Mudanças Climáticas e Biodiversidade da Mata Atlântica e do Cerrado

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&

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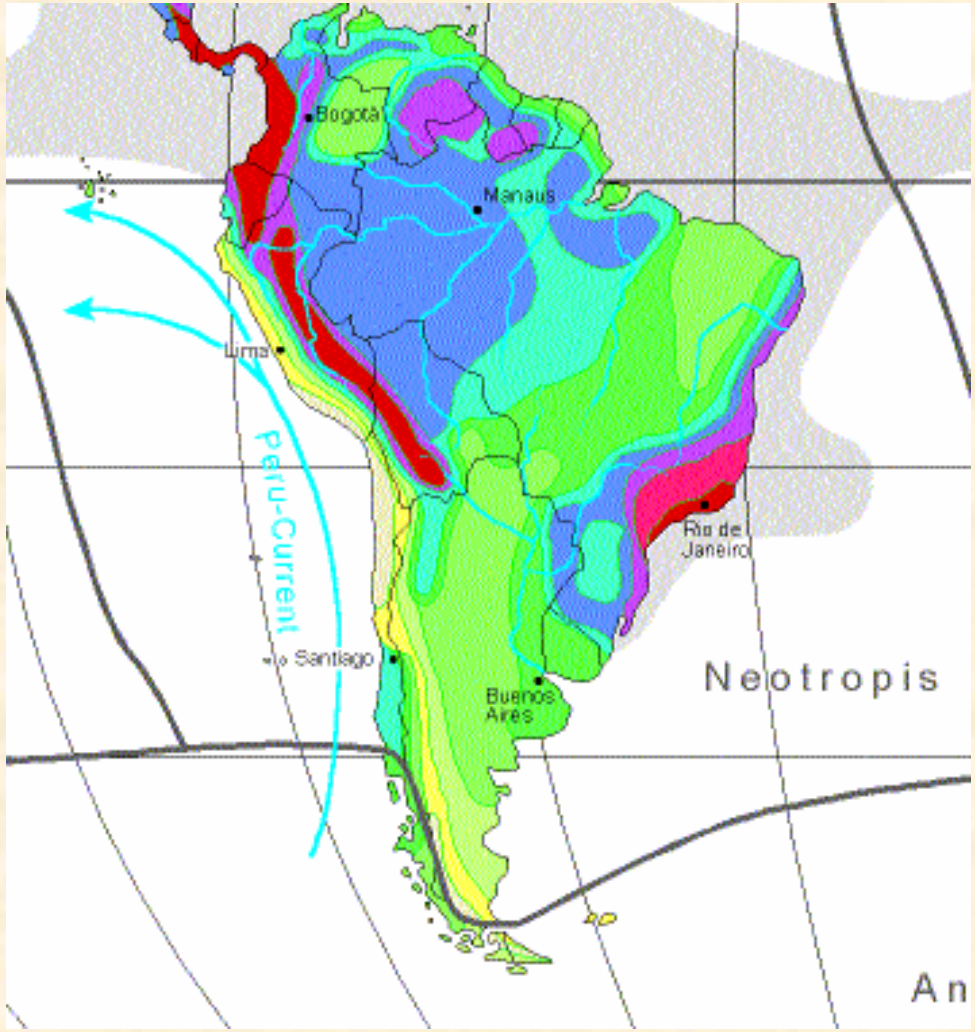
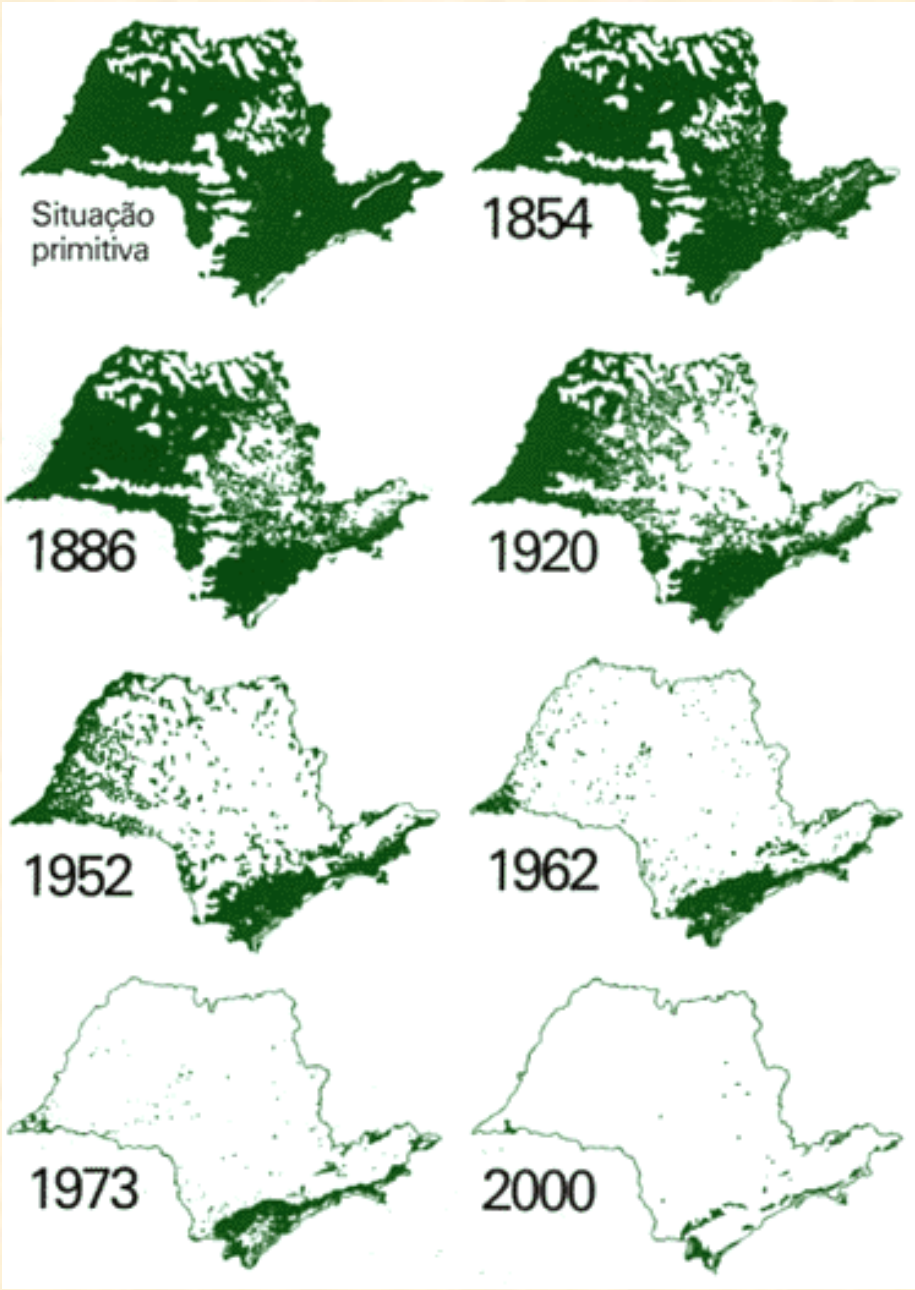
UNICAMP

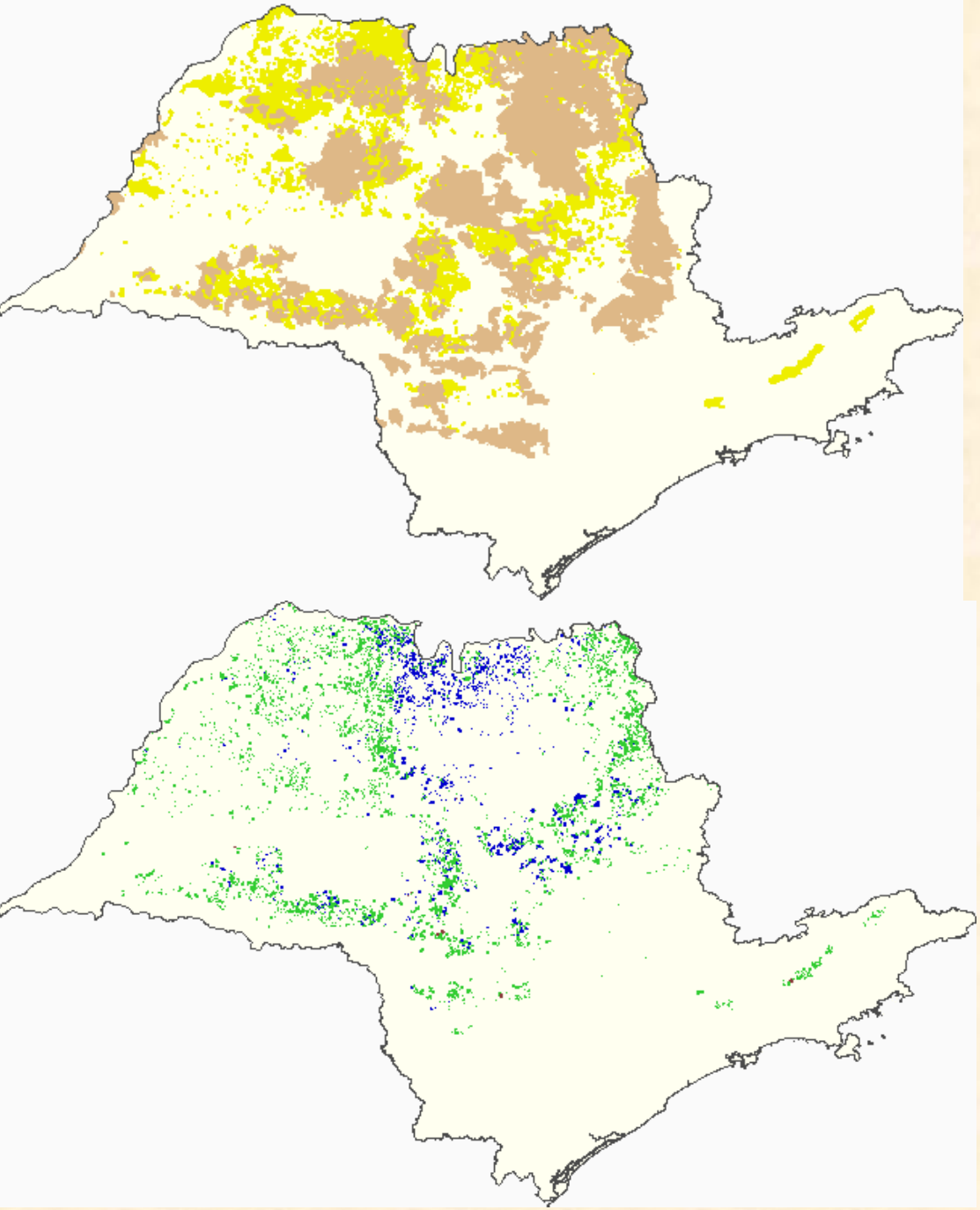


Diversity Zones (DZ): Number of species per 10.000km^2

- DZ 1 (<100)
- DZ 2 (100 - 200)
- DZ 3 (200 - 500)
- DZ 4 (500 - 1000)
- DZ 5 (1000 - 1500)
- DZ 6 (1500 - 2000)
- DZ 7 (2000 - 3000)
- DZ 8 (3000 - 4000)
- DZ 9 (4000 - 5000)
- DZ 10 (≥5000)



No Estado de São Paulo a área coberta por florestas nativas caiu de 85% em 1500 para 13% in 2000. Cerca de 60% dos remanescentes de floresta nativa estão na Serra do Mar e Vale do Ribeira. Destes 50% está em Parques Estaduais.

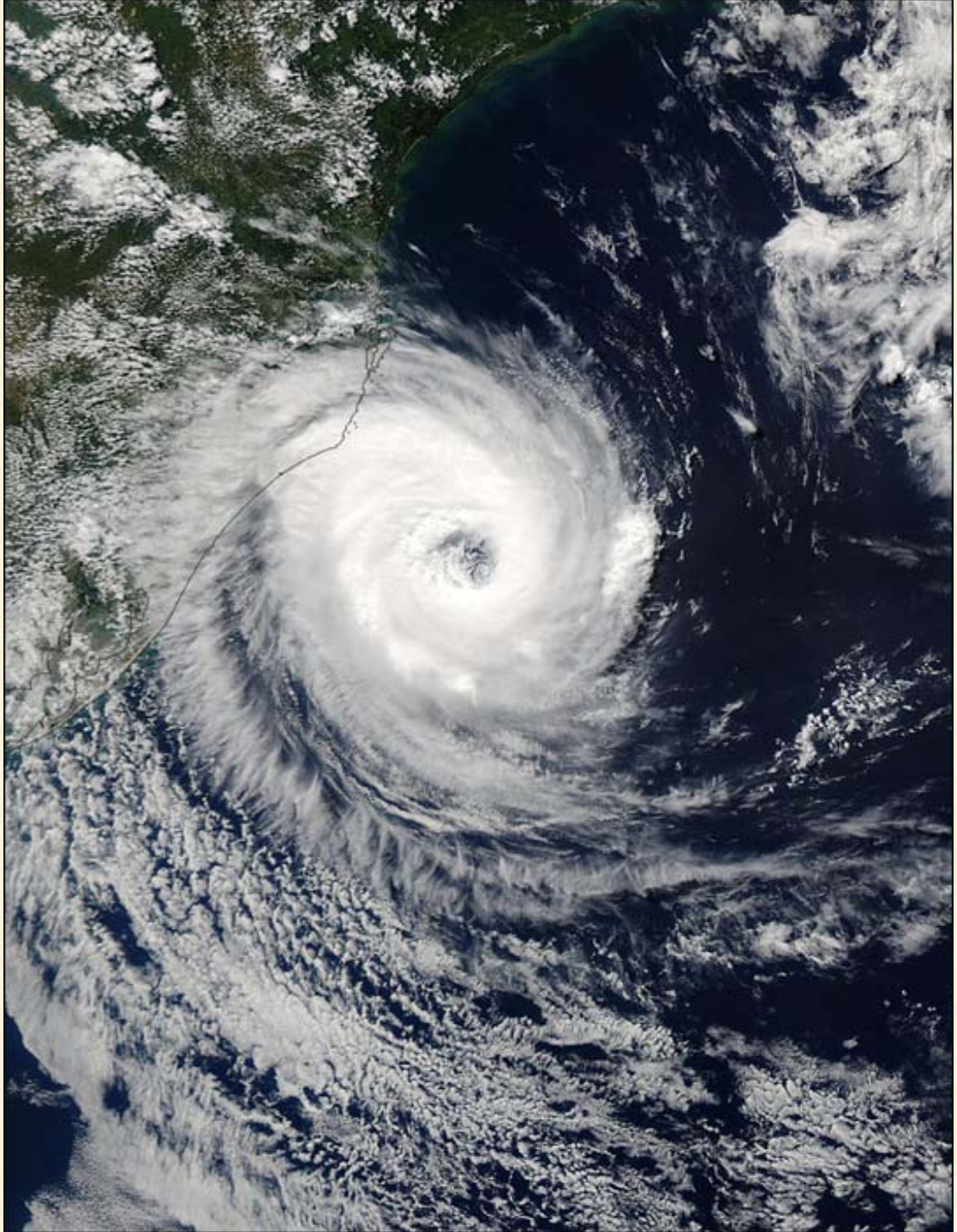


No Estado de São Paulo a área coberta por Cerrado era de 14% em 1500.

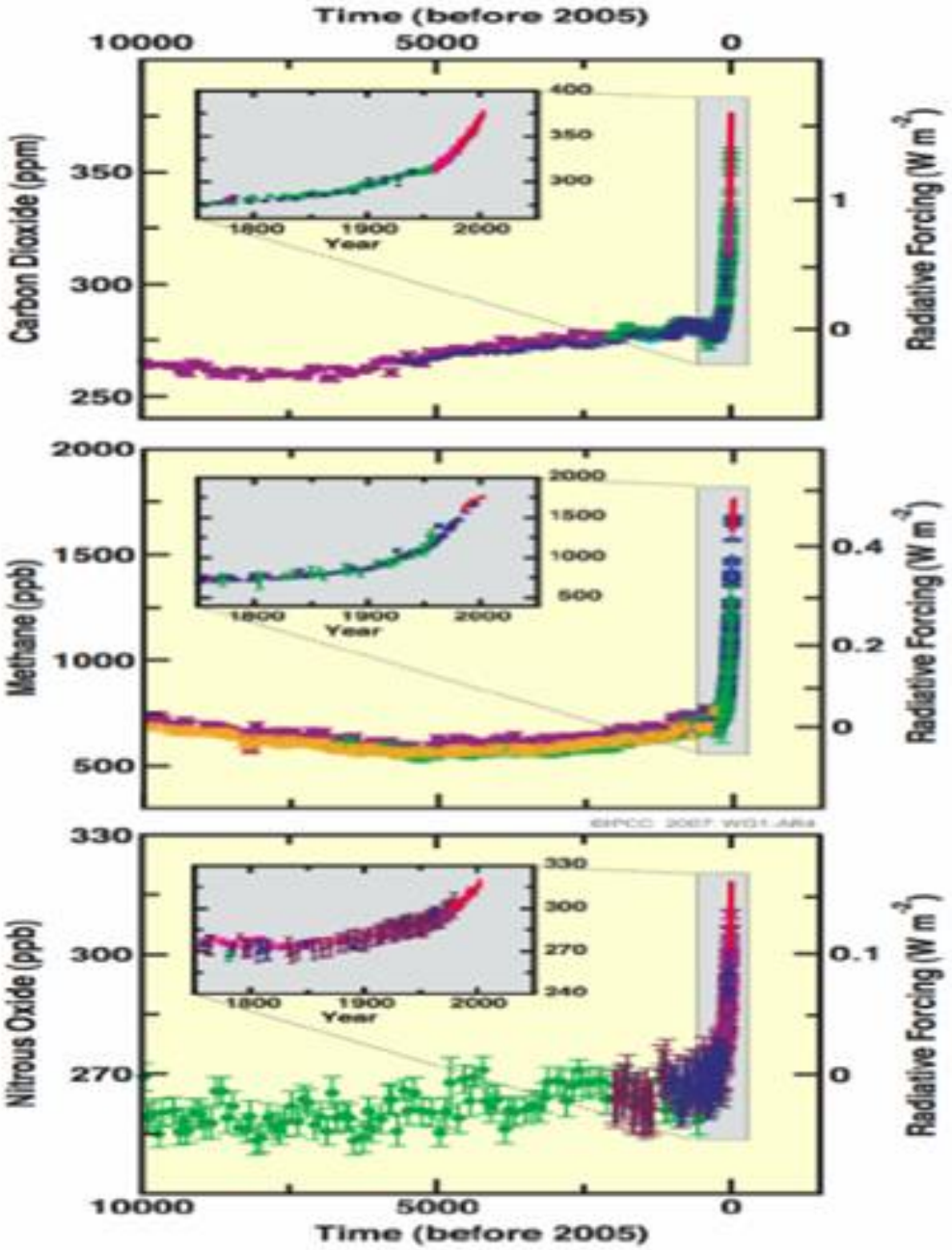
Em 1950 São Paulo detinha mais de 85% da área original de Cerrado.

Em 2004 a área de Cerrado era inferior a 2% em cerca de 8.500 fragmentos.

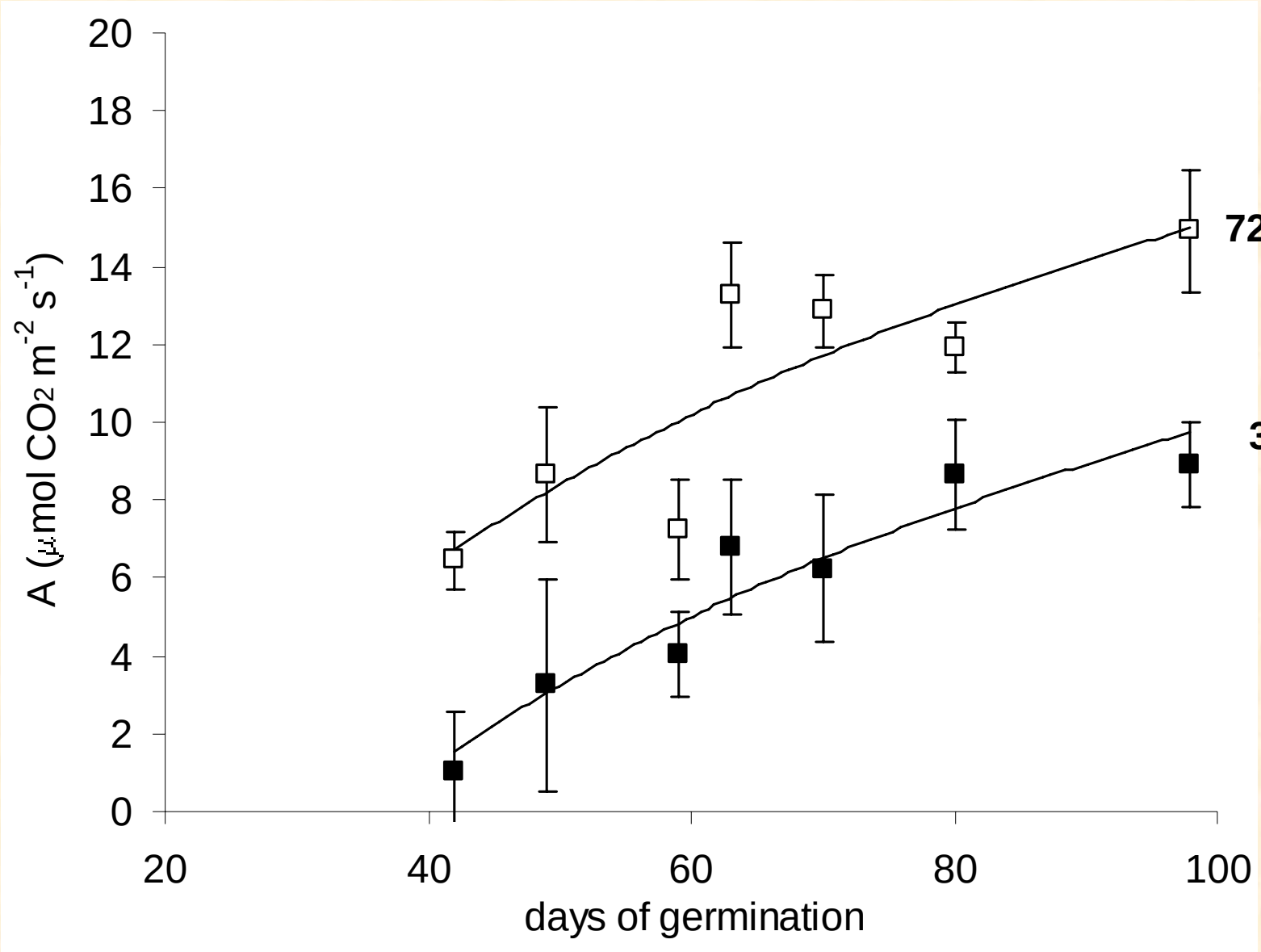
Somente cerca de 10% da área remanescente de Cerrado está em Unidades de Conservação.



Changes in Greenhouse Gases from ice-Core and Modern Data



CONSEQUÊNCIAS DO AUMENTO DA CONCENTRAÇÃO DE CO_2 NA ATMOSFERA



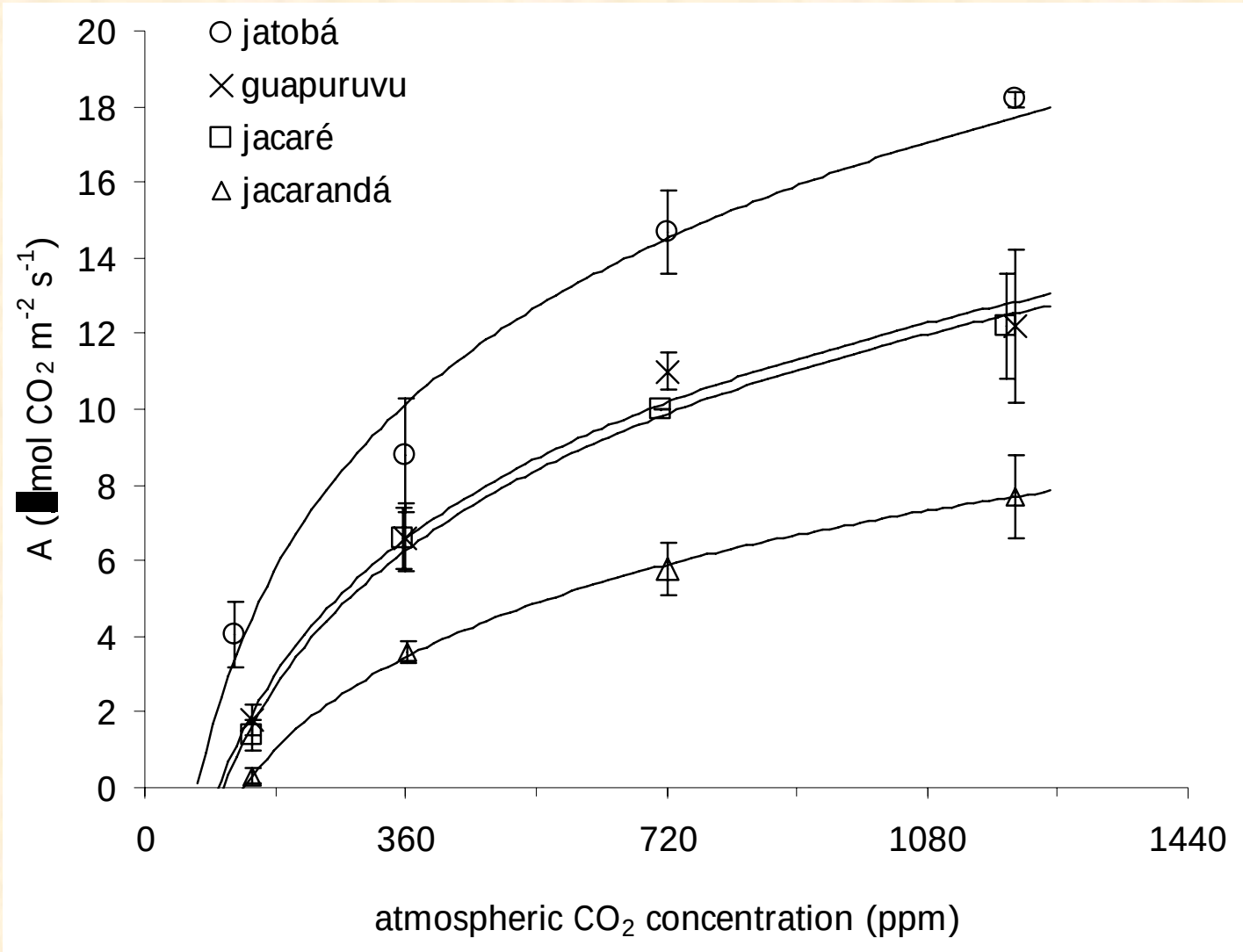
Aidar *et al.* 2002. Efeito do aumento de CO_2 no estabelecimento de plântulas de jatobá. Biota Neotropica

Jatobá ***Hymenaea courbaril***

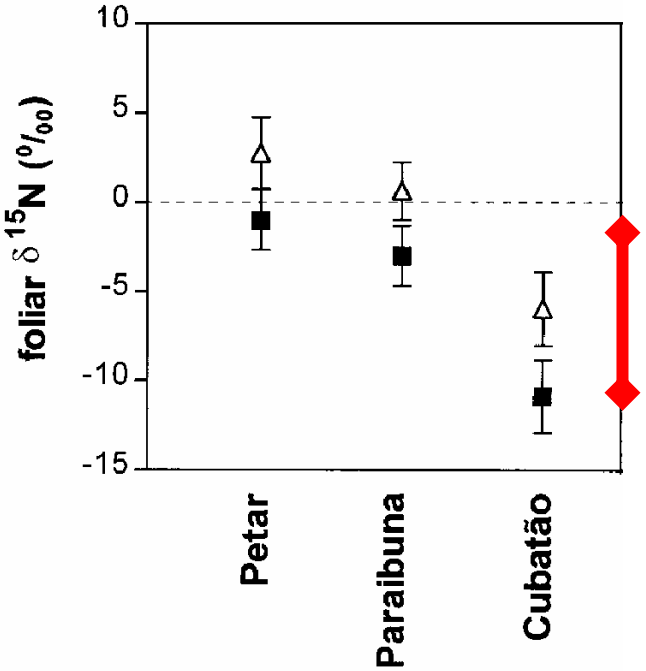
Guapuruvú – ***Schyzolobium parahyba***

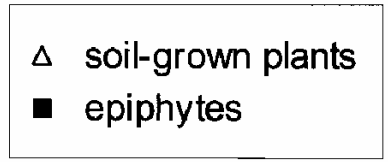
Jacaré - ***Piptadenia gonoachanta***

Jacarandá - ***Dalbergia nigra***

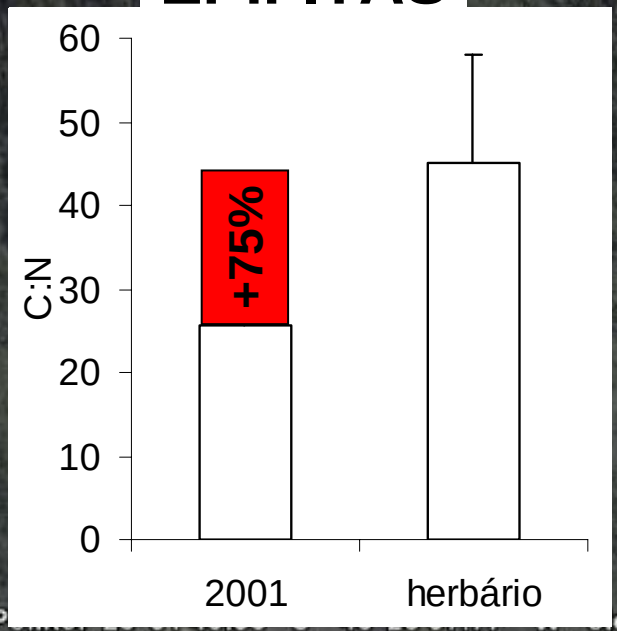

jatobá
guapuruvu
jacaré
jacarandá
A (μmol CO2 m-2 s-1)
0
2
4
6
8
10
12
14
16
18
20
0
360
720
1080
1440
atmospheric CO2 concentration (ppm)

MONITORANDO ALTERAÇÕES NA CONCENTRAÇÃO DE N_2 ATMOSFÉRICO





EPÍFITAS



Epífitas podem ser utilizadas para monitoramento da poluição atmosférica através do uso da isotopia de $\delta^{15}N$.

Stewart, Joly, Aidar et al, 2002

Herbários, Museus e outras coleções biológicas, por guardarem o registro de espécies e de padrões fenológicos de décadas, às vezes séculos, atrás, são de fundamental importância para o estudo dos efeitos das mudanças climáticas globais. Estudos comparativos poderão identificar, por exemplo, alterações no padrão de distribuição ou no padrão de floração de espécies que teriam conseqüências imprevisíveis para as populações de seus polinizadores e dispersores. A flora e a fauna de áreas de alta concentração de espécies endêmicas, como campos de altitude do Domínio Atlântico,poderá ser a primeira a demonstrar o efeito do aquecimento, pelo fato destas espécies serem extremamente sensíveis às alterações climáticas.

Science, Vol 282, Issue 5388, 439-442 , 16 October 1998

Changes in the Carbon Balance of Tropical Forests: Evidence from Long-Term Plots

Oliver L. Phillips, * Yadvinder Malhi, * Niro Higuchi, William F. Laurance, Percy V. Núñez, Rodolfo M. Vásquez, Susan G. Laurance, Leandro V. Ferreira, Margaret Stern, Sandra Brown, John Grace

Our results suggest that mature Neotropical forest biomass may account for ~40% of the so-called "missing" terrestrial C sink (36). Hence, intact forests may be helping to buffer the rate of increase in atmospheric CO_2, thereby reducing the impacts of global climate change. However, the C sink in mature forests appears vulnerable to several factors. There is likely to be an upper limit to the biomass a forest stand can hold. **Moreover, deforestation, logging (37), increased fragmentation and edge-effect mortality (23, 24), regional drying and warming (38), and possible intensification of El Niño phenomena (39) may limit and even reverse the sink provided by mature forest.**

Science, Vol 284, Issue 5417, 1177-1179 , 14 May 1999

Net Primary Production of a Forest Ecosystem with Experimental CO_2 Enrichment

Evan H. DeLucia, Jason G. Hamilton, Shawna L. Naidu, Richard B. Thomas, Jeffrey A. Andrews, Adrien Finzi, Michael Lavine, Roser Matamala, Jacqueline E. Mohan, George R. Hendrey, William H. Schlesinger

Seedlings or saplings exposed to two times the current atmospheric concentration of CO_2 in growth chambers, greenhouses, or open-top chambers have ~54% greater photosynthesis and ~31% greater biomass (4). These enhancements are considerably reduced when plants receive suboptimal amounts of other important resources such as nitrogen (5). Most studies of tree rings (6) show no increase in growth rate in response to the increase in atmospheric CO_2 that has occurred from the pre-industrial concentration of ~280 ppm to the current 360 ppm. **Resource limitations in natural ecosystems and other ecological interactions including competition (7) may constrain the potential for forests to respond to increasing concentrations of CO_2.**

Table 1 **Increasing or decreasing tree genera in undisturbed Amazonian rainforests**

Genus	Family	Net change (%)
Tree density increases over time		
Corythophora	Lecythidaceae	+9.8
Eschweilera	Lecythidaceae	+4.0
Tree density decreases over time		
Aspidosperma	Apocynaceae	−13.3
Brosimum	Moraceae	−8.1
Couepia	Chrysobalanaceae	−8.9
Croton	Euphorbiaceae	−35.0
Heisteria	Olacaceae	−25.0
Hirtella	Chrysobalanaceae	−13.0
Iryanthera	Myristicaceae	−16.3
Licania	Chrysobalanaceae	−11.0
Naucleopsis	Moraceae	−17.8
Oenocarpus	Arecaceae	−32.3
Quiina	Quiinaceae	−29.0
Tetragastris	Burseraceae	−15.0
Unonopsis	Annonaceae	−15.3
Virola	Myristicaceae	−14.0
Tree basal area increases over time		
Corythophora	Lecythidaceae	+12.0
Couepia	Chrysobalanaceae	+10.8
Couma	Apocynaceae	+14.4
Dipteryx	Leguminosae	+7.2
Ecclinusa	Sapotaceae	+13.8
Eschweilera	Lecythidaceae	+7.0
Licaria	Lauraceae	+17.2
Maquira	Moraceae	+9.9
Parkia	Leguminosae	+22.0
Peltogyne	Leguminosae	+15.9
Sarcaulus	Sapotaceae	+14.4
Sclerobium	Leguminosae	+76.6
Sterculia	Sterculiaceae	+23.4
Trattinnickia	Burseraceae	+13.6
Tree basal area decreases over time		
Oenocarpus	Arecaceae	−29.1

All increases or decreases in tree genera based on population density and basal-area data are significant ($P < 0.01$).

Laurance et al 2004 Pervasive alteration of tree communities in undisturbed Amazonian forests. Natute 428:171-175

Here we show that, over the past two decades, **forests in a central Amazonian landscape have experienced highly nonrandom changes in dynamics and composition.** Our analyses are based on a network of 18 permanent plots unaffected by any detectable disturbance. Within these plots,rates of tree mortality, recruitment and growth have increased over time. **Of 115 relatively abundant tree genera, 27 changed significantly in population density or basal area—a value nearly 14 times greater than that expected by chance.** An independent, eight-year study in nearby forests corroborates these shifts in composition. **Contrary to recent predictions, we observed no increase in pioneer trees. However, genera of faster-growing trees, including many canopy and emergent species, are increasing in dominance or density, whereas genera of slower-growing trees, including many subcanopy species, are declining. Rising atmospheric CO_2 concentrations may explain these changes, although the effects of this and other large-scale environmental alterations remain uncertain. These compositional changes could have important impacts on the carbon storage, dynamics and biota of Amazonian forests**.

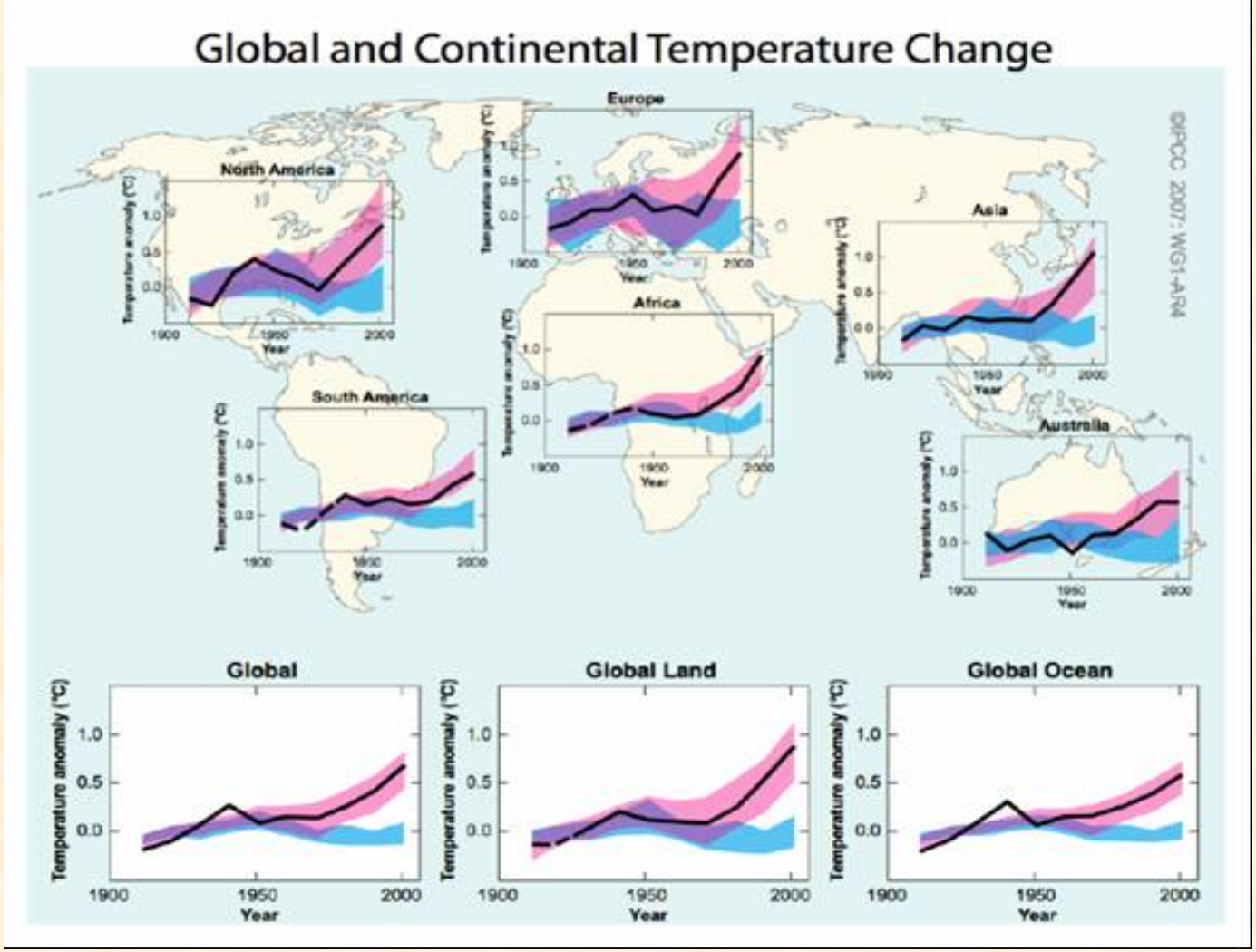


Figure 3. Comparison of observed continental- and global-scale changes in surface temperature with results simulated by climate models using natural and anthropogenic forcings. **Decadal averages** of observations are shown for the period **1906–2005 (black line)** plotted against the centre of the decade and relative to the corresponding average for 1901–1950. Lines are dashed where spatial coverage is less than 50%. **Blue shaded bands** show the 5–95% range for 19 simulations from 5 climate models using only the **natural forcings** due to solar activity and volcanoes. **Red shaded bands** show the 5–95% range for 58 simulations from 14 climate models using **both natural and anthropogenic forcings**. IPCC WGI SPM, 2007

CONSEQUENCES OF GLOBAL CLIMATE CHANGE FOR GEOGRAPHIC DISTRIBUTIONS OF CERRADO TREE SPECIES

Marinez Ferreira de Siqueira[1] *& Andrew Townsend Peterson*[2]

Biota Neotropica v3 (n2) – http://www.biotaneotropica.org.br/v3n2/pt/abstract?article+BN00803022003

Date Received 01/27/2003

Revised 04/15/2003

Accepted 07/21/2003

http://www.biotaneotropica.org.br/v3n2/pt/fullpaper?bn00803022003+en

Data on distributions and ecological dimensions

Distributional data representing **15,657 records (i.e., unique species x latitude-longitude combinations)** for **162 tree species** occurring in Cerrado (*sensu lato*) were assembled from the *Projeto de Cooperação Técnica Conservação e Manejoda Biodiversidade do Bioma Cerrado – EMBRAPA Cerrados – UnB – Ibama/DFID e RBGE/Reino Unido*.

Ecological niche modeling and dispersal assumptions.

All modeling in this study was carried out on a desktop implementation of ***Genetic Algorithm for Ruleset Prediction* (GARP)** now available publicly for download (http://beta.lifemapper.org/desktopgarp/

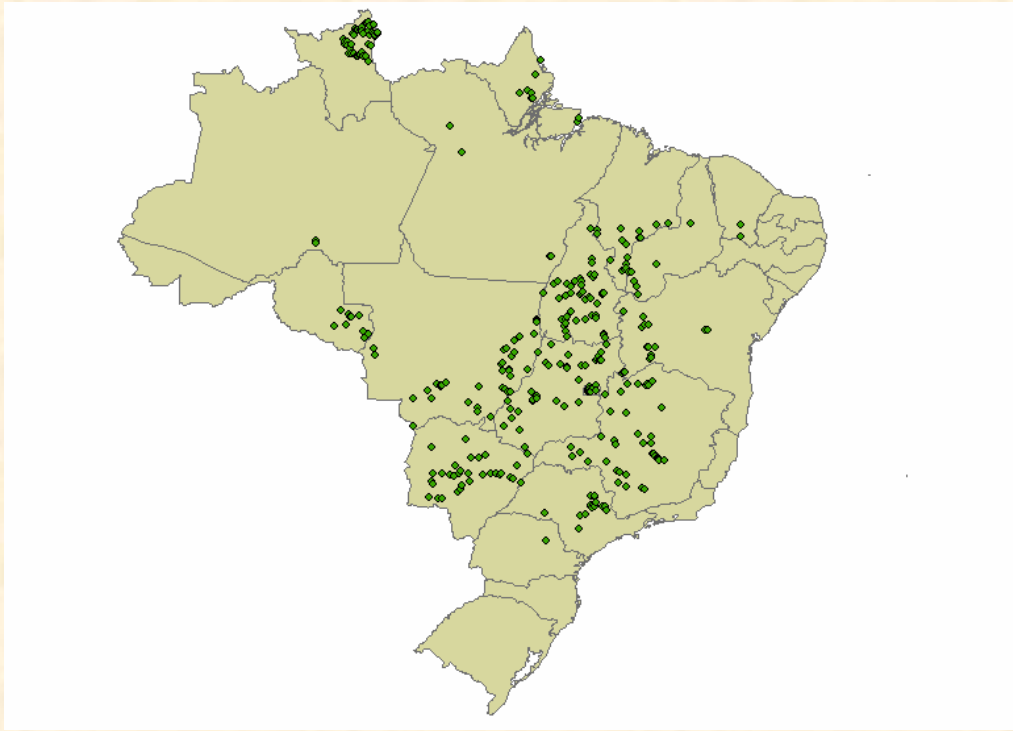
Scenarios of climate change

We assessed both a conservative and a less conservative view of how climates could change over the next 50 yr using the Hadley HHGSDX50 and HHGGAX50 scenarios (**http://ipcc-ddc.cru.uea.ac.uk/cru_data/examine/HadCM2_info.html**). The future projected climate data are provided at a spatial resolution of 2.5 x 3.75° (Carson 1999). To improve spatial resolution, however, following recommended methodologies (**http://www.ipcc.ch/),** we calculated expected changes in each climate variable for each scenario and each of the relatively coarse pixels via subtraction of future from present model results. These difference maps were then applied to the more detailed (0.5 x 0.5° cells) IPCC current climate data layers, which are developed and provided by the same organism, and which are intended to be parallel and consistent with the climate-model projections.

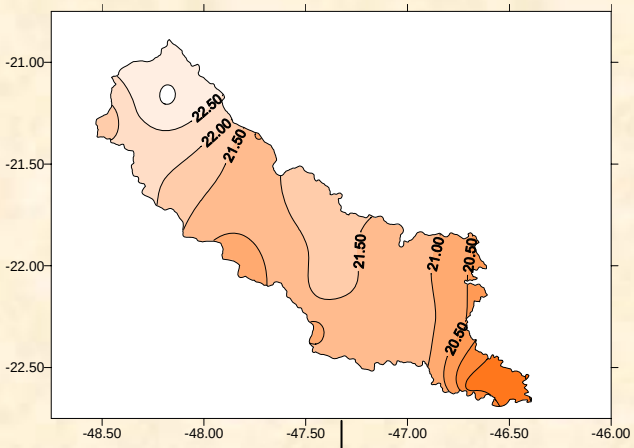
Construindo um modelo

Pontos de ocorrência (latitude e longitude) de uma determinada espécie.

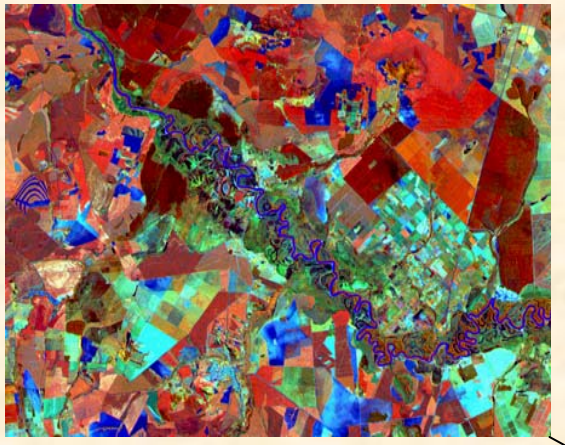
Pi = (**Lat**i, **Long**i)



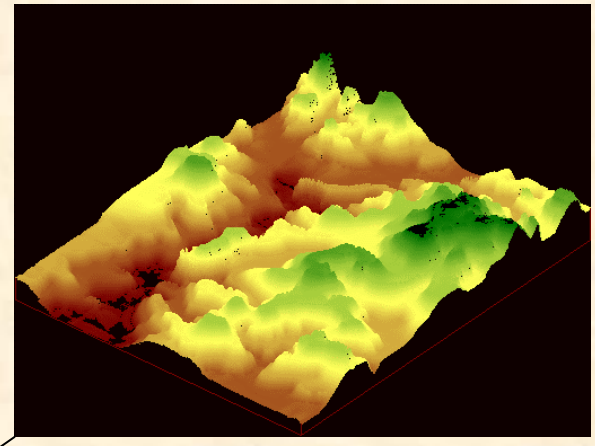
Clima



Imagens /Uso da Terra

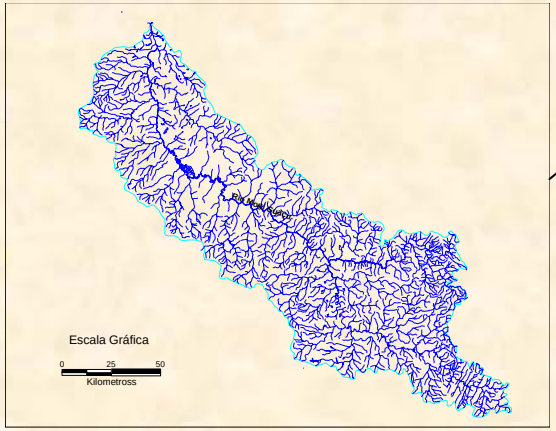


Relevo

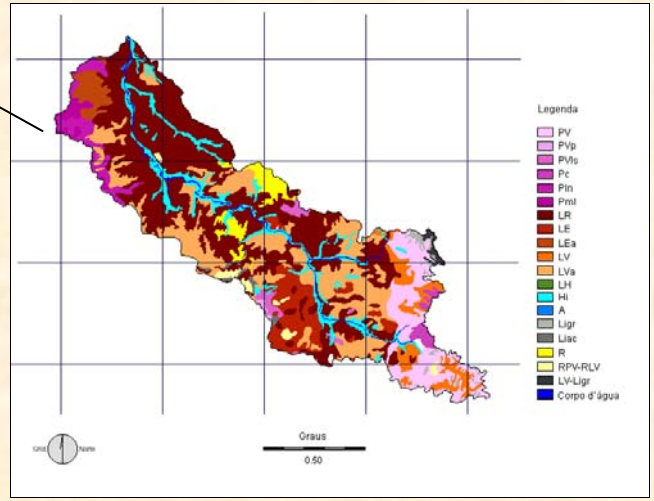


Informações do Meio Físico

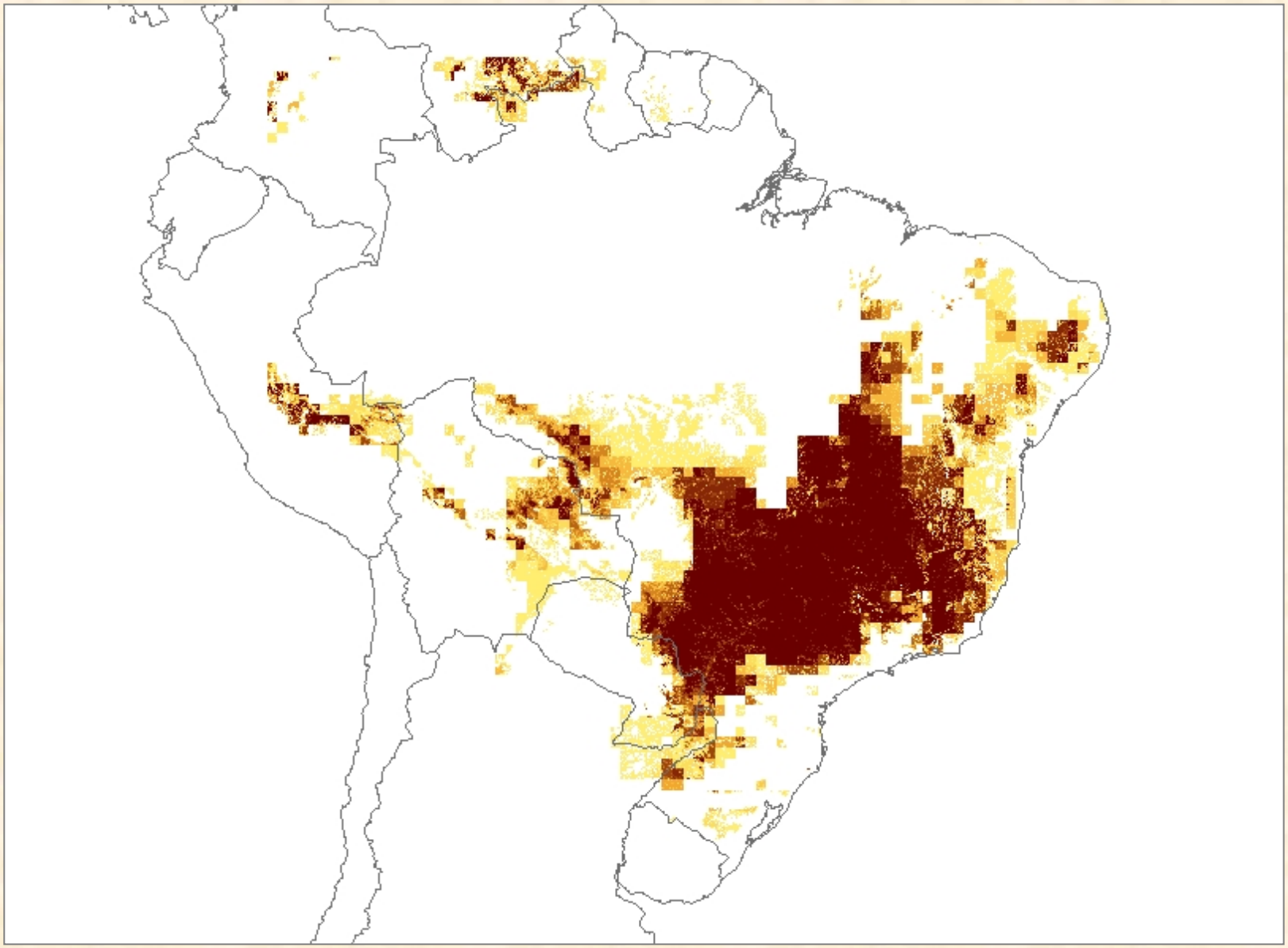
Drenagem

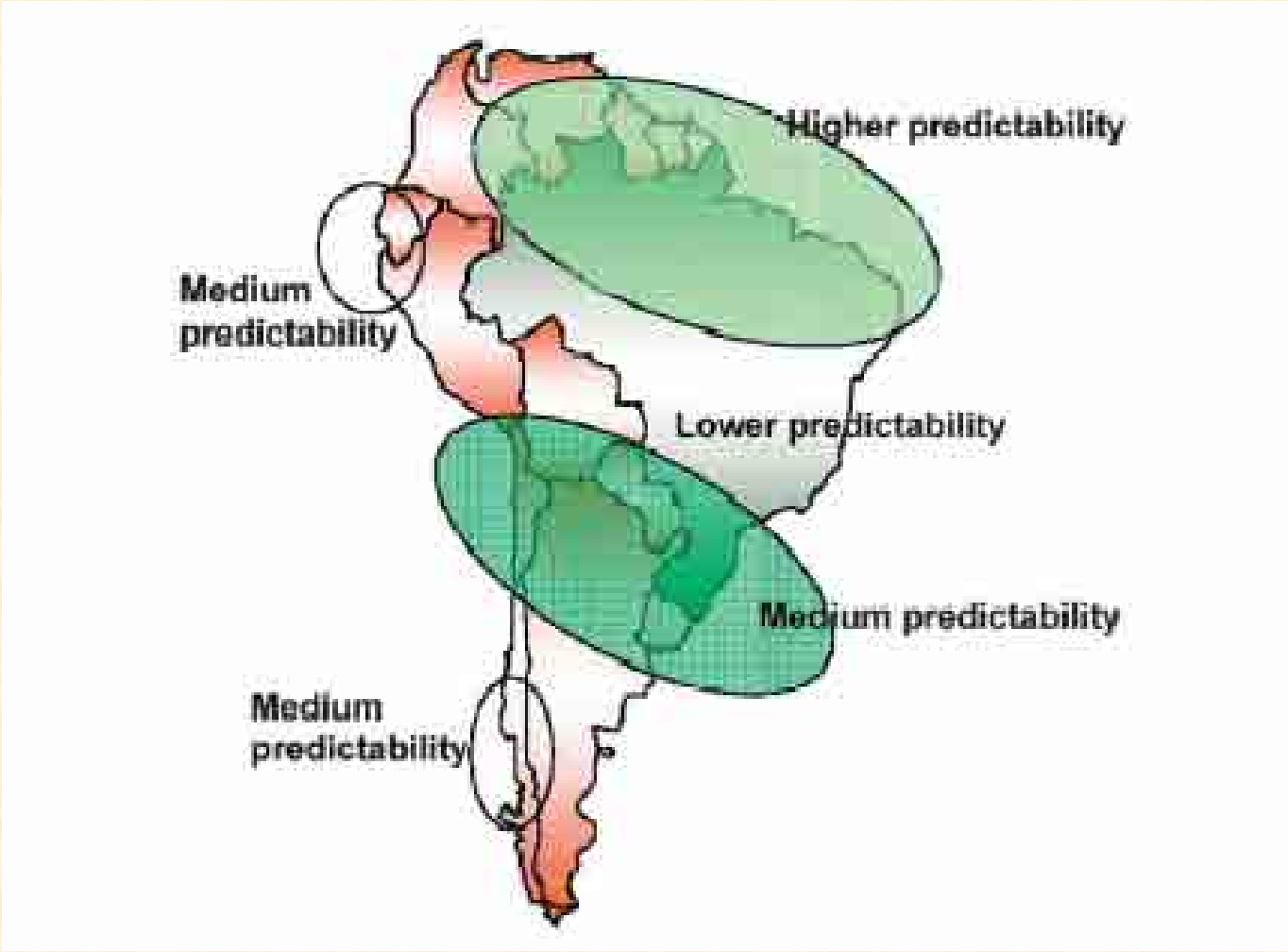


Solos

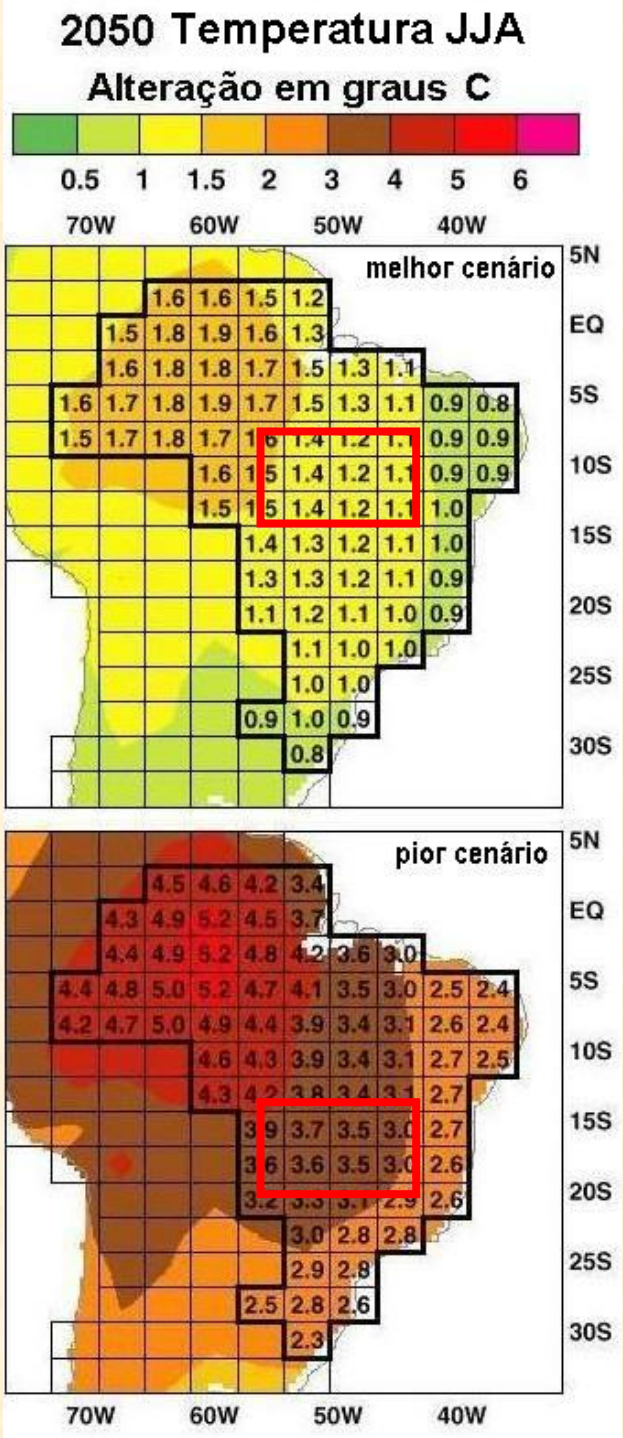


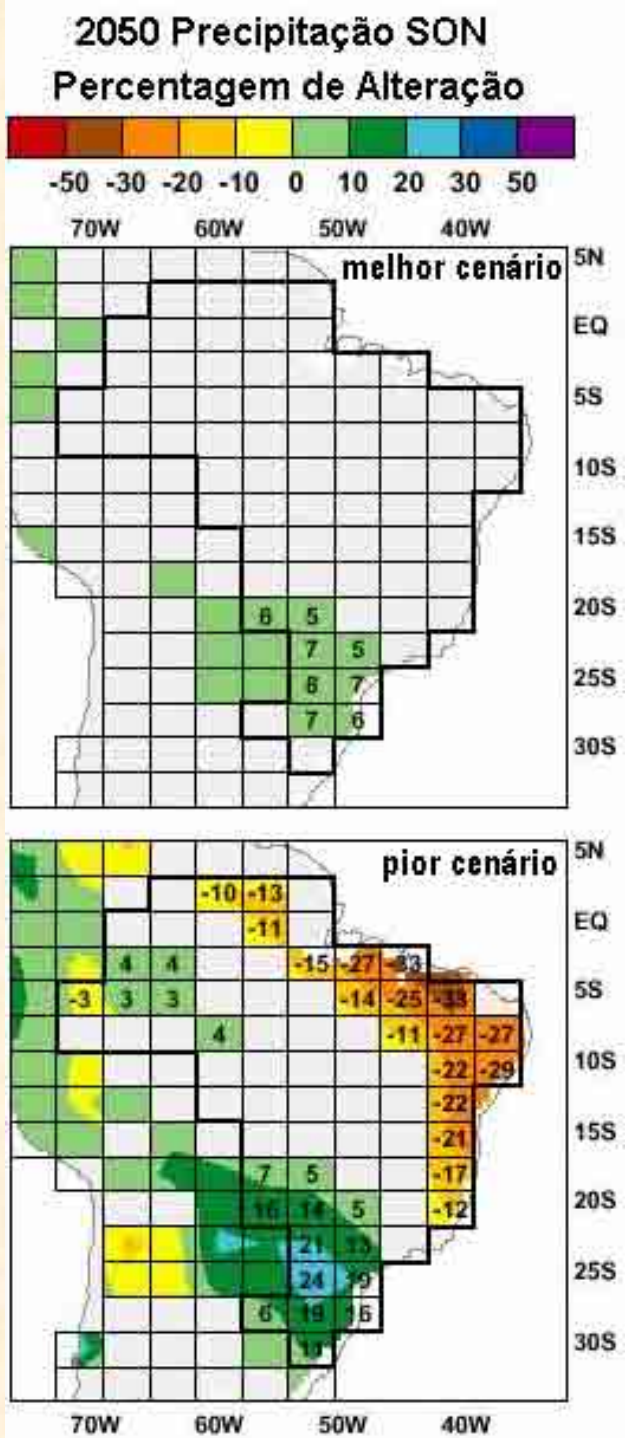
Distribuição de *Terminalia argentea* usando GARP



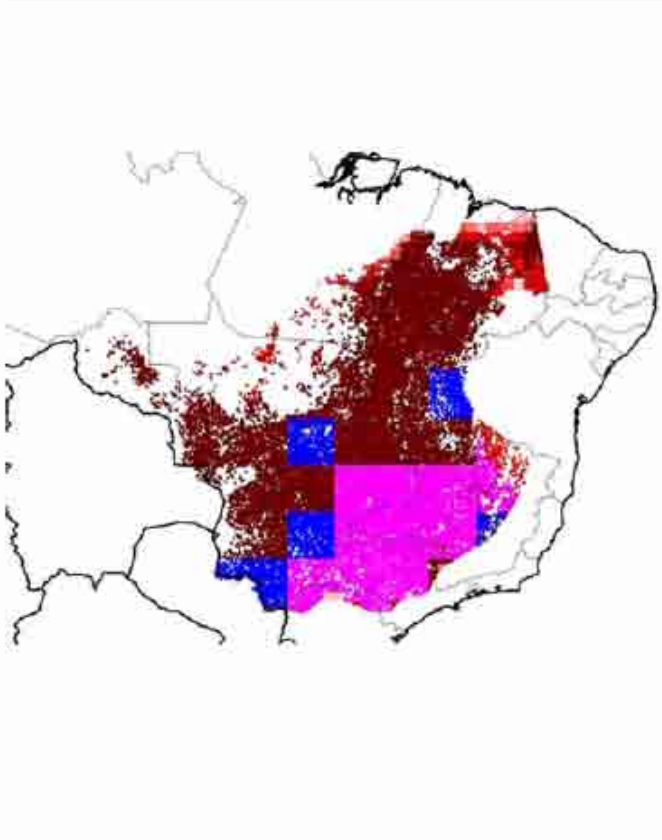

Higher predictability
Medium predictability
Lower predictability
Medium predictability
Medium predictability

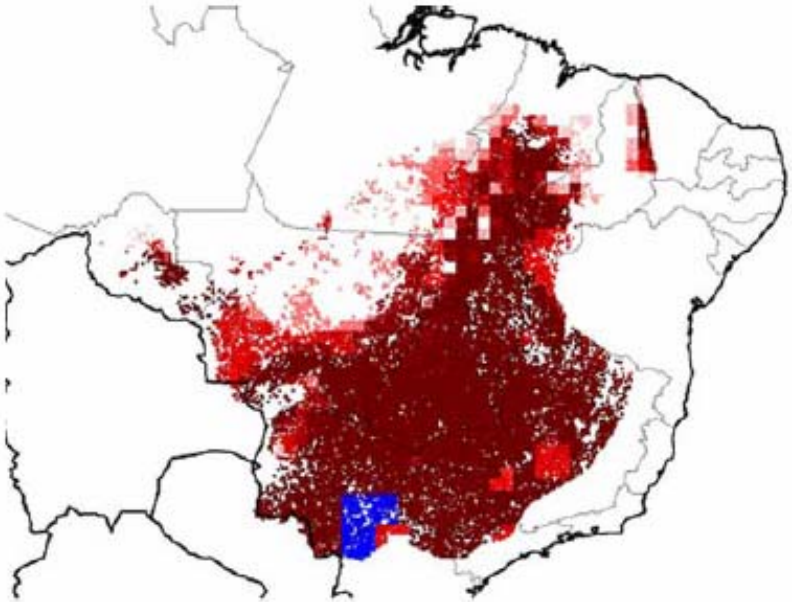
Climate change scenarios for Brazil





Siqueira, M. F. & Peterson, A. T. - Biota Neotropica, v3 (n2) - BN00803022003





***Qualea grandiflora* Mart**

(Vochysiaceae)

***Rapanea guianensis* Aubl.**

(Myrsinaceae)

Área de ocorrência atual

Área de possível ocorrência em 2055 – cenário otimista < 2ºC

Área de possível ocorrência em 2055 – cenário pessimista > 3ºC

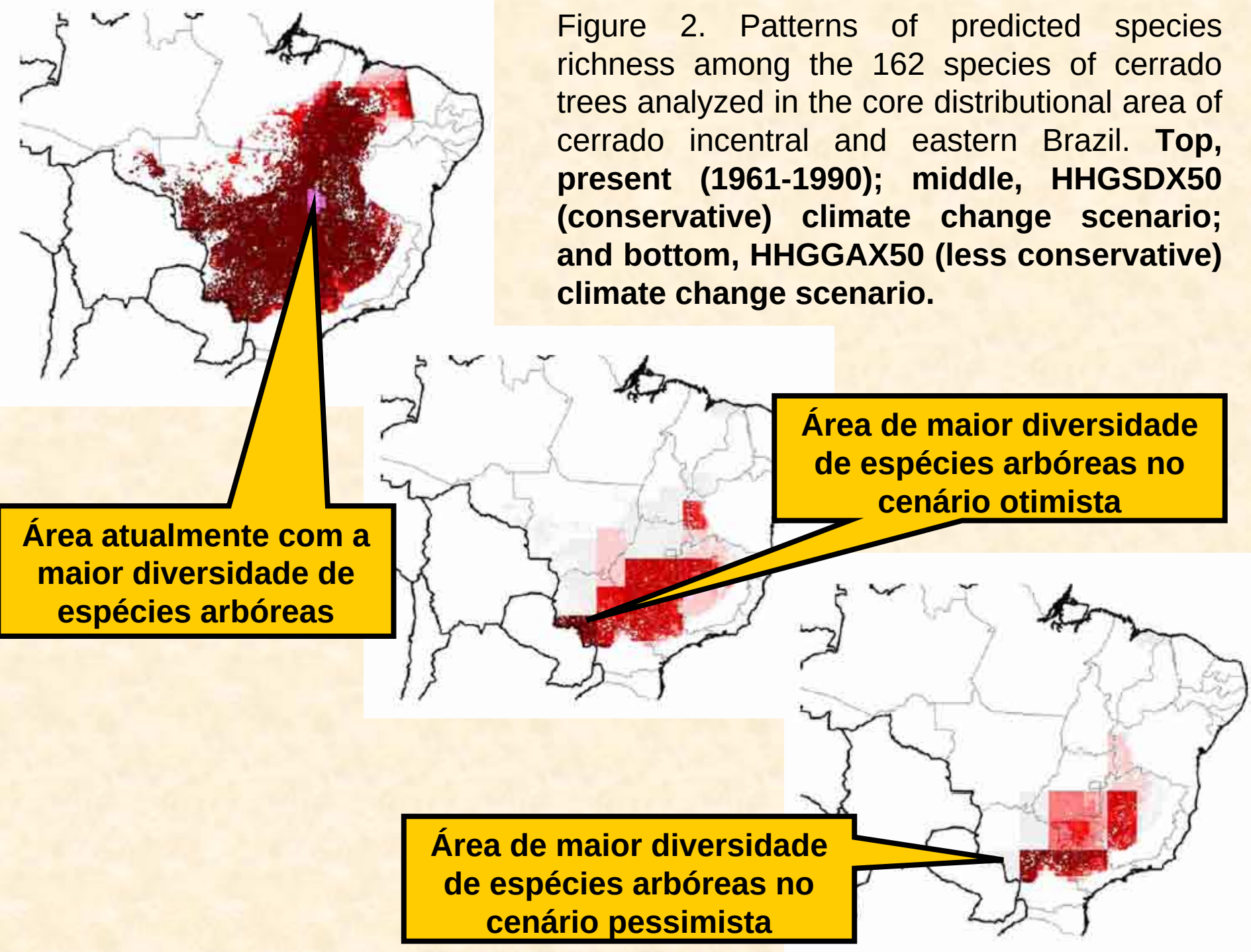
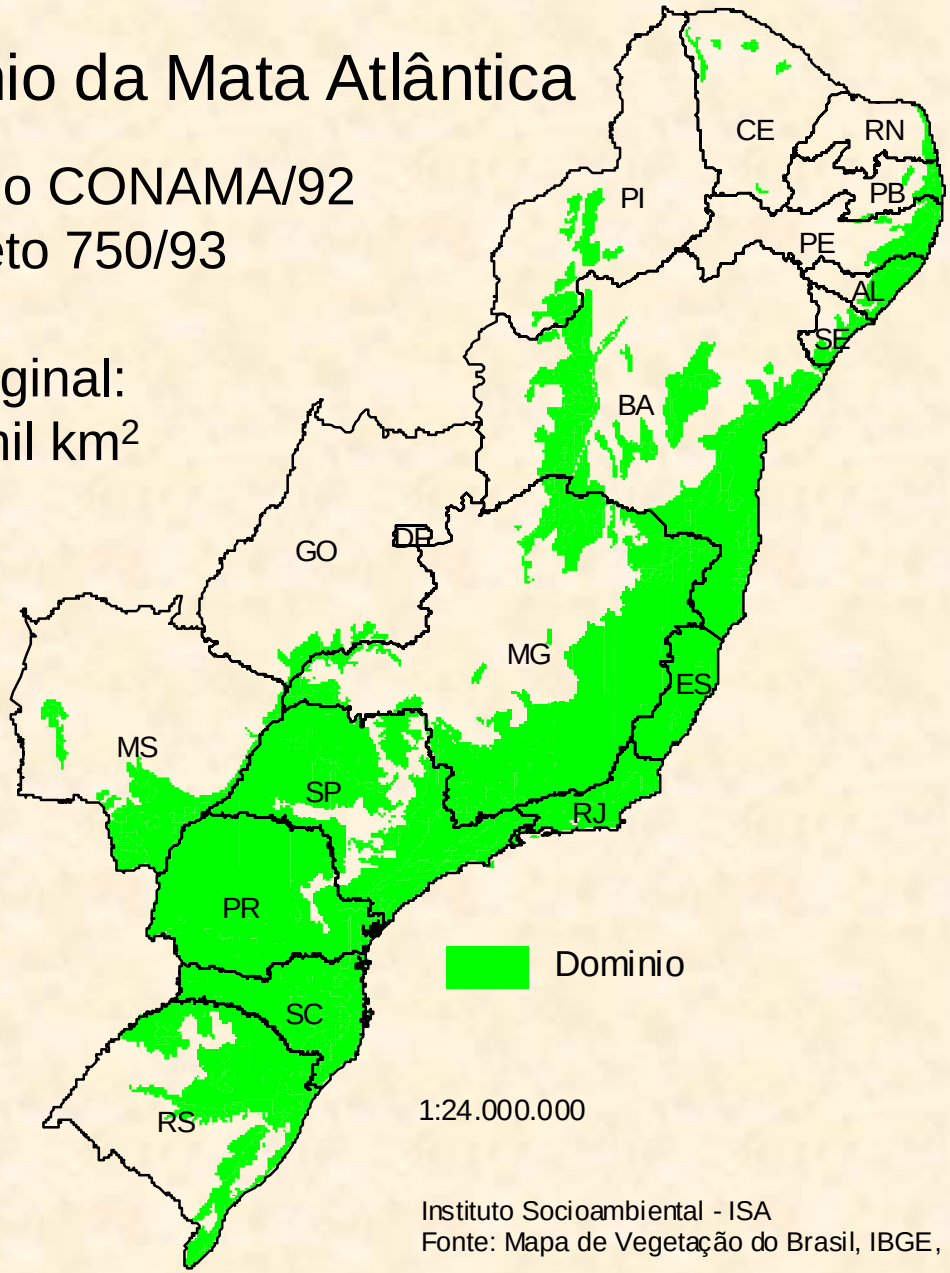


Figure 2. Patterns of predicted species richness among the 162 species of cerrado trees analyzed in the core distributional area of cerrado incentral and eastern Brazil. **Top, present (1961-1990); middle, HHGSDX50 (conservative) climate change scenario; and bottom, HHGGAX50 (less conservative) climate change scenario.**

Domínio da Mata Atlântica

Segundo CONAMA/92
e Decreto 750/93

área original:
1.306 mil km²

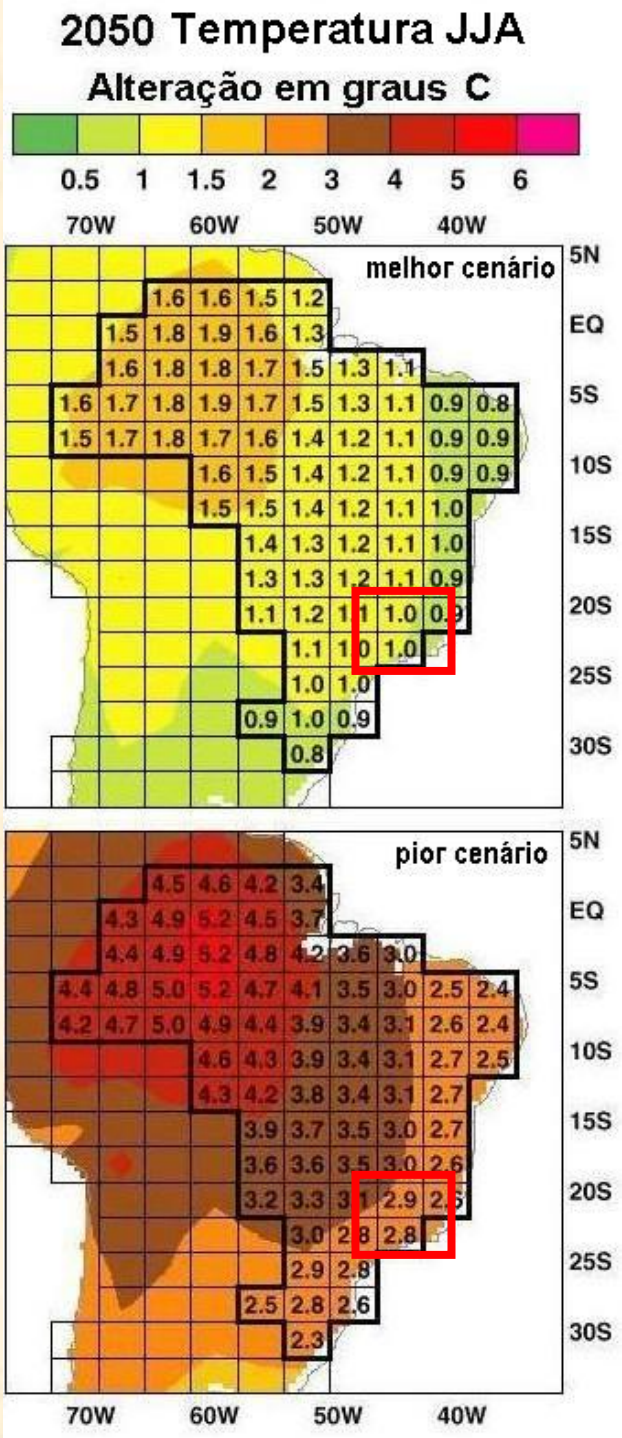


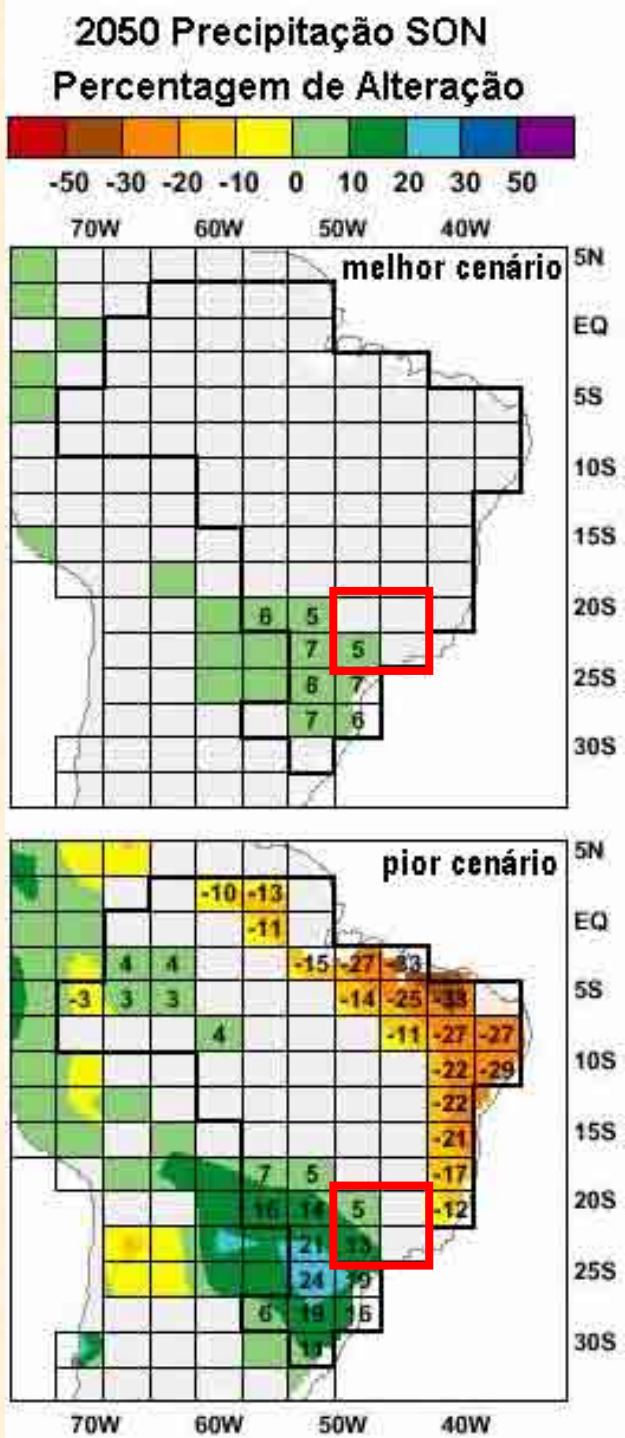
1:24.000.000

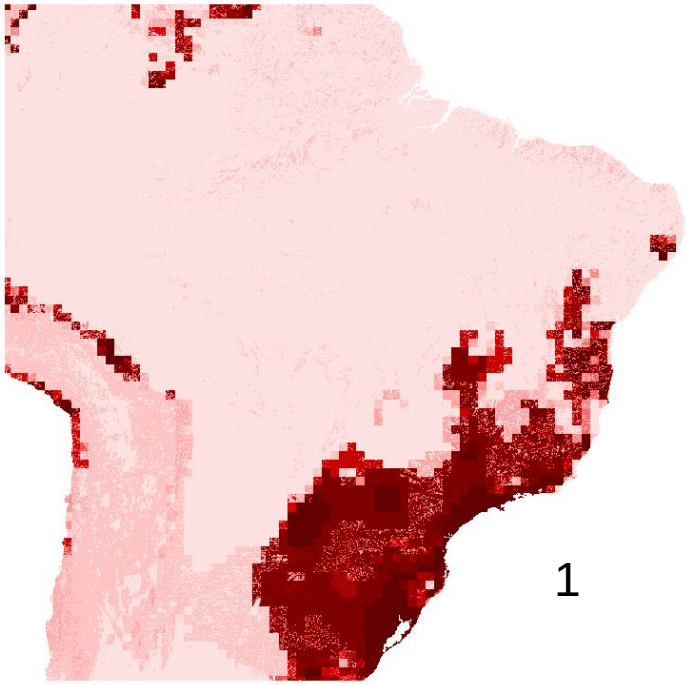
Instituto Socioambiental - ISA
Fonte: Mapa de Vegetação do Brasil, IBGE, 1993

INSTITUTO SOCIOAMBIENTAL

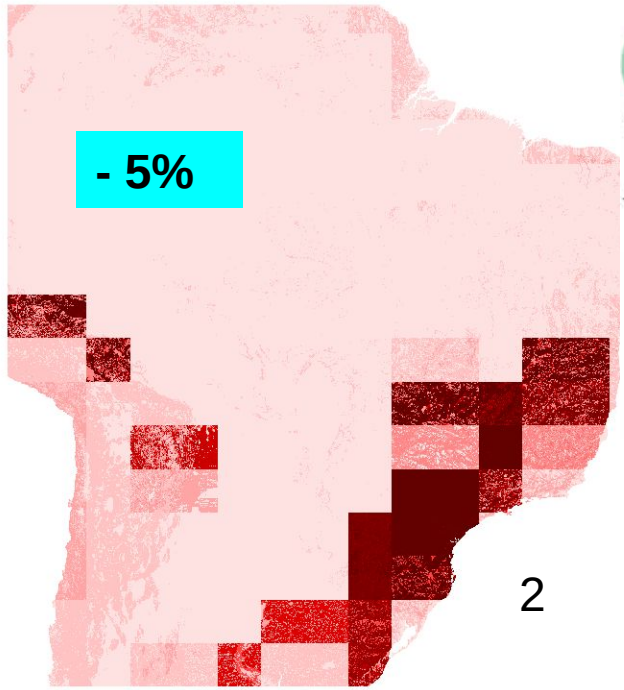
CENÁRIOS CLIMÁTICOS PARA O BRASIL



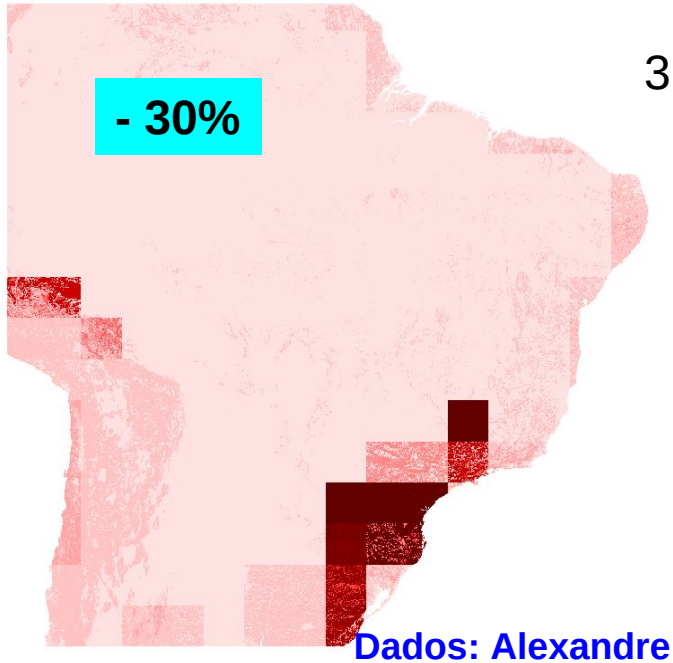




1



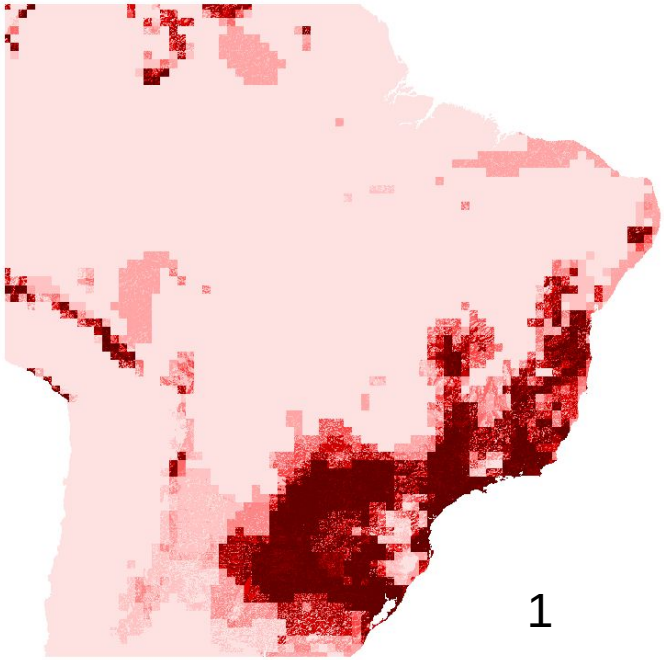
2



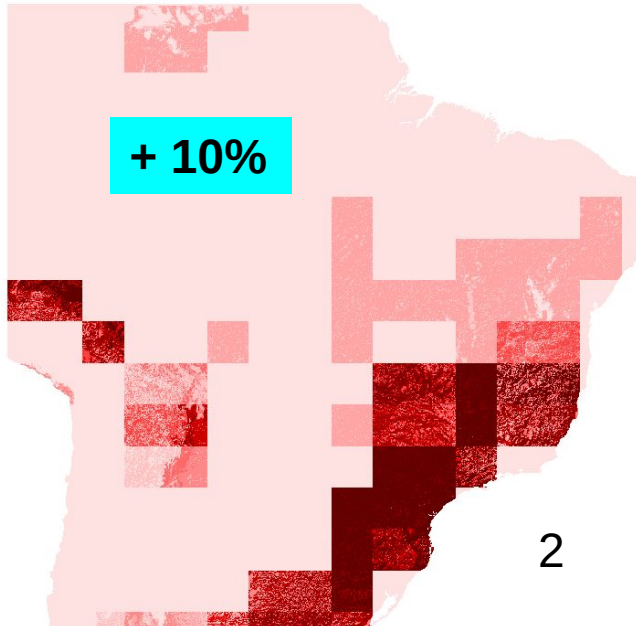
3

Geographic distribution of *Calyptranthes grandifolia* O. Berg. (Myrtaceae) 1 – present registered occurrence; 2 projection of occurrence area in 2050 with the optimistic scenario; 3 projection of occurrence area in 2050 with the pessimistic scenario of global warming.

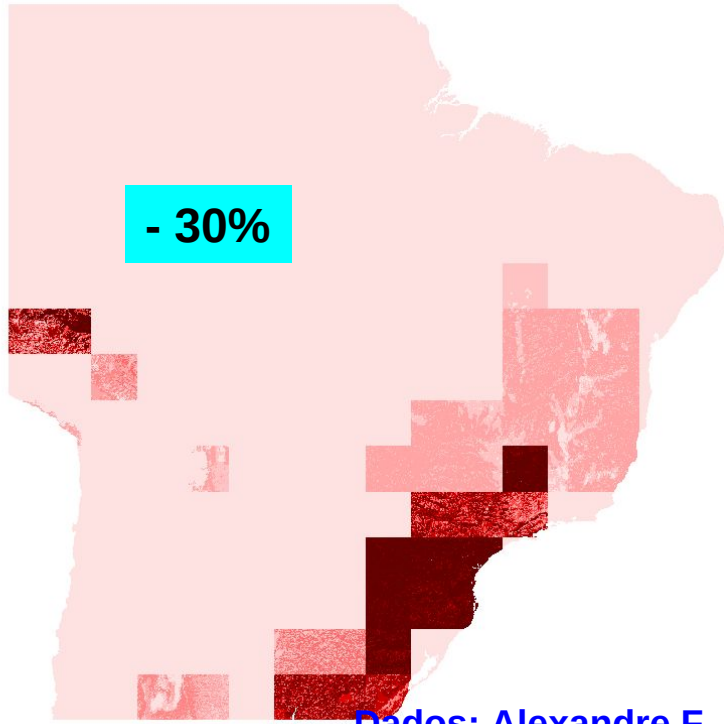
Dados: Alexandre F. Colombo



1



2



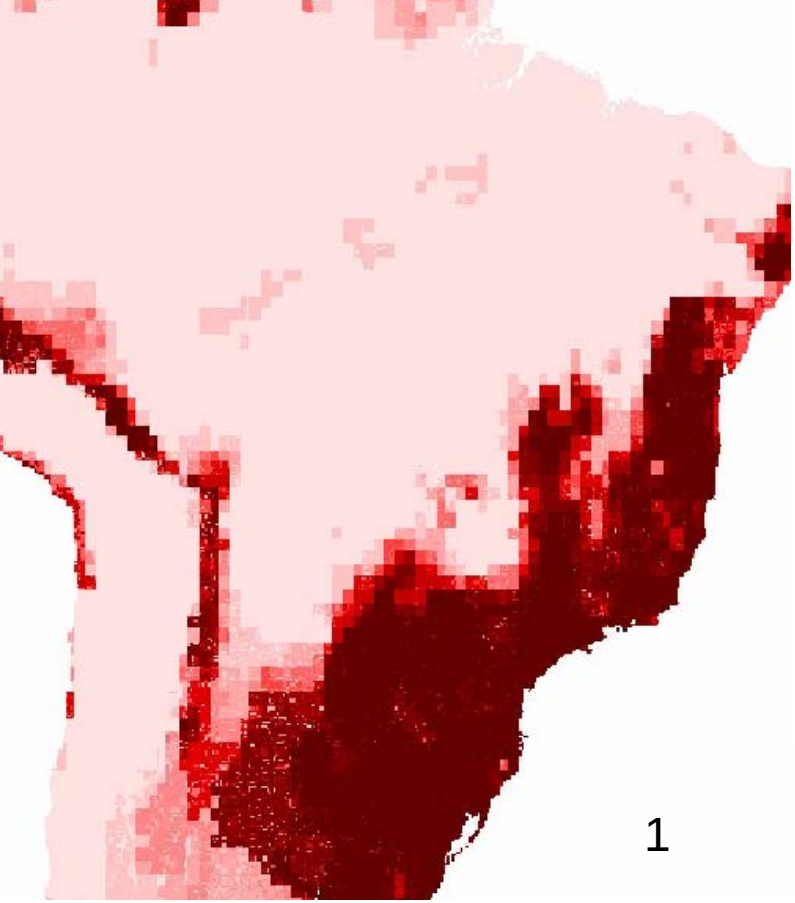
3

Geographic distribution of *Chrysophyllum flexuosum* Mart. (Sapotaceae) 1 – present registered occurrence; 2 projection of occurrence area in 2050 with the optimistic scenario; 3 projection of occurrence area in 2050 with the pessimistic scenario of global warming.

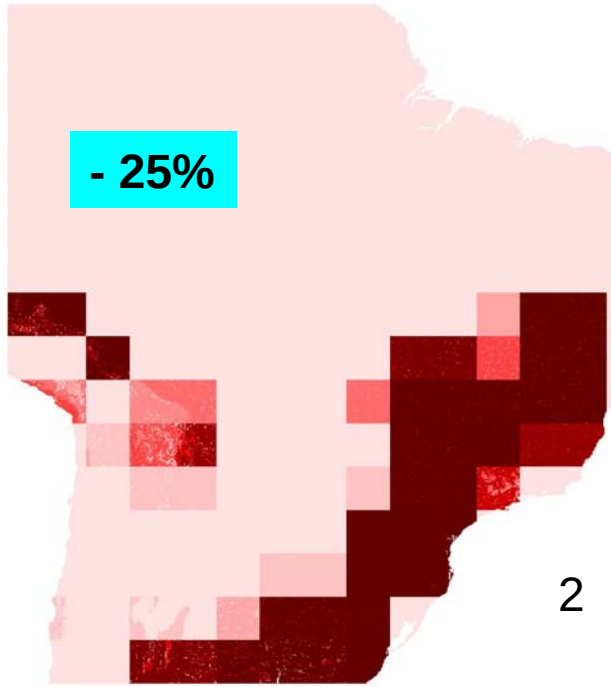
Biota FAPESP

gradiente.funcional

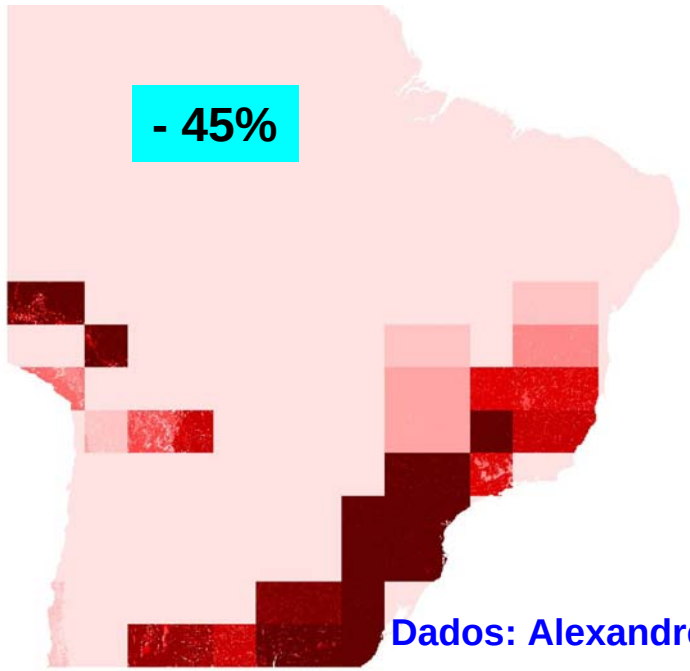
Dados: Alexandre F. Colombo



1



2

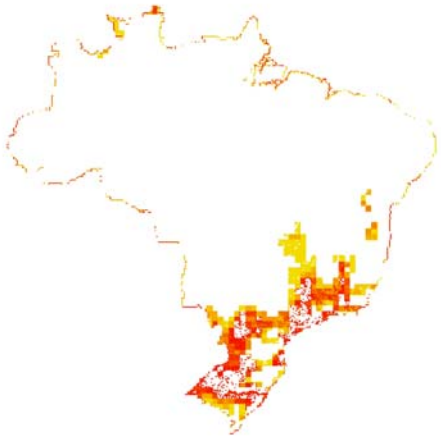


3

Geographic distribution of *Alchornea triplinervia (Spreng.) Müll. Arg.* (Euphorbiaceae) 1 – present registered occurrence; 2 projection of occurrence area in 2050 with the optimistic scenario; 3 projection of occurrence area in 2050 with the pessimistic scenario of global warming.

Dados: Alexandre F. Colombo

1



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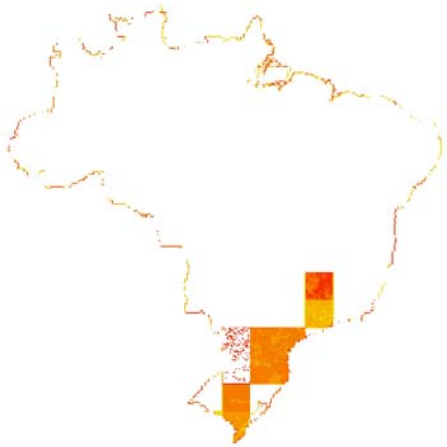

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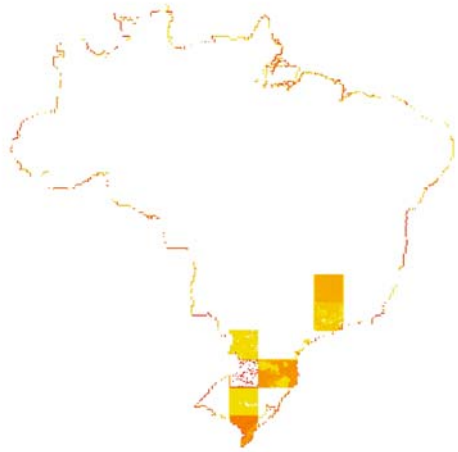


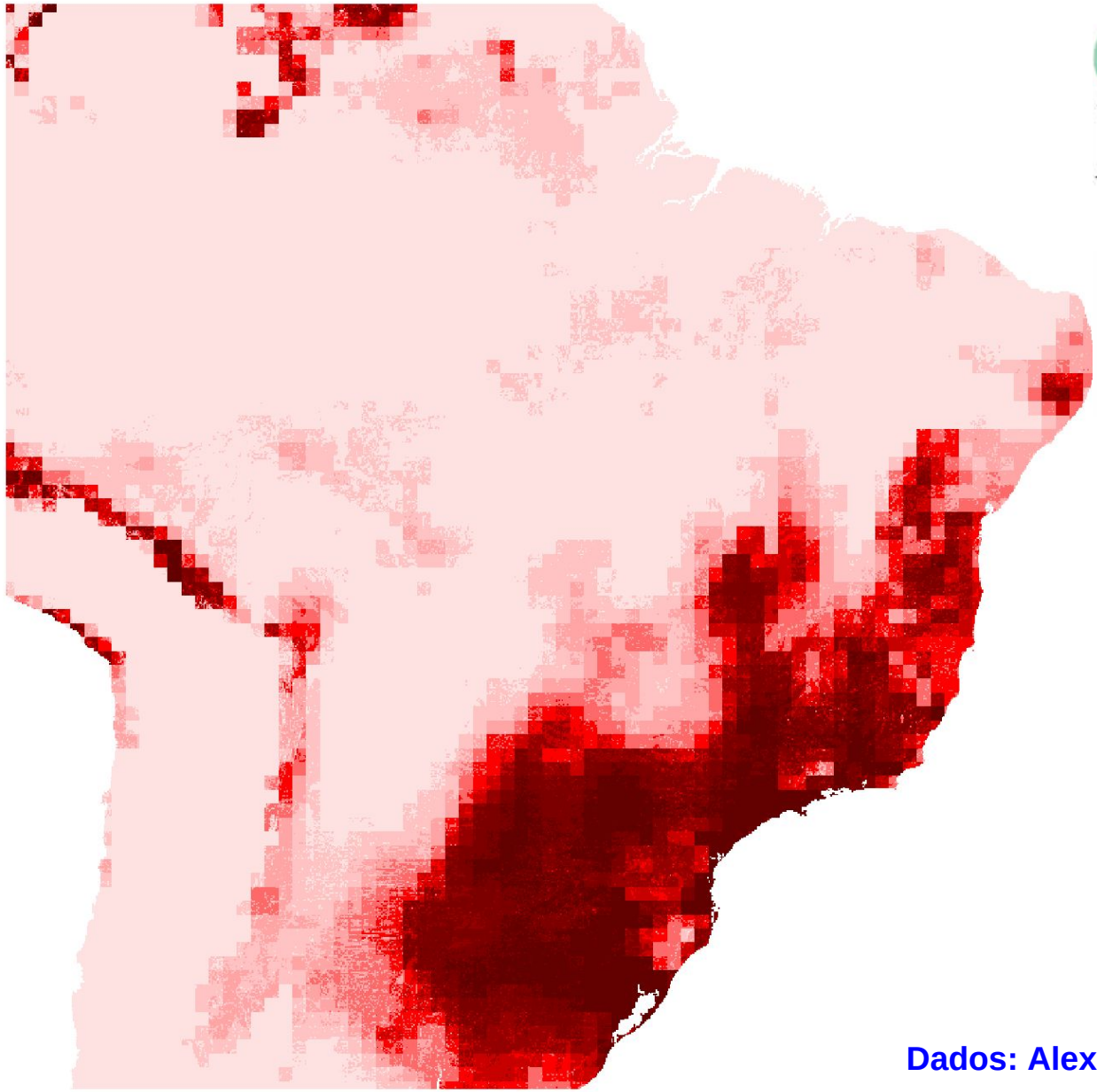
Areas of registered occurrence or high probability of occurrence

Areas of medium probability of occurrence

Areas of low probability of occurrence

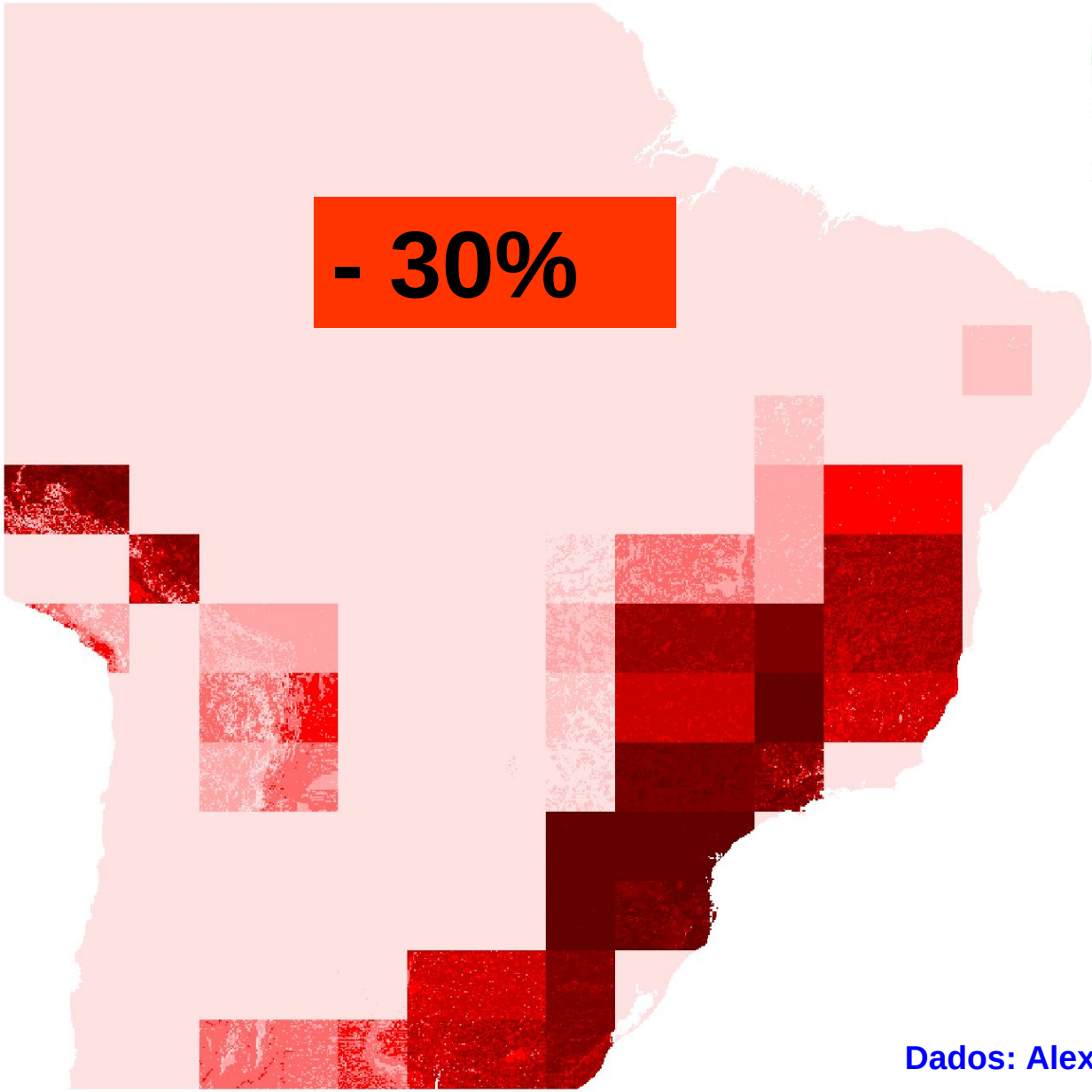
Areas were the species does not occur

Geographic distribution of *Euterpe edulis* Mart. (Arecaceae) – Palm hart. 1 – present registered occurrence; 2 projection of occurrence area in 2050 with the optimistic scenario; 3 projection of occurrence area in 2050 with the pessimistic scenario of global warming.



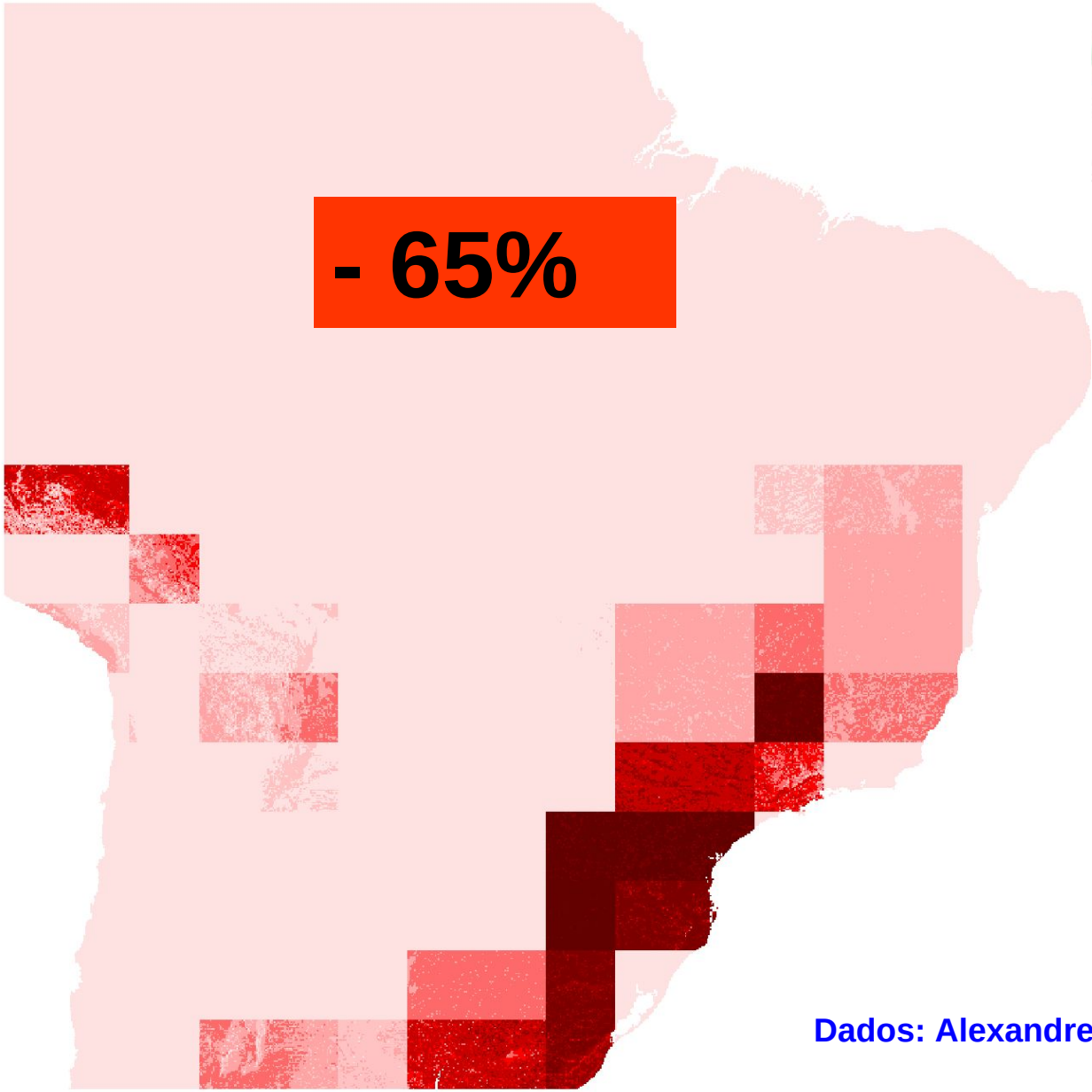
Dados: Alexandre F. Colombo

Present geographic distribution of Mata Atlântica *sensu lato*.



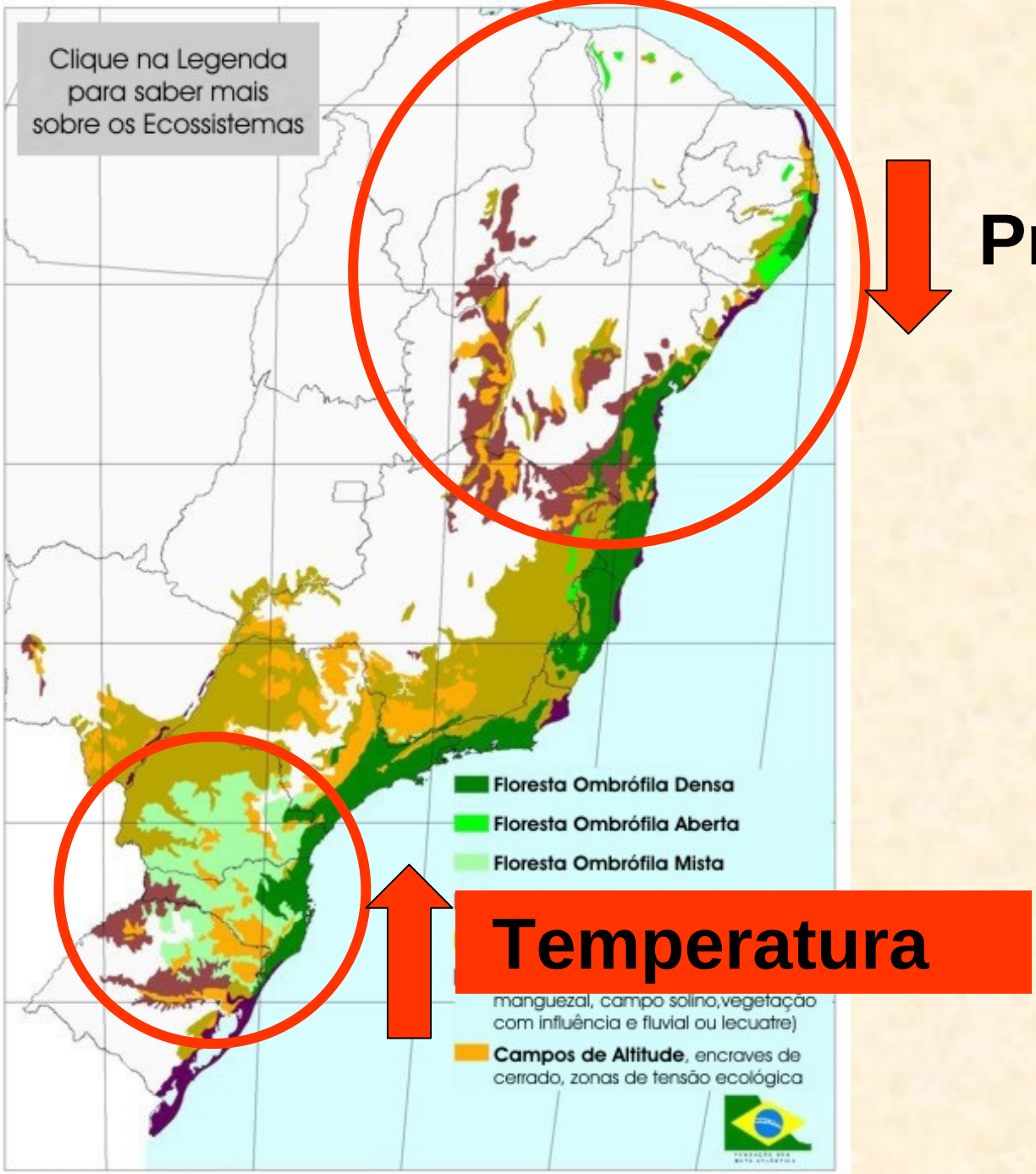
Dados: Alexandre F. Colombo

Geographic distribution of Mata Atlântica *sensu lato* in 2050 with the optimistic scenario.



Dados: Alexandre F. Colombo

Geographic distribution of Mata Atlântica *sensu lato* in 2050 with the pessimistic scenario.



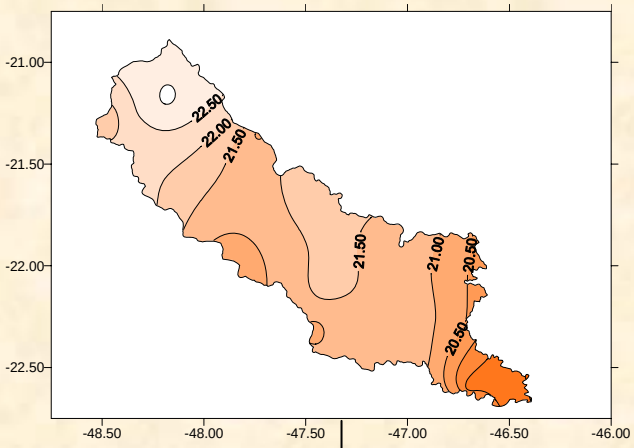
Precipitação

Temperatura

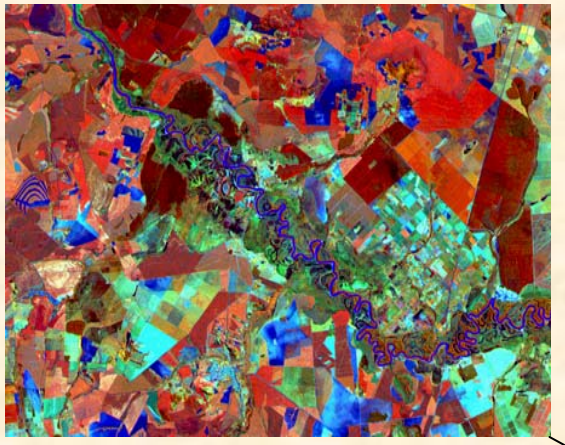
Fonte: Digitalização do Mapa de Vegetação do Brasil, FIBGE, 1993, escala 1:5.000.000 - Instituto Socioambiental /Fundação SOS Mata Atlântica

Deficiências dos Modelos

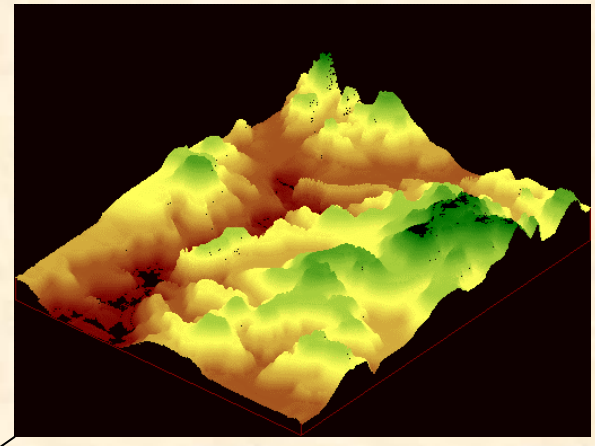
Clima



Imagens /Uso da Terra

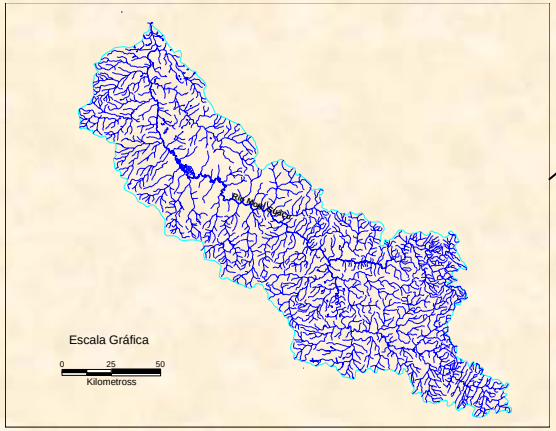


Relevo

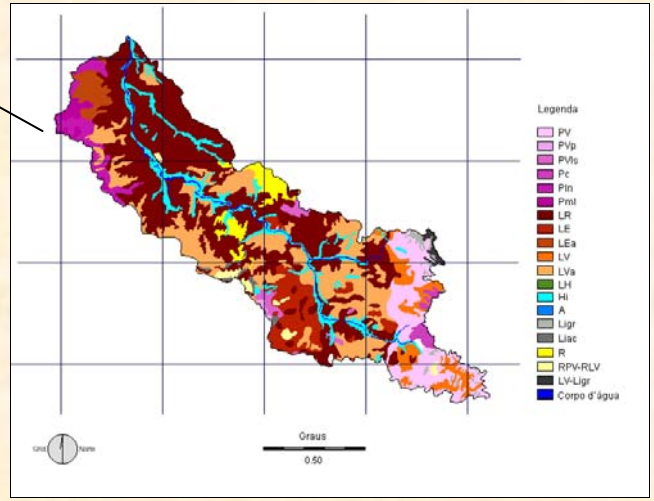


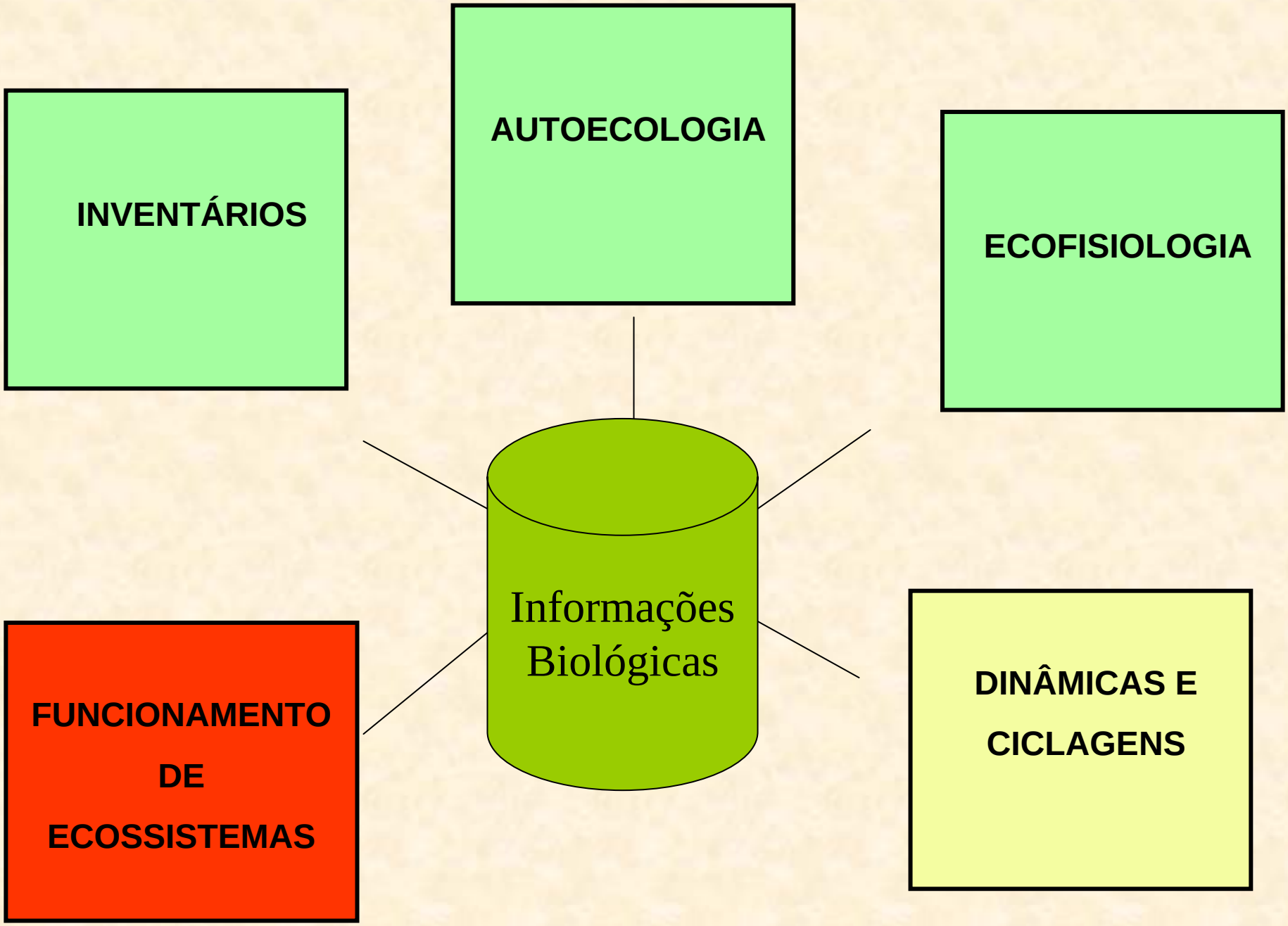
Informações do Meio Físico

Drenagem



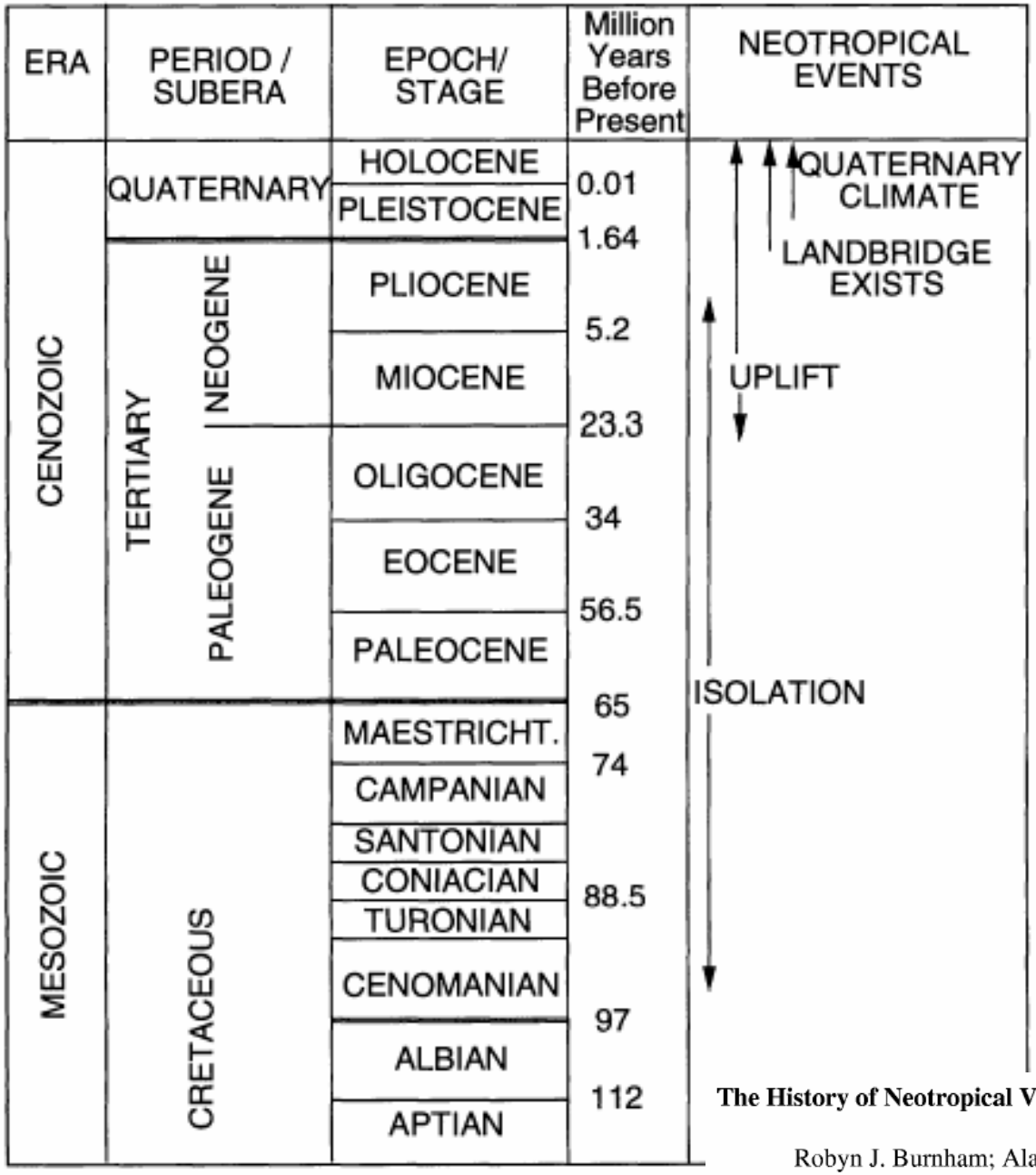
Solos




INVENTÁRIOS
AUTOECOLOGIA
ECOFISIOLOGIA
Informações Biológicas
FUNCIONAMENTO DE ECOSSISTEMAS
DINÂMICAS E CICLAGENS

http://www.ib.unicamp.br/destaques/biota/gradiente_funcional/index.html

A PARTIAL TIME SCALE (CRETACEOUS TO PRESENT)

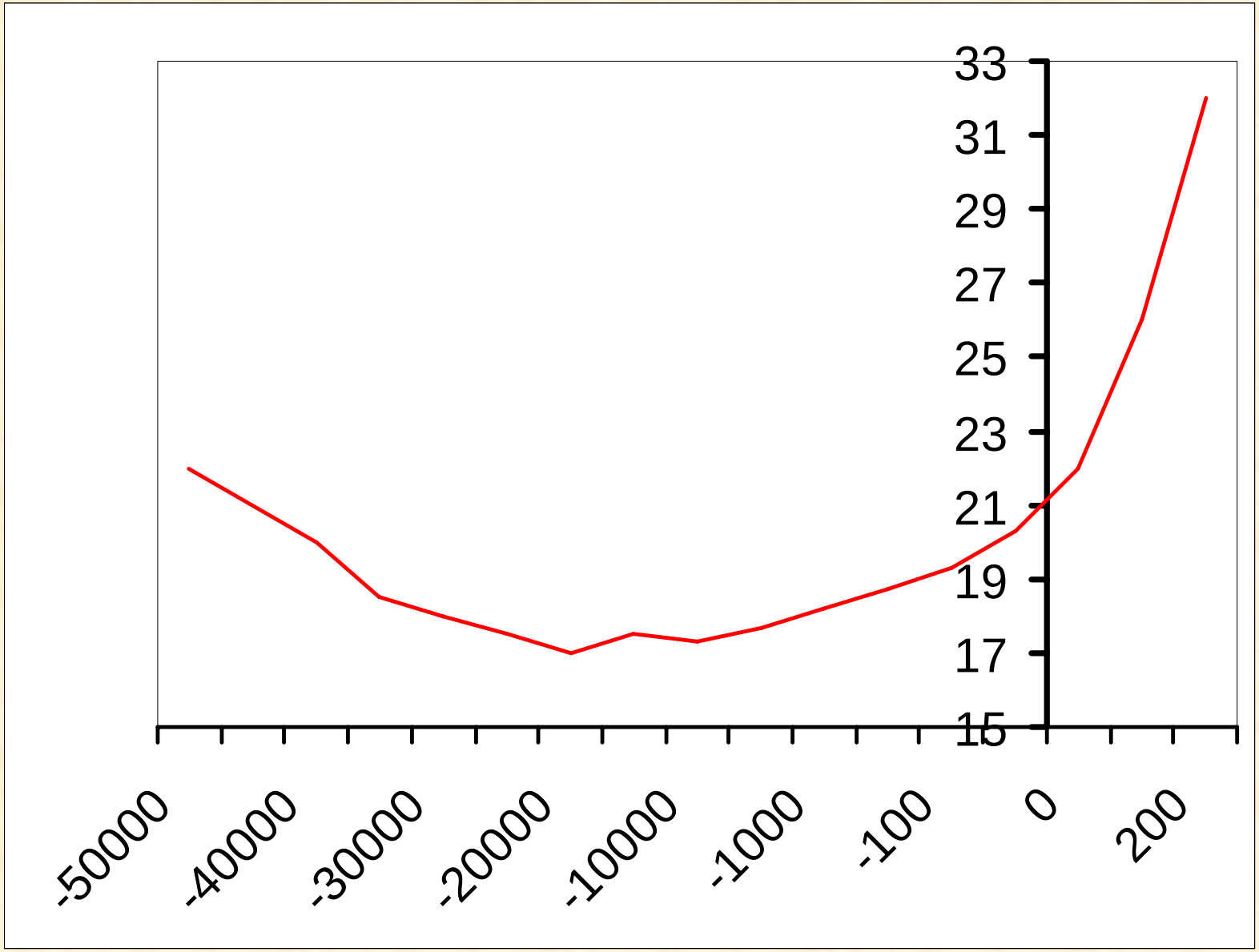


SINERGIA

The History of Neotropical Vegetation: New Developments and Status

Robyn J. Burnham; Alan Graham

Annals of the Missouri Botanical Garden, Vol. 86, No. 2 (Spring, 1999), 546-589.



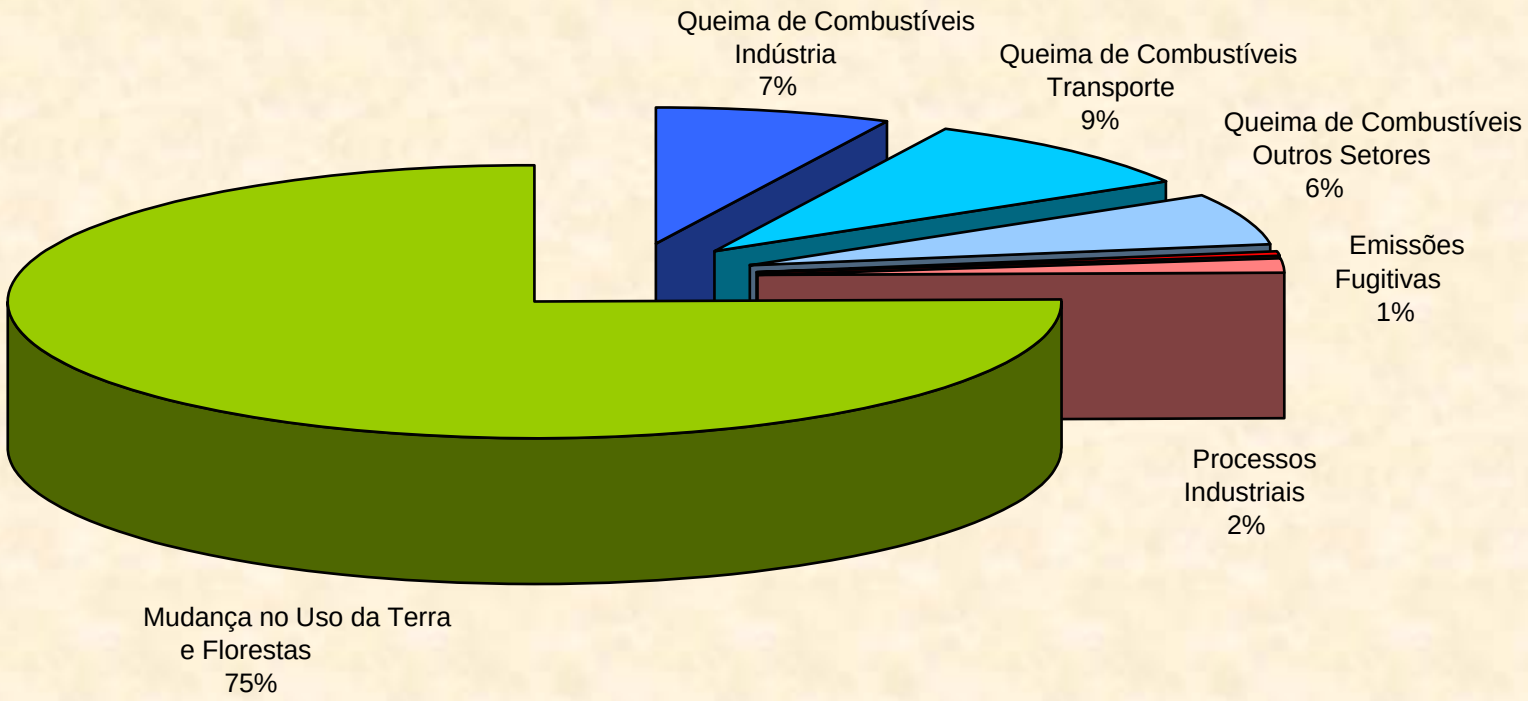
ANTAGONISMO

Escala logarítmica da evolução da temperatura média da Terra nos últimos 50.000 anos.

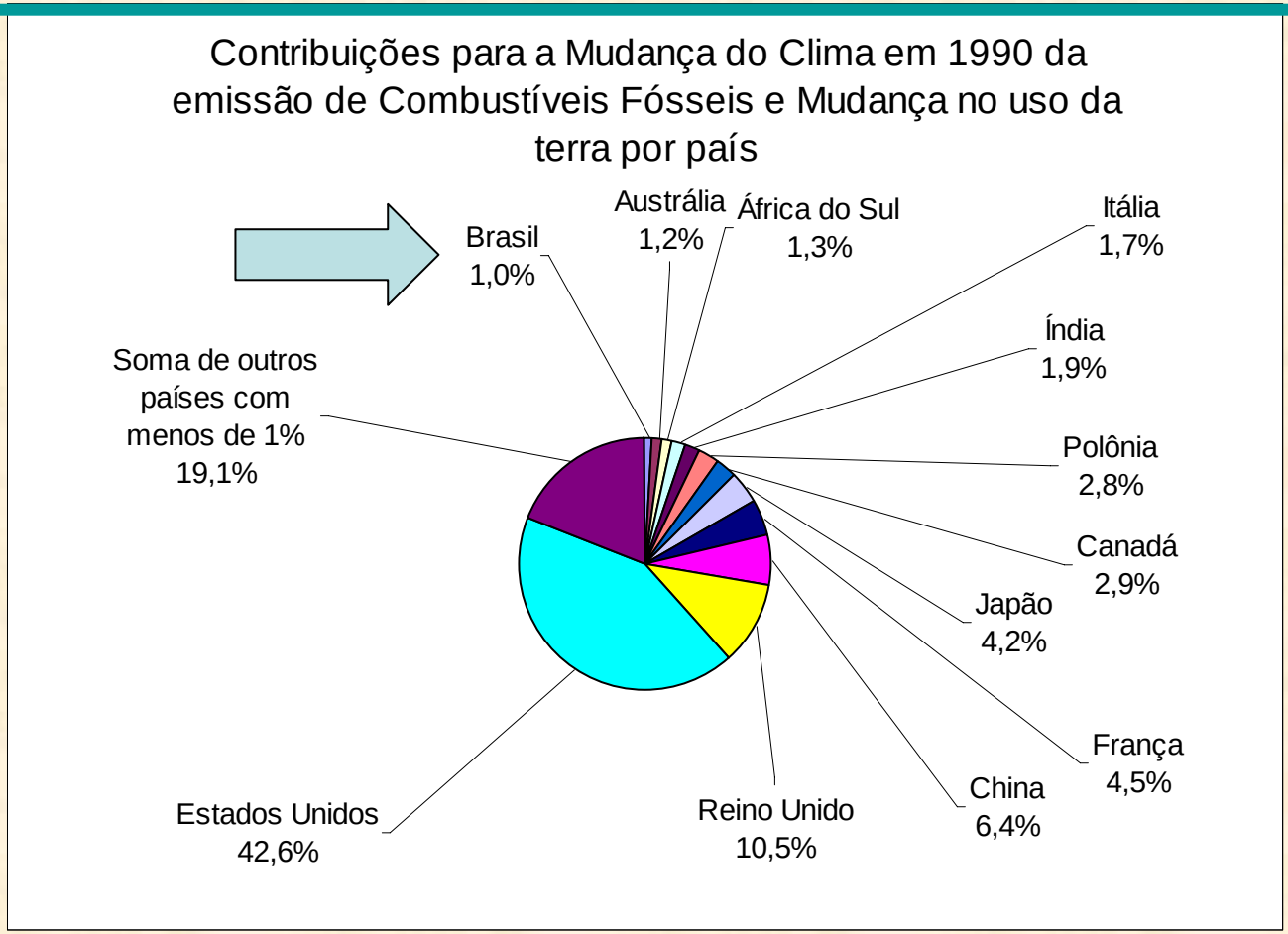

Duas realidades
Cortesia Peter Mann de Toledo


100 a 200 toneladas de Carbono por hectare
fonte: Greenpeace

GEEs Emissions - 1994



Contribuição Histórica do Brasil



Elaborado pela equipe da COPPE (Prof. Pinguelli) com base na proposta brasileira para Quioto em 1997 (MCT/MRE)

Ministério da Ciência e Tecnologia

BRASIL UM PAÍS DE TODOS GOVERNO FEDERAL

O Brasil tem a oportunidade histórica, e a obrigação moral, de iniciar as negociações do Período Pós-2012 (Pós Kyoto), propondo uma diminuição voluntária de suas emissões de GEEs. Uma redução de 20% dos GEEs que o Brasil emite anualmente corresponde a uma redução de, apenas, 35% das taxas atuais de desmatamento. Portanto, limitar voluntariamente nossas emissões não é um empecilho para nosso desenvolvimento econômico, pelo contrário, significa não incinerar nossa rica biodiversidade, dando as gerações futuras a possibilidade de usa-la de forma sustentável .

Evidentemente, este esforço tem **custos** que, a meu ver, devem ser **financiados pelos países desenvolvidos**, **com a fiscalização e certificação do efetivo cumprimento das metas de redução** de desmatamento estabelecidas.

REMOÇÃO DE GASES DE EFEITO ESTUFA – Financiável pelo **Protocolo de Kyoto**

Programa de revitalização e recuperação dos remanescentes de vegetação nativa

Em parceria com os Consórcio/Comitês projetos de recomposição da vegetação nativa da APPs – Mata Ciliar

EVITAR A EMISSÃO GASES DE EFEITO ESTUFA – Financiável pelo **Protocolo de Kyoto**

Programa de controle de emissões veiculares

Programa de controle de emissões industrial

Programa de aproveitamento de gases gerados por aterros sanitários

PROGRAMAS DE MUDANÇA DE PADRÃO DE CONSUMO/COMPORTAMENTO

Programa de incentivo de uso de madeira certificada – construção civil, móveis, lenha

Programas efetivos de reciclagem

Estímulo ao uso de fontes alternativas de energia – painéis solares, etc....

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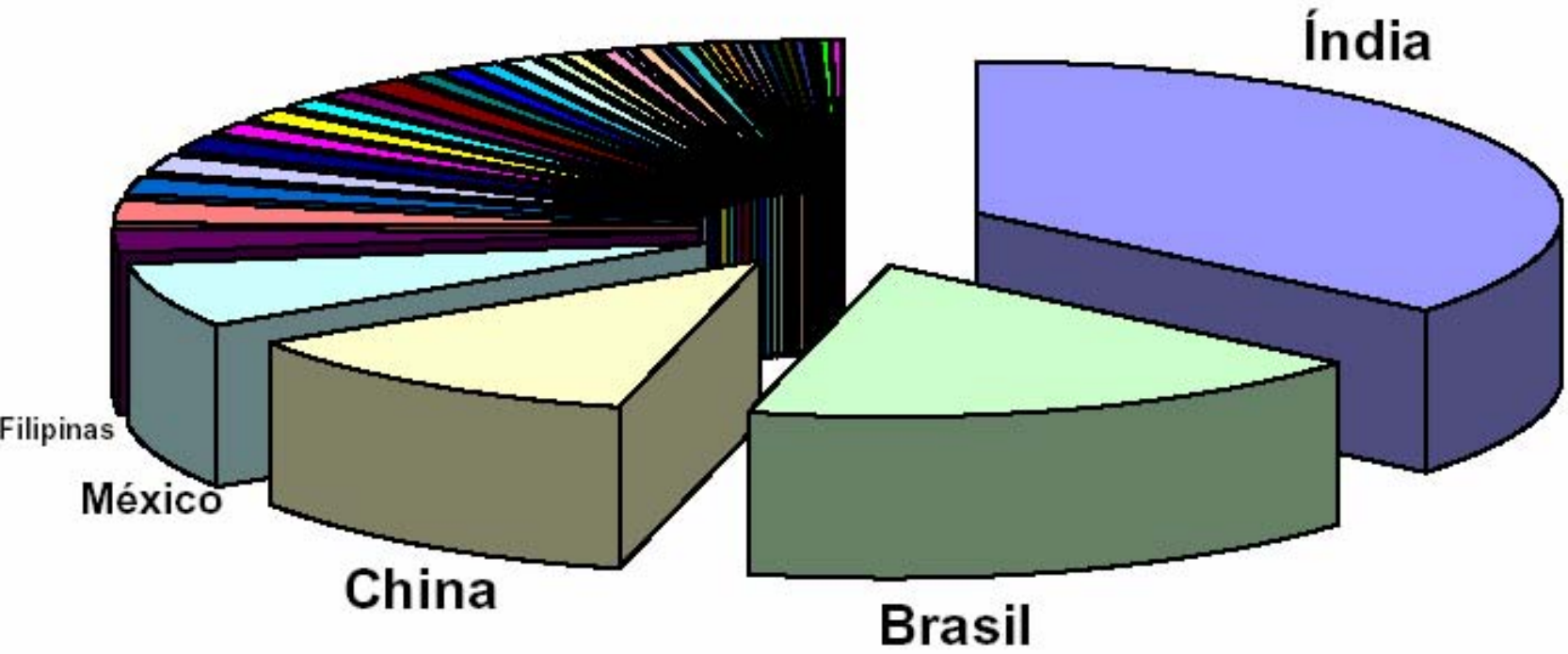
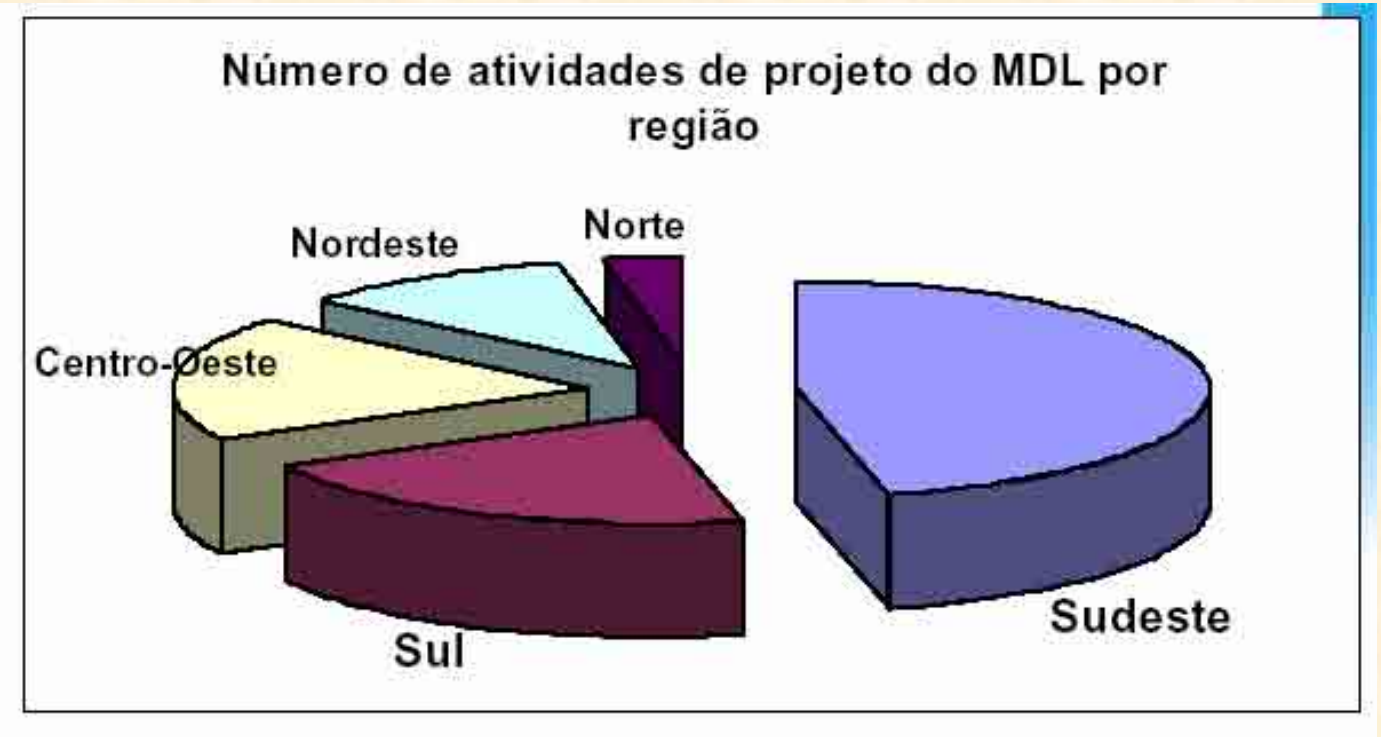
ATUALIZAÇÃO DO INVENTÁRIO NACIONAL DE EMISSÕES DE GEEs, REGIONALIZAÇÃO DO INVENTÁRIO NACIONAL.


MUITO OBRIGADO !

Total de Atividades de Projeto do MDL no Mundo
1015



- India
- Brasil
- China
- México
- Filipinas
- Chile
- Honduras
- Malásia
- Coréia do Sul
- Tailândia
- Guatemala
- Equador
- Argentina
- África do Sul
- Indonésia
- Peru
- Colômbia
- Sri Lanka
- El Salvador
- Vietnam
- Panamá
- Marrocos
- Costa Rica
- Bolivia
- Israel
- Moldávia
- Egito
- Nicarágua
- Bangladesh
- Nigéria
- Tunísia
- Uruguai
- Armênia
- Rep. Dominicana
- Chipre
- Nepal
- Paquistão
- Costa do Marfim
- P. N. Guiné
- Tanzania
- Uganda
- Jamaica
- Quirguizistão
- Tadjiquistão
- Cambodja
- Mongólia
- Fiji
- Laos


Número de atividades de projeto do MDL por região
Nordeste
Norte
Centro-Oeste
Sul
Sudeste