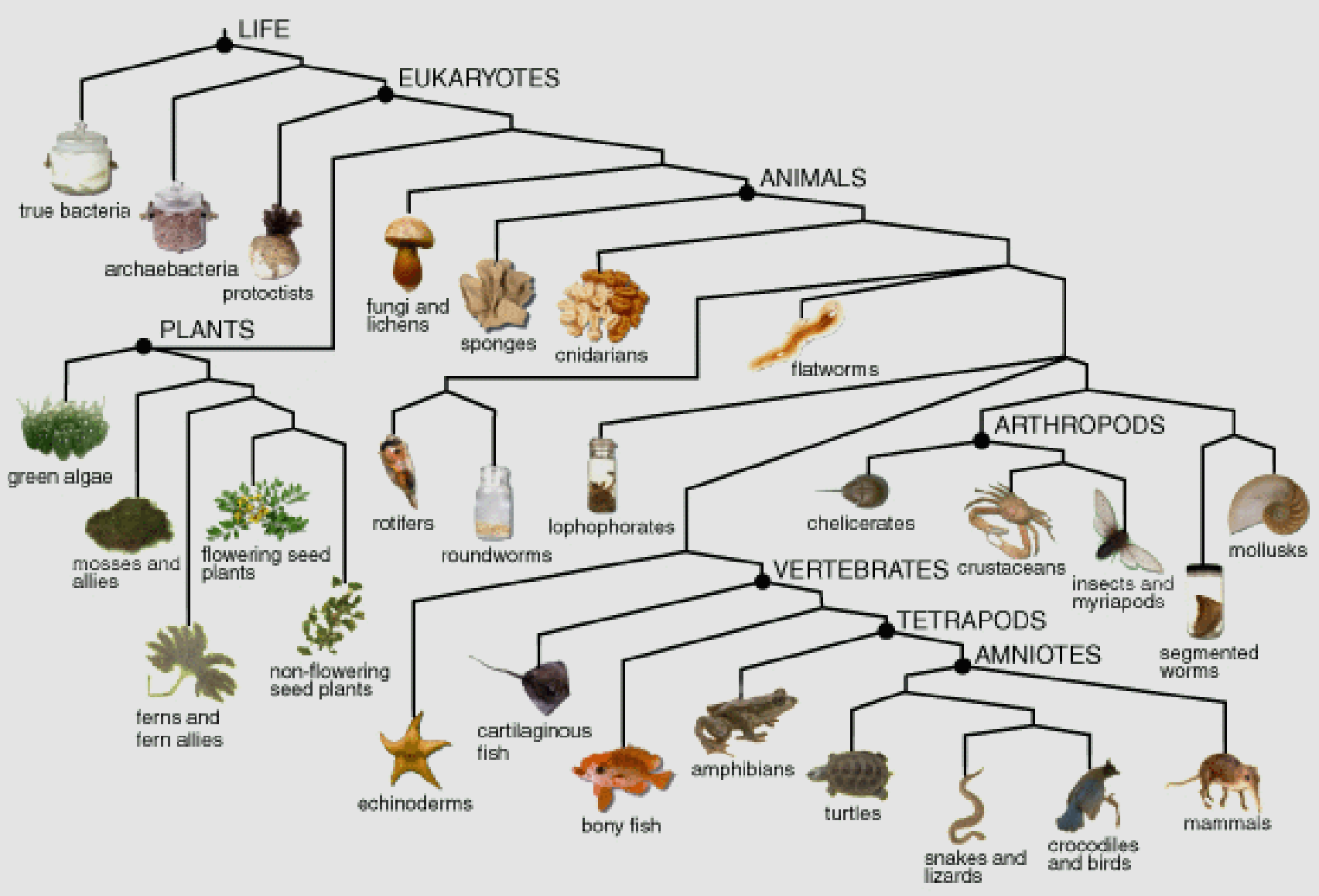
Aula 14
Amphibia

Universidade de São Paulo
Escola Superior de Agricultura Luiz de Queiroz
Curso de Gestão Ambiental
LFN-0233 Zoologia e Ambiente
26 Novembro 2021

GENERALIDADES

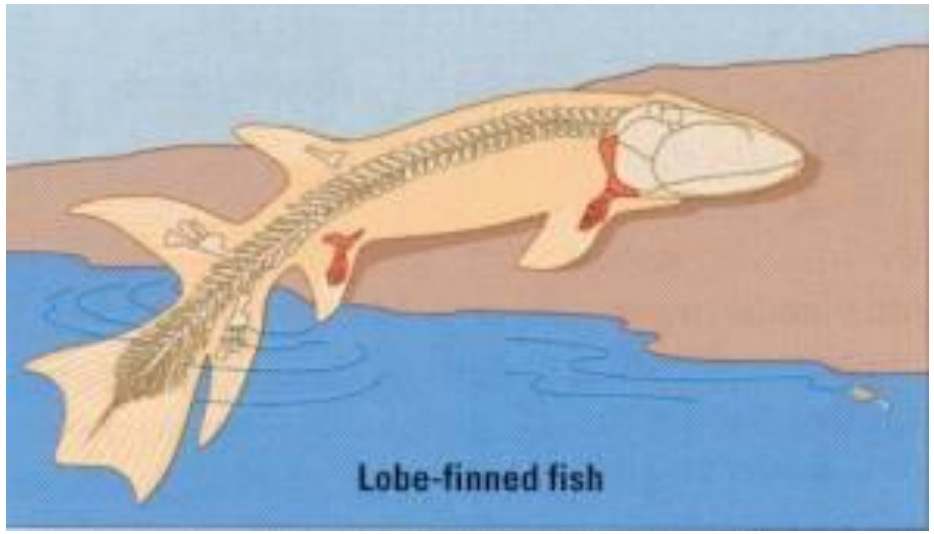
Filogenia dos Chordata

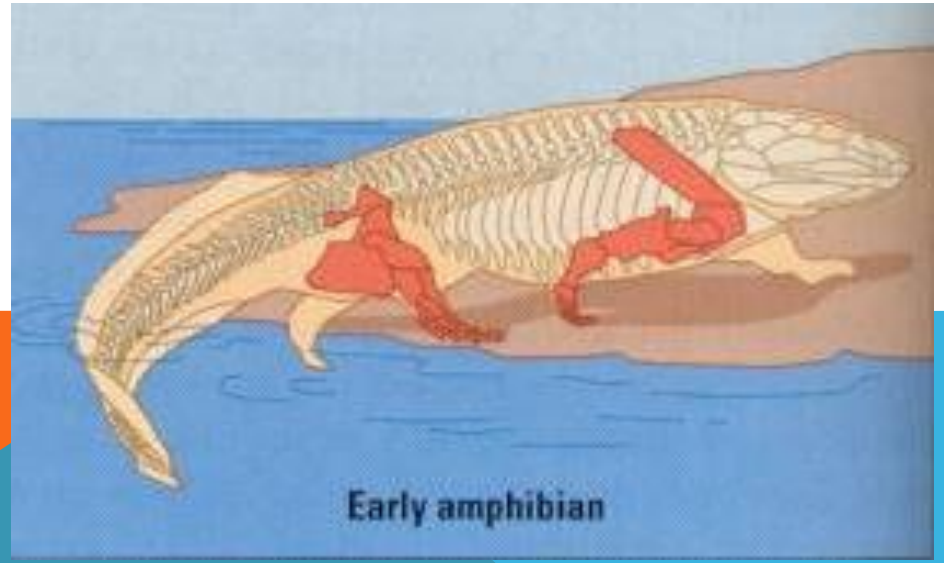


PARTE 1

CARACTERIZAÇÃO

Origem e Diversidade dos Amphibia





http://lanbob.com/lanbob/H-Evolution/H-Evolution-007Animals_files/image094.jpg

Características dos Amphibia

Pele úmida e lisa.

Dois pares de pernas.

Esqueleto parcialmente ossificado.

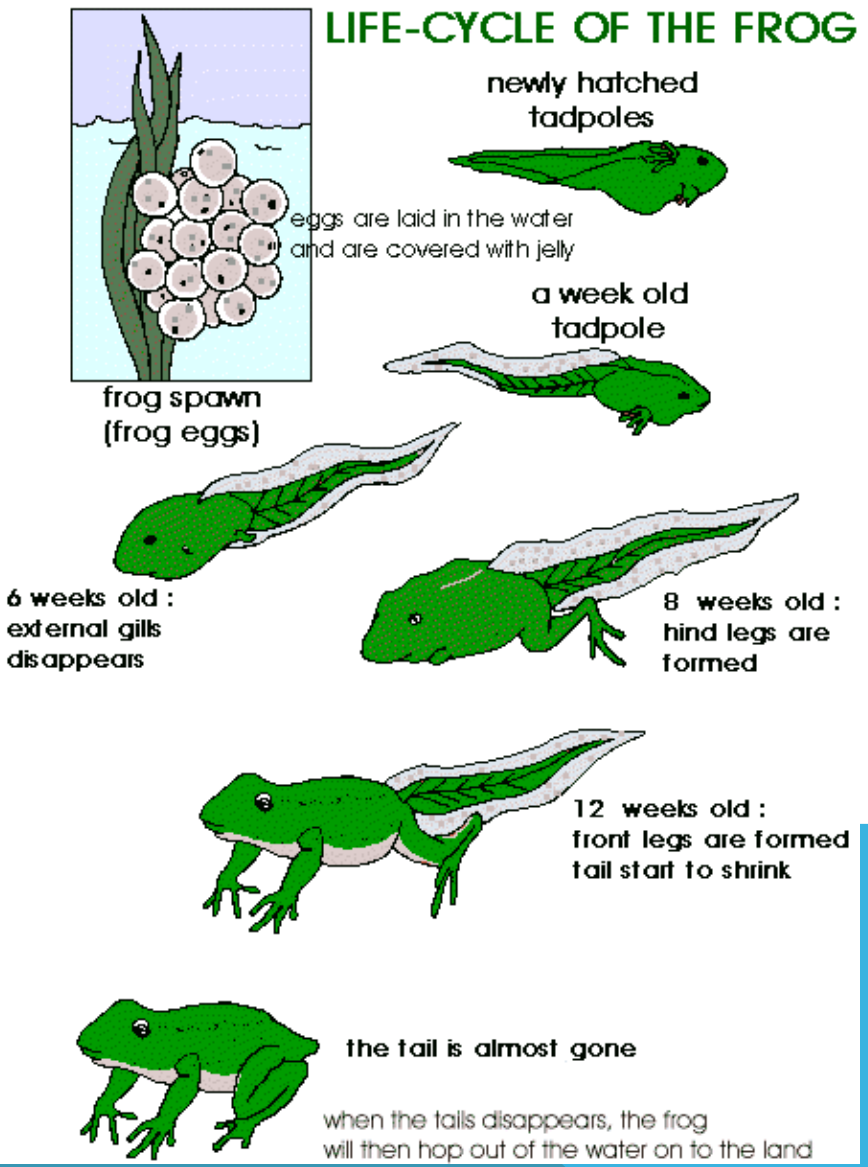
Respiração pulmonar e cutânea (adultos);
branquial e cutânea (larvas).

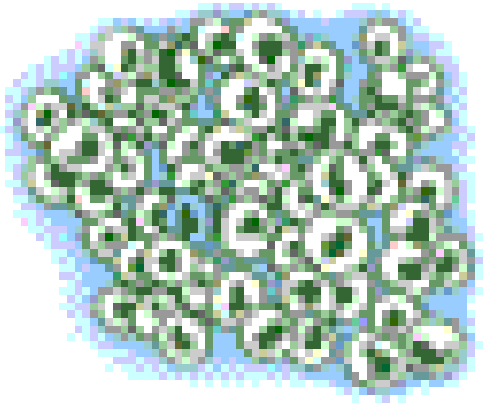
Ectotérmicos.

Fecundação externa.

Ovos com cápsula gelatinosa; com metamorfose.

Metamorfose





Perguntas?

IMPORTÂNCIA

Alimentação

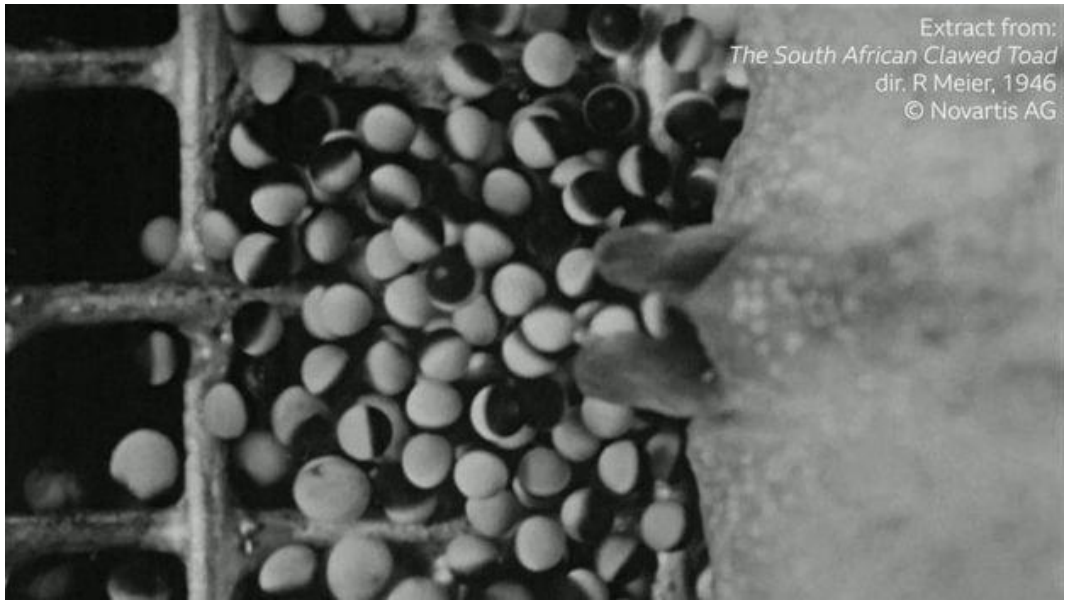
Rã-pimenta
Leptodactylus spp.

Rã-touro
Lithobates catesbeianus
Sin. *Rana catesbeiana*

https://www.iucnredlist.org/species/58565/53969770

Teste de Gravidez

http://i1.wp.com/diariodebiologia.com/files/2010/07/frog.jpg?resize=600%2C655



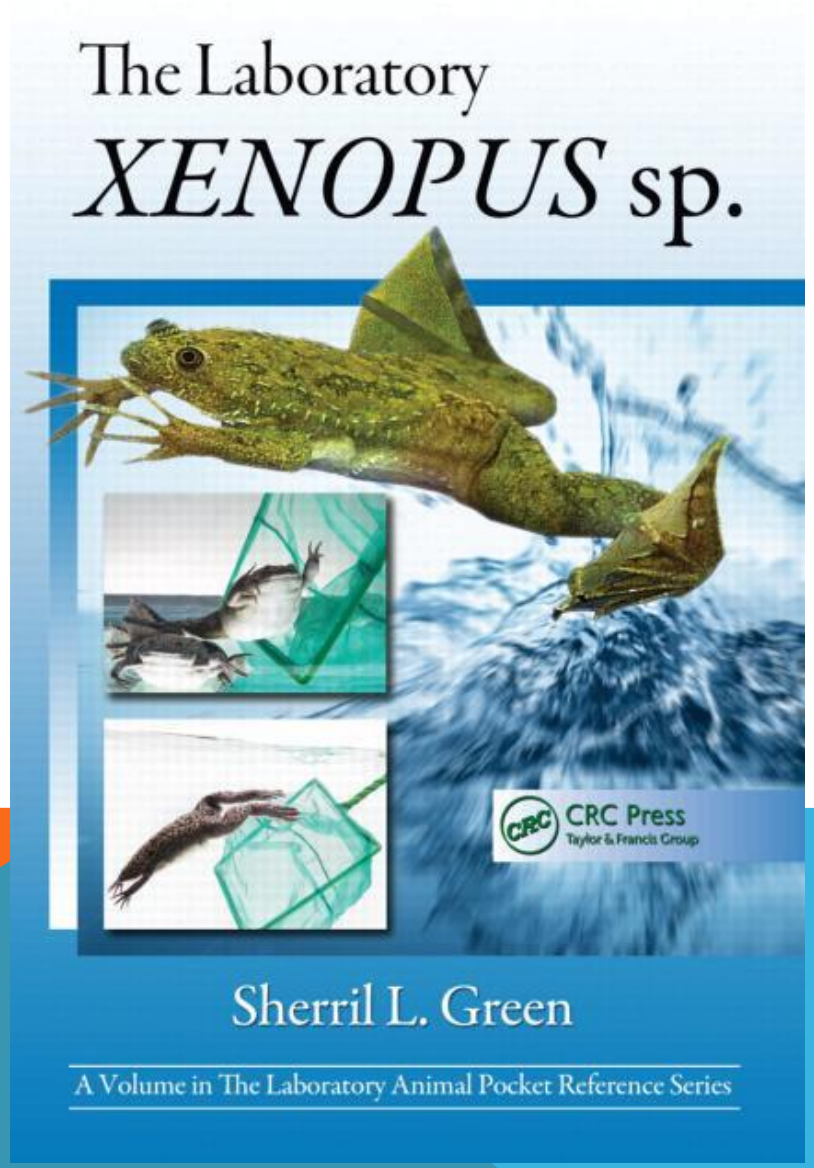
https://www.proambientecampinas.com.br/noticia/a-ra-que-pode-ser-usada-como-teste-de-gravidez/

Teste de Gravidez *Xenopus laevis*

https://wellcomehistory.files.wordpress.com/2013/02/audrey1.jpg

https://upload.wikimedia.org/wikipedia/commons/5/5d/Gemeiner_Krallenfrosch_-_Xenopus_laevis_-_aus_Afrika.JPG

Outros Estudos *Xenopus laevis*



https://images.tandf.co.uk/common/jackets/amazon/978142009/9781420091090.jpg

Indústria Farmacêutica

Perereca-de-folhagem-com-perna-reticulada
Matas de galeria Brasil
Phyllomedusa ayeaye

"Gastric brooding frog"
Leste da Austrália
Rheobatrachus silus e *R. vitellinus*

Perguntas?

Ação do Homem

Introdução de espécies Sapo-cururu na Austrália, rã-touro e rã-de-unhas-africana

Alteração hábitat Aquecimento global (ação direta / indireta)

Poluição Fertilizantes nitrogenados e fosforados / poluição orgânica – esgoto doméstico (ação indireta)

Sapo-Cururu

http://www.critterzone.com/animal-pictures-nature/stock-photos/may-beetle-Phyllophaga-species-sp-spp-AWIN073108-125.jpg

https://parkerbiolabs.files.wordpress.com/2015/05/grubs-in-soil.jpg

Sapo-Cururu vs. *Dermolepida albohirtum*

https://www.cirad.fr/en/our-research/research-results/2010/tracking-greyback-cane-beetle-flights-by-radiotelemetry

D. albohirtum e *Lepidiota frenchi* são pragas da cana-de-açúcar na Austrália

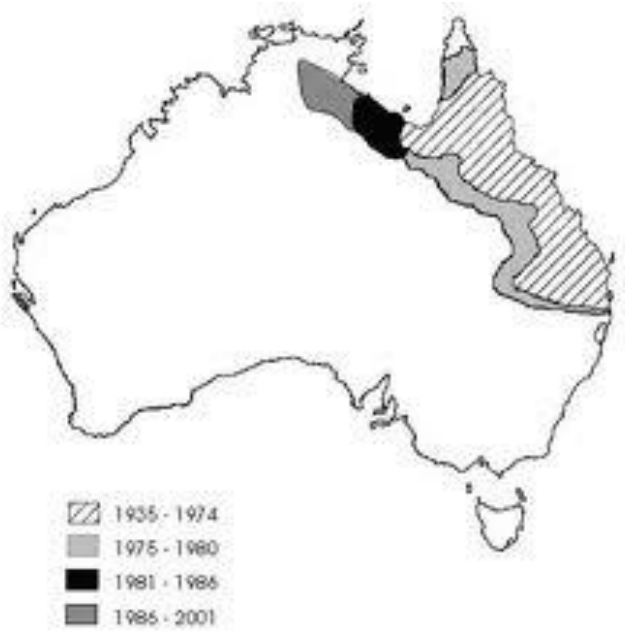
http://www.coleoptera-forum.nl/viewtopic.php?t=255

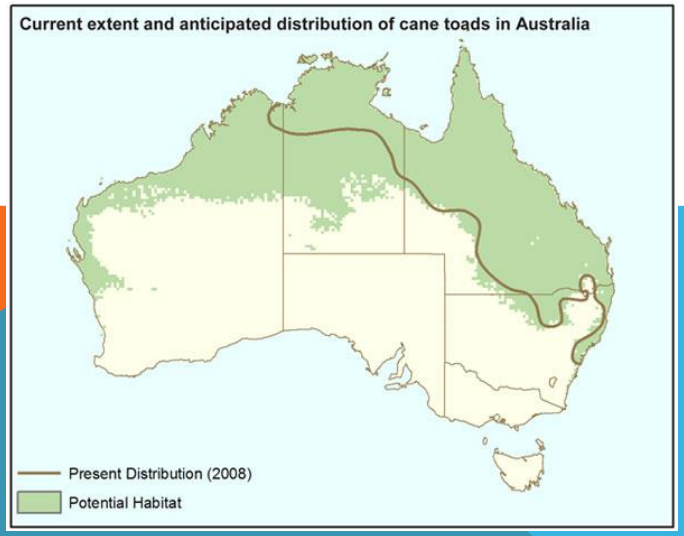
https://sugarresearch.com.au/wp-content/uploads/2017/02/Greyback-canegrub-B14017.pdf

Em 1932, congresso sobre tecnologia canavieria em Porto Rico: relato sobre o uso do sapo no controle de pragas da cana em Porto Rico, Jamaica e Barbados

https://www.invasive.org/browse/subthumb.cfm?sub=63161&Fam=443&aut=35841&view=3

Sapo-Cururu Austrália





Dasyurus hallacatus

http://3.bp.blogspot.com/-Eh4MznsKaUQ/TsRy3VC3F3I/AAAAAAAAAAU/J-8RcLv9Ps8/s320/N+quoll+and+Cane+Toad.jpg

Sapo-Cururu Distribuição

https://upload.wikimedia.org/wikipedia/commons/0/0d/Bufo_marinus_distribution.png

Animal Conservation ZSL

Animal Conservation. Print ISSN 1367-9430

Biological control of the cane toad in Australia: a review

T. Shanmuganathan[1], J. Pallister[2], S. Doody[3], H. McCallum[4], T. Robinson[1], A. Sheppard[1], C. Hardy[1], D. Halliday[1], D. Venables[1], R. Voysey[2], T. Strive[1], L. Hinds[1] & A. Hyatt[2]

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3 Department of Botany and Zoology, Australian National University, Canberra, ACT , WA, Australia
4 School of Zoology, University of Tasmania, Hobart, Tas., Australia

Keywords
genetically modified organisms; BIV; *Bufo marinus*; immune response; species specificity.

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Abstract

The marine toad *Bufo marinus* is native to northern South America, parts of Central America and Southern Texas. It was deliberately introduced into Australia's tropical north-east in 1935 in an unsuccessful attempt to control the cane beetle, a damaging insect pest of sugarcane crops. The toads quickly established in the new environment and began to spread. Today, they inhabit most of the Australian tropics and sub-tropics and have reached Western Australia. Models predict that global warming will enable the toads to extend their range further south. They cause severe environmental impacts, as all life stages of *B. marinus* contain bufadienolides, alkaloid substances toxic to vertebrates, resulting in death of the predators ingesting it. The continental scale of this biological invasion in combination with the remoteness of the areas affected, poses a specific set of challenges to potential control approaches for cane toads. This review covers different biocontrol strategies pursued over the past 8 years, with particular focus on an immunological approach aiming at the disruption of toad metamorphosis. So far, research efforts have failed to produce a tool for large-scale reduction of toad populations. Considerations of future research priorities and efforts are also discussed.

Rã-Touro, Rã-de-Unhas-Africana

https://www.iucnredlist.org/species/58565/53969770

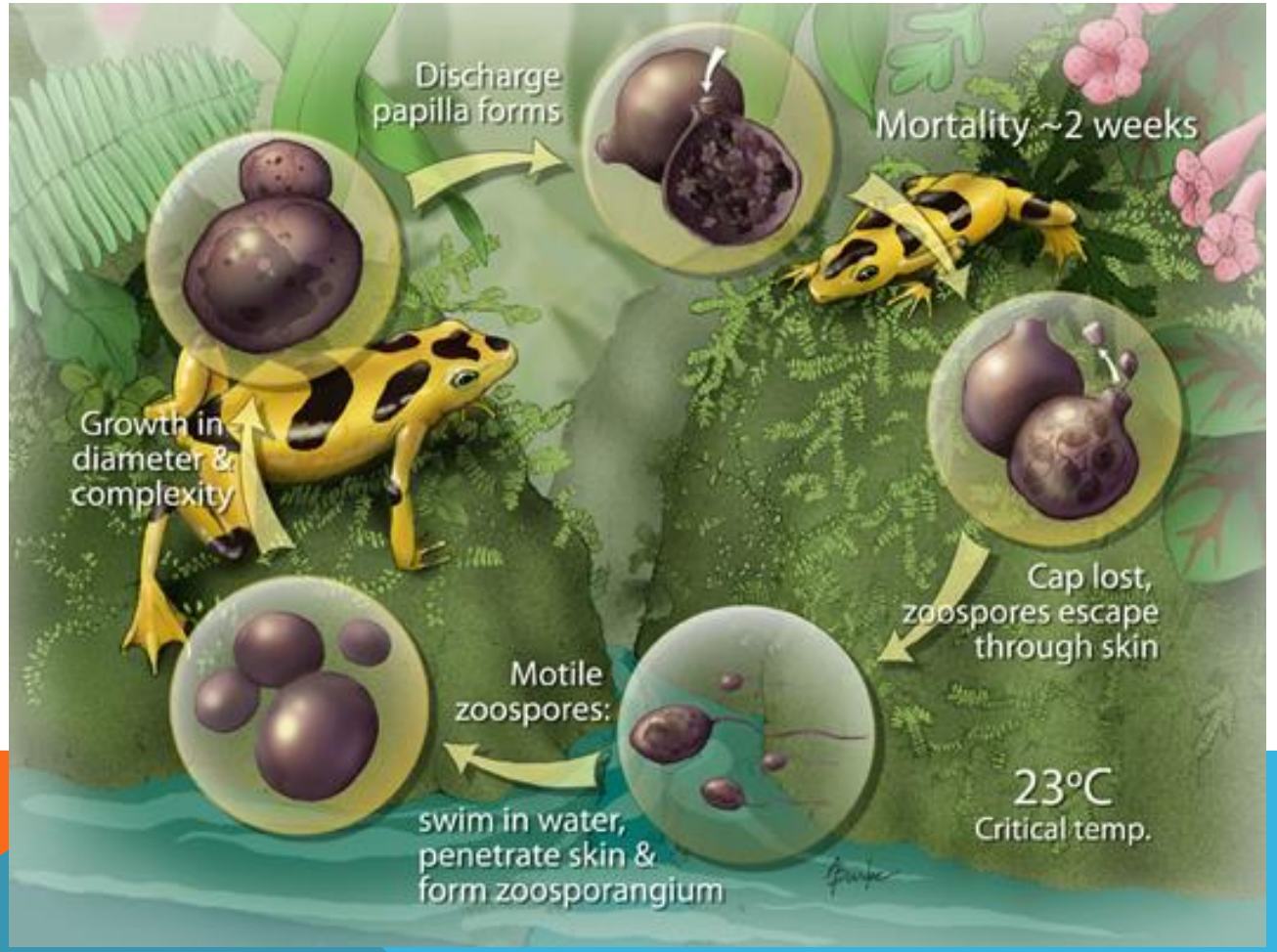
Xenopus laevis

Competição com espécies locais

Introdução de doenças
(*Batrochytrium dendrobatidis*)

Batrachochytrium dendrobatidis

Quitrídio



Causa doença na pele. Originário do sul da África e dispersão com *Xenopus laevis* e outros anfíbios

X. laevis é tolerante à doença, mas vários outros anfíbios são muito sensíveis

Alterações climáticas aparentemente exacerbam o problema

Efeito de *Batrachochytrium dendrobatidis*

Perereca morta na Nova Zelândia

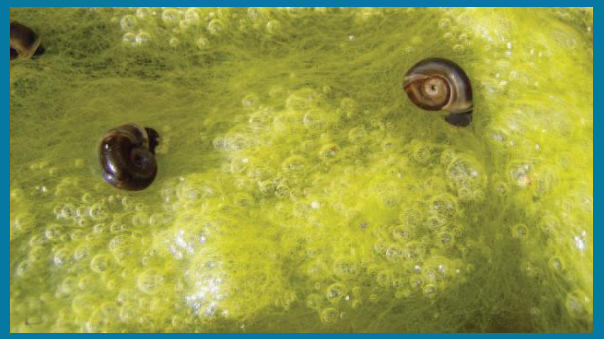
Ação do quitrídio em uma perereca no Brasil.

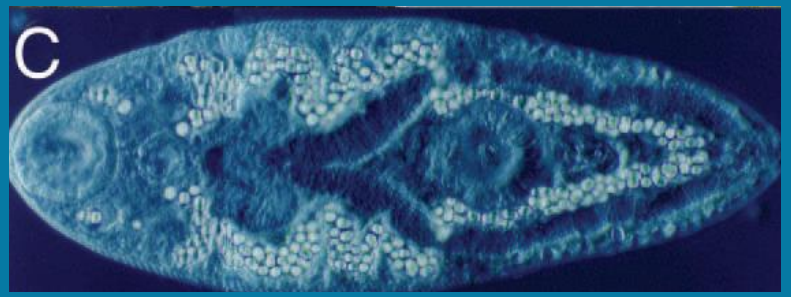
Poluição

Eutrofização

Johnson PT *et al.* (2008) Aquatic eutrophication promotes pathogenic infection in amphibians. Proc. Nat. Acad. Sc. USA 104 (40): 15781-15786.

↑P (adubos fosfatados / detergentes) ↑N (adubos nitrogenados / matéria orgânica solo / dejetos domésticos) ➔ ↑ algas perifíticas ➔ ↑ caramujos ➔ ↑ trematódeo *Ribeiroia ondatrae* ➔ deformidades em rãs



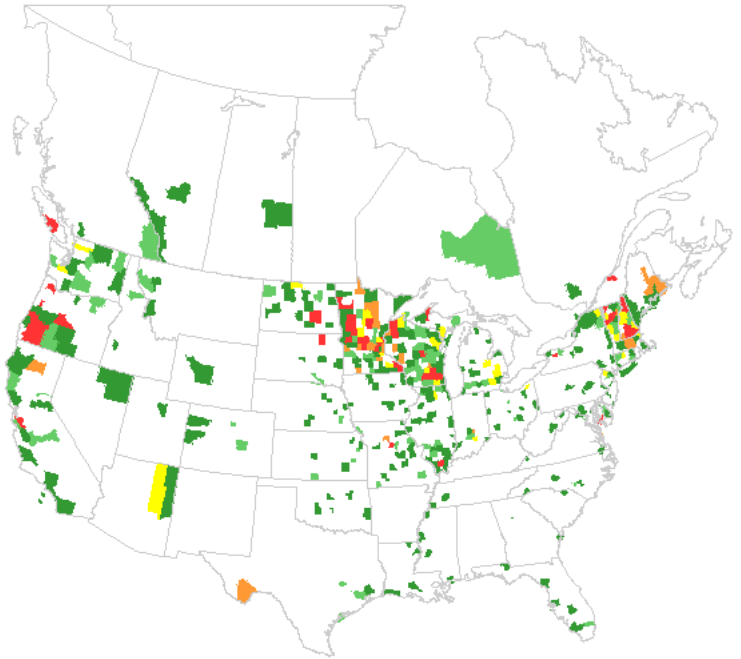


Biomphalaria / esquistossomose?

↑P (adubos fosfatados / detergentes) ↑N (adubos nitrogenados / matéria orgânica solo / dejetos domésticos) ➔ ↑ algas e plantas aquáticas ➔ ↑ caramujos ➔ ↑ trematódeo *Schistosoma mansoni* ➔ incidência de esquistossomose ??? (hipótese de Johnson *et al.*, 2008)

Santana do Mundaú (AL) Novembro de 2009

Declínio dos Anfíbios



Países mais ameaçados Haiti, República Dominicana, Cuba, Jamaica e Porto Rico (72 a 92% das spp.)

Arca dos Anfíbios

Coleta de espécime no Panamá 35 spp. em El Valle enviados para os EUA (projeto Zoo Atlanta) e 60 spp. mantidas no Panamá (projeto Houston Zoo)

Marris, 2008. Bagged and Boxed: It's a Frog Life. Nature 452: 394-395. 6.000 spp. de anfíbios; 1.896 spp. ameaçados de extinção; 100 spp. extintas desde 1980

Amphibian Ark Proteção de 500 spp.

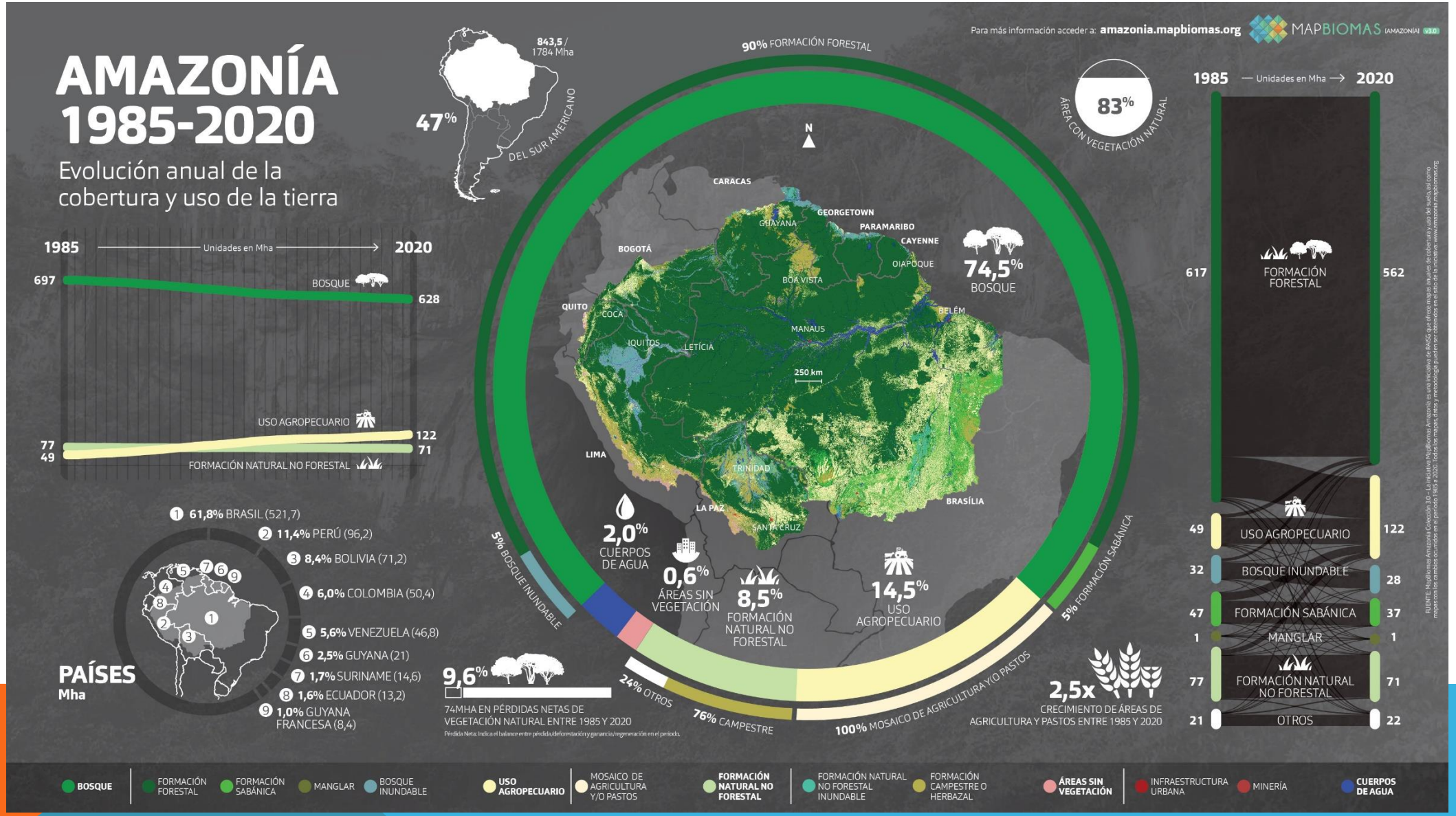
Perereca dourada do Panamá (*Atelopus zeteki*)

The Vanishing Frog (2009) Jeff Corwin

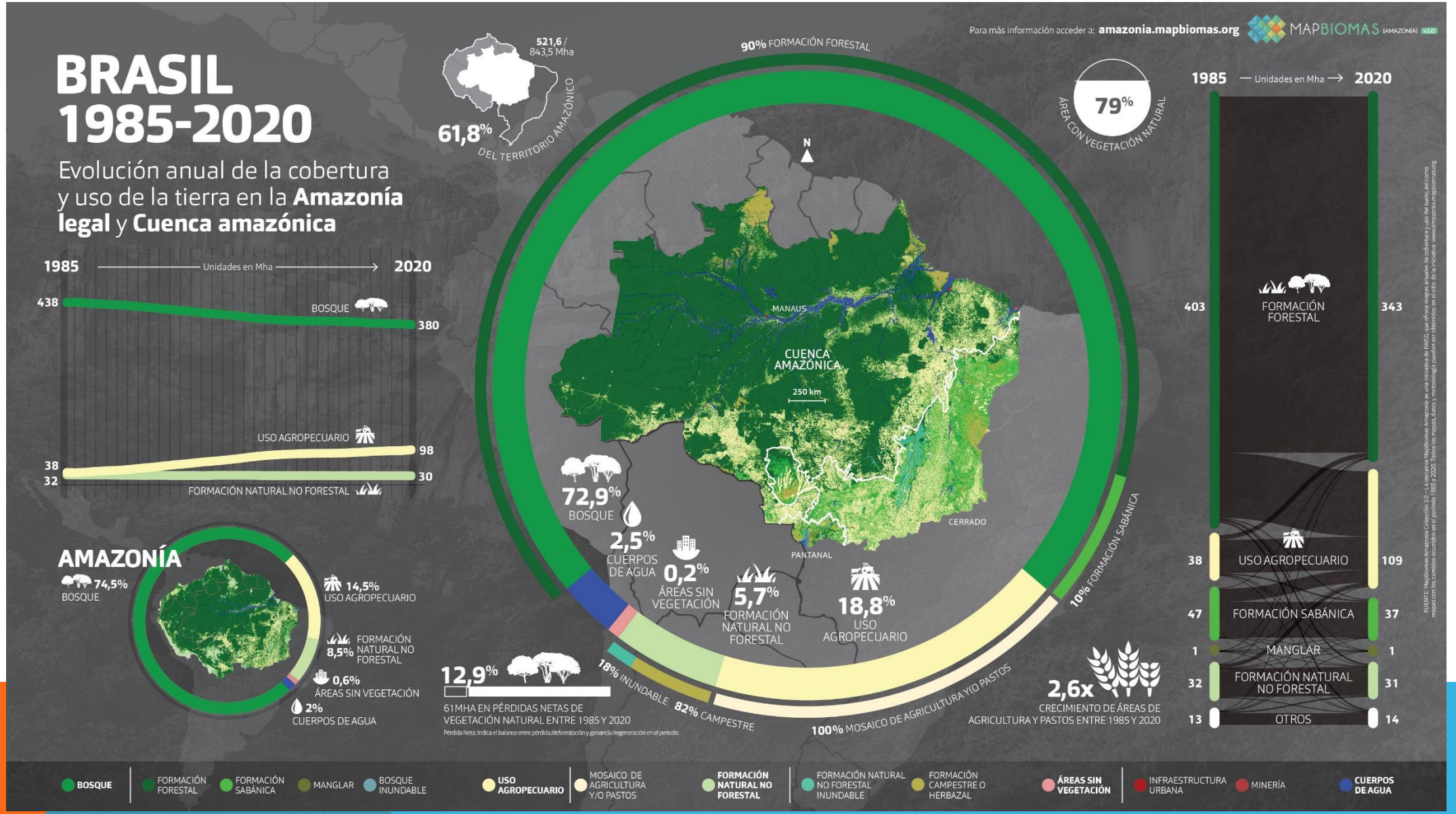
Perguntas?

Floresta Amazônica

Perguntas?



https://amazonia.mapbiomas.org/infografias



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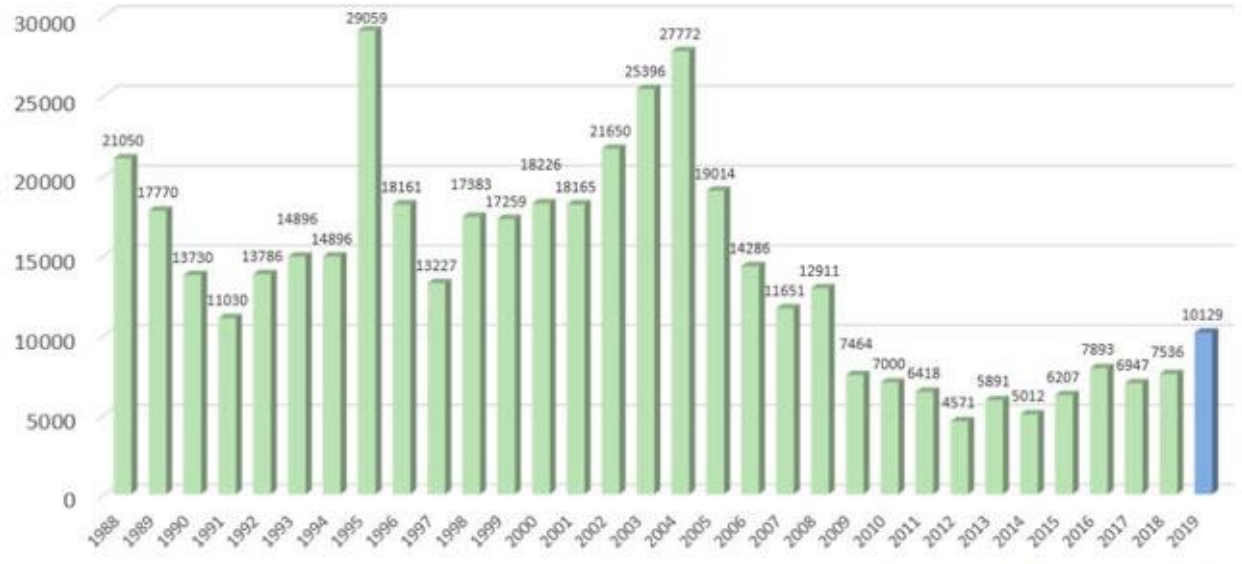
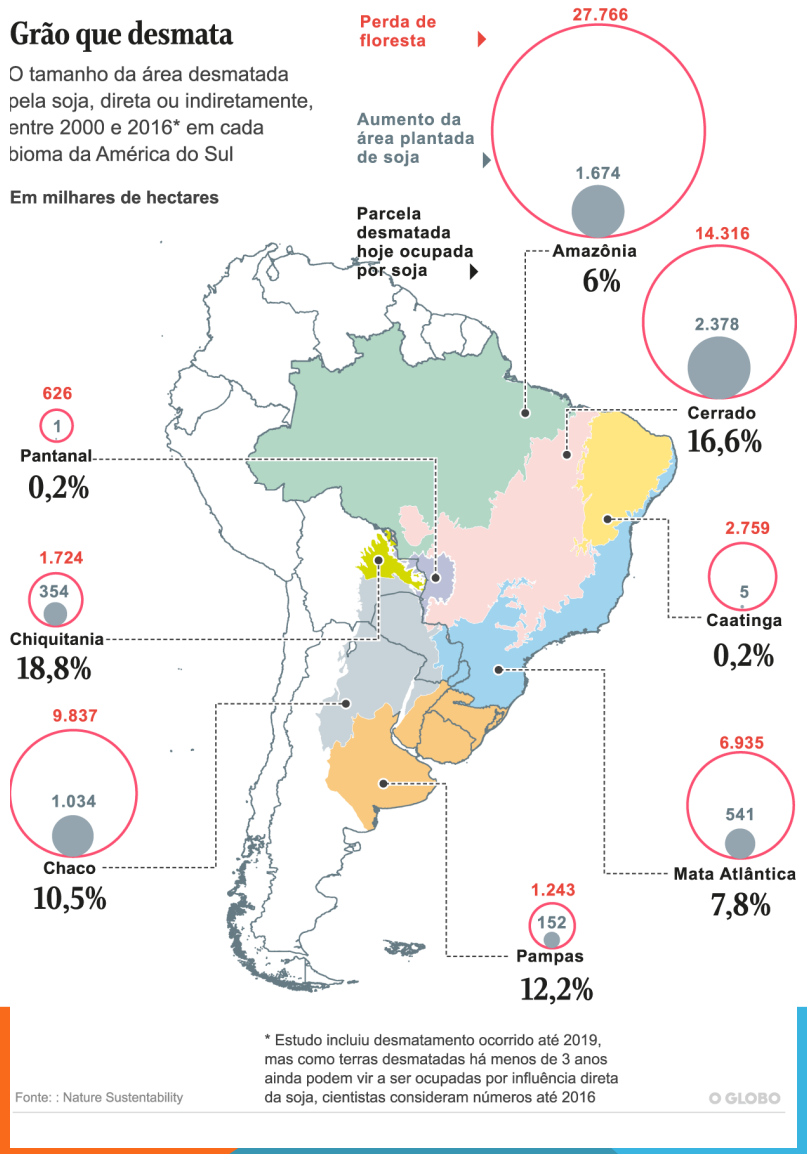


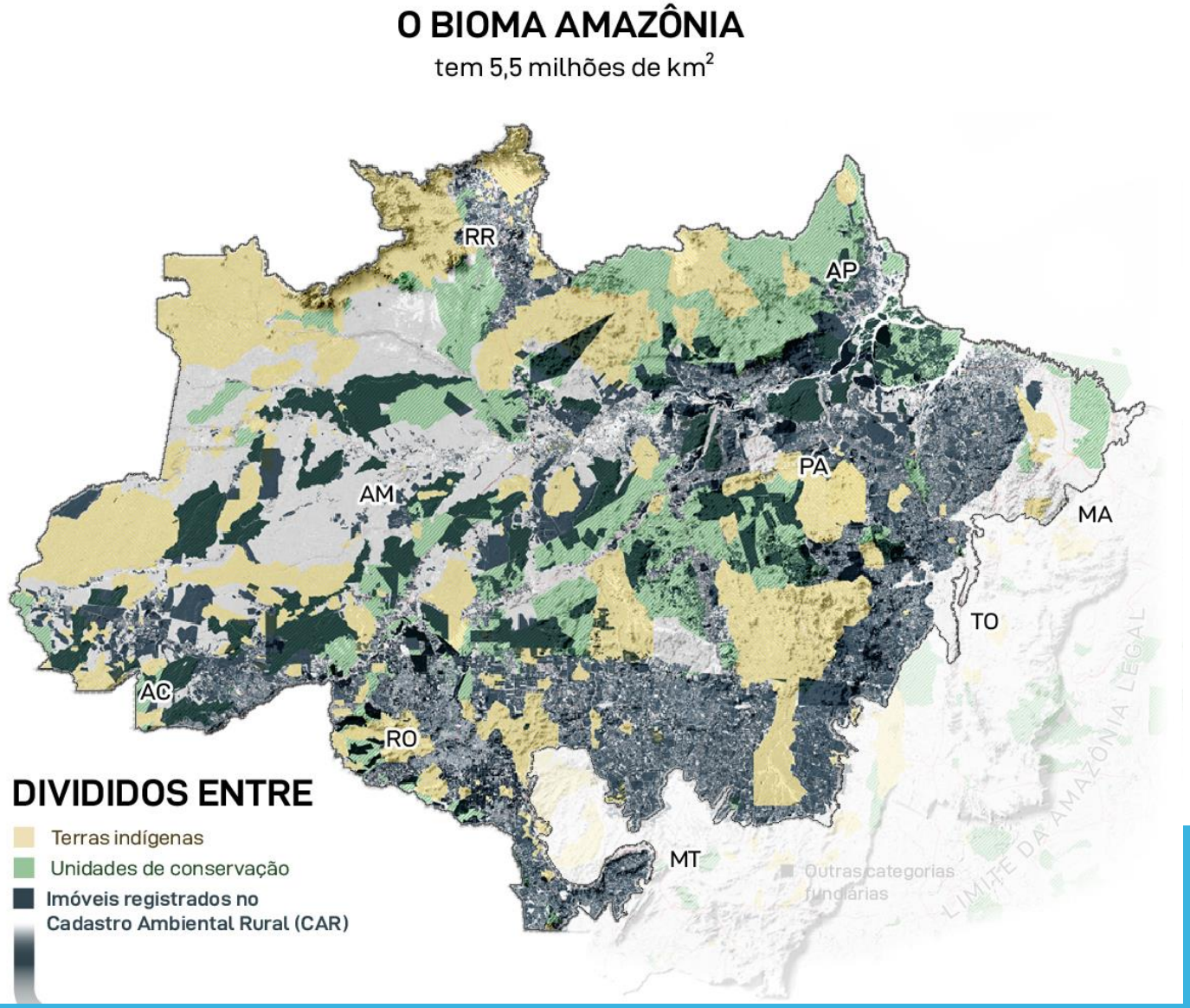
Tabela 2 – Valores absolutos e variação percentual para cada estado.

Estado	PRODES 2018 (km²)	PRODES 2019 (km²)	Variação (%)
Acre	444	682	53,60%
Amazonas	1.045	1.434	37,22%
Amapá	24	32	33,33%
Maranhão	253	237	-6,32%
Mato Grosso	1.490	1.702	14,23%
Pará	2.744	4.172	52,04%
Rondônia	1.316	1.257	-4,48%
Roraima	195	590	202,56%
Tocantins	25	23	-8,00%
AMZ. Legal	**7.536**	**10.129**	**34,41%**

http://www.inpe.br/noticias/noticia.php?Cod_Noticia=5465



https://oglobo.globo.com/um-so-planeta/soja-contribuiu-para-10-do-desmatamento-na-america-do-sul-em-20-anos-mostra-estudo-25054890



https://piaui.folha.uol.com.br/reserva-legal-uma-ilusao-amazonica/

Hemiphractus johnsoni (“Johnson's Horned Frog”)

https://www.gettyimages.ae/detail/photo/hemiphractus-johnsoni-royalty-free-image/1141873475

https://calphotos.berkeley.edu/cgi/img_query?enlarge=0000+0000+1209+2218

Boa Noite!