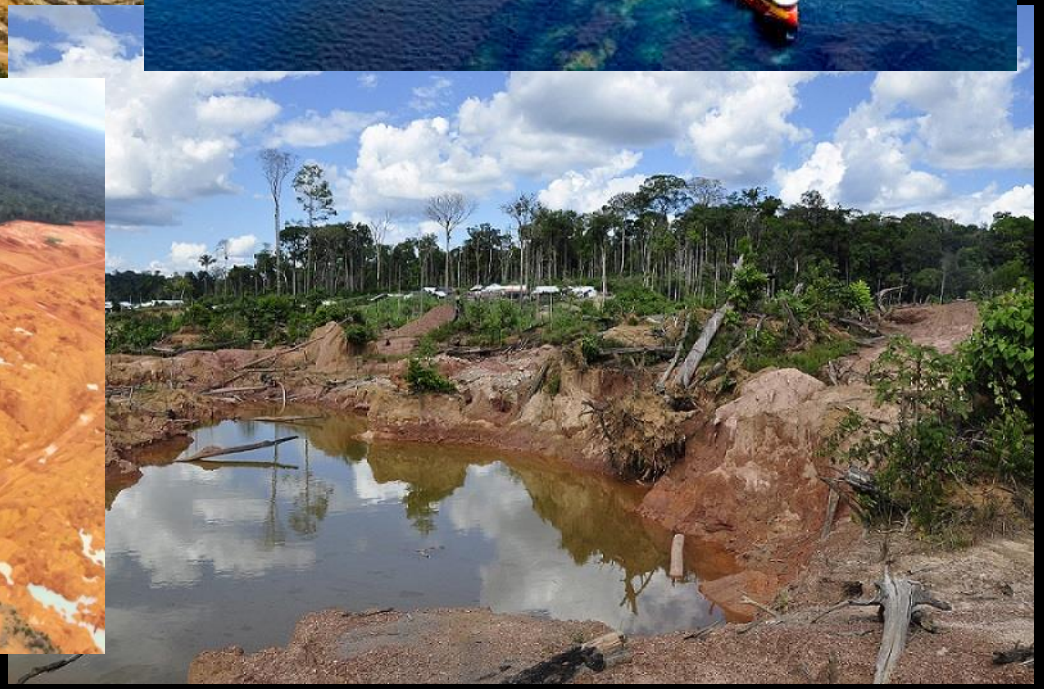
Ameaças à Biodiversidade!



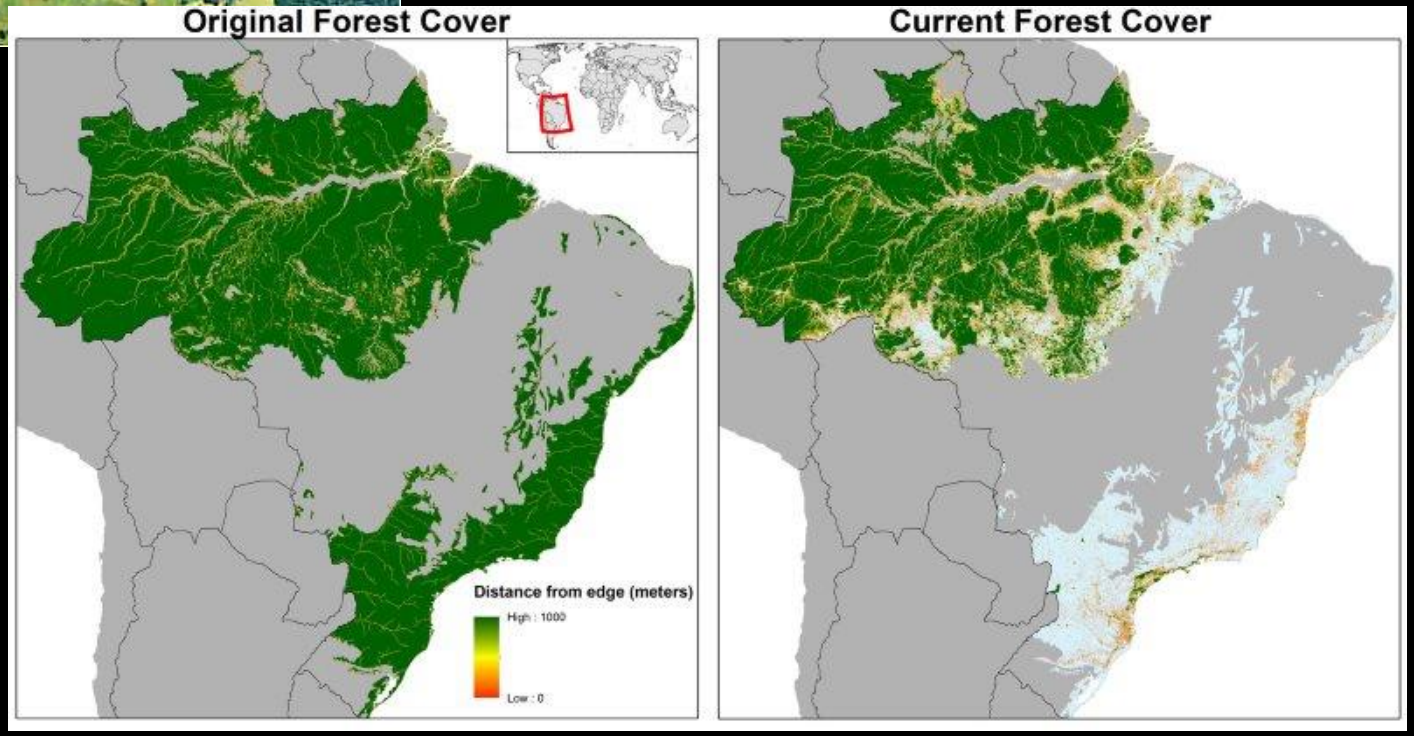
Ameaças à Biodiversidade



Degradação e perda de Hábitat



Degradação e perda de Hábitat



Degradação e perda de Hábitat

Core Habitat, Habitat Edge and Connectivity

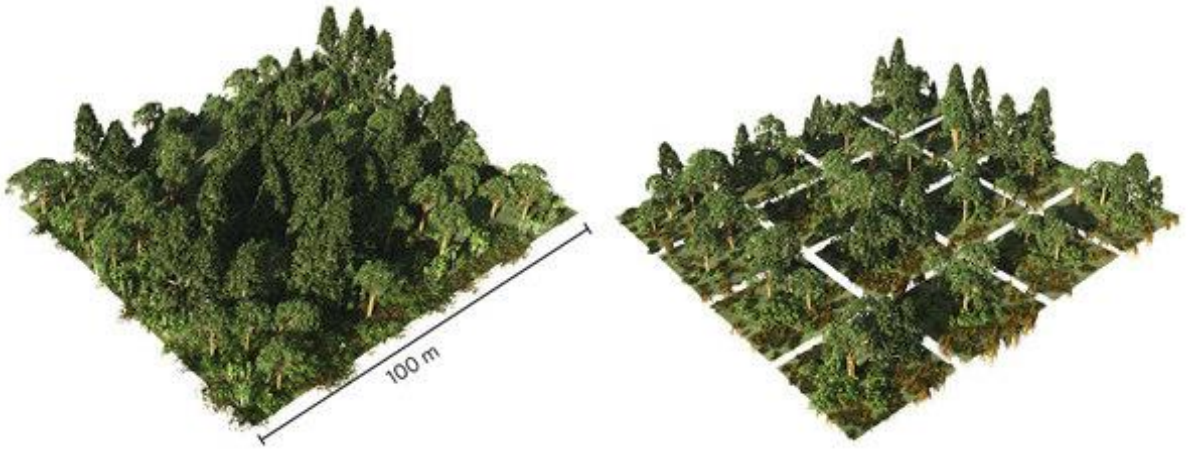
Maximum habitat interior (core habitat) and minumum edge

Maximum habitat edge and no interior habitat

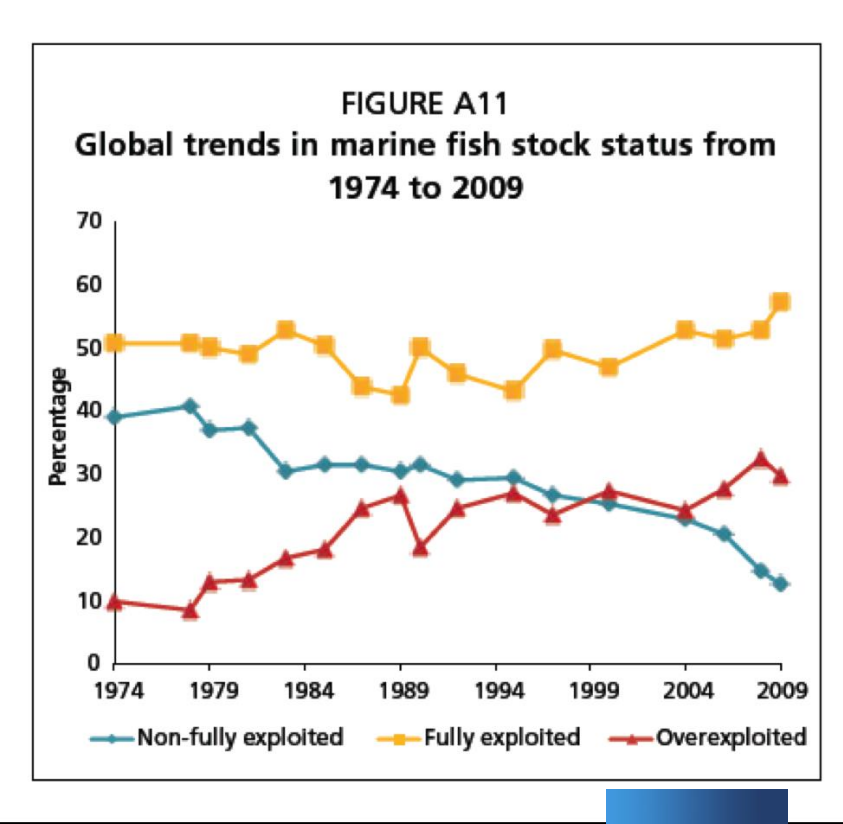
Connect core habitat 'nodes' to prevent habitat fragmentation

Images courtesy of Benjamin Penington, 1000 Friends of Florida

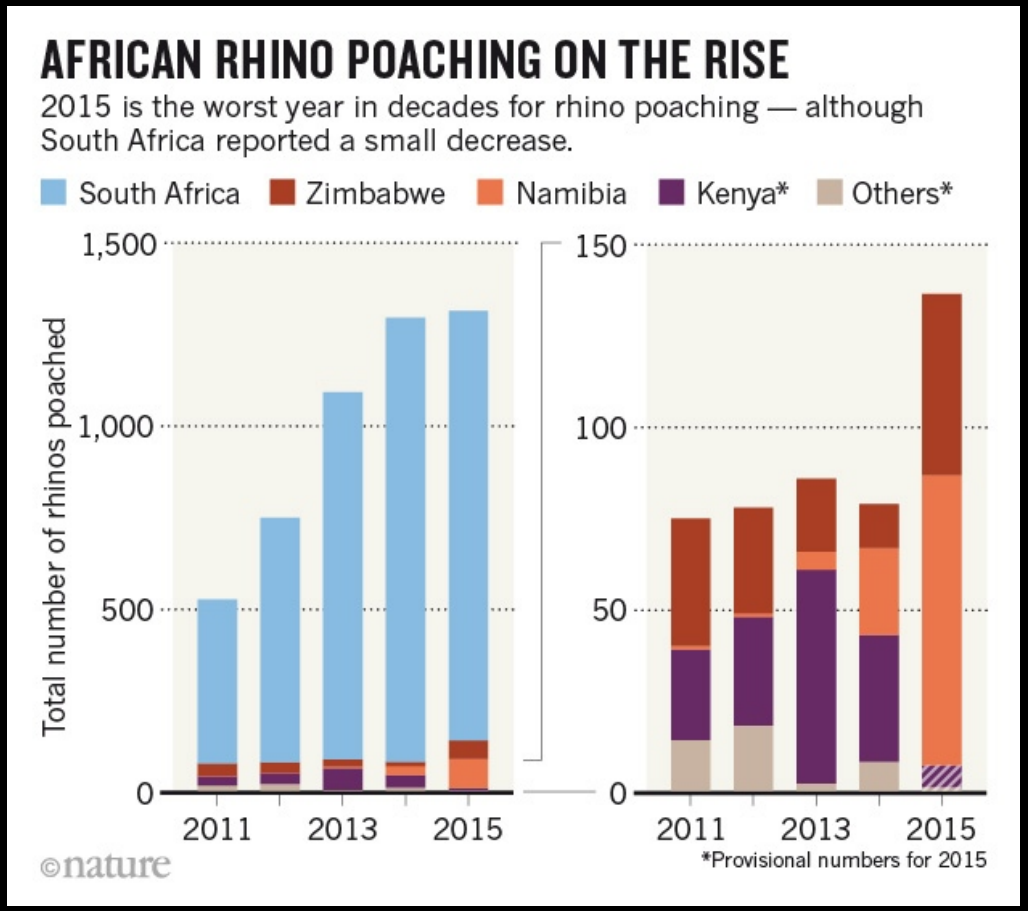
Maintain large circular nodes (core areas) of habitat to maximize interior habitat and minimize edge. Habitat edges occur at the border of incompatible land and are generally detrimental to priority wildlife species because edges are more accessible to predators and parasites that reduce the survival of their young. For this reason, wider wildlife travel corridors are better. Wildlife also need to be able to travel through uninterrupted, contiguous habitat.

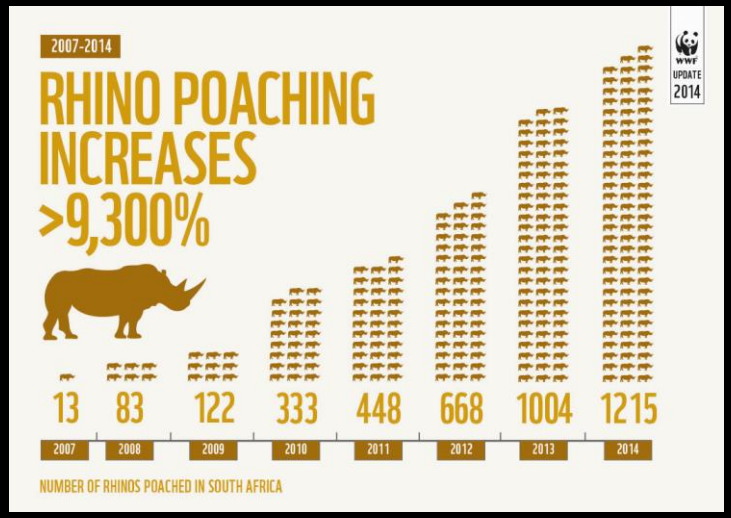


Sobre Explotação

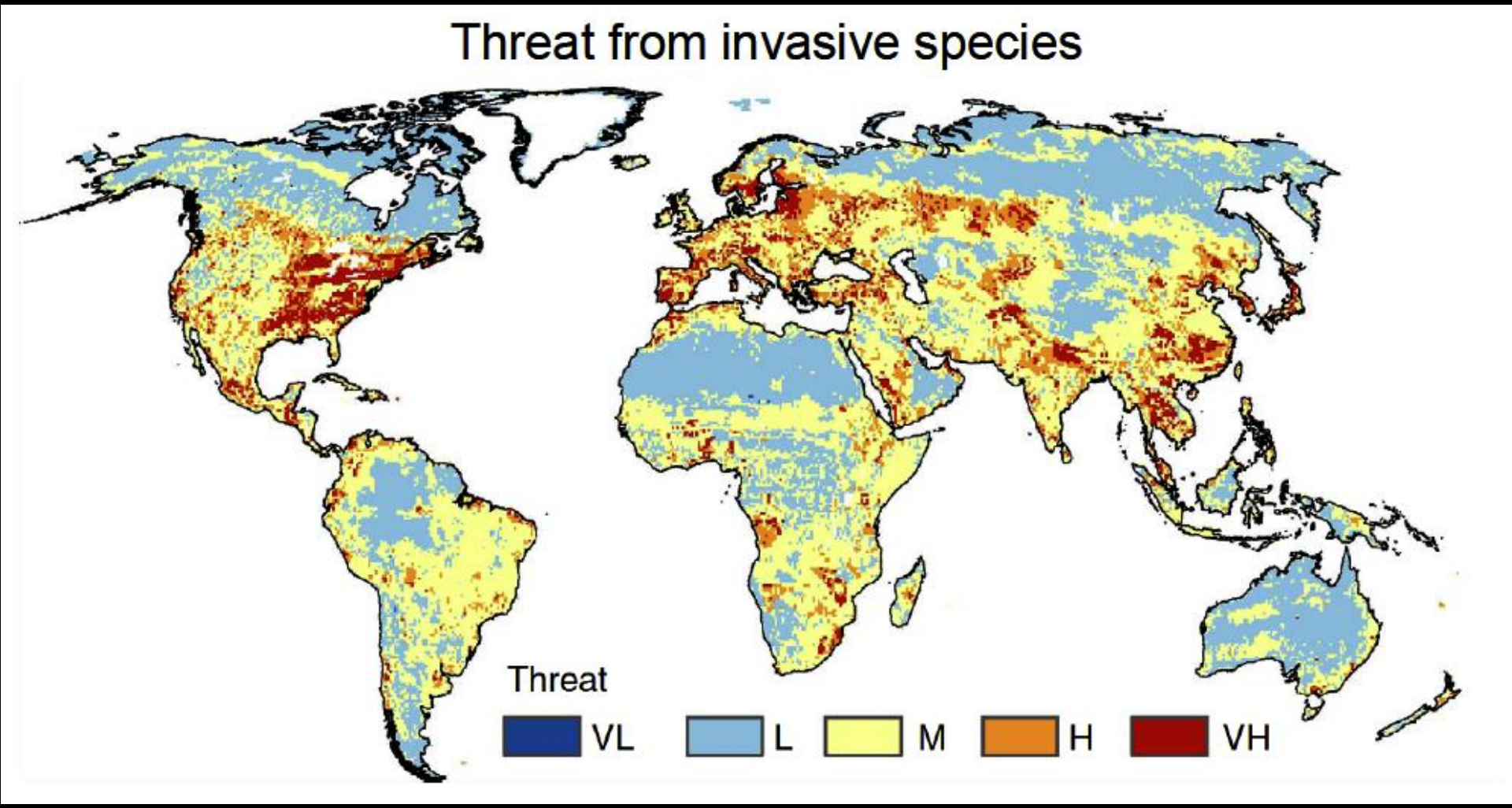


Sobre Explotação

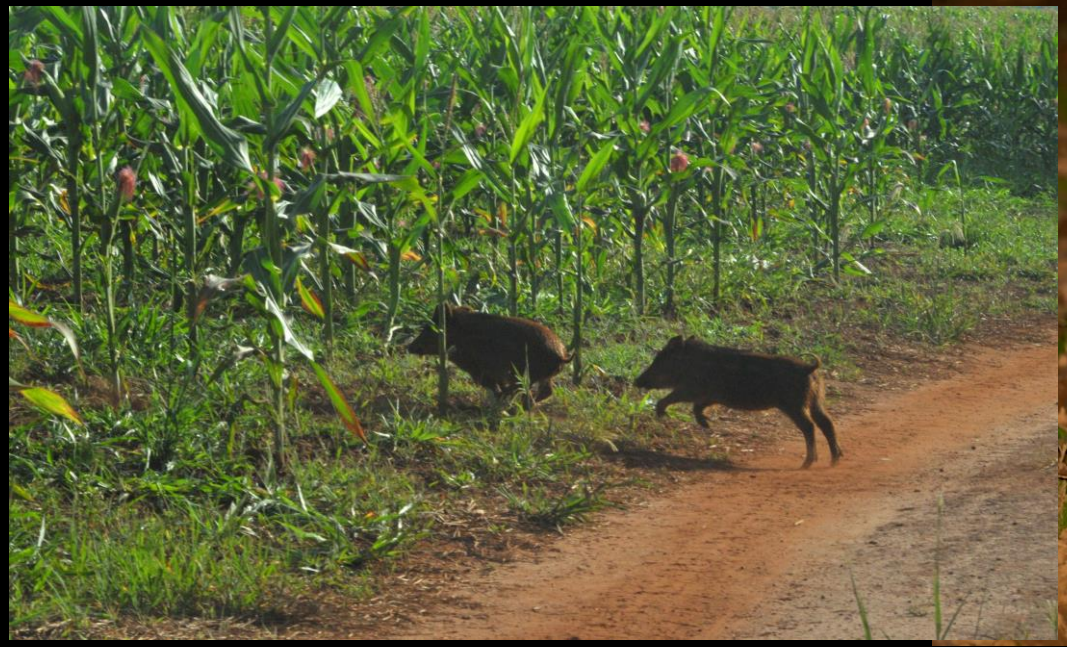




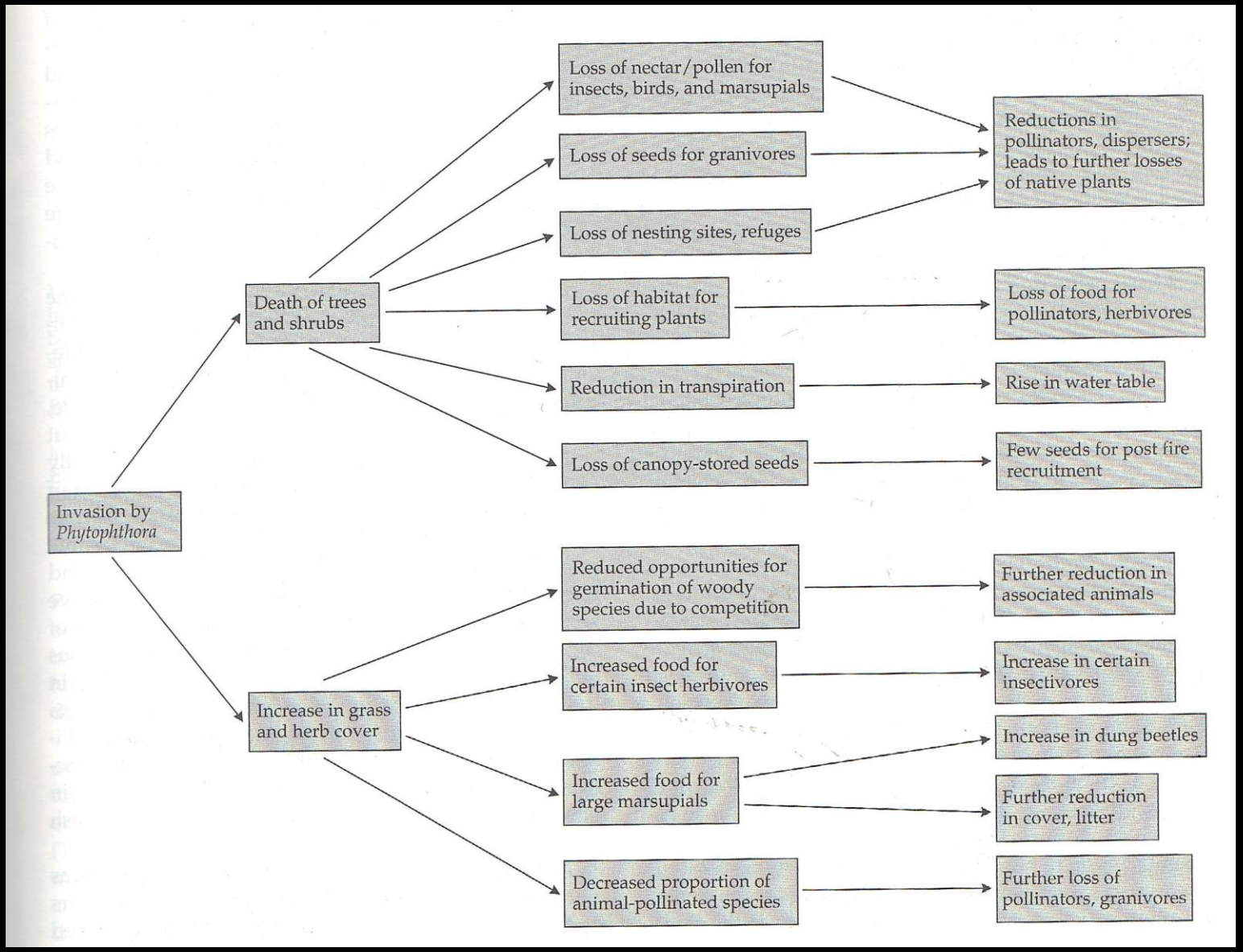
Espécies Invasoras



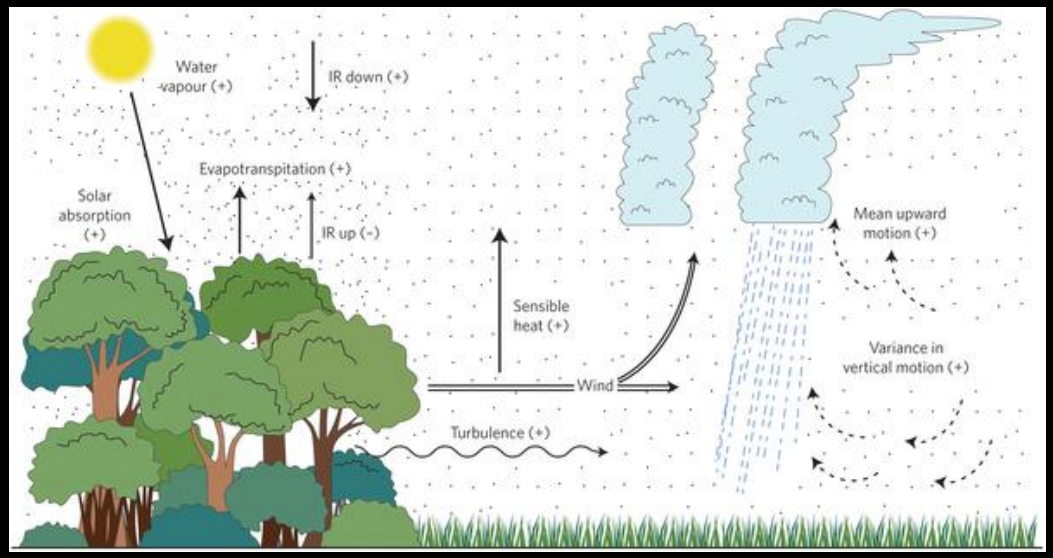
Espécies Invasoras

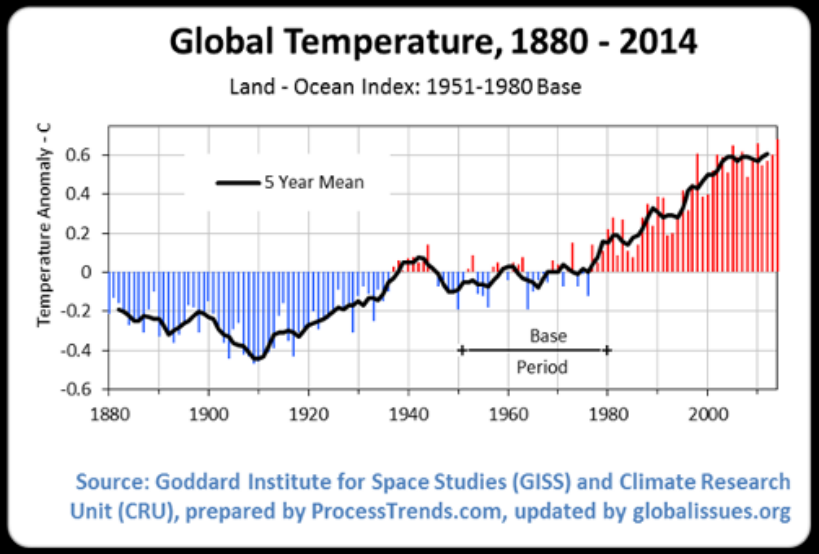


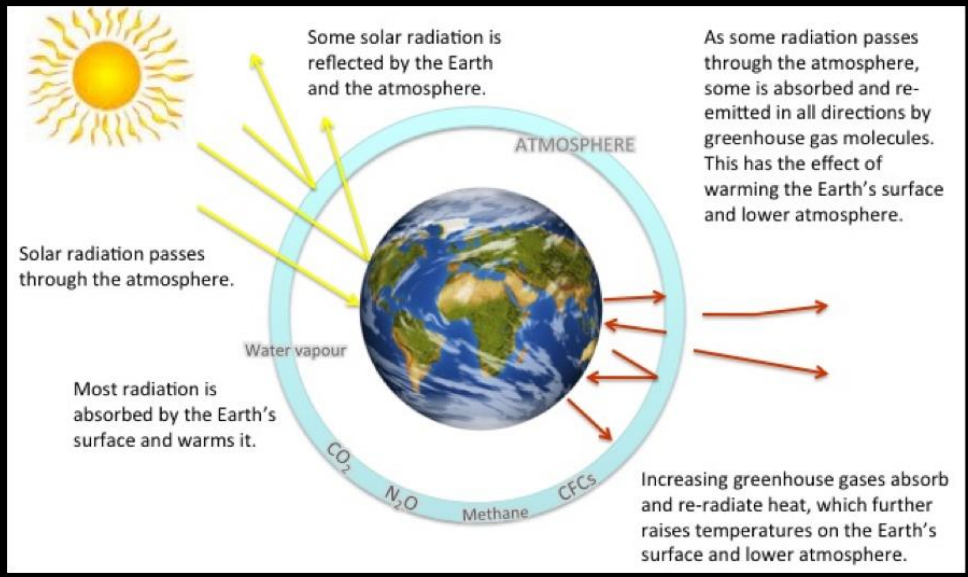
Espécies Invasoras



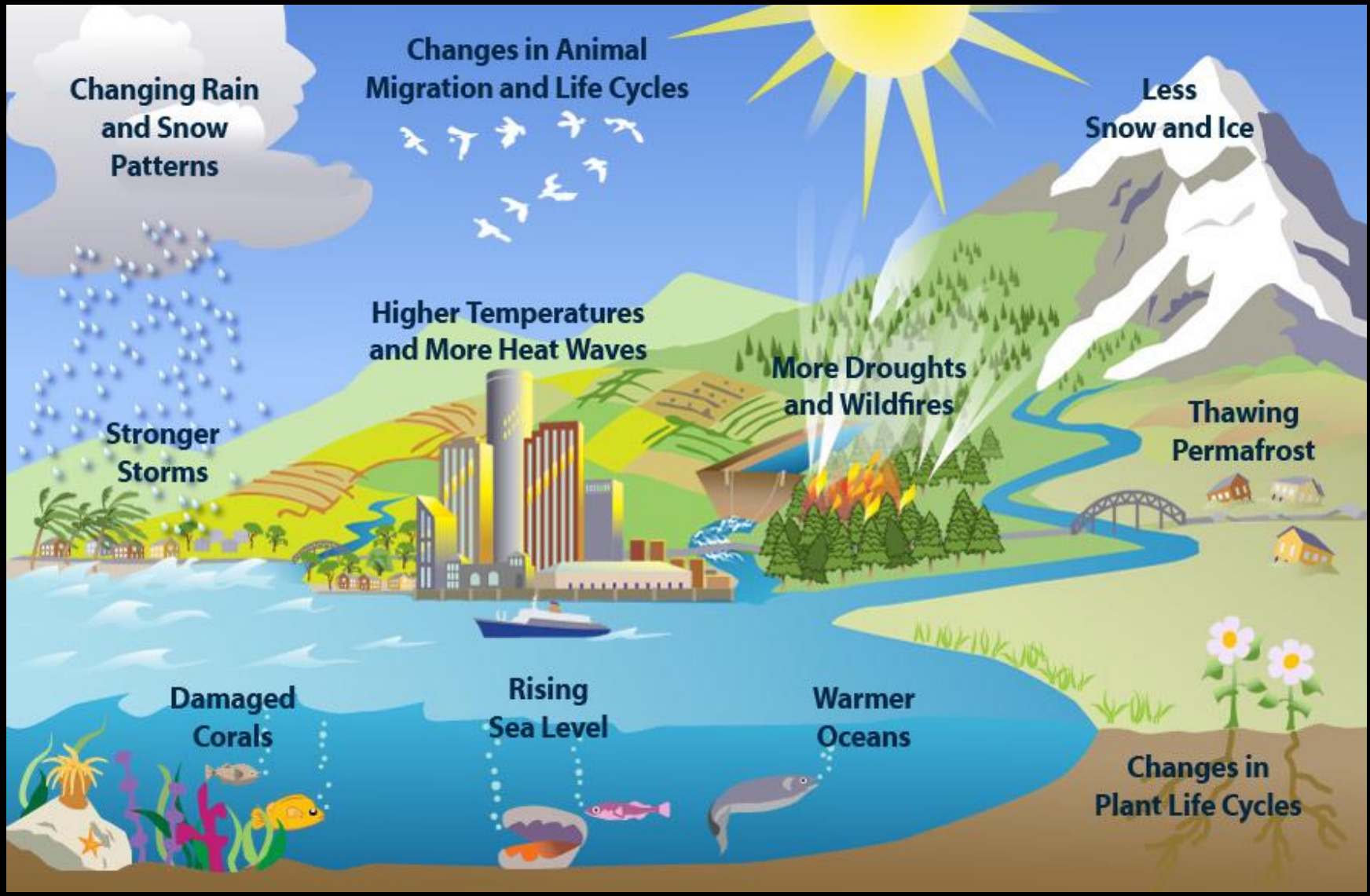
Mudanças Climáticas



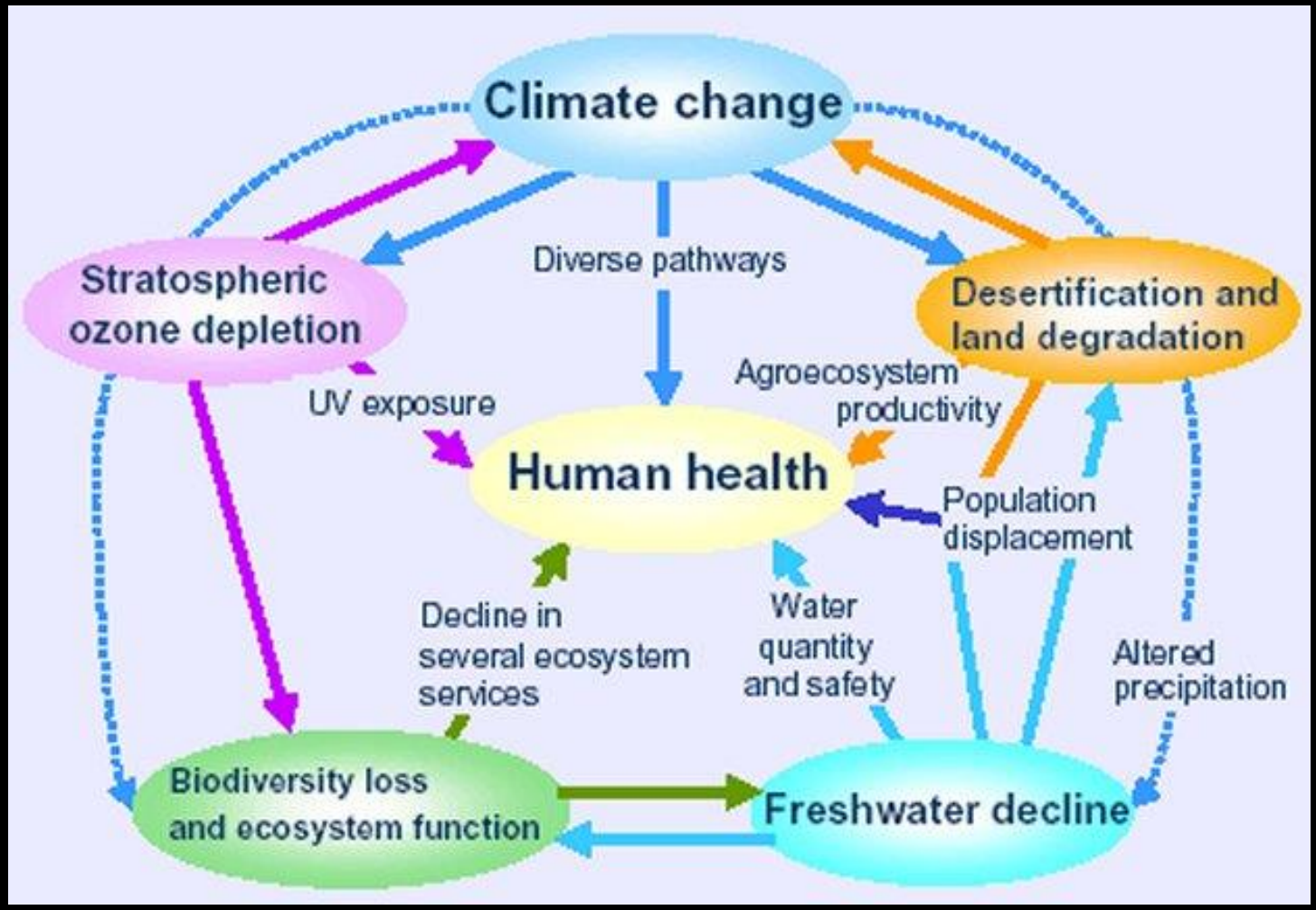




Mudanças Climáticas

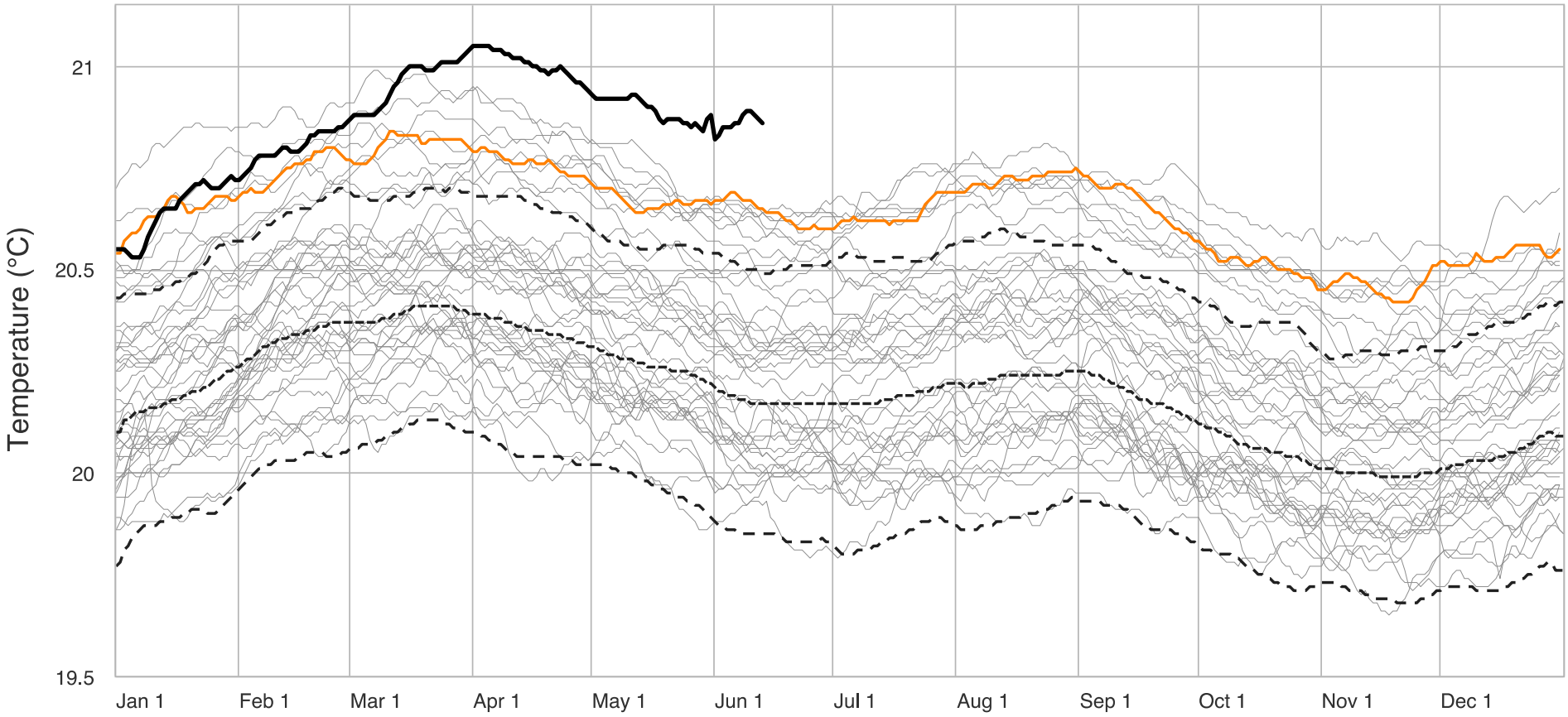


Mudanças Climáticas



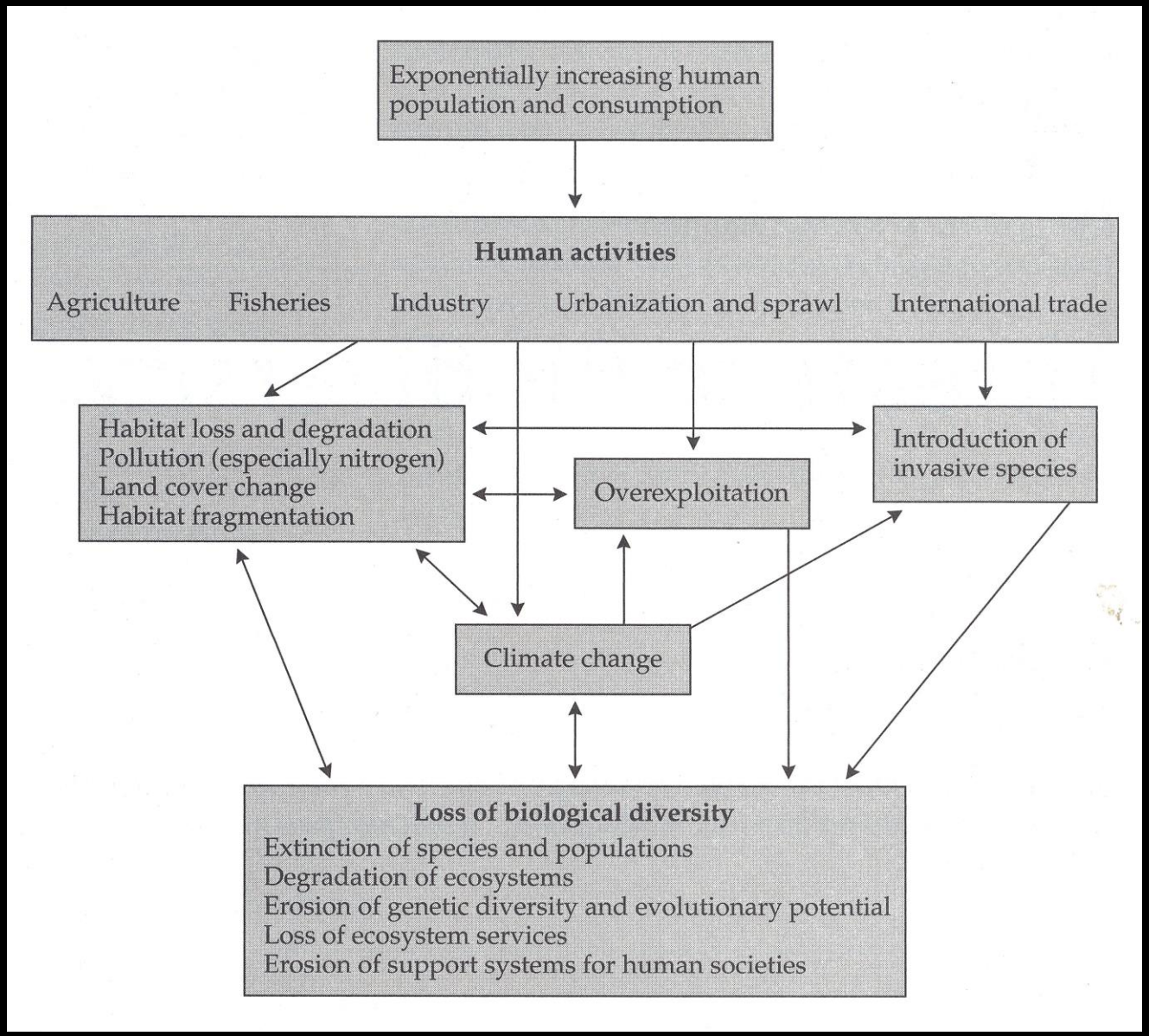
SST World (60S-60N)

NOAA OISST V2.1 | ClimateReanalyzer.org, Climate Change Institute, University of Maine



1981 1982 1983 1984 1985 1986 1987
1988 1989 1990 1991 1992 1993 1994
1995 1996 1997 1998 1999 2000 2001
2002 2003 2004 2005 2006 2007 2008
2009 2010 2011 2012 2013 2014 2015
2016 2017 2018 2019 2020 2021 2022
2023 1982-2011 mean þÿ p l u s 2 Ã þÿ m i n u s 2 Ã

Ameaças à Biodiversidade



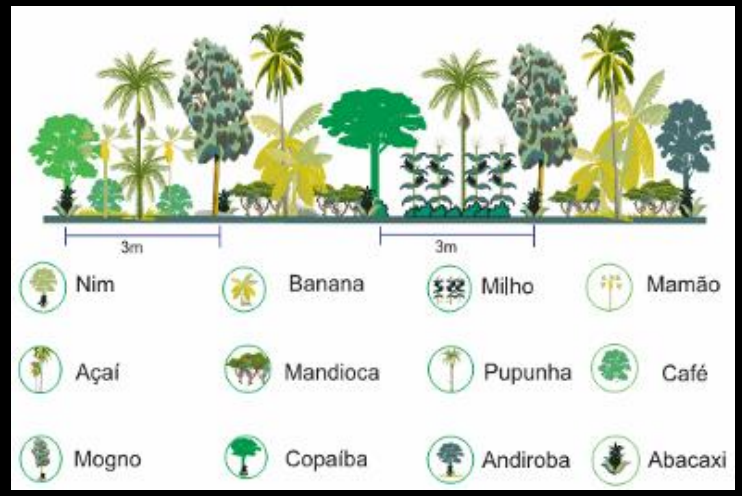
Ameaças à Biodiversidade

Monoculturas extensivas (Alfa-diversidade) = perda de biodiversidade

produtos cultivados

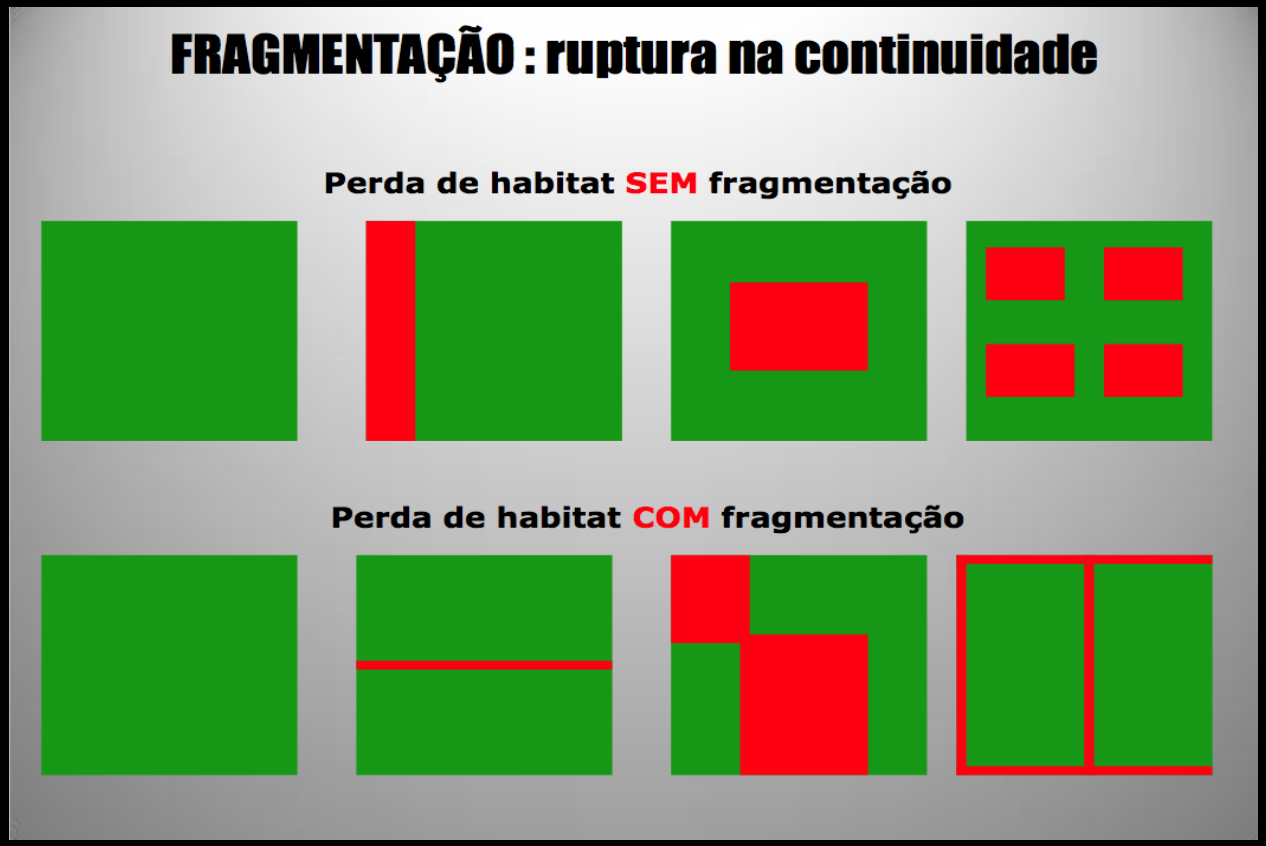
cultural Beta-diversidade

espécies



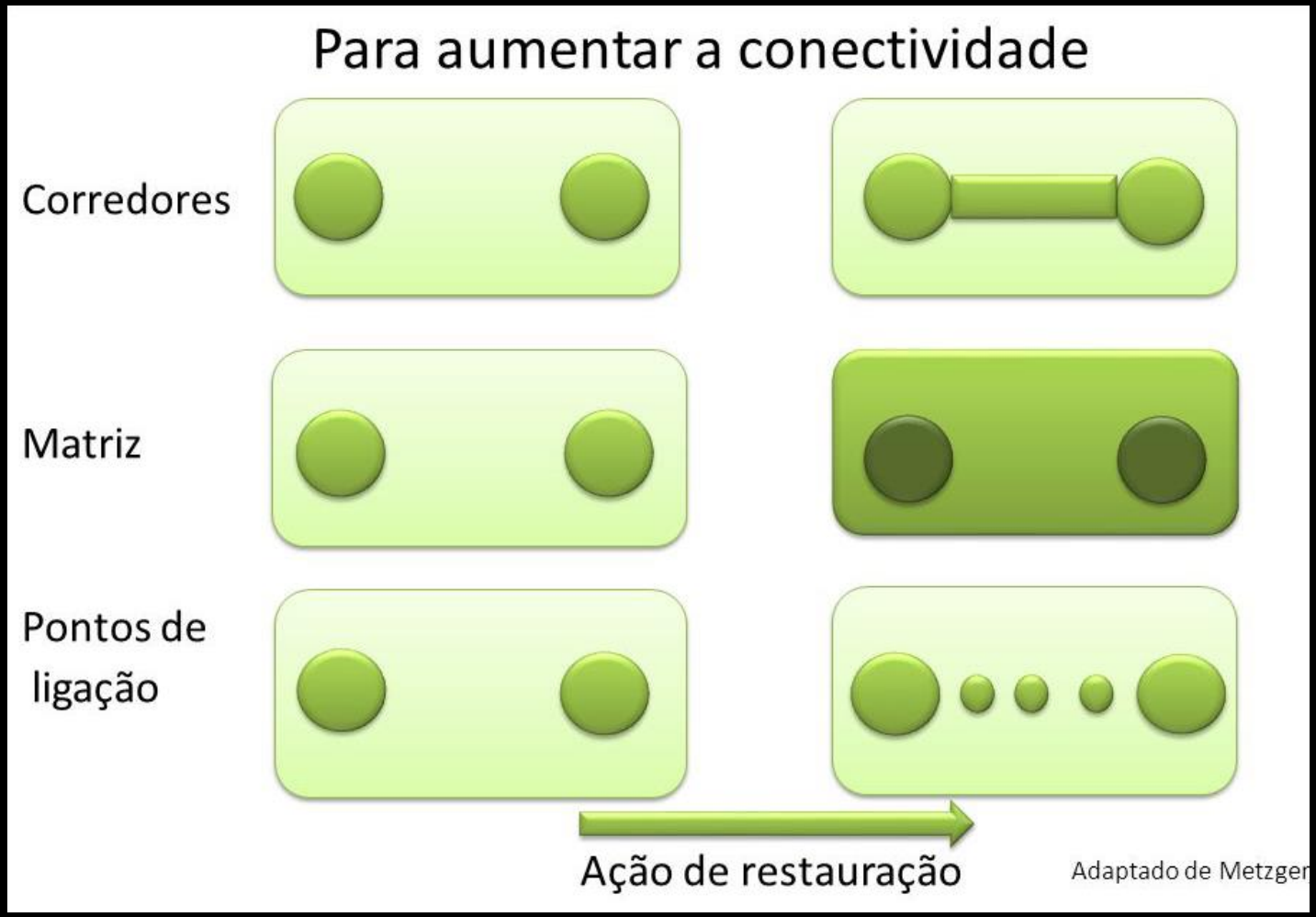
Ameaças à Biodiversidade

Perda de Diversidade Genética



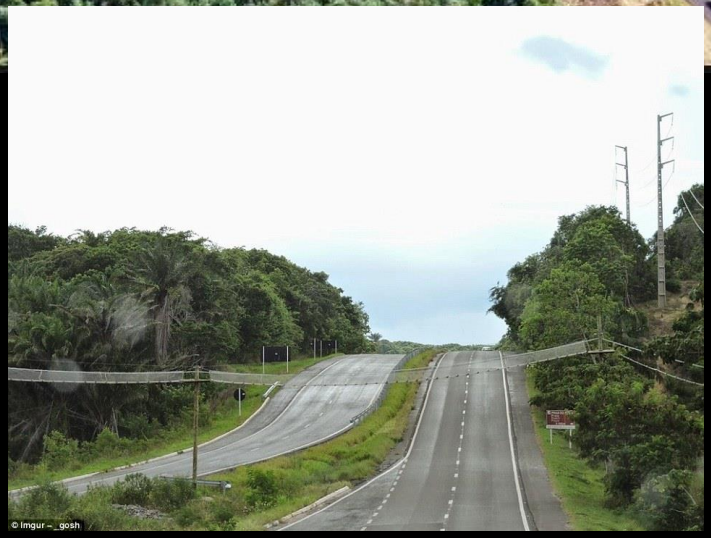
Ameaças à Biodiversidade

Perda de Diversidade Genética



Ameaças à Biodiversidade

Perda de Diversidade Genética



Ameaças à Biodiversidade

Perda de Diversidade Genética

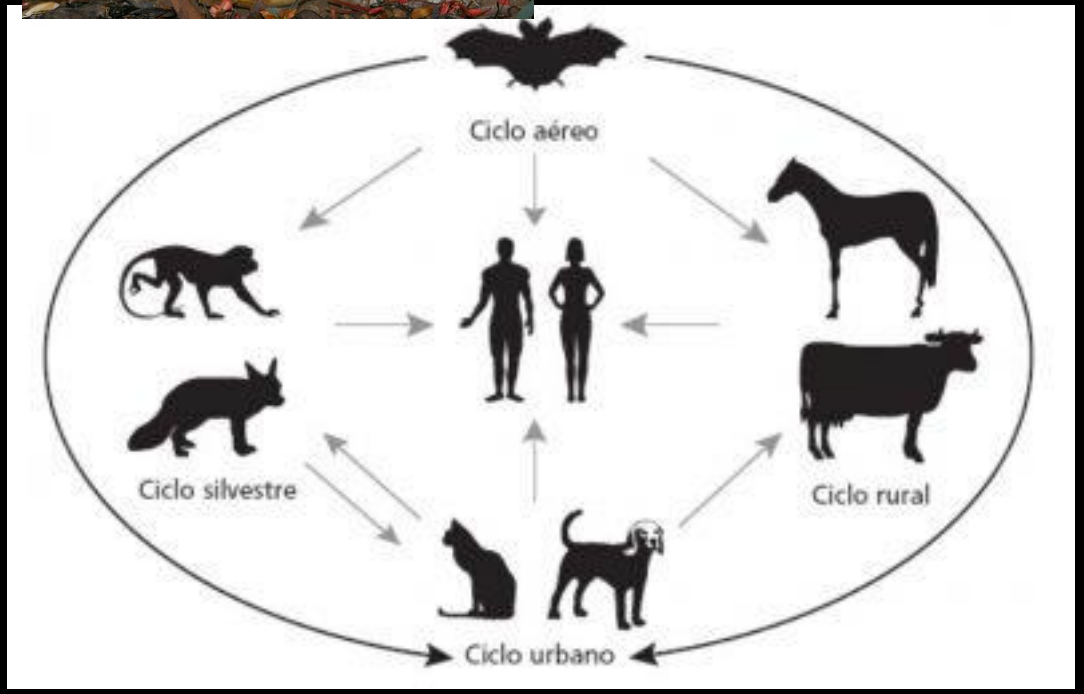
> É um patrimônio biológico inestimável, com lugares que lembram como era a floresta atlântica no passado
>
> — diz o ecólogo Marcelo Tabarelli sobre Serra Grande

Ameaças à Biodiversidade

Conflitos Fauna

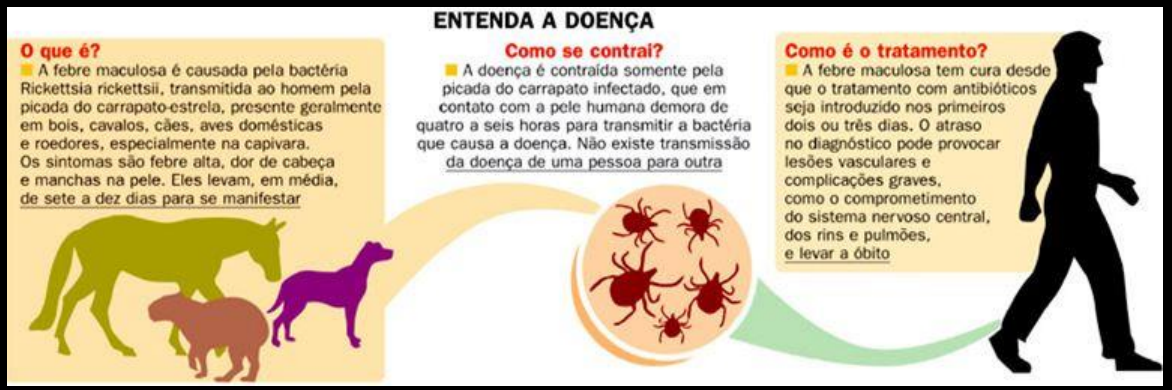
Ameaças à Biodiversidade

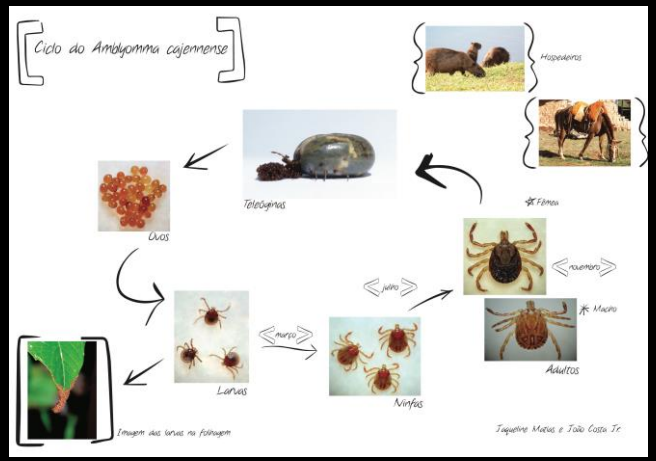
Conflitos Fauna/Zoonoses



Ameaças à Biodiversidade

Conflitos Fauna/Zoonoses

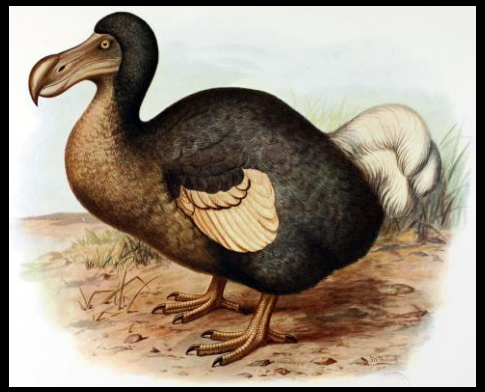


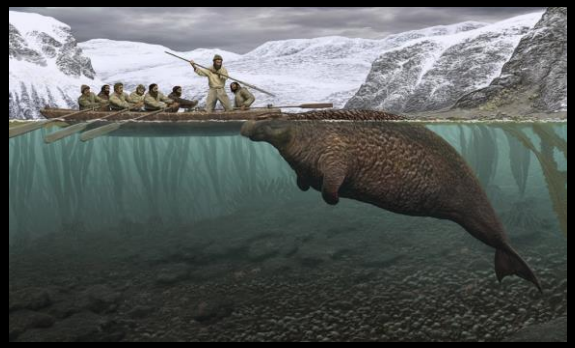


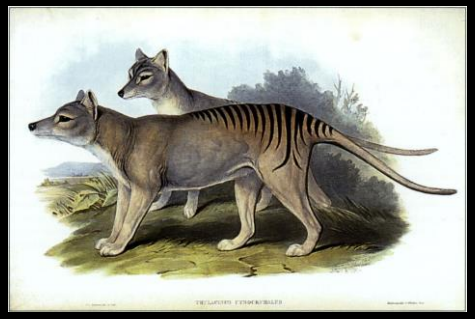
Ameaças à Biodiversidade

Caça

Risco de Extinção







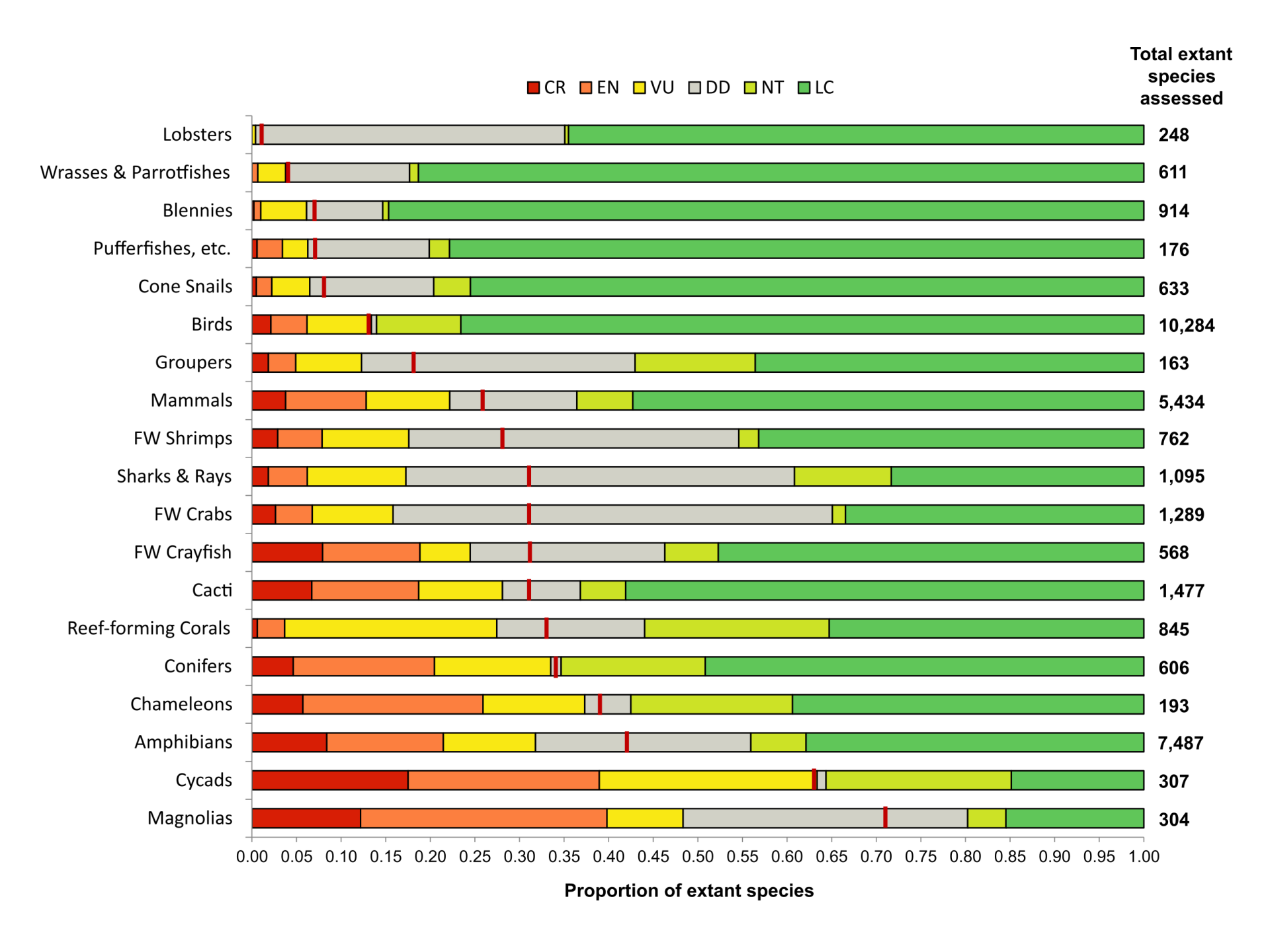
Listas de espécies ameaçadas – Global e regional

(IUCN; www.iucnredlist.org)

RED LIST
Guiding Conservation for 50 Years

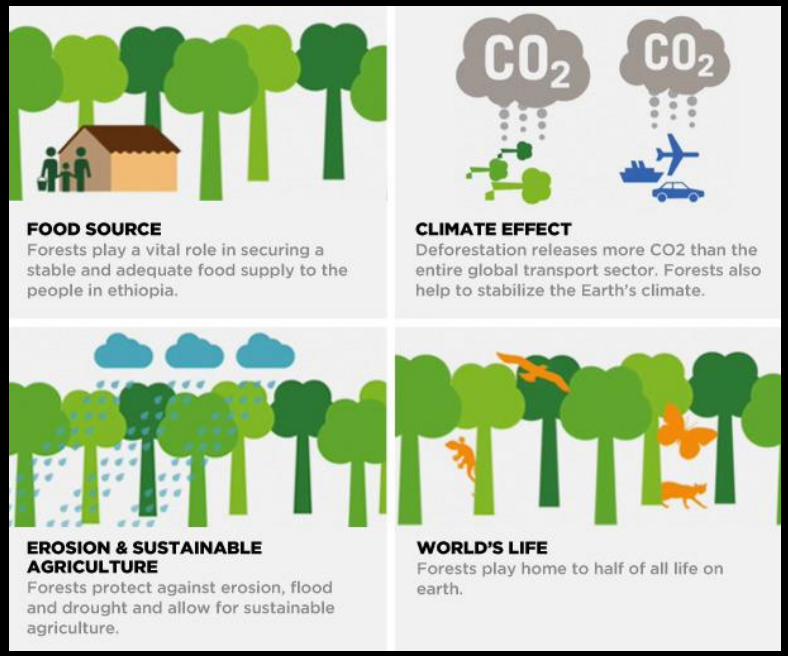
SOUTH AMERICA

South America	Mammals	Birds	Reptiles*	Amphibians	Fishes*	Molluscs*	Other Inverts*	Plants*	Fungi & Protists*	Total*
Argentina	38	50	15	30	39	0	14	70	0	**256**
Bolivia, Plurinational States of	20	55	6	35	8	2	1	104	0	**231**
Brazil	81	165	29	36	86	22	33	521	0	**973**


CR
EN
VU
DD
NT
LC
Total extant species assessed
Lobsters
248
Wrasses & Parrotfishes
611
Blennies
914
Pufferfishes, etc.
176
Cone Snails
633
Birds
10,284
Groupers
163
Mammals
5,434
FW Shrimps
762
Sharks & Rays
1,095
FW Crabs
1,289
FW Crayfish
568
Cacti
1,477
Reef-forming Corals
845
Conifers
606
Chameleons
193
Amphibians
7,487
Cycads
307
Magnolias
304
0.00 0.05 0.10 0.15 0.20 0.25 0.30 0.35 0.40 0.45 0.50 0.55 0.60 0.65 0.70 0.75 0.80 0.85 0.90 0.95 1.00
Proportion of extant species

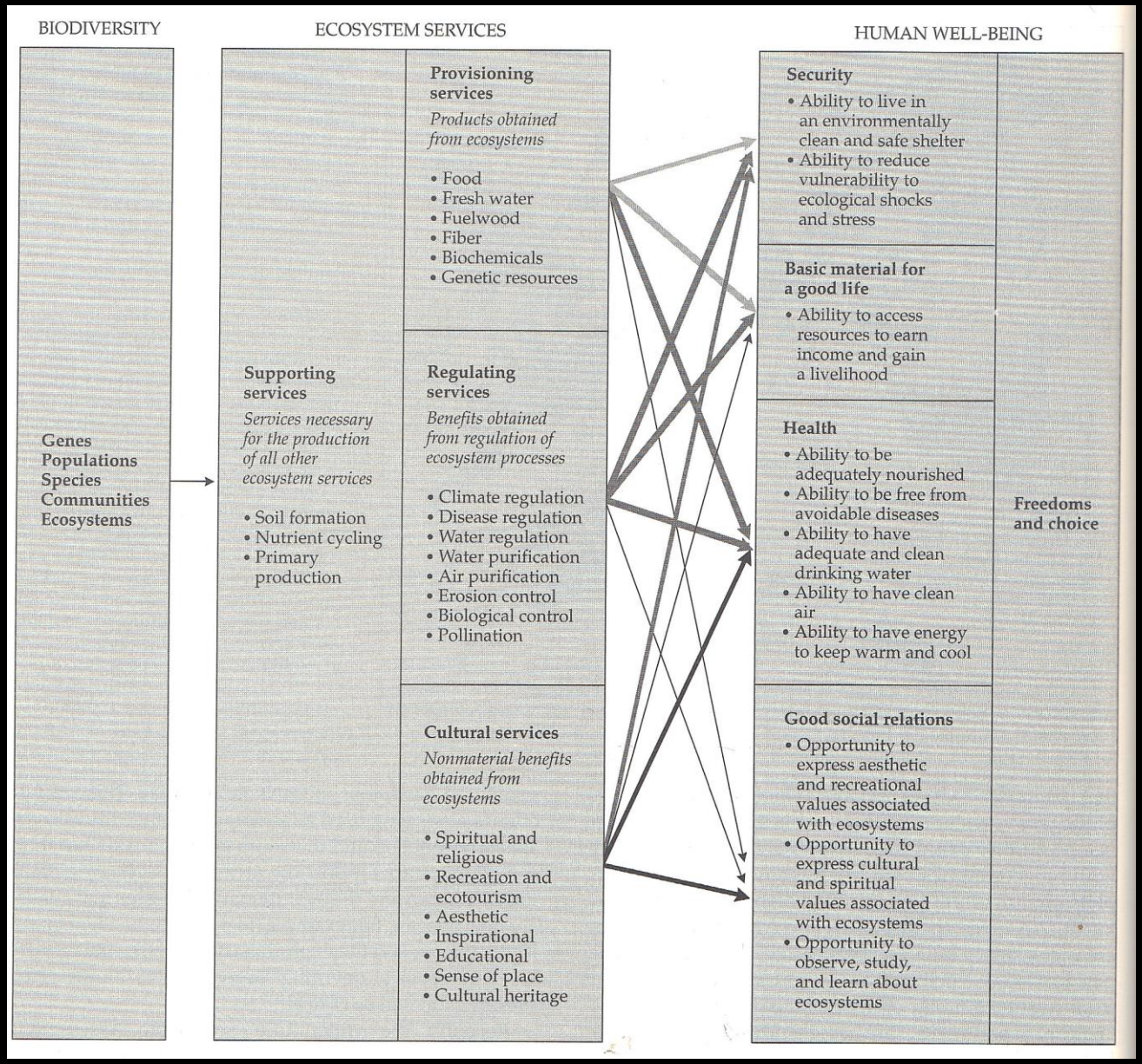

Between 1990 and 2015, the world lost
129 million ha of forest
An area the size of South Africa


Everyone
living on planet Earth
should take part in the essential duty
of preserving the nature.


FOOD SOURCE
Forests play a vital role in securing a stable and adequate food supply to the people in ethiopia.
CO2
CO2
CLIMATE EFFECT
Deforestation releases more CO2 than the entire global transport sector. Forests also help to stabilize the Earth's climate.
EROSION & SUSTAINABLE AGRICULTURE
Forests protect against erosion, flood and drought and allow for sustainable agriculture.
WORLD'S LIFE
Forests play home to half of all life on earth.


intact forests landscapes
other forest areas*
GREENPEACE

Millennium Ecosystem Assessment

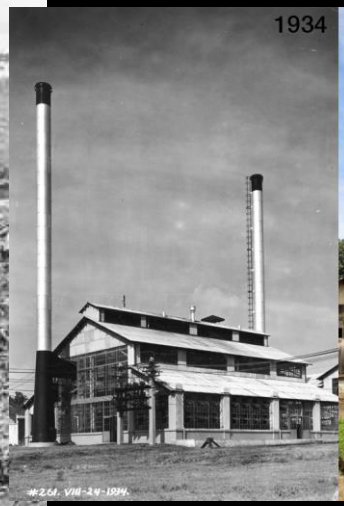


Serviços Ecossistêmicos

Diversidade Funcional

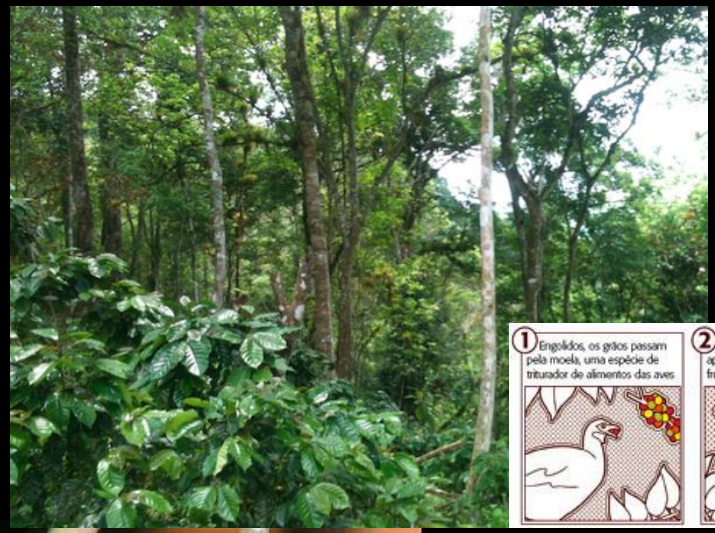
Ideias não muito boas

Fordlândia



Boas idéias

Jacu Bird Coffee



Boas idéias

Fazenda Yrere, Ilhéus, BA

Desafios

Com população crescente, como conciliar alta produtividade de alimentos com:

- Suprimento de água

- Preservação dos hábitats

- Diversidade de espécies

Desafios

Mudança de Paradigma

- Educação Ambiental
- Interação Homem – Natureza – Sistemas Produtivos
  - Homem é parte do processo
- Manutenção de Serviços Ecossistêmicos

Responder às perguntas: Quantas espécies existem? E qual seu estado de conservação?

Grupos de Pesquisa ESALQ

Laboratório de Zoologia de Vertebrados

Laboratório de Mamíferos – Alexandre Reis Percequillo

Laboratório de herpetologia – Jaime Bertoluci

Laboratório Ecologia e Conservação da Biodiversidade – Katia Ferraz

Laboratório Ecologia Isotópica – Luciano Verdade (Conservação da Biodiversidade em paisagens agrícolas multifuncionais)

Plinio Camargo (Qualidade da água em bacias tropicais)

Laboratório de Restauração Florestal – Ricardo Rodrigues/Renato Lima

Laboratório de Agroecologia – Flavio Gandara

Programas de Pós-graduação ESALQ

Ecologia Aplicada – Multidisciplinar ESALQ/CENA
(http://www4.esalq.usp.br/pg/programas/ecologia-aplicada)

Recursos Florestais– Ciências Florestais ESALQ
(http://www4.esalq.usp.br/pg/programas/recursos-florestais)

Outras iniciativas

NACE PTECA
Projeto Corredor Caipira, entre outros
(http://www.nacepteca.esalq.usp.br)

PET Ecologia
(https://www.esalq.usp.br/svcex/programa-de-educacao-tutorial-ecologia-pet-ecologia)

NACEPTECA

Objetivos

Extensão universitária para educação & conservação

- Gerar metodologias de restauração e conservação de florestas nativas, de manejo de bacias hidrográficas e de intervenção socioambiental em torno da sustentabilidade, bem como divulgar e socializar este conhecimento, buscando utilizá-lo como referência para outras experiências;
- Ser um fórum de reflexão e um aglutinador de pessoas, grupos e instituições que desejam contribuir para a construção de sociedades sustentáveis

CORREDOR CAIPIRA

Realização:

Fealq

NACEPTECA

ESALQ

Patrocínio:

PETROBRAS

GOVERNO FEDERAL

BRASIL

UNIÃO E RECONSTRUÇÃO