Impactos das mudanças climáticas globais sobre a biodiversidade, agricultura e desenvolvimento

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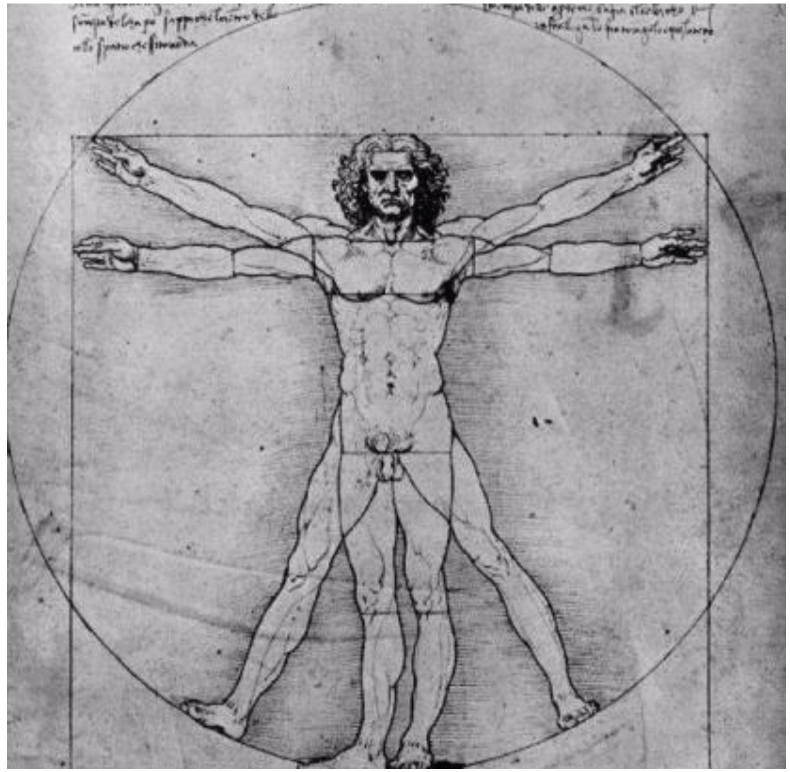
Mudanças Climáticas e o Homem



Evidência

?

Evidência

Argumento que atesta "verdade" em um determinado contexto de normas

Científica

Conclusão oriunda de experimento e que segundo Popper é falseável.
Nível de complexidade: extremamente alto

Política

Conclusão oriunda de uma orientação política, segundo Bobbio é resultado de ideologia
Nível de complexidade: médio

Religiosa

Conclusão oriunda de uma seita religiosa. É incontestável dentro do contexto de normas estabelecido
Nível de complexidade: baixo

Artística

Estilo que respeita um conjunto de normas em um dado espaço de tempo e uma cultura. Muda rapidamente através de substituição
Nível de complexidade: alto

Evidência Científica

Painel Intergovernamental de Mudanças Climáticas **(IPCC)**

Estrutura: 30 capítulos sobre diferentes aspectos das MCG escrito em conjunto por mais de 300 cientistas

WGI – O que são MCGs? Elas realmente existem?

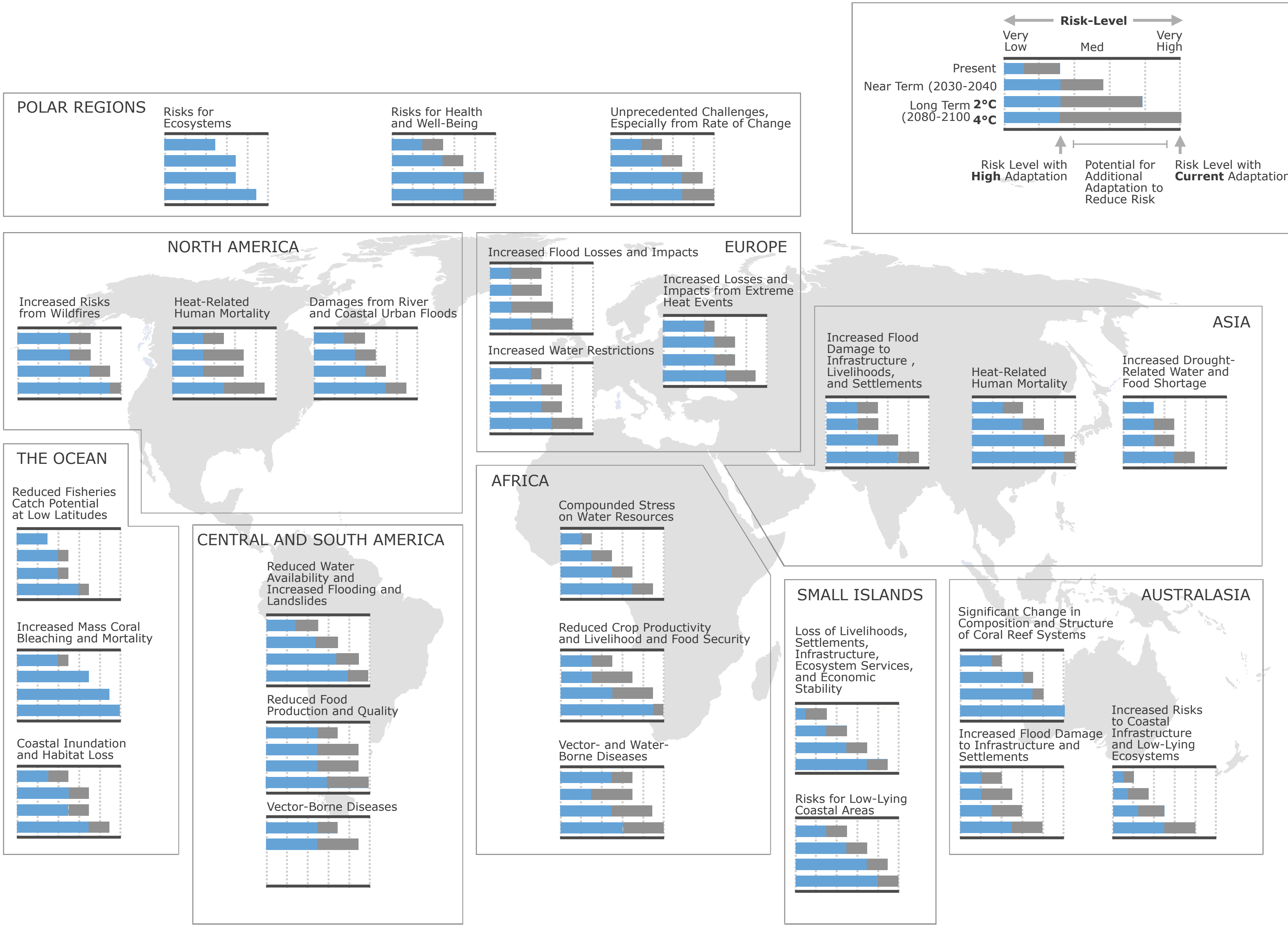
WGII – Quais os impactos das MCGs?

WGIII – Quais as possíveis soluções ou medidas adaptativas

Painel Intergovernamental de Mudanças Climáticas (IPCC)

WGII – Impactos Regionais: Cap 27, Americas do Sul e Central

- Bibliografia
- Uso de literatura científica versus "grey literature"
- Vários "drafts", encontros regionais e mundiais para entregar os capítulos em agosto de 2014
- Revisão pelos pares
- Revisão pelos governos



Risk-Level
Very Low
Med
Very High
Present
Near Term (2030-2040
Long Term 2°C
(2080-2100 4°C
Risk Level with High Adaptation
Potential for Additional Adaptation to Reduce Risk
Risk Level with Current Adaptation
POLAR REGIONS
Risks for Ecosystems
Risks for Health and Well-Being
Unprecedented Challenges, Especially from Rate of Change
NORTH AMERICA
Increased Risks from Wildfires
Heat-Related Human Mortality
Damages from River and Coastal Urban Floods
EUROPE
Increased Flood Losses and Impacts
Increased Losses and Impacts from Extreme Heat Events
Increased Water Restrictions
ASIA
Increased Flood Damage to Infrastructure , Livelihoods, and Settlements
Heat-Related Human Mortality
Increased Drought-Related Water and Food Shortage
THE OCEAN
Reduced Fisheries Catch Potential at Low Latitudes
Increased Mass Coral Bleaching and Mortality
Coastal Inundation and Habitat Loss
CENTRAL AND SOUTH AMERICA
Reduced Water Availability and Increased Flooding and Landslides
Reduced Food Production and Quality
Vector-Borne Diseases
AFRICA
Compounded Stress on Water Resources
Reduced Crop Productivity and Livelihood and Food Security
Vector- and Water-Borne Diseases
SMALL ISLANDS
Loss of Livelihoods, Settlements, Infrastructure, Ecosystem Services, and Economic Stability
Risks for Low-Lying Coastal Areas
AUSTRALASIA
Significant Change in Composition and Structure of Coral Reef Systems
Increased Flood Damage to Infrastructure and Settlements
Increased Risks to Coastal Infrastructure and Low-Lying Ecosystems

27

Central and South America

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This chapter should be cited as:

Magrin, G.O., J.A. Marengo, J.-P. Boulanger, M.S. Buckeridge, E. Castellanos, G. Poveda, F.R. Scarano, and S. Vicuña, 2014: Central and South America. In: *Climate Change 2014: Impacts, Adaptation, and Vulnerability. Part B: Regional Aspects. Contribution of Working Group II to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change* [Barros, V.R., C.B. Field, D.J. Dokken, M.D. Mastrandrea, K.J. Mach, T.E. Bilir, M. Chatterjee, K.L. Ebi, Y.O. Estrada, R.C. Genova, B. Girma, E.S. Kissel, A.N. Levy, S. MacCracken, P.R. Mastrandrea, and L.L. White (eds.)]. Cambridge University Press, Cambridge, United Kingdom and New York, NY, USA, pp. XXX-YYY.

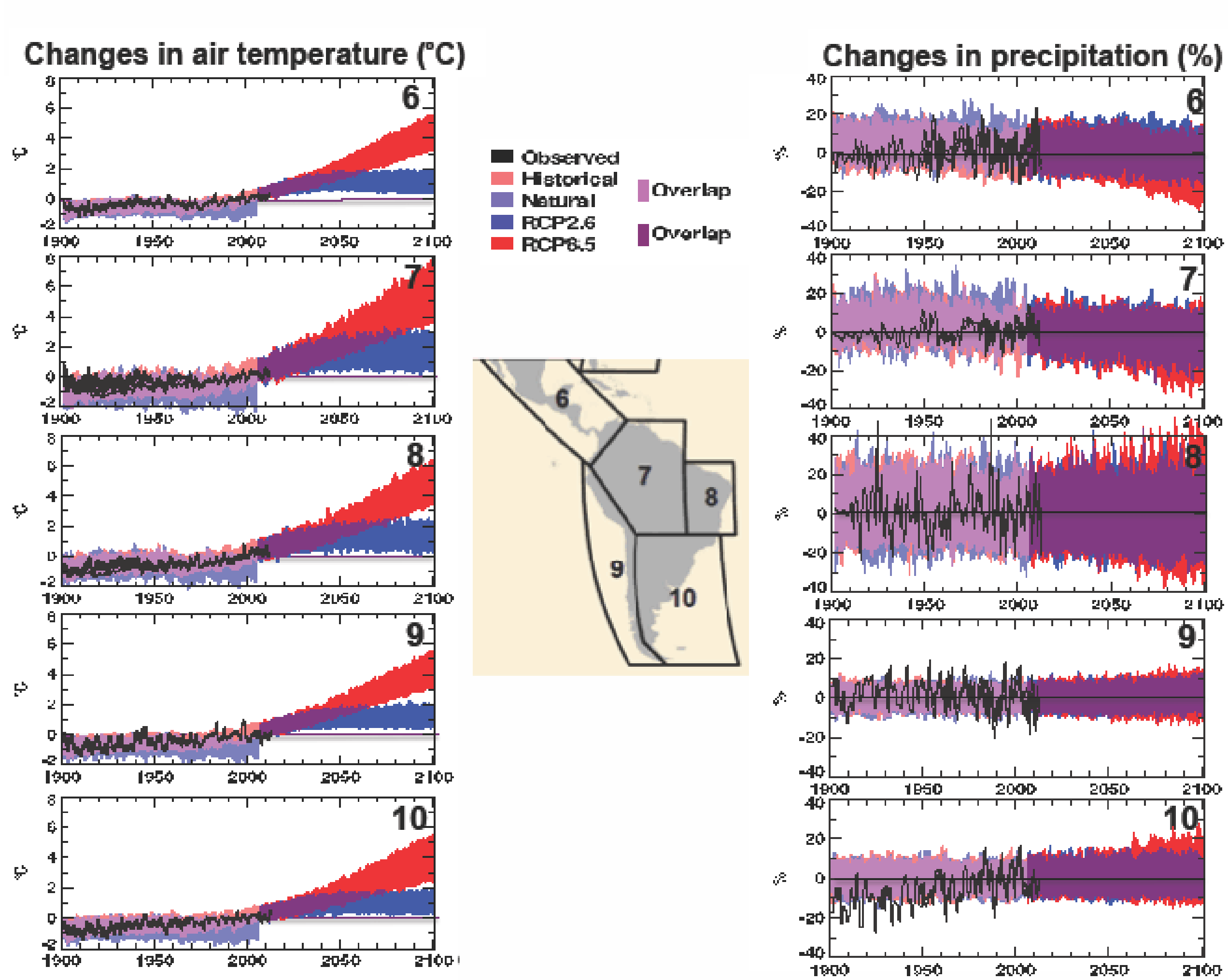

Figure 27-1: Observed and simulated variations in past and projected future annual average temperature over the Central and South American regions defined in IPCC (2012). Black lines show various estimates from observational measurements. Shading denotes the 5-95 percentile range of climate model simulations driven with "historical" changes in anthropogenic and natural drivers (63 simulations), historical changes in "natural" drivers only (34), the "RCP2.6" emissions scenario (63), and the "RCP8.5" (63). Data are anomalies from the 1986-2006 average of the individual observational data (for the observational time series) or of the corresponding historical all-forcing simulations. Further details are given in Box 21-3.
[Illustration to be redrawn to conform to IPCC publication specifications.]

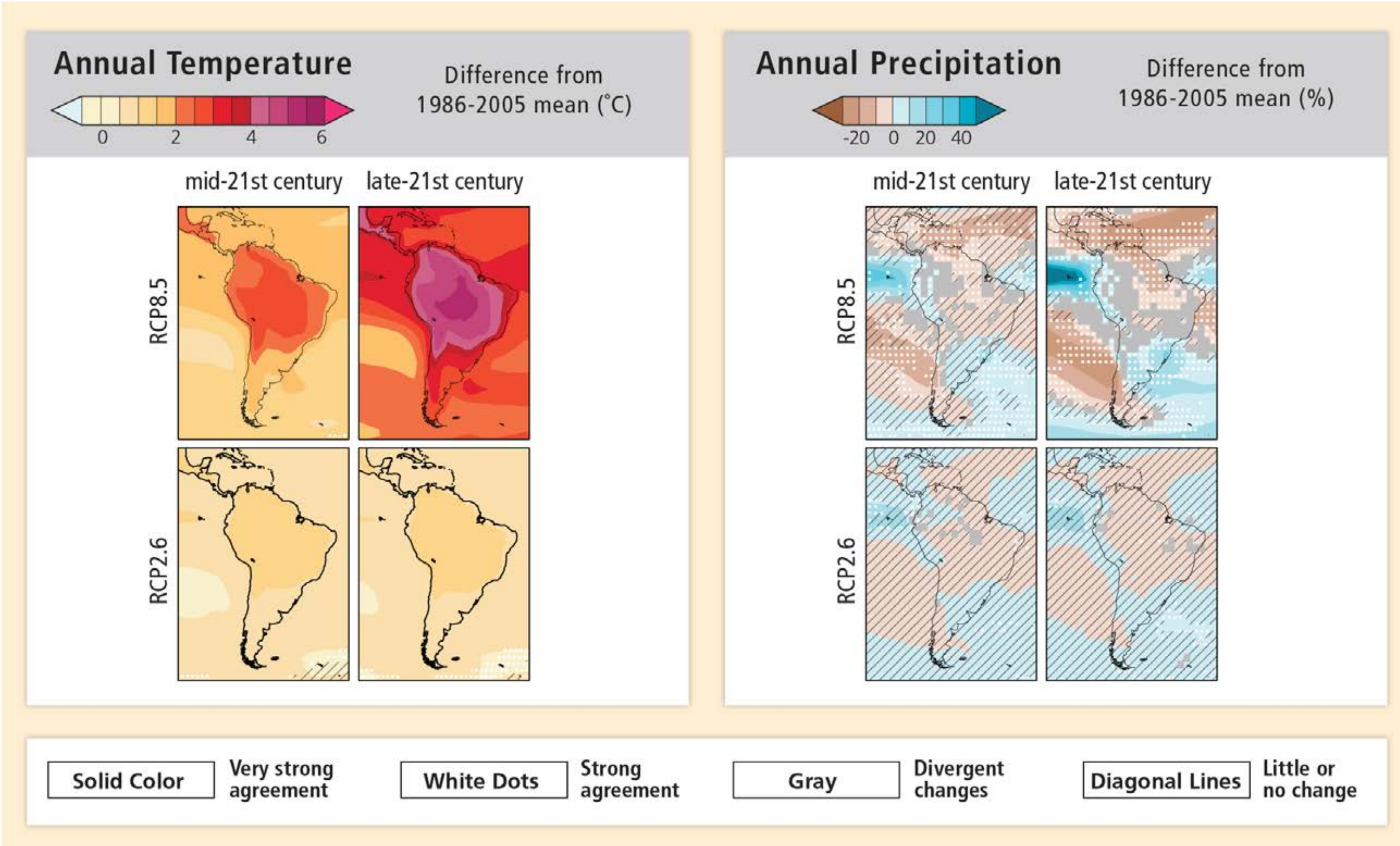

Figure 27-2: Projected changes in annual average temperature and precipitation. CMIP5 multi-model mean projections of annual average temperature changes (left panel) and average percent change in annual mean precipitation (right panel) for 2046-2065 and 2081-2100 under RCP2.6 and 8.5. Solid colors indicate areas with very strong agreement, where the multi-model mean change is greater than twice the baseline variability, and>90% of models agree on sign of change. Colors with white dots indicate areas with strong agreement, where>66% of models show change greater than the baseline variability and>66% of models agree on sign of change. Gray indicates areas with divergent changes, where>66% of models show change greater than the baseline variability, but<66% agree on sign of change. Colors with diagonal lines indicate areas with little or no change, less than the baseline variability in>66% of models. (There may be significant change at shorter timescales such as seasons, months, or days.). Analysis uses model data and methods building from WGI AR5 Figure SPM.8. See also Annex I of WGI AR5. [Boxes 21-3 and CC-RC]

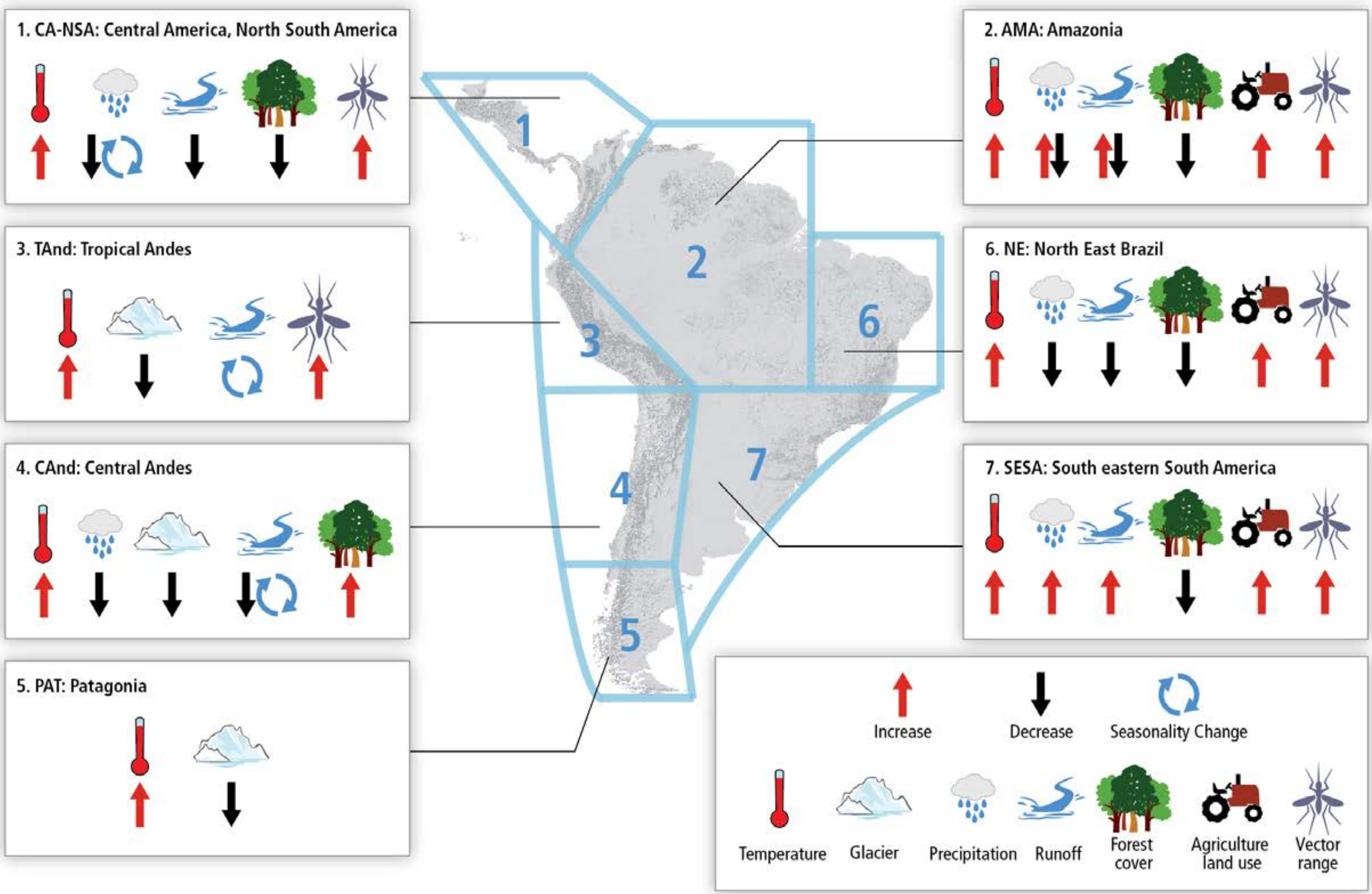

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Figure 27-7: Summary of observed changes in climate and other environmental factors in representative regions of CA and SA. The boundaries of the regions in the map are conceptual (neither geographic nor political precision). Information and references to changes provided are presented in different sections of the chapter.

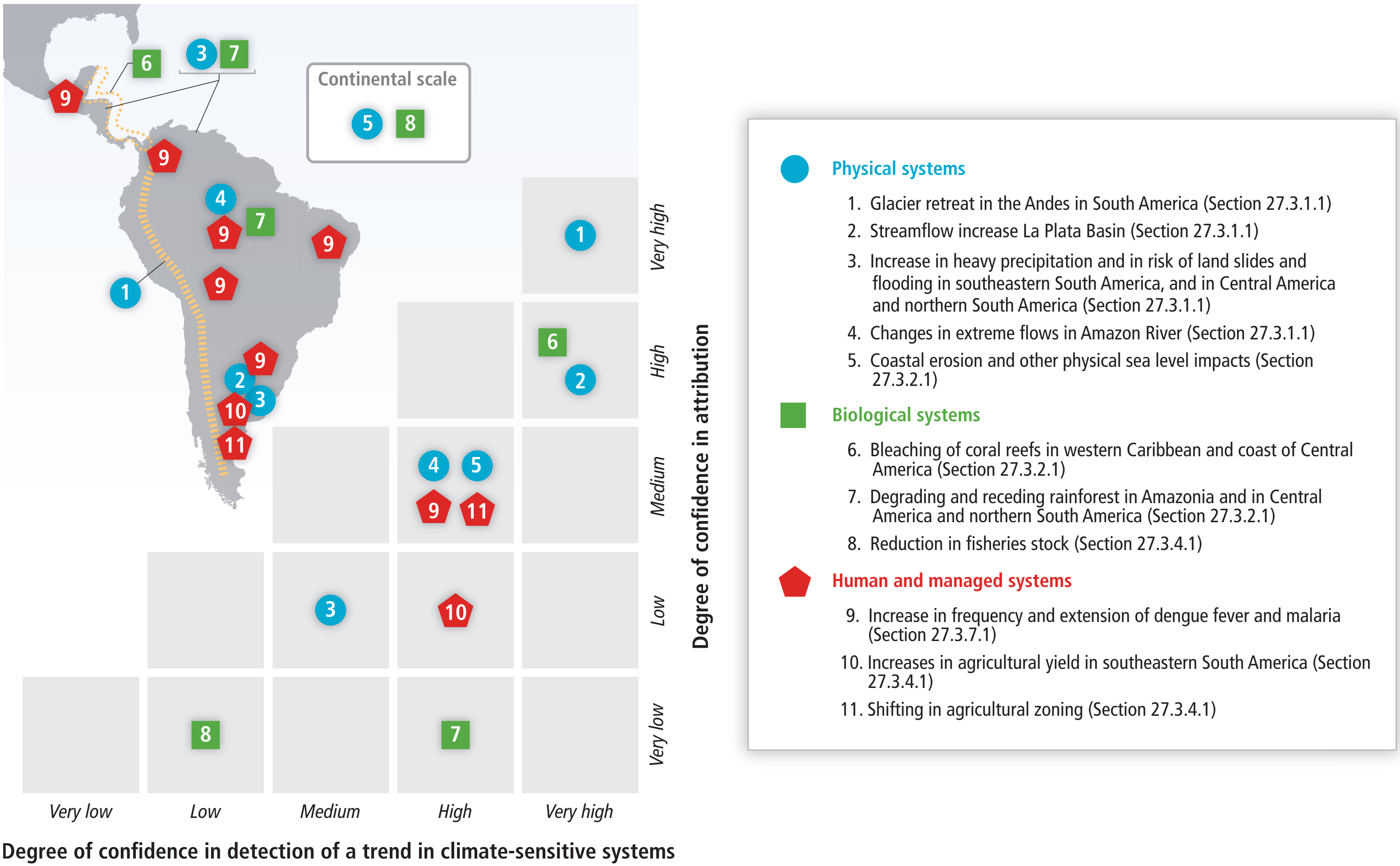
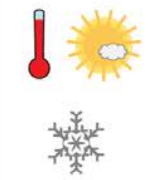
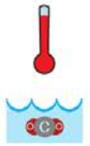
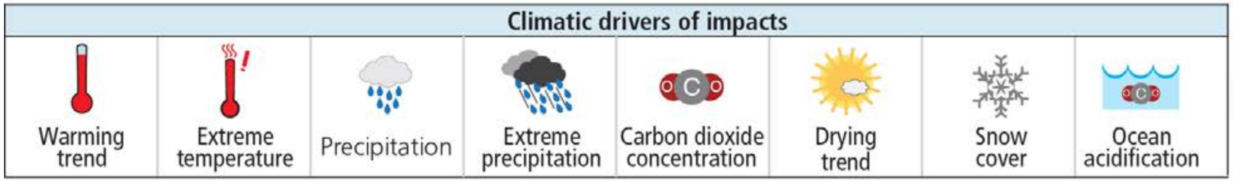
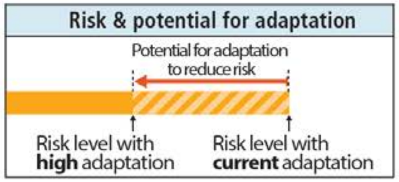


Figure 27-8 | Observed impacts of climate variations and attribution of causes to climate change in Central and South America.

Table 27-8: Key risks from climate change and the potential for risk reduction through mitigation and adaptation.

Key risk	Adaptation issues and prospects	Climatic drivers	Supporting ch. sections	Timeframe	Risk for current and high adaptation
Water availability in semi arid and glacier melting dependent regions and flooding in urban areas due to extreme precipitaion (*high confidence*)	Need to replace deficit of water supply. Improve land use and urban flood management (including infrastructure), establish early warning systems and better weather and runoff forecasts. Control infectious diseases.		27.3.1, 27.3.7	Present Near-term (2030-2040) Long-term (2080-2100) 2°C 4°C	Very low / Medium / Very high 
CA coral reef bleaching (*high confidence*)	Limited evidence for autonomous genetic adaptation of corals; other adaptation options are limited to reducing other stresses, mainly enhancing water quality and limiting pressures from tourism and fishing.		27.3.3	Present Near-term (2030-2040) Long-term (2080-2100) 2°C 4°C	Very low / Medium / Very high 
Decrease in food prodcution and food quality (*medium confidence*)	Develop new varieties (classical and biotech) capable to adapt to the changes in CO2, temperature and drought. Mitigate impacts in food quality and its effects on human and animal health. Plan to mitigate the economic impacts of land use change.		27.3.4, 27.3.6, 27.3.7	Present Near-term (2030-2040) Long-term (2080-2100) 2°C 4°C	Very low / Medium / Very high 
Spread of vector-borne diseases in altitude and latitude (*high confidence*)	Develop early warning systems for disease control and mitigation based on climatic and other relevant inputs.Many factors augment vulnerability. Establish programs to extending basic public health services.		27.3.7.1, 27.3.7.2	Present Near-term (2030-2040) Long-term (2080-2100) 2°C 4°C	Very low / Medium / Very high  2°C: not available; 4°C: not available





Energias Renováveis

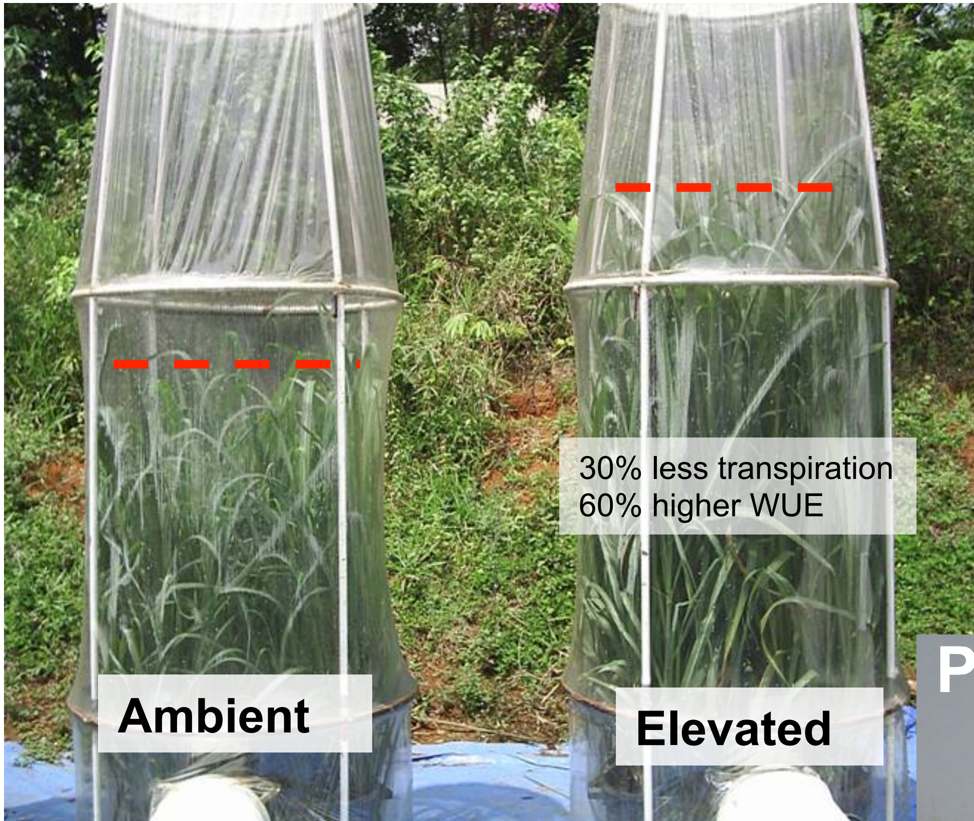
Table 27-6: Comparison of consumption of different energetics in Latin America and the world (in thousand tonnes of oil equivalent (ktoe) on a net calorific value basis).

Energy resource		LATAM						World					
		TFC (non electricity)		TFC (via electricity generation)		Total TFC		TFC (non electricity)		TFC (via electricity generation)		TFC	
Fossil	Coal and Peat	9,008	3%	1,398	2%	10,406	3%	831,897	12%	581,248	40%	1,413,145	17%
	Oil	189,313	55%	8,685	13%	197,998	48%	3,462,133	52%	73,552	5%	3,535,685	44%
	Natural Gas	59,44	17%	9,423	14%	68,863	17%	1,265,862	19%	307,956	21%	1,573,818	19%
Nuclear	Nuclear	0	0%	1,449	2%	1,449	0%	0	0%	193,075	13%	193,075	2%
Renewable	Biofuels and waste	82,997	24%	2,179	3%	85,176	21%	1,080,039	16%	20,63	1%	1,100,669	14%
	Hydro	0	0%	45,92	66%	45,92	11%	0	0%	238,313	17%	238,313	3%
	Geothermal, solar, wind, other renewable	408	0%	364	1%	772	0%	18,265	0%	26,592	2%	44,857	1%
TOTAL		341,166	100%	69,418	100%	410,584	100%	6,658,196	100%	1,441,366	100%	8,099,562	100%

* TFC: Total final consumption

Source: IEA, 2012

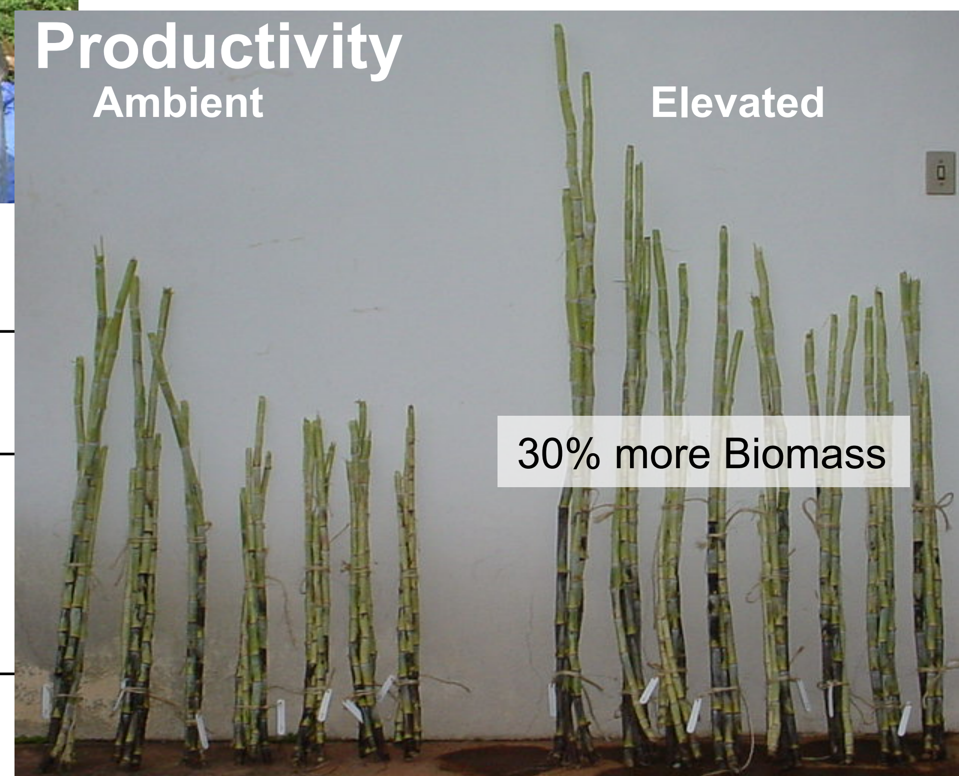
O Brasil **PODE TER** um papel fundamental na expansão do uso de energias renováveis na America do Sul e no mundo

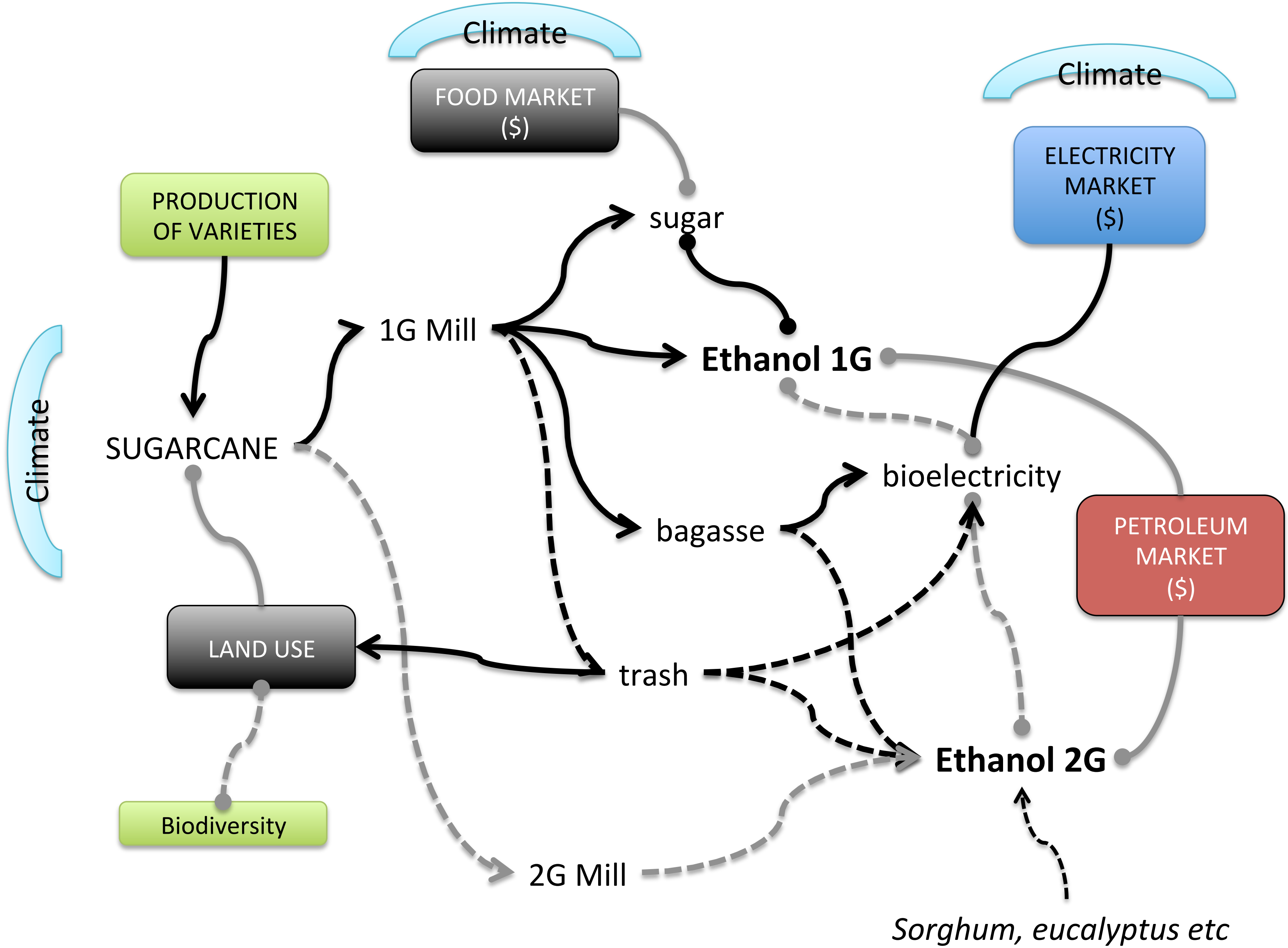


Lafieco
Departamento de Botânica

De Souza et al. 2008
Plant Cell & Environment,
Volume 31, pg 1116

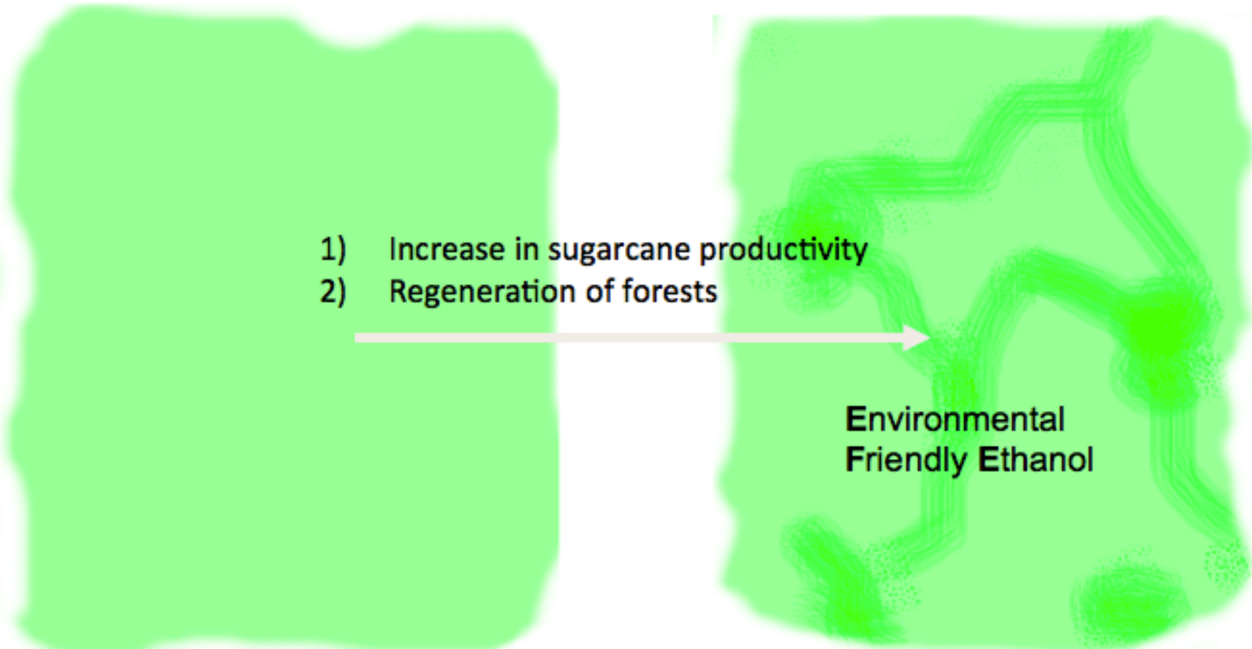
	Fiber(% FW)	Sucrose (% FW)
Ambient	6.62 ± 0.13	2.18 ± 0.20
Elevated	7.13 ± 0.21	2.82 ± 0.14*





Prepared by Marcos Buckeridge and Paul Moore

Midway Strategy



Sugarcane alone
Bioethanol production only

Sugarcane with forest corridors
Higher production of bioethanol
Higuer C sequestration, mitigation, adaptation

2006: All sugarcane of Brazil represents only 0.022% of all C currently stored in the forests of South America

BUCKERIDGE, M.S. (2007) Seqüestro de carbono, cana-de-açúcar e o efeito Cinderela. Comciência - LabJor
http://www.comciencia.br/comciencia/?section=8&edicao=23&id=258

GLOBAL CHANGE BIOLOGY BIOENERGY
GCB Bioenergy (2012) **4**, 119–126, doi: 10.1111/j.1757-1707.2011.01122.x

OPINION

Ethanol from sugarcane in Brazil: a 'midway' strategy for increasing ethanol production while maximizing environmental benefits

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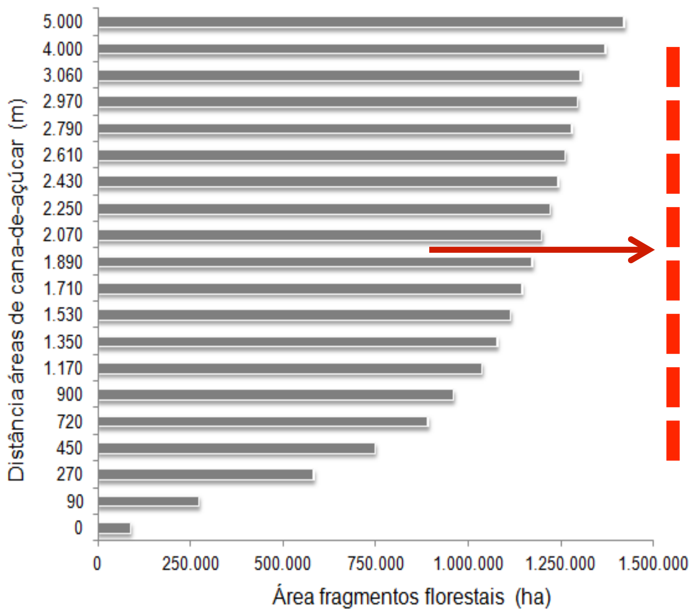
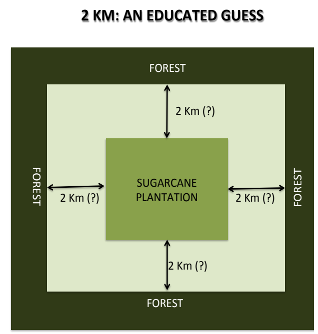
**Laboratório de Fisiologia Ecológica de Plantas, LAFIECO, Departamento de Botânica, Instituto de Biociências, Universidade de São Paulo, SP, Brazil, †Brazilian Bioethanol Science and Technology Laboratory, CTBE, Campinas SP, Brazil, ‡Department of Plant Biology, University of Illinois, Urbana, IL 61801, USA*

CARBON BALANCE IN SUGARCANE PLANTATIONS IN SÃO PAULO





According to Buckeridge *et al*. (2012) the **sugarcane** C storage is approximately 7.4 t C/ha/year

.....and carbon emissions of 8.2 t C/ha/year

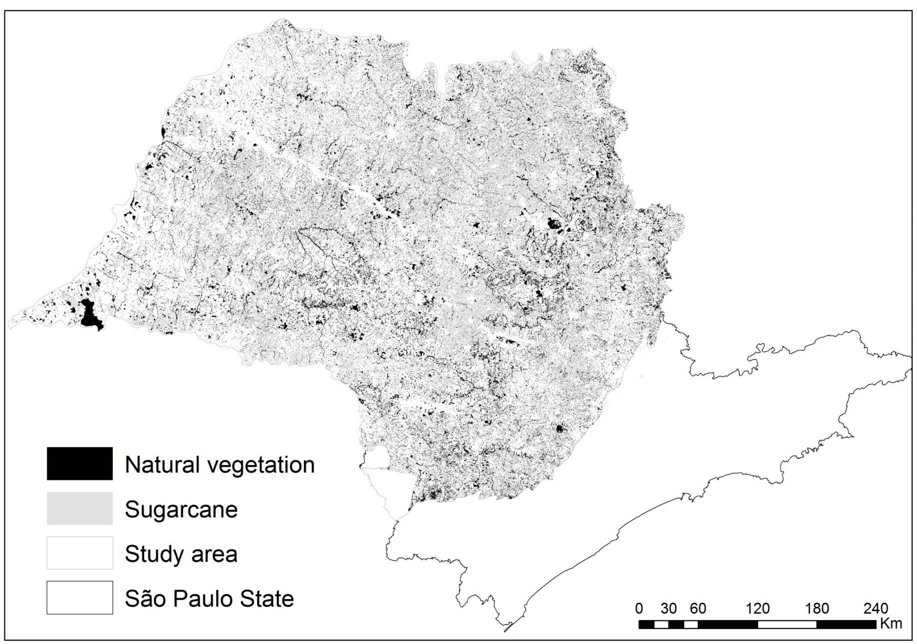
Thus, carbon balance is negative: -0.8 t C/ha/year

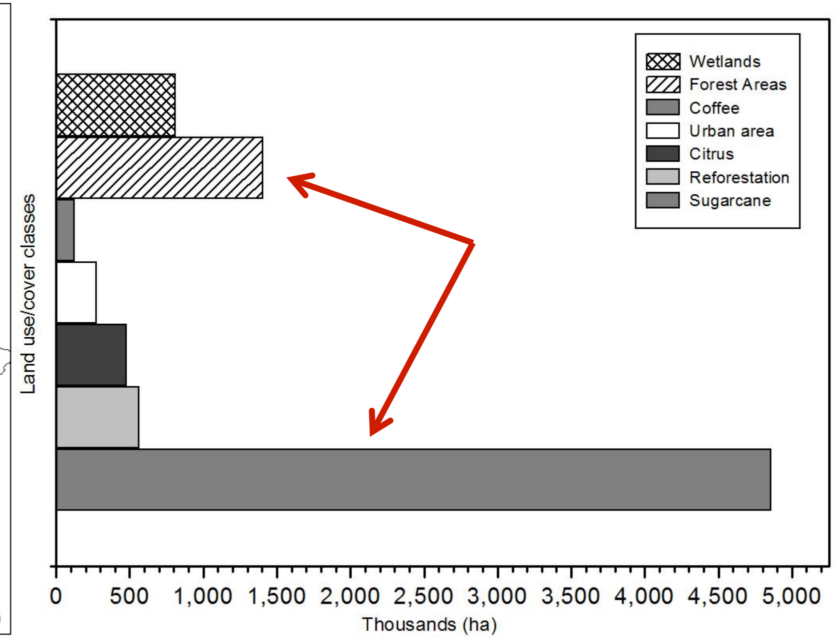
The total area of sugarcane in SP is of 5 Mha

Total of C emission of sugarcane: - 4 t C/ha/year

Considering that forests store an average of 5 t C/ha/year

We need approximately 800.000 ha of forests to match the sugarcane C emissions





Biodiversidade

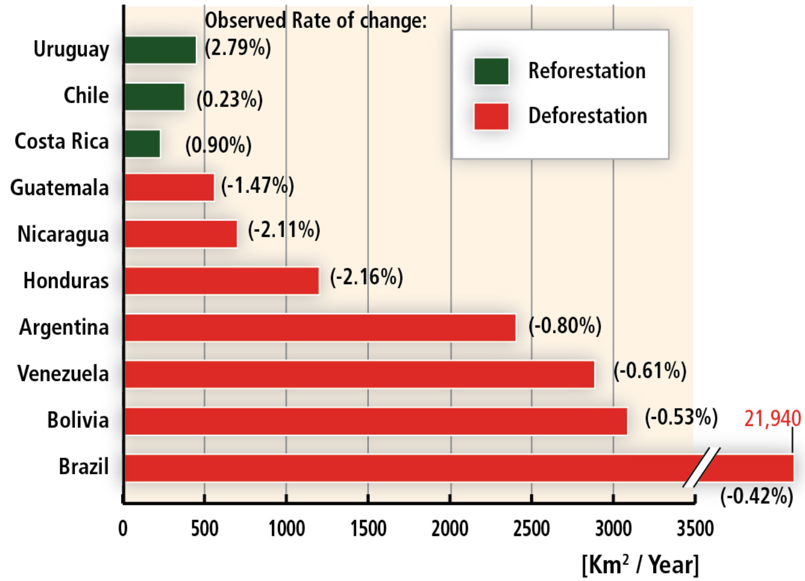


Figure 27-3: Area deforested per year for selected countries in CA and SA (2005-2010). Notice three countries listed with a positive change in forest cover (based on data from FAO, 2010).

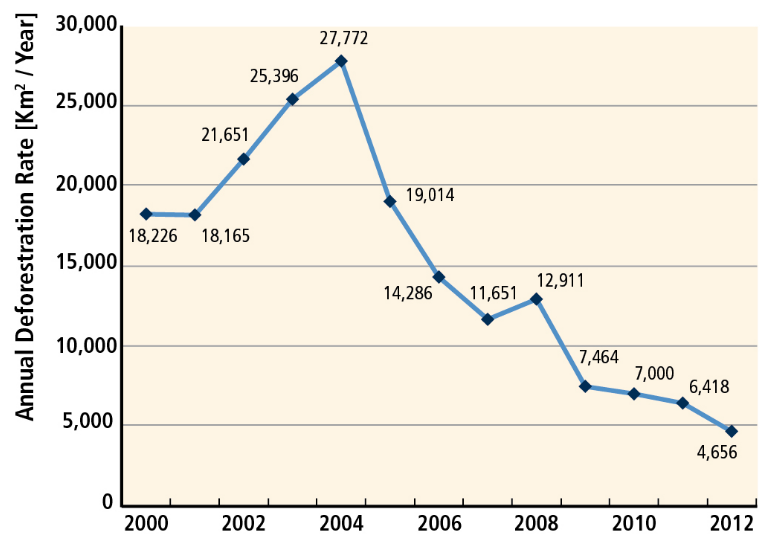
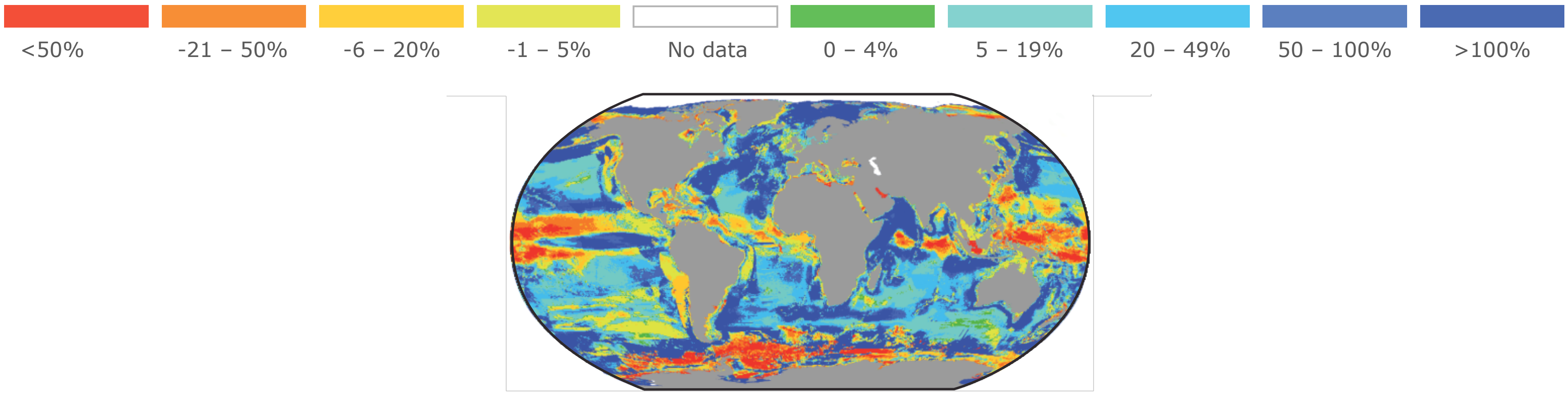
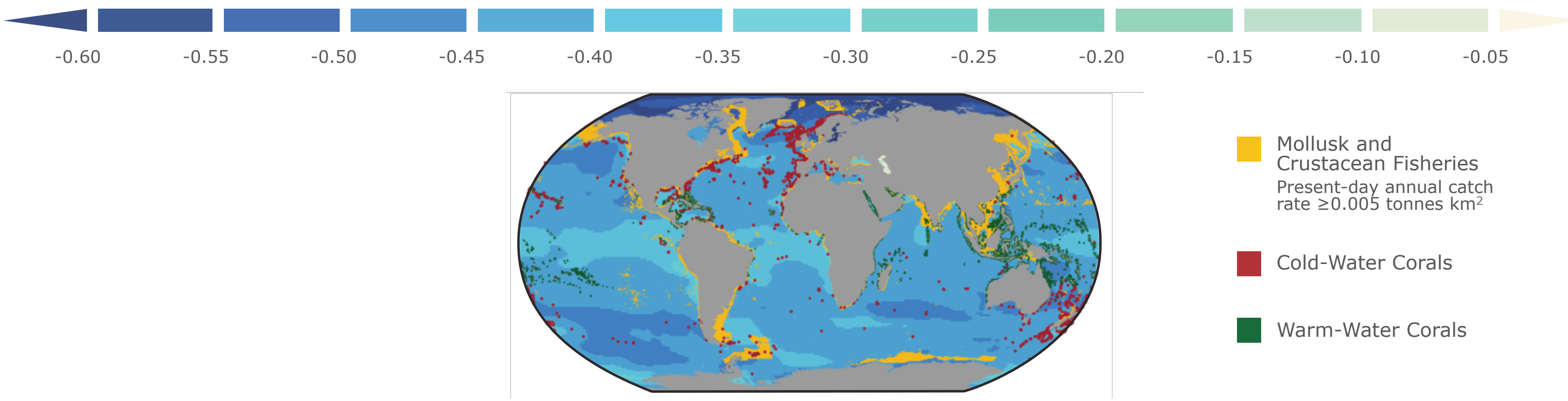


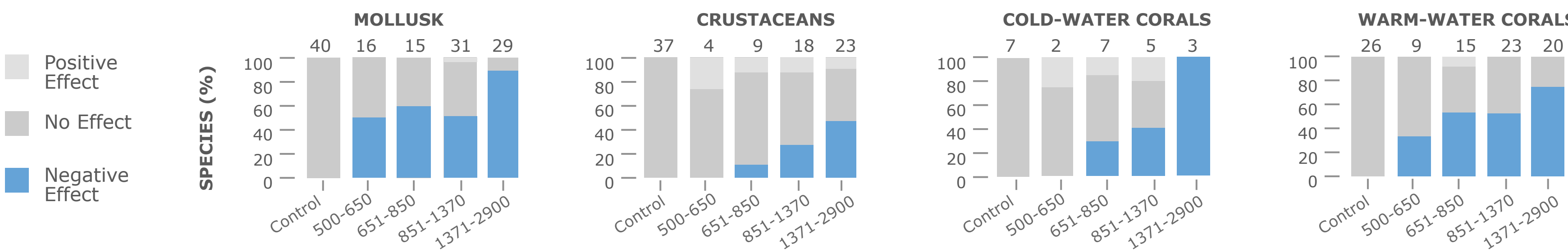
Figure 27-4: Deforestation rates in the Brazilian Amazonia (km²/year) based on measurements by the PRODES project (INPE, 2011).

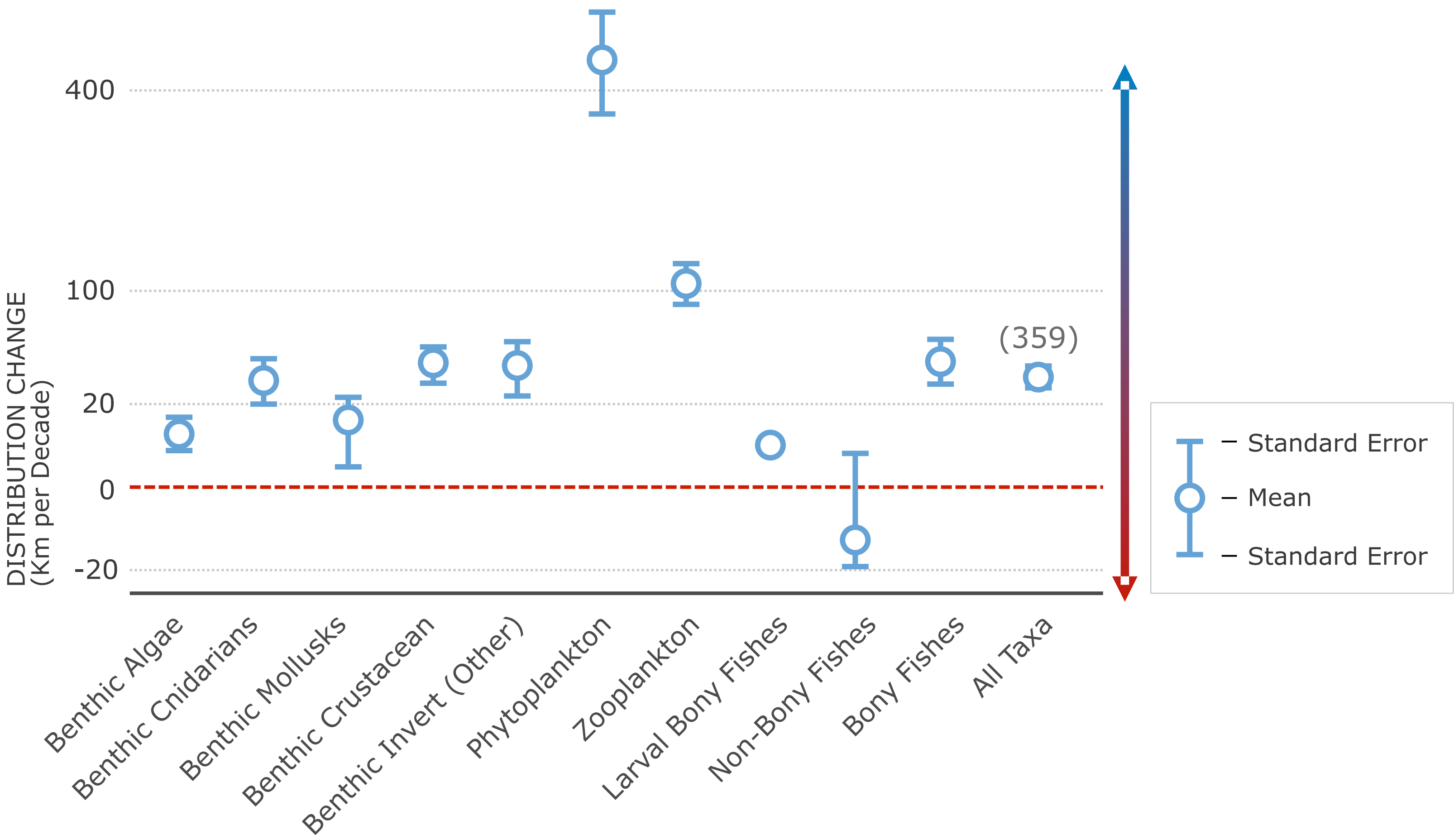
CHANGE IN MAXIMUM CATCH POTENTIAL (2051-2060 COMPARED TO 2001-2010, SRES A1B)



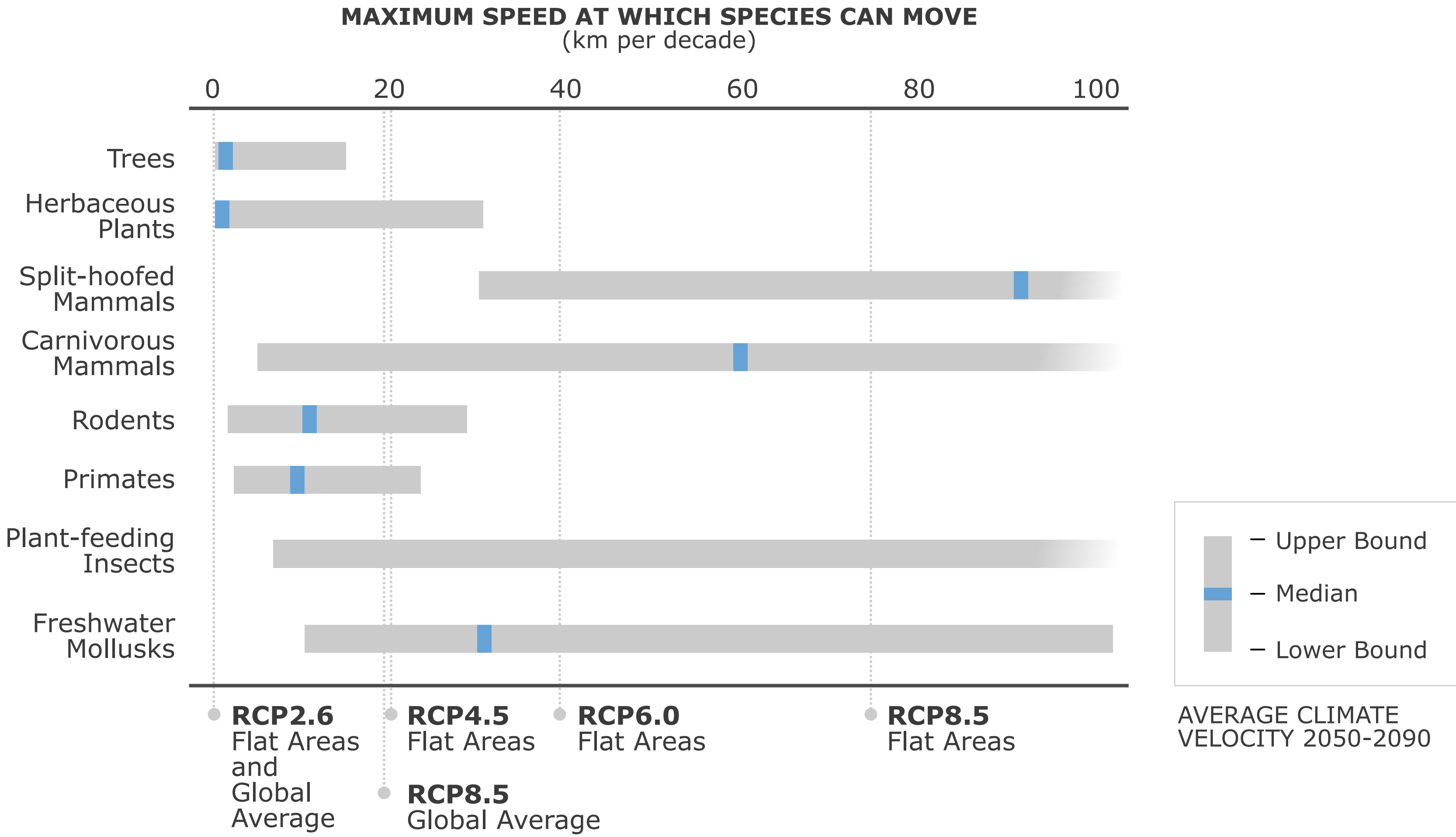
CHANGE IN pH (2081-2100 COMPARED TO 1986-2005, RCP 8.5)



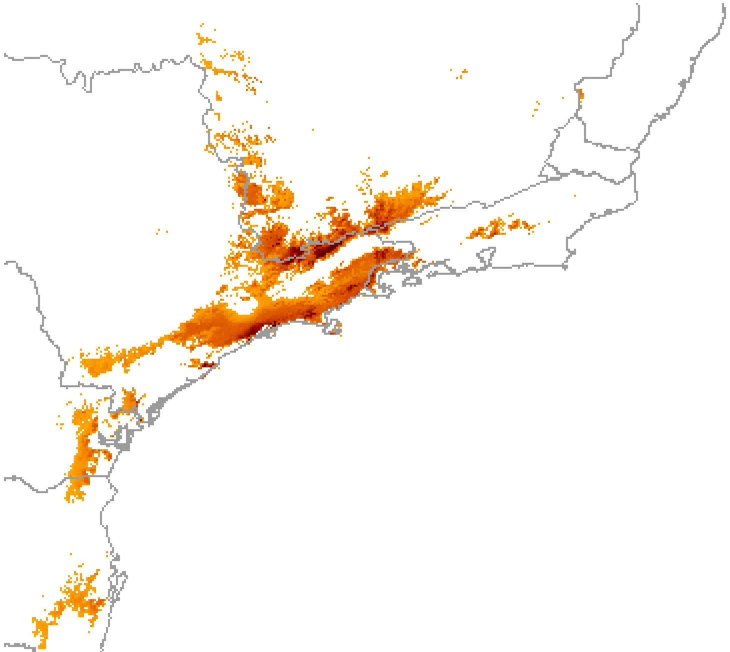




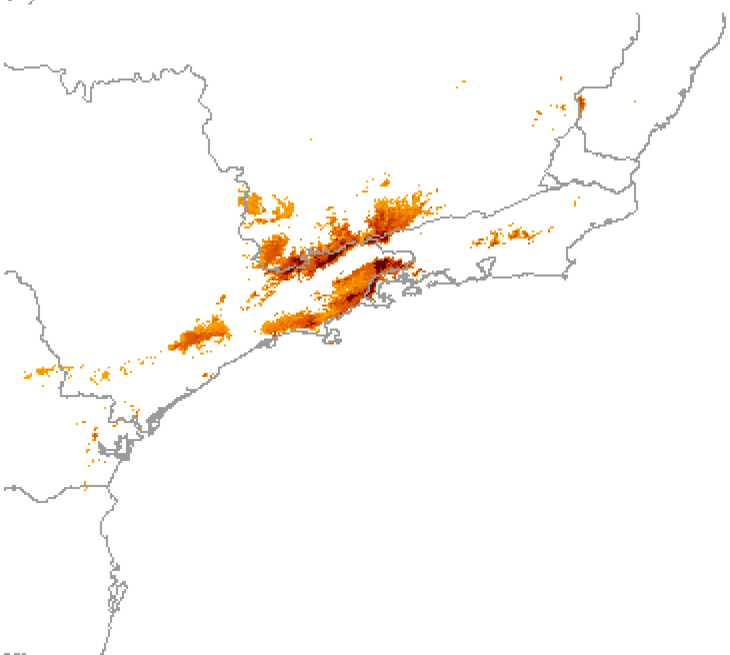
DISTRIBUTION CHANGE
(Km per Decade)
400
100
20
0
-20
(359)
Benthic Algae
Benthic Cnidarians
Benthic Mollusks
Benthic Crustacean
Benthic Invert (Other)
Phytoplankton
Zooplankton
Larval Bony Fishes
Non-Bony Fishes
Bony Fishes
All Taxa
– Standard Error
– Mean
– Standard Error



MAXIMUM SPEED AT WHICH SPECIES CAN MOVE
(km per decade)
0
20
40
60
80
100
Trees
Herbaceous Plants
Split-hoofed Mammals
Carnivorous Mammals
Rodents
Primates
Plant-feeding Insects
Freshwater Mollusks
RCP2.6 Flat Areas and Global Average
RCP4.5 Flat Areas
RCP6.0 Flat Areas
RCP8.5 Flat Areas
RCP8.5 Global Average
Upper Bound
Median
Lower Bound
AVERAGE CLIMATE VELOCITY 2050-2090



A) Atual

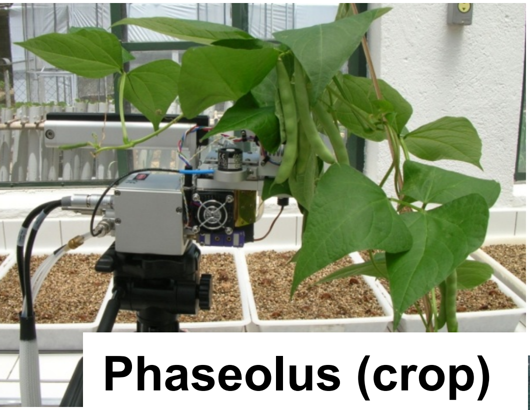


B) Futuro = $2\times CO_2$

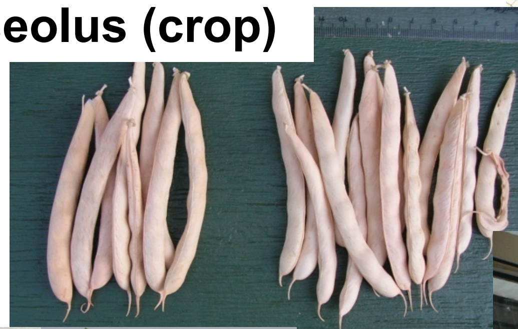
- Modelos de entropia máxima (MAXENT) da distribuição geográfica de *Brachycephalus* spp. no sudeste e sul do Brasil: **A)** distribuição potencial de acordo com características bioclimáticas atuais (BIOCLIM v.1.4; Hijmans et al. 2005); **B)** distribuição de *Brachycephalus* spp. de acordo com mudanças bioclimáticas futuras resultantes da duplicação da concentração de CO_2 na atmosfera prevista no ano de 2100 AD ($[CO_2] \approx 710$ppm; cenário CCM3; Govindasamy et al. 2003).

Haddad e colaboradores

Some species used in research projects developed by the **LAFIECO** team



Phaseolus (crop)



sugarcane

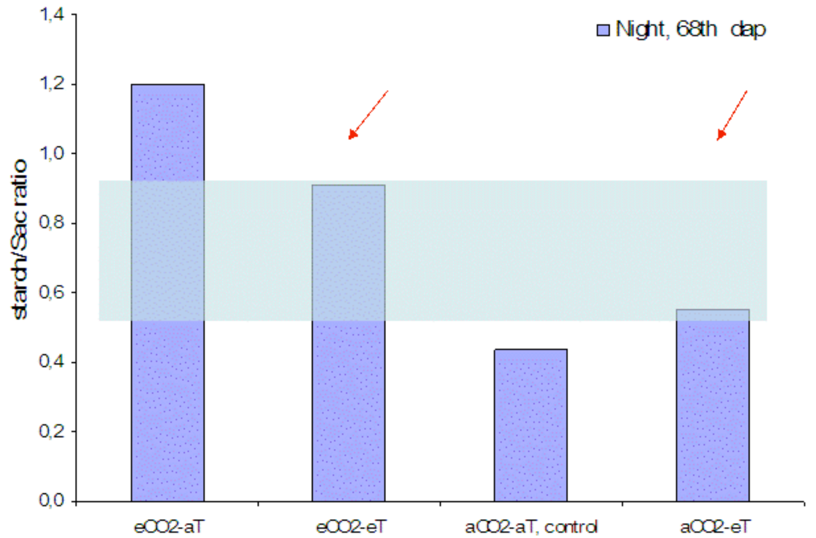
Matapasto (Amazon)

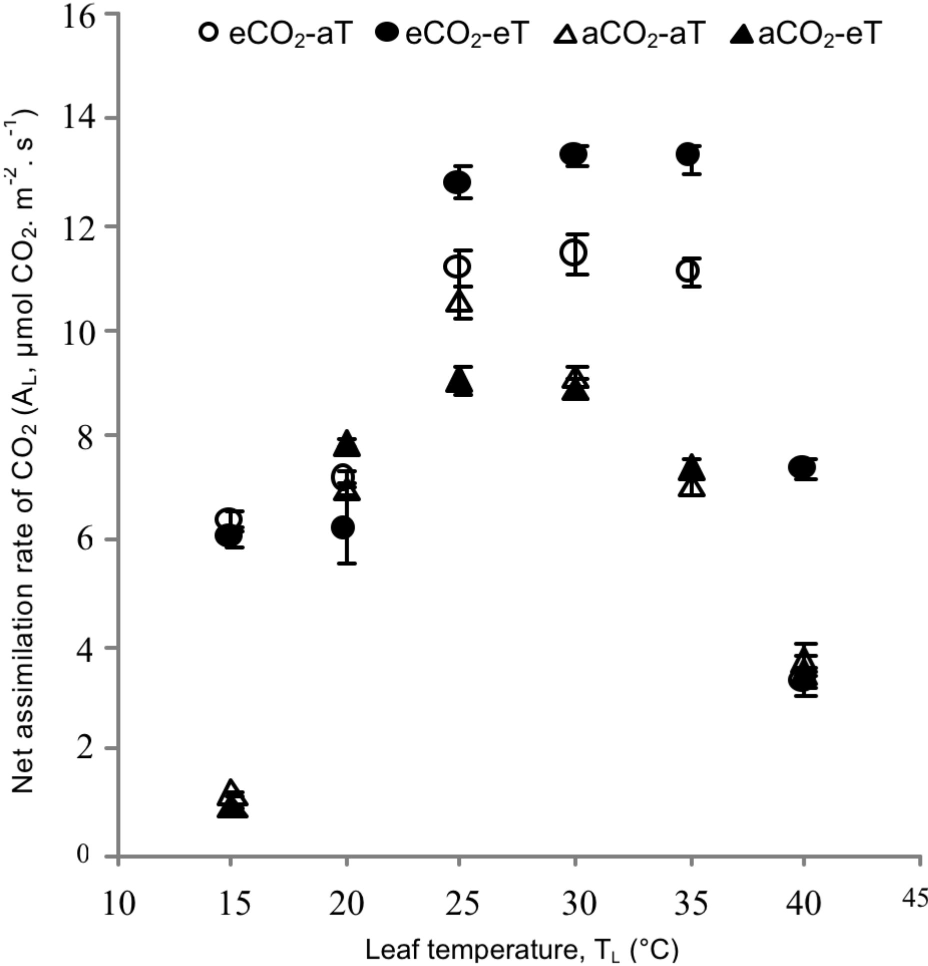
Several species from the Atlantic Forest

Soybean (crop)

Assai palm (Amazon)

Efeito do CO_2 e da temperatura sobre o jatobá



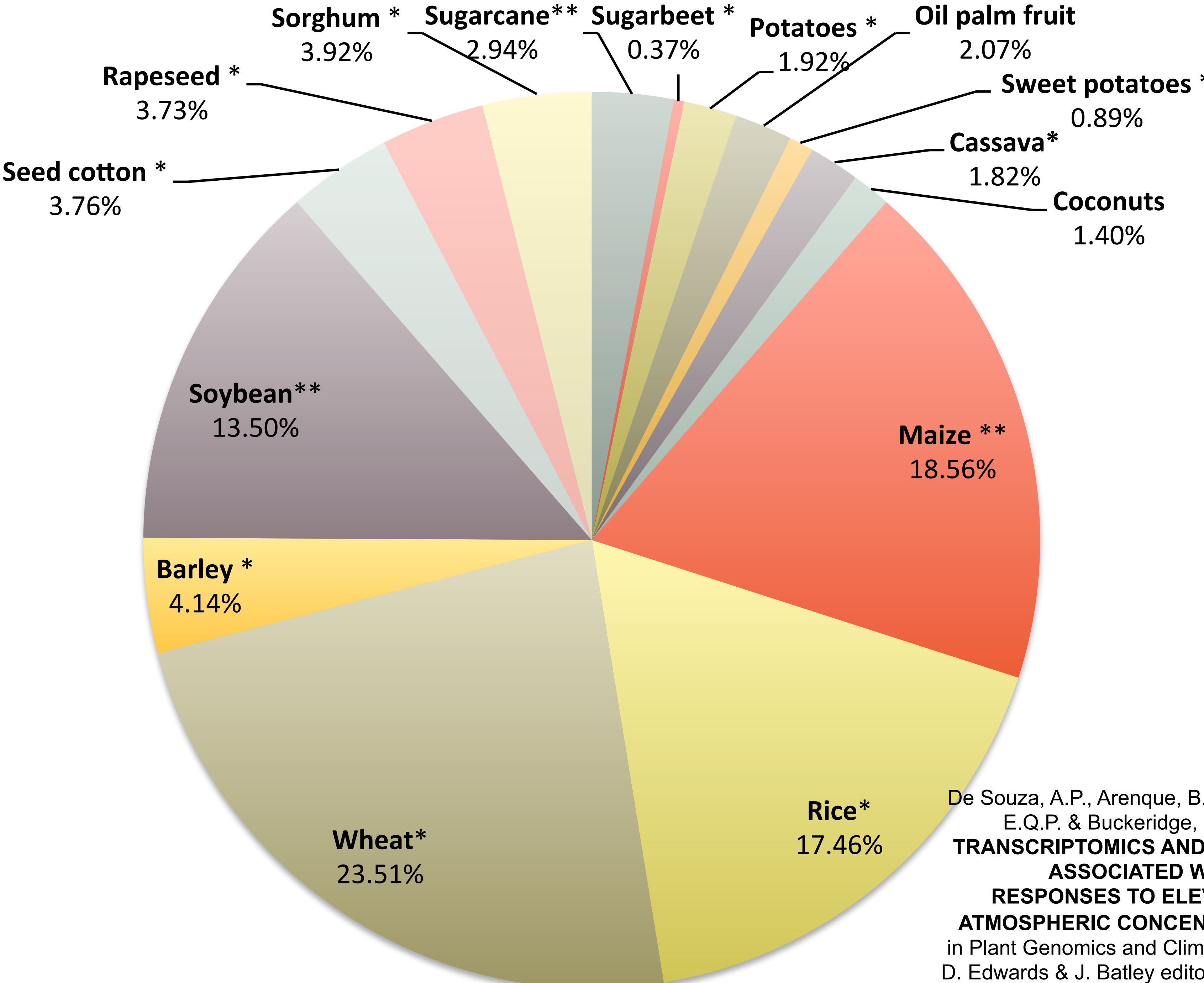


Agricultura

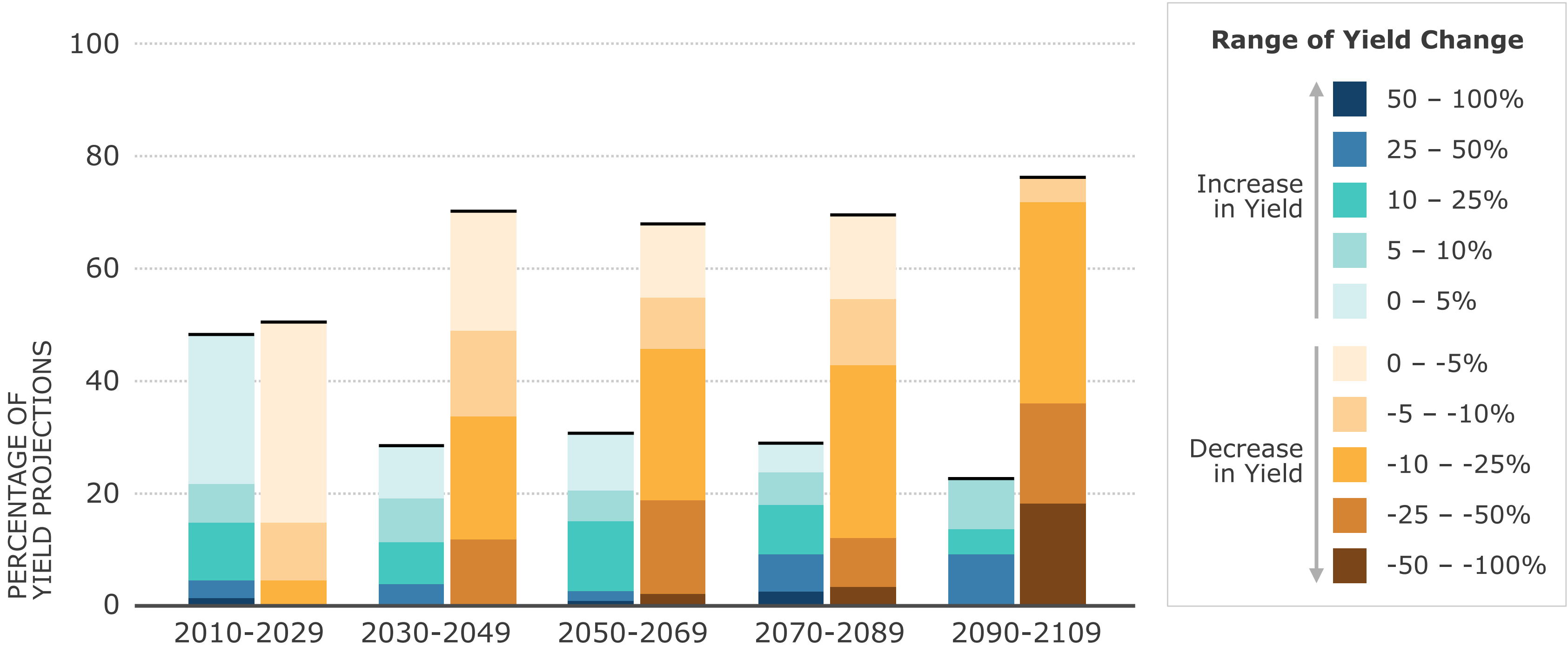
Até 2040, o mundo terá que aumentar a produção de alimentos em 70% para poder suprir o efeito do crescimento dos países em desenvolvimento

Asia	Sugarcane	Sugarbeet	Potatoes	Oli palm fruit	Sweet potatoes	Cassava	Coconuts	Maize	Rice	Wheat	Barley	Soybean	Seed cotton	Rapeseed	Sorghum	TOTAL	Asia
PRODUCTIVITY	68,9	55,1	19,1	14,3	12,9	12,8	5	4,9	4,4	3,1	2,7	2,4	2,2	1,9	1,5		
Bangladesh	118	0	534	0	32	0	43	340	11700	400	0	42	16,2	255	0,18	13480,38	Bangladesh
China	1804	235	5431	48	3482	280	33	34989	30557	24139	630	6750	4700	7300	472	120850	China
India	5090	0	1900	0	115	221	2132	8400	42500	29900	780	10800	11700	5920	6320	125778	India
Indonesia	456	0	64,5	6900	178	1119	3000	3959	13443	0	0	567	14	0	0	29700,5	Indonesia
Iran	70	105	153	0	0	0	0	180	480	7000	1680	80	110	170	0	10028	Iran
Kazakhstan	0	11,8	190	0	0	0	0	97	97	13464	1615	84	151	201	0,2	15911	Kazakhstan
Malaysia	13,5	0	0	4010	2,3	3	115	10	705	0	0	0	0	0	0	4858,8	Malaysa
Russia	0	1102	2197	0	0	0	0	1937	191	21277	7641	1375	0	976	43	36739	Russia
Pakistan	1046	0	185	0	1,4	0	0	910	2700	8666	75	0	2879	380	240	17082,4	Pakistan
Philippines	433	0	0	52	101	217	3573	2593	4689	0	0	0	0	0	0	11658	Philippines
Tanzania	29	0	210	5	700	954	680	4118	799	109	8	4	487	0	839	8942	Tanzania
Thailand	1300	0	10	645	0	1250	217	1080	12600	1,1	10	100	6,5	0	29	17248,6	Thailand
Turkey	0	281	174	0	0	0	0	622	119	7529	2748	31	488	30	0	12022	Turkey
Ukraine	0	448	1440	0	0	0	0	4371	25,8	5629	3293	1412	0	547	64	17229,8	Ukraine
	10359,5	2182,8	12488,5	11660	4611,7	4044	9793	63606	120605,8	118114,1	18480	21245	20551,7	15779	8007,38	441528	
Africa	**Sugarcane**	**Sugarbeet**	**Potatoes**	**Oli palm fruit**	**Sweet potatoes**	**Cassava**	**Coconuts**	**Maize**	**Rice**	**Wheat**	**Barley**	**Soybean**	**Seed cotton**	**Rapeseed**	**Sorghum**	**TOTAL**	**Africa**
Angola	13.5	0	94	0	0	1062	0	584	27,9	3,4	0	0	3	0	0	1774,3	Angola
D.R.Congo	45	0	22,5	179	51,5	2200	1	1725	500	7,5	1,4	42	67	0	0	4841,9	D.R. Congo
Ethiopia	22.2	0	74,9	0	41	0	0	2013	30,6	1437	948	19,4	80	45,2	1923	6612,1	Ethiopia
Morocco	10,1	28,9	59,2	0	0	0	0	118	9,1	3142	1893	1	0	0	6,1	5267,4	Morocco
Niger	3.8	0	1,5	0	3,5	7,5	0	8,5	25	4,5	0	0	11	0	2500	2561,5	Niger
Nigeria	74	0	262	3200	1115	3850	42	5200	2685	90	0	440	300	0	5500	22758	Nigeria
Uganda	41	0	112	0	540	426	0	1094	92	14	0	153	70	0	373	2915	Uganda
Sudan	61	0	20	0	7,5	7,9	0	30,6	7,5	187	0	0	152	0	4103	4576,5	Sudan
	231,1	28,9	646,1	3379	1758,5	7553,4	43	10773,1	3377,1	4885,4	2842,4	655,4	683	45,2	14405,1	51306,7	
Europe	**Sugarcane**	**Sugarbeet**	**Potatoes**	**Oli palm fruit**	**Sweet potatoes**	**Cassava**	**Coconuts**	**Maize**	**Rice**	**Wheat**	**Barley**	**Soybean**	**Seed cotton**	**Rapeseed**	**Sorghum**	**TOTAL**	**Europe**
France	0	389	154	0	0	0	0	1718	20	5303	1684	37,5	0	1607	42	10954,5	France
Germany	0	402	238	0	0	0	0	510	0	3061	1683	0	0	1306	0	7200	Germany
Spain	0	38,9	73,9	0	1,2	0	0	386	113	1758	2676	0	69,8	28,6	8,7	5154,1	Spain
	0	829,9	465,9	0	1,2	0	0	2614	133	10122	6043	37,5	69,8	2941,6	50,7	23308,6	
N. America	**Sugarcane**	**Sugarbeet**	**Potatoes**	**Oli palm fruit**	**Sweet potatoes**	**Cassava**	**Coconuts**	**Maize**	**Rice**	**Wheat**	**Barley**	**Soybean**	**Seed cotton**	**Rapeseed**	**Sorghum**	**TOTAL**	**N. America**
Canada	0	10	148	0	0	0	0	1399	0	9353	2060	1668	0	8379	0	23017	Canada
Mexico	735	0	67	34	2,8	1,5	166	6923	31	407	328	142	154	0	1819	10810,3	Mexico
United States	470	487	458	0	51	0	0	35359	1083	19826	1312	30798	3792	700	2005	96341	United States
	1205	497	673	34	53,8	1,5	166	43681	1114	29586	3700	32608	3946	9079	3824	130168	
S. America	**Sugarcane**	**Sugarbeet**	**Potatoes**	**Oli palm fruit**	**Sweet potatoes**	**Cassava**	**Coconuts**	**Maize**	**Rice**	**Wheat**	**Barley**	**Soybean**	**Seed cotton**	**Rapeseed**	**Sorghum**	**TOTAL**	**S. America**
Argentina	350	0	70	0	26	18,7	0	3500	235	3700	1500	19350	360	29,4	1150	30289,1	Argentina
Brazil	9047	0	130	109	45	1703	256	14225	2370	1891	102	24937	1379	44	691	56929	Brazil
	9397	0	200	109	71	1721,7	256	17725	2605	5591	1602	44287	1739	73,4	1841	87218,1	
Oceania	**Sugarcane**	**Sugarbeet**	**Potatoes**	**Oli palm fruit**	**Sweet potatoes**	**Cassava**	**Coconuts**	**Maize**	**Rice**	**Wheat**	**Barley**	**Soybean**	**Seed cotton**	**Rapeseed**	**Sorghum**	**TOTAL**	**Oceania**
Australia	338	0	33	0	0	0	0	69,7	103	13902	3718	38,1	596	2358	650	21805,8	Australia
	338	0	33	0	0	0	0	69,7	103	13902	3718	38,1	596	2358	650	21805,8	
TOTAL	21530,6	2708,7	14040,6	15182	6495	13320,6	10258	135854,8	127804,9	172078,5	30342,4	98833,5	27515,7	27334,6	28727,48	TOTAL	733530

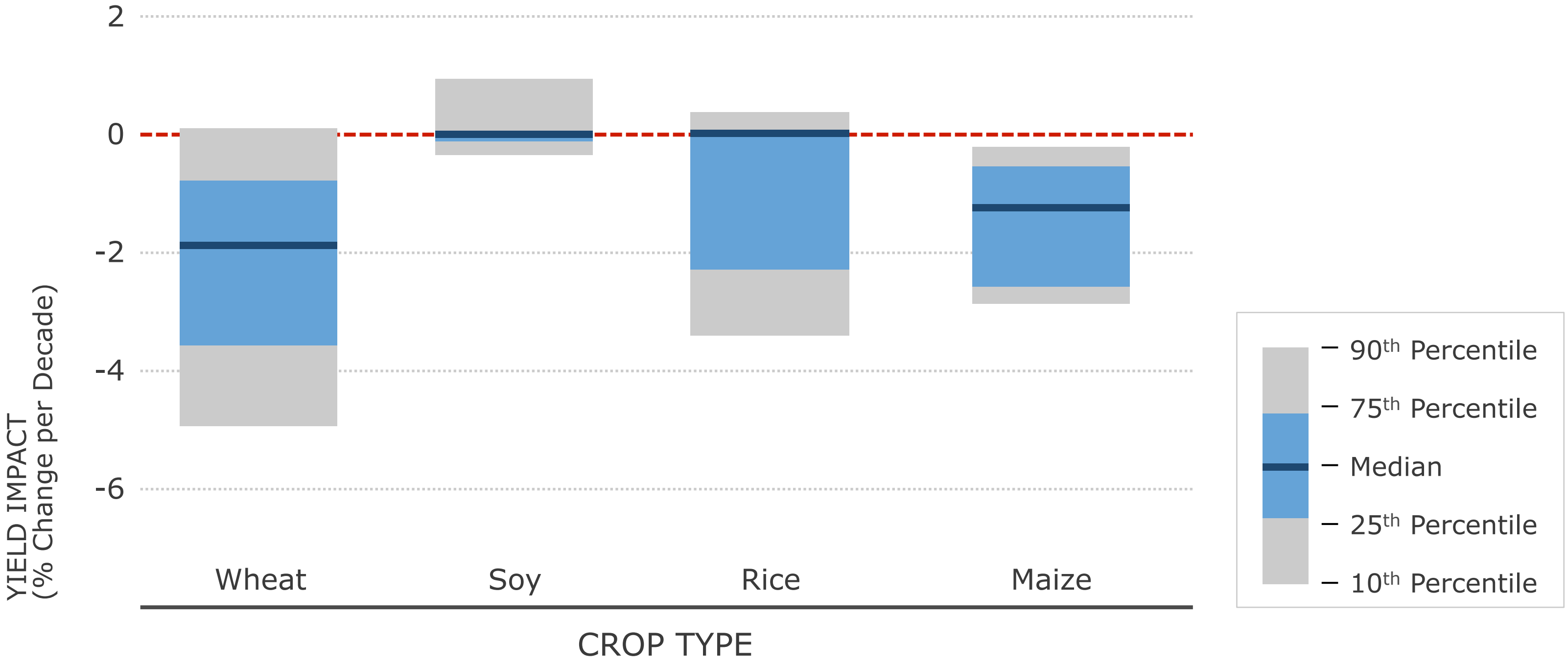
Data from FAO- 15 major crops production in 2012 (data in millions of tons) – compiled by Amanda P. de Souza and Marcos Buckeridge

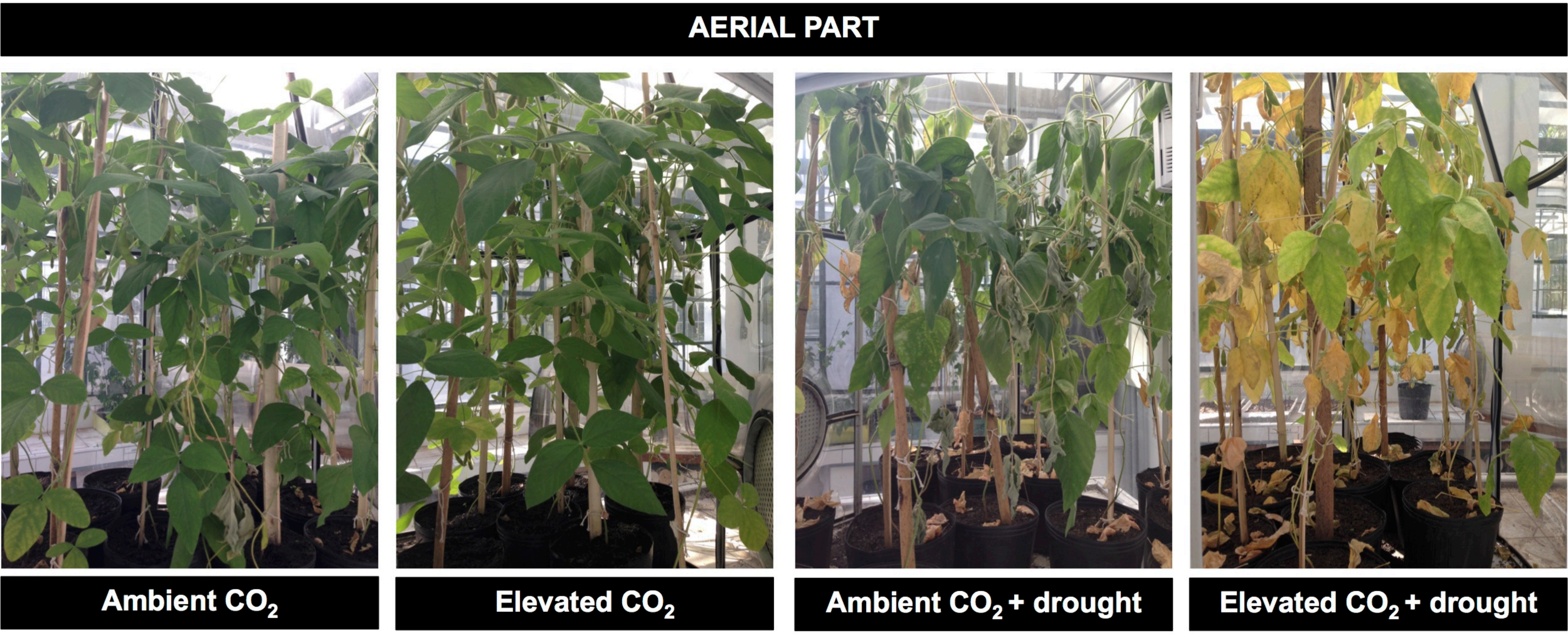


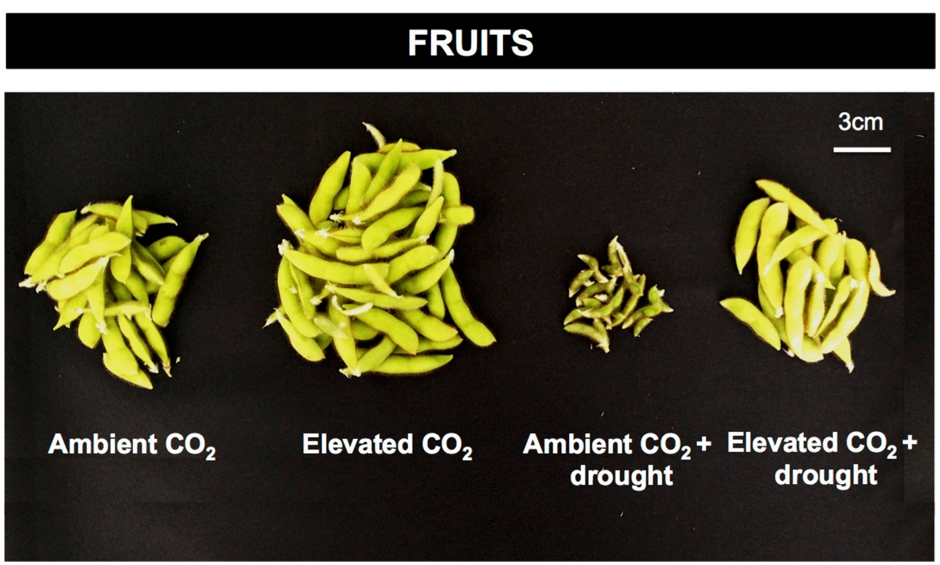
De Souza, A.P., Arenque, B.C., Tavares, E.Q.P. & Buckeridge, M.S. (2013). **TRANSCRIPTOMICS AND GENETICS ASSOCIATED WITH PLANT RESPONSES TO ELEVATED CO2 ATMOSPHERIC CONCENTRATIONS**. in Plant Genomics and Climate Change. D. Edwards & J. Batley editors, Springer, in preparation

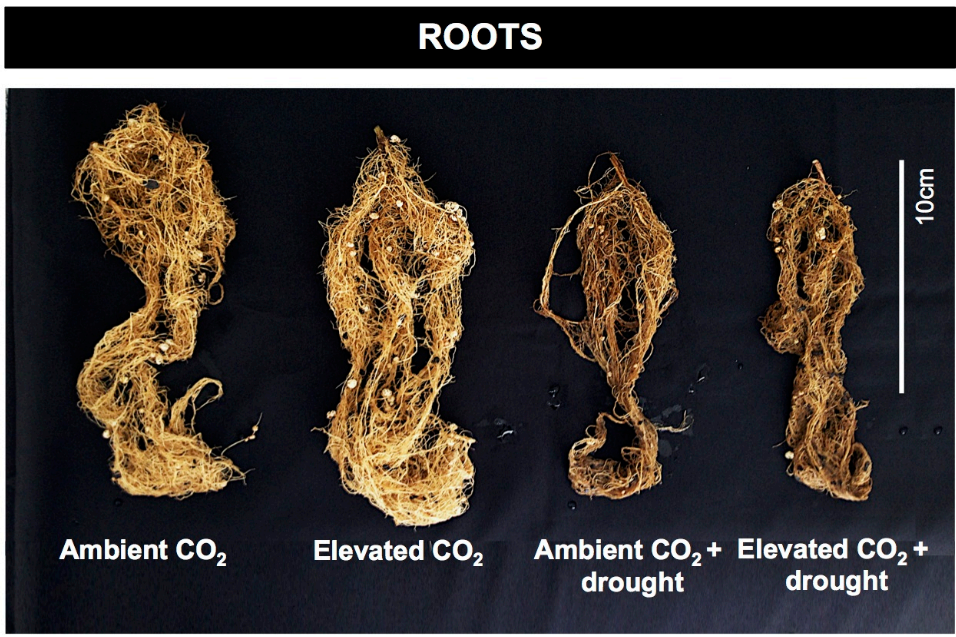


INTERGOVERNMENTAL PANEL ON climate change


2
0
-2
-4
-6
YIELD IMPACT
(% Change per Decade)
Wheat
Soy
Rice
Maize
CROP TYPE
90th Percentile
75th Percentile
Median
25th Percentile
10th Percentile







LAFIECO-UNIVELER RESEARCH

Plant Biology ISSN 1435-8603

RESEARCH PAPER

Growth and nutritive value of cassava (*Manihot esculenta* Cranz.) are reduced when grown in elevated CO_2

Roslyn M. Gleadow[1], John R. Evans[2], Stephanie McCaffery[2] & Timothy R. Cavagnaro[2,3]

1 School of Biological Science, Monash University, Victoria, Australia
2 Environmental Biology Group, Research School of Biological Sciences, The Australian National University, Canberra, ACT, Australia
3 Australian Centre for Biodiversity, Monash University, Clayton, Victoria, Australia

MANDIOCA: produção poderá diminuir drasticamente em elevado CO2

Fig. 2. Tubers of cassava grown at ambient CO2 (360 ppm) and approximately twice-ambient CO2 (710 ppm) and supplied with 12 mM N. (Concentrations noted on tags were from preliminary data.)

Plant Biology ISSN 1435-8603

A DIMINUIÇÃO DE TEORES DE PROTEÍNAS E AMINO ÁCIDOS EM **TRIGO** EM ALTO CO_2 É DA ORDEM DE 7%

RESEARCH PAPER

Effects of elevated CO_2 on grain yield and quality of wheat: results from a 3-year free-air CO_2 enrichment experiment

P. Högy[1], H. Wieser[2], P. Köhler[2], K. Schwadorf[3], J. Breuer[3], J. Franzaring[1], R. Muntifering[4] & A. Fangmeier[1]

1 Institute for Landscape and Plant Ecology, Universität Hohenheim, Stuttgart, Germany
2 German Research Centre for Food Chemistry and Hans-Dieter-Belitz-Institute for Cereal Research, Garching, Germany
3 Landesanstalt für Landwirtschaftliche Chemie, Universität Hohenheim, Stuttgart, Germany
4 Department of Animal Sciences, Auburn University, Auburn, AL, USA

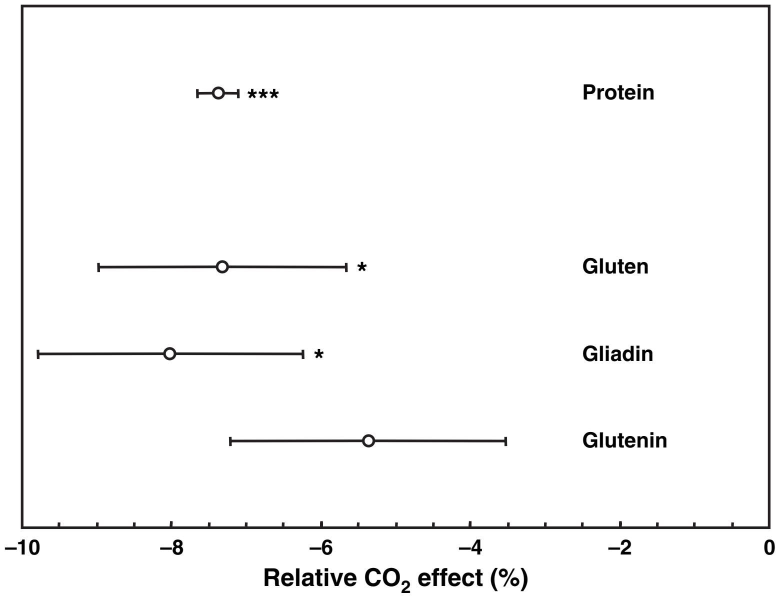


Fig. 5. Effects of CO_2 elevation on concentrations and composition of wheat grain proteins (% DW). Presented are average relative changes (± standard error) due to elevated CO_2 concentrations for each of five replicates per treatment for the years 2004–2006. The results of the ANOVA are denoted by asterisks (trend: $^{(*)}0.1 \geq P > 0.05$; significant: $*P \leq 0.05$, $**P \leq 0.01$, $***P \leq 0.001$).

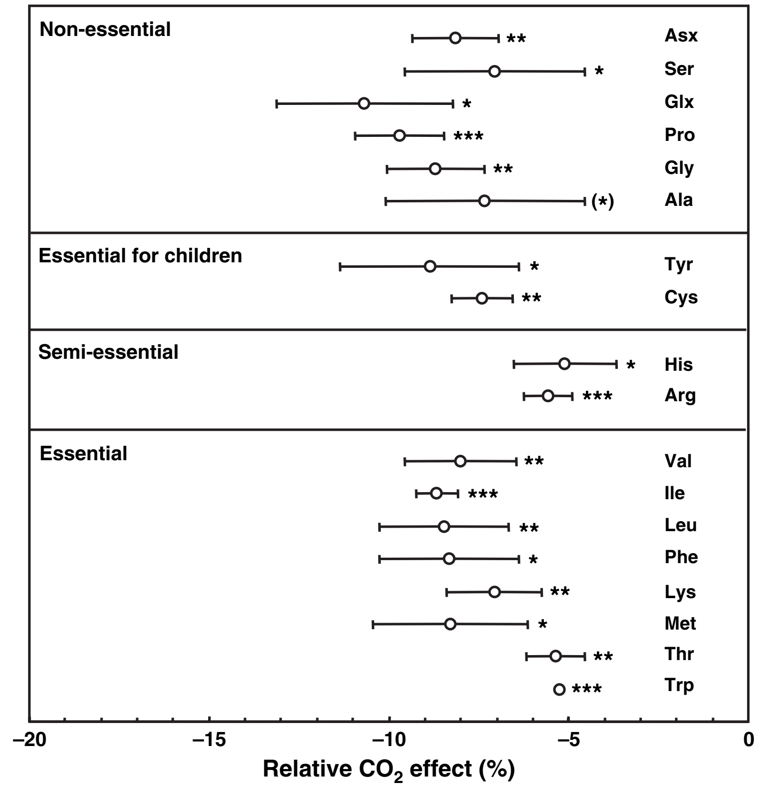


Fig. 6. Impact of CO_2 exposure on concentrations of amino acids (% DW) in wheat grain. Presented are average relative changes (±standard error) due to CO_2 enrichment against ambient CO_2 concentration for each of five replicates per treatment for the years 2004–2006. The results of the ANOVA are denoted by asterisks (trend: $^{(*)}0.1 \geq P > 0.05$; significant: $*P \leq 0.05$, $**P \leq 0.01$, $***P \leq 0.001$).

O MUNDO TERÁ QUE AUMENTAR A PRODUÇÃO DE ALIMENTOS EM 70% ATÉ 2040.

Porém, não há área suficiente em regiões com estabilidade política para plantar o suficiente usando agricultura convencional, exceto pelo Brasil

O Brasil terá que entrar na era da *engenharia biológica* para aumentar a produtividade e manter a qualidade dos alimentos

Desenvolvimento

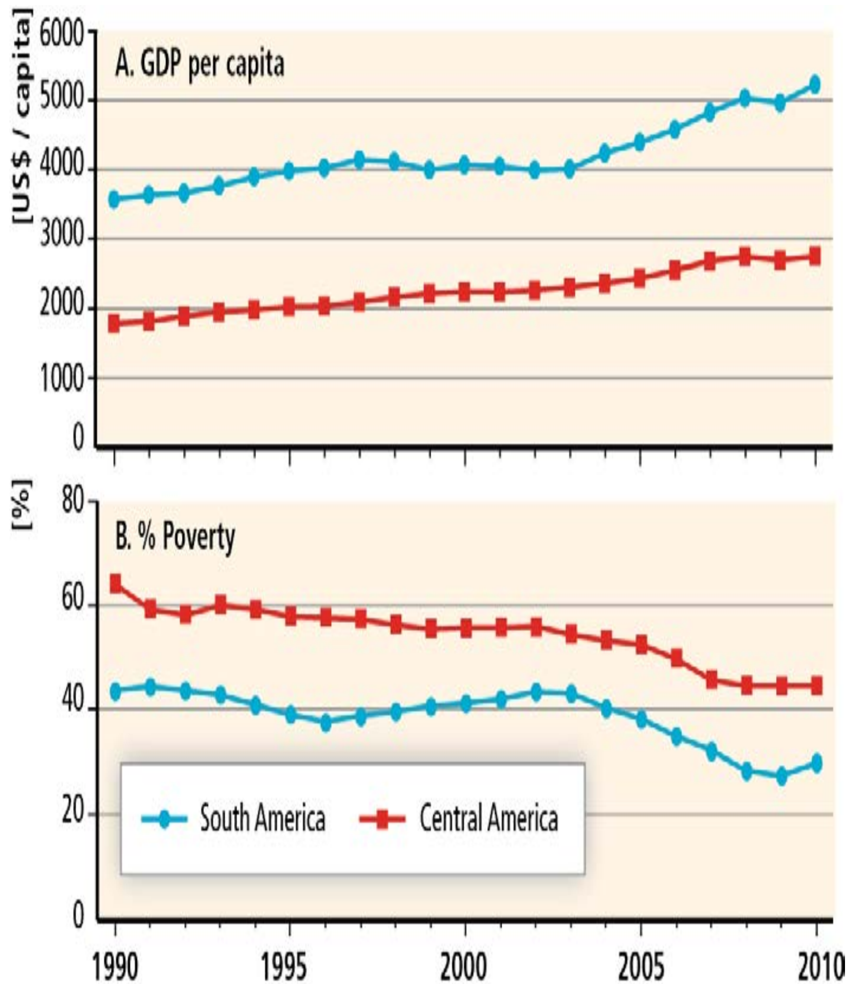


Figure 27-5: Evolution of GDP per capita and poverty (income below US$ 2 per day) from 1990-2010: CA and SA (US-Dollars per inhabitant at 2005 prices and percentages) (ECLAC on the basis of CEPALSTAT (2012) and ECLAC (2011b)).

Três tendências

1. Declínio das populações

2. Populações mais velhas

3. Populações hiper-urbanizadas

Tim Miller
Population Division - CEPAL

Primeira tendência
Declínio das populações

As décadas passadas (1950-2010) foram caracterizadas por rápido crescimento populacional nos países em desenvolvimento

↓

Devido ao rápido declínio na fertilidade humana, abaixo do nível de reposição, as populações irão declinar em vários países no mundo desenvolvido e em desenvolvimento

Análise baseada em dados da ONU (UN World Population Prospects 2010)

Segunda tendência
Populações mais velhas

Em 1950, todos os países do mundo tinham abundância de crianças

↓

Durante o século 21, esta estrutura demográfica deverá desaparecer, dando lugar à sociedades com abundância de idosos

Análise baseada em dados da ONU (UN World Population Prospects 2010

Malmberg - Quatro estágios de transição demográfica

Abundância de crianças (idade de 0-19)

↓

Abundância de jovens (idade de 20-39)

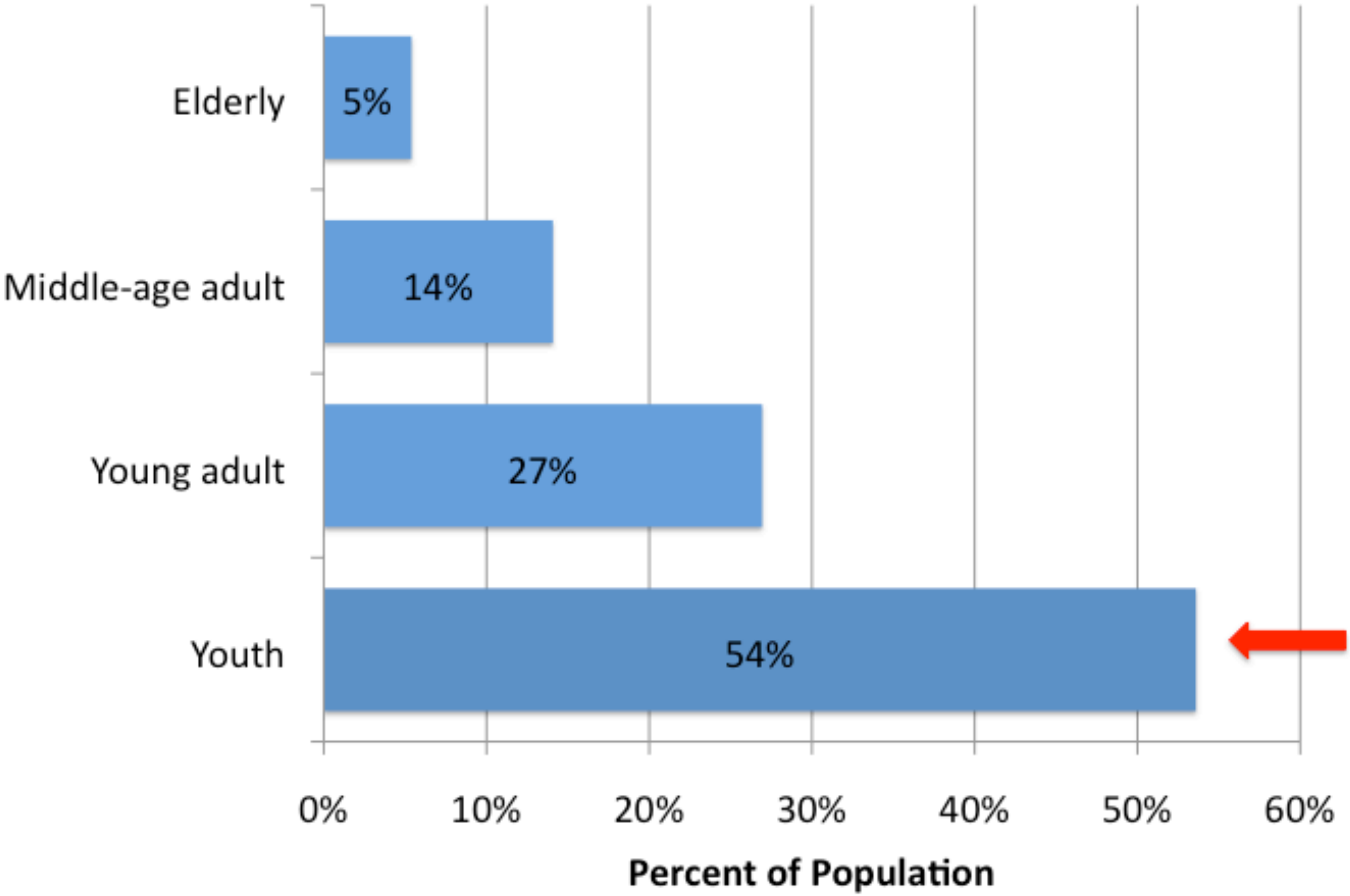
↓

Abundância de meia-idade (idade de 40-59)

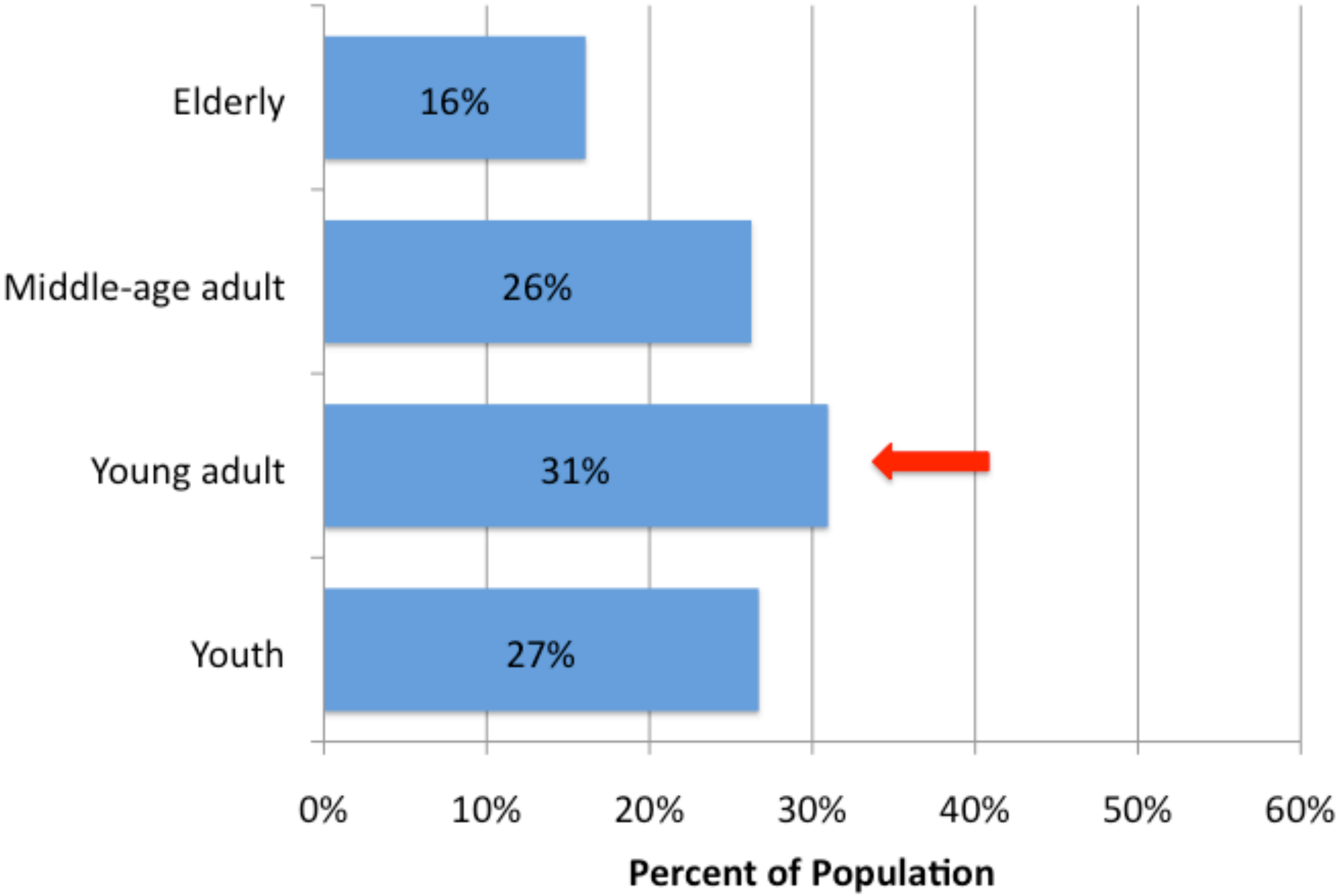
↓

Abundância de idosos (idade de 60 ou +).

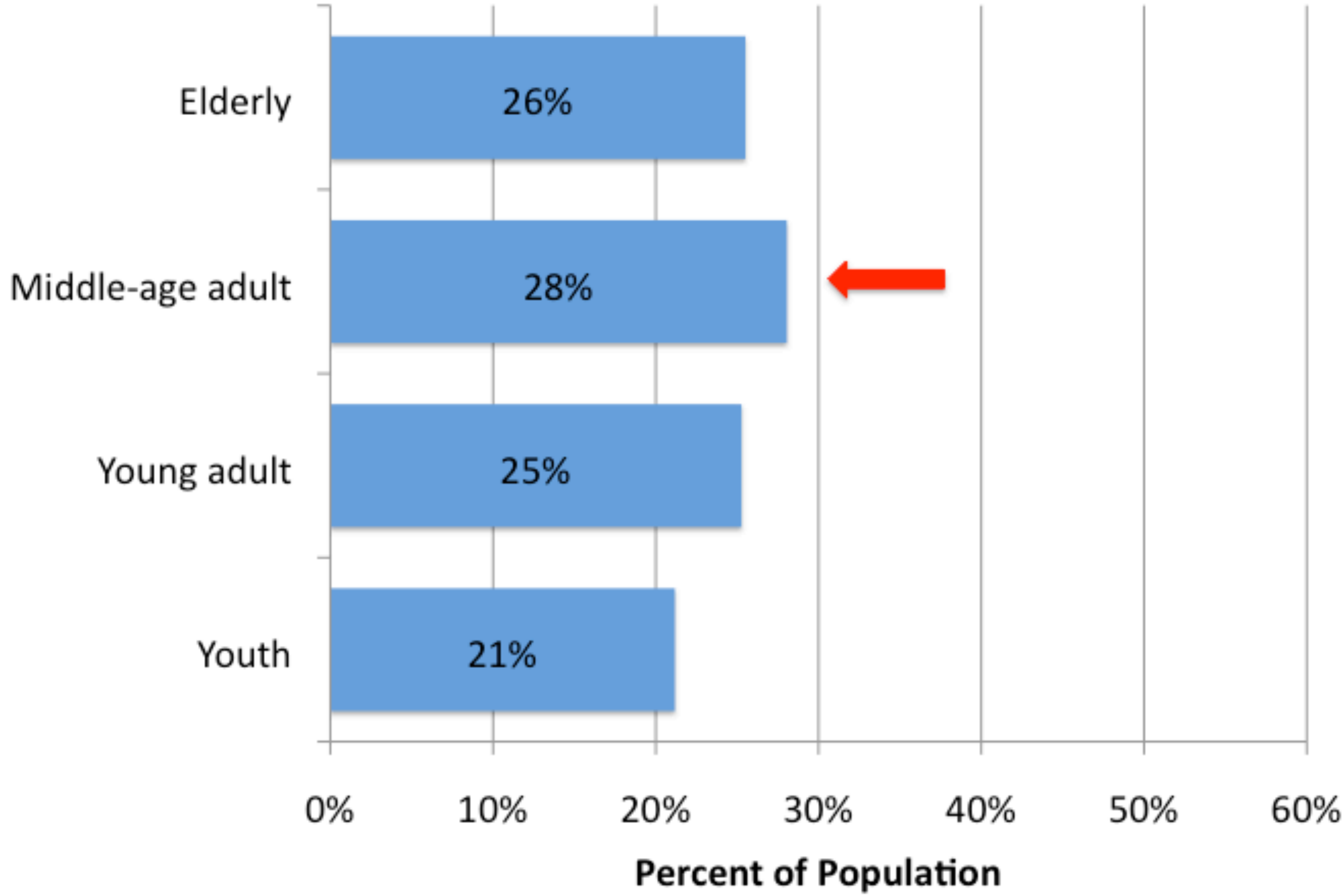
Abundância de crianças: Brasil 1966



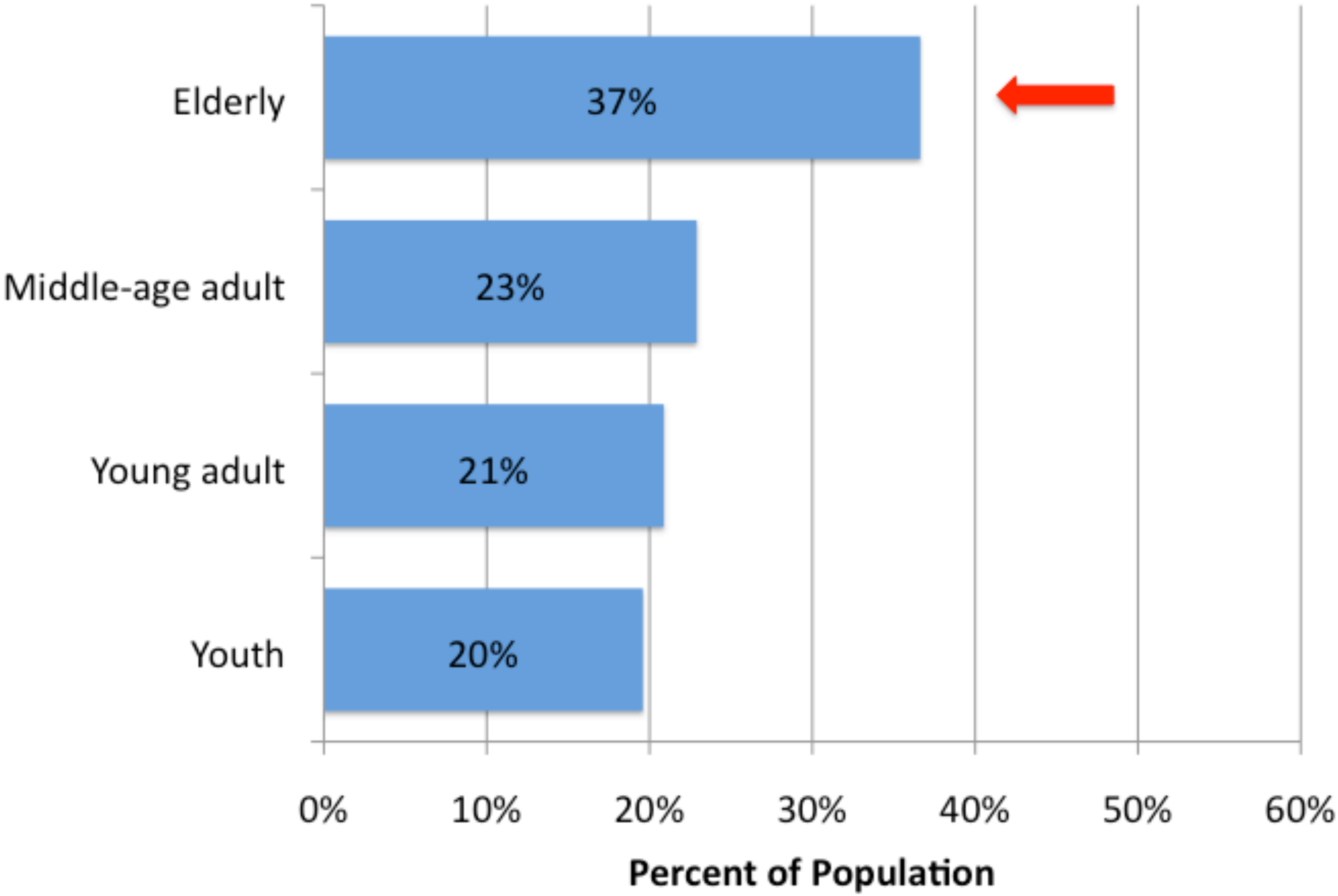
Abundância de jovens-adultos: Brasil 2024



Abundância de meia-idade: Brasil 2044



Abundância de idosos: Brasil 2080



<u>Terceira tendência</u>
Países hiper-urbanizados

A partir de 2009, mais pessoas passaram a viver em áreas urbanas do que em áreas rurais em todo o mundo

Na América Latina, este limiar foi atingido em 1960

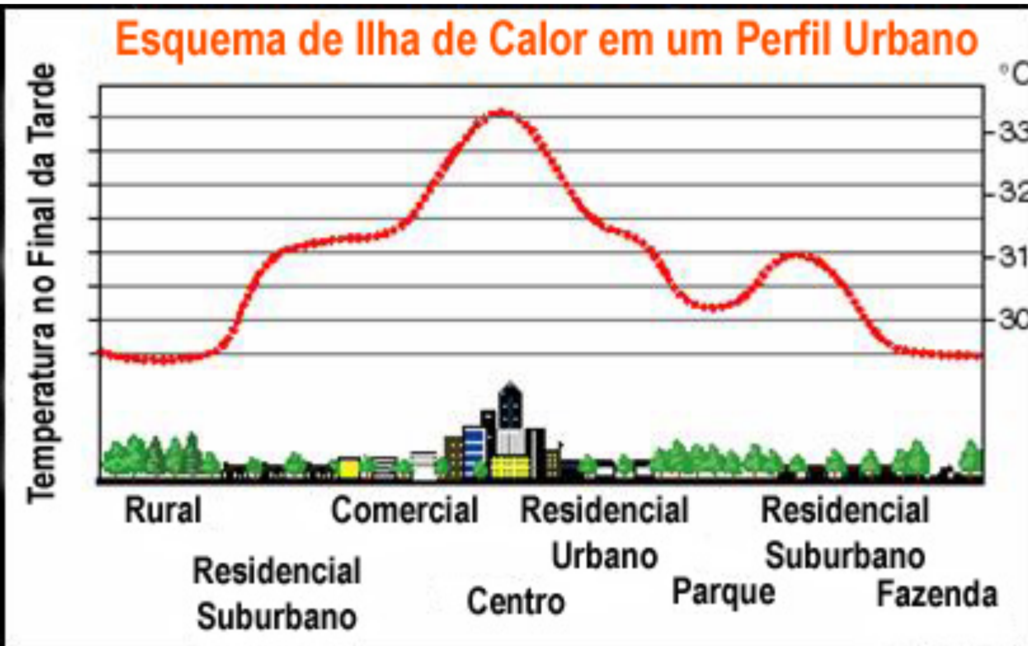
Espera-se uma continuidade de aumento na urbanização, dirigido pelo aumento natural das cidades e por migração de zonas rurais para urbanas.

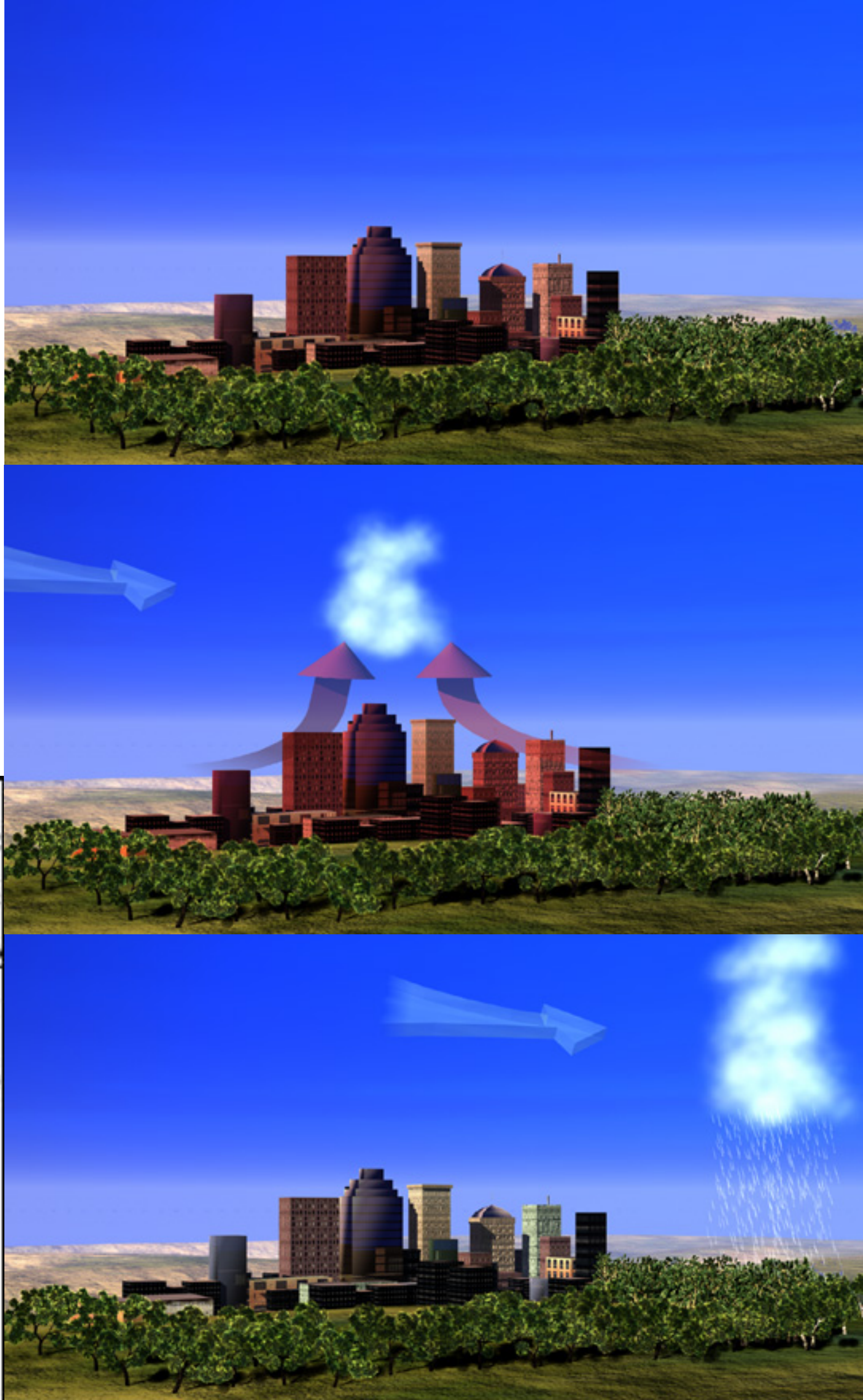
Projeções indicam que em 2050, cerca de 90% das populações latinoamericanas estarão vivendo em cidades

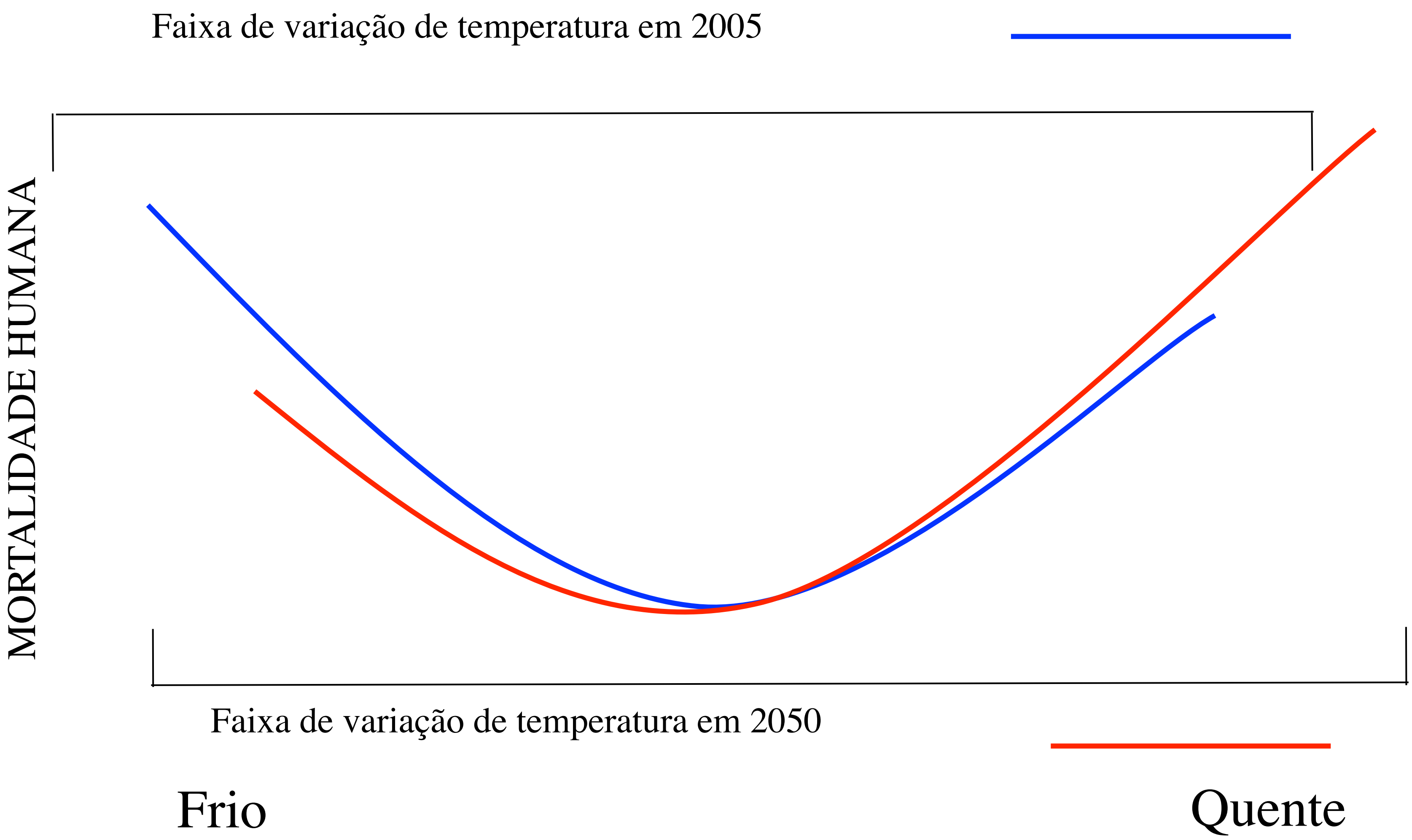
Análise baseada em dados da ONU (UN World Urbanization Prospects 2009

O processo de urbanização intensa reduz consideravelmente a presença de áreas verdes, o que provoca as “**Ilhas de Calor**”.

Segundo a NASA, a chuva que poderia amenizar este fenômeno, acaba por se deslocar para cair no entorno arborizado, dificultando a “lavagem” da **atmosfera poluída** da cidade.







Adaptado de Paulo Saldiva

Por outro lado, seca ou chuvas mais intensas causam enormes prejuízos

Enchentes (ou seca) na cidade de São Paulo

METAS PARA AUMENTAR AS ÁREAS VERDES EM SÃO PAULO

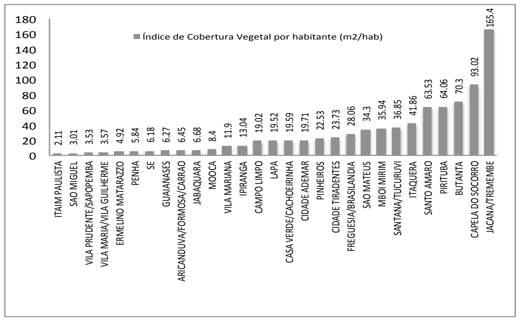
Marcos Buckeridge, Instituto de Biociências,
Universidade de São Paulo
msbuck@usp.br

Distribuição do Índice de Cobertura Vegetal (ICV) na cidade de São Paulo 2012

Preto: regiões de alta prioridade 1 (3 a 8,4)
Vermelho: regiões de prioridade 2 (8,5 a 13)
Azul: regiões de prioridade 3 (13,1 a 22,5)

São 5 faixas de ICV:

0-5 muito baixo
5-11 baixo
11-20 médio-baixo
20-35 médio-alto
35-65 alto
75+ muito alto



Comentários

1 -As regiões contornadas em **PRETO** estão na faixa de muito-baixo e baixo ICV. Portanto, é necessário ter metas mais arrojadas nestas áreas. **TEMOS QUE PLANTAR 57 MIL* ÁRVORES NESTA NESTA REGIÃO**

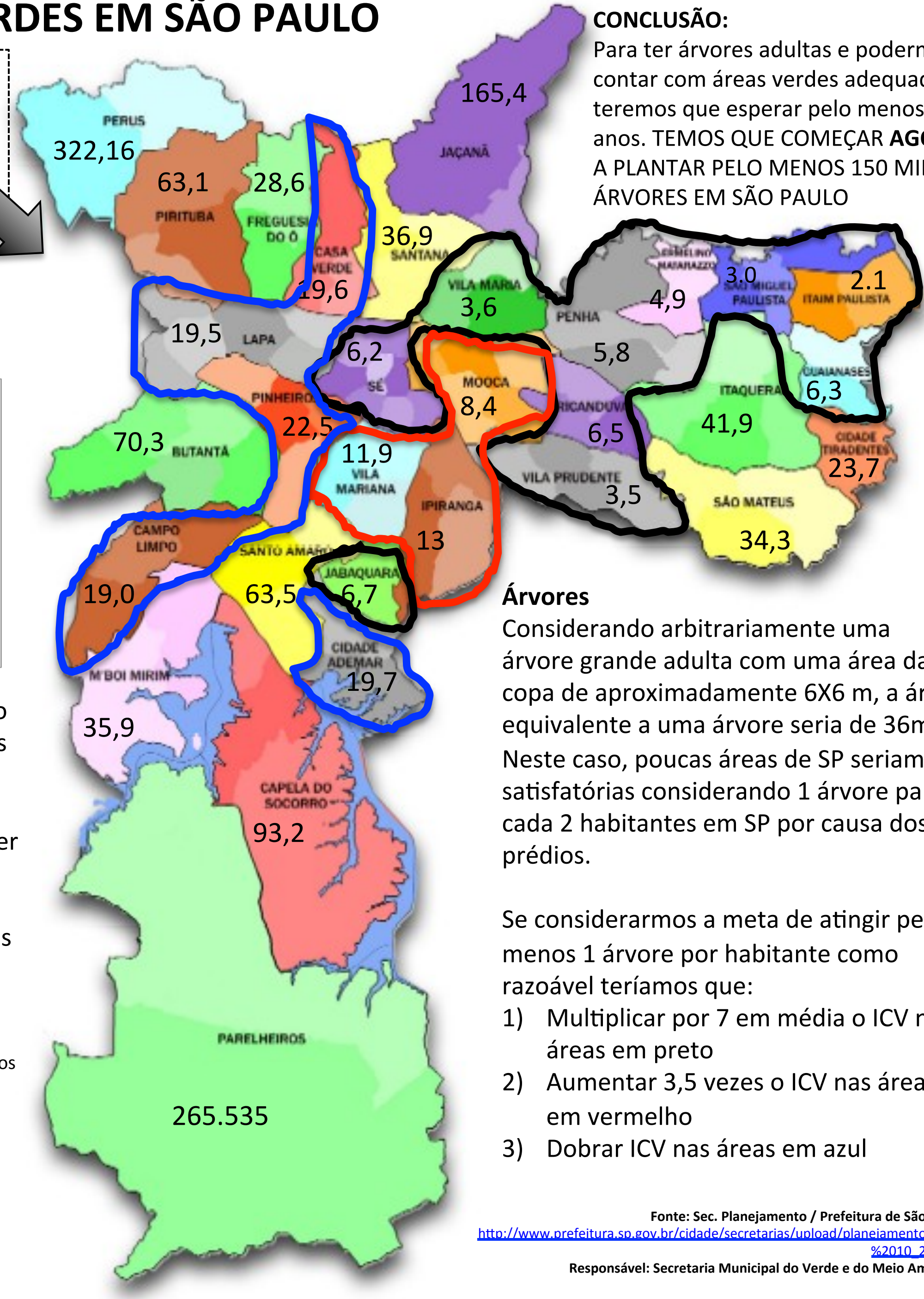
2 - A região contornada em **VERMELHO** tem baixo ICV e tem que ter também uma ação mais intensiva. **TEMOS QUE PLANTAS 22 MIL ÁRVORES NESTA REGIÃO**

3 - As regiões contornadas em **AZUL** necessitam de ações em áreas específicas e manutenção (reposição) em subregiões com menos árvore. **TEMOS QUE PLANTAS 66 MIL ÁRVORES NESTA REGIÃO**

*Se considerarmos 1 árvore por habitante, o que alguns acreditam ser o ideal, estes números dobram

Regiões como Butantã, Santo Amaro e Itaquera têm que ser vistas com mais detalhe. No Butantã, por exemplo, a USP é muito arborizada e causa diferenças. A Fazenda do Carmo também faz diferença em itaquera.

Regiões mais periféricas ao norte, sul e também no leste são influenciadas pelas Matas nativas em volta da cidade. É preciso olhar para as áreas urbanizadas para saber o real ICV



CONCLUSÃO:
Para ter árvores adultas e podermos contar com áreas verdes adequadas, teremos que esperar pelo menos 20 anos. TEMOS QUE COMEÇAR **AGORA** A PLANTAR PELO MENOS 150 MIL ÁRVORES EM SÃO PAULO

Árvores

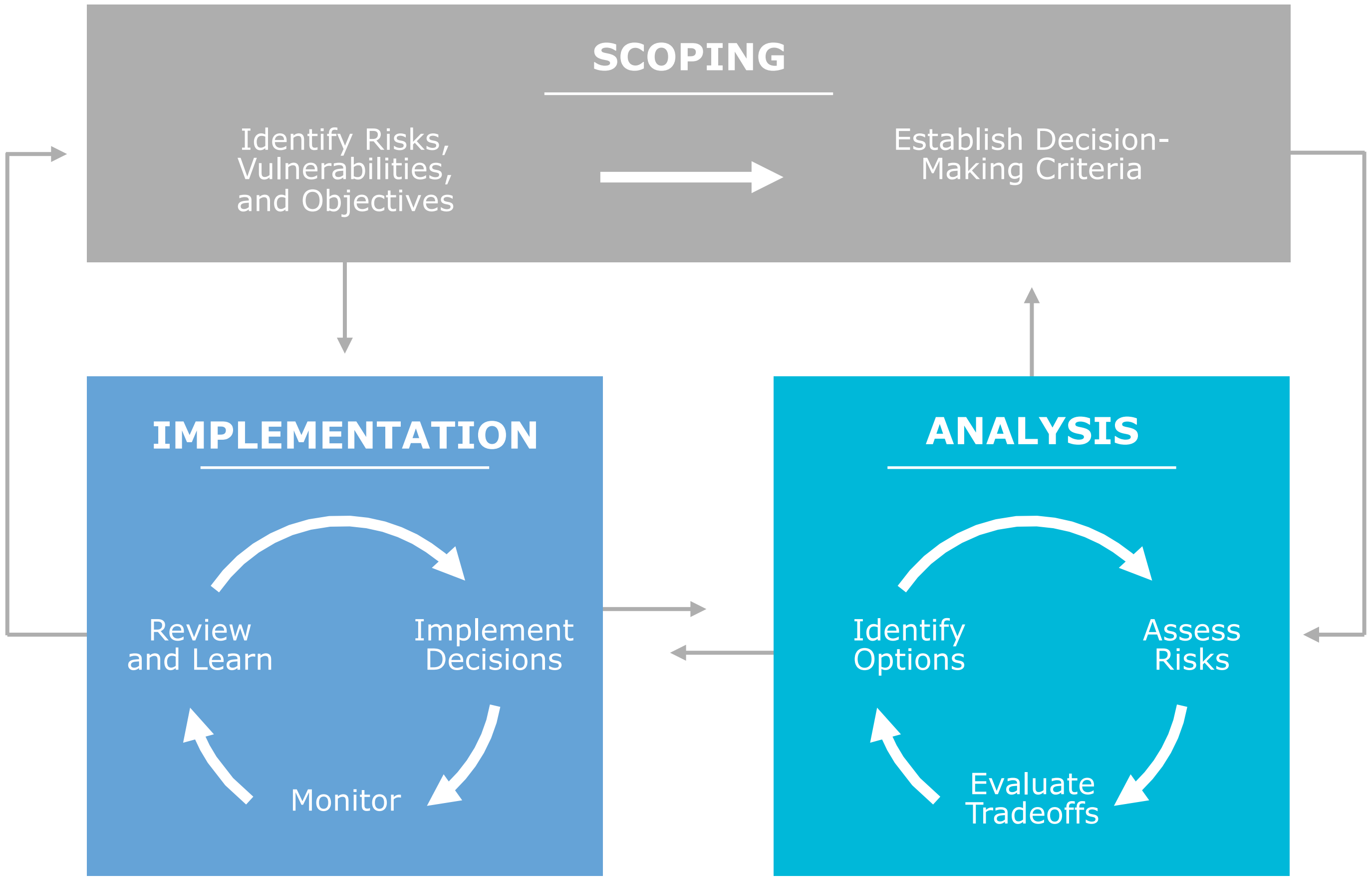
Considerando arbitrariamente uma árvore grande adulta com uma área da copa de aproximadamente 6X6 m, a área equivalente a uma árvore seria de $36m^2$. Neste caso, poucas áreas de SP seriam satisfatórias considerando 1 árvore para cada 2 habitantes em SP por causa dos prédios.

Se considerarmos a meta de atingir pelo menos 1 árvore por habitante como razoável teríamos que:

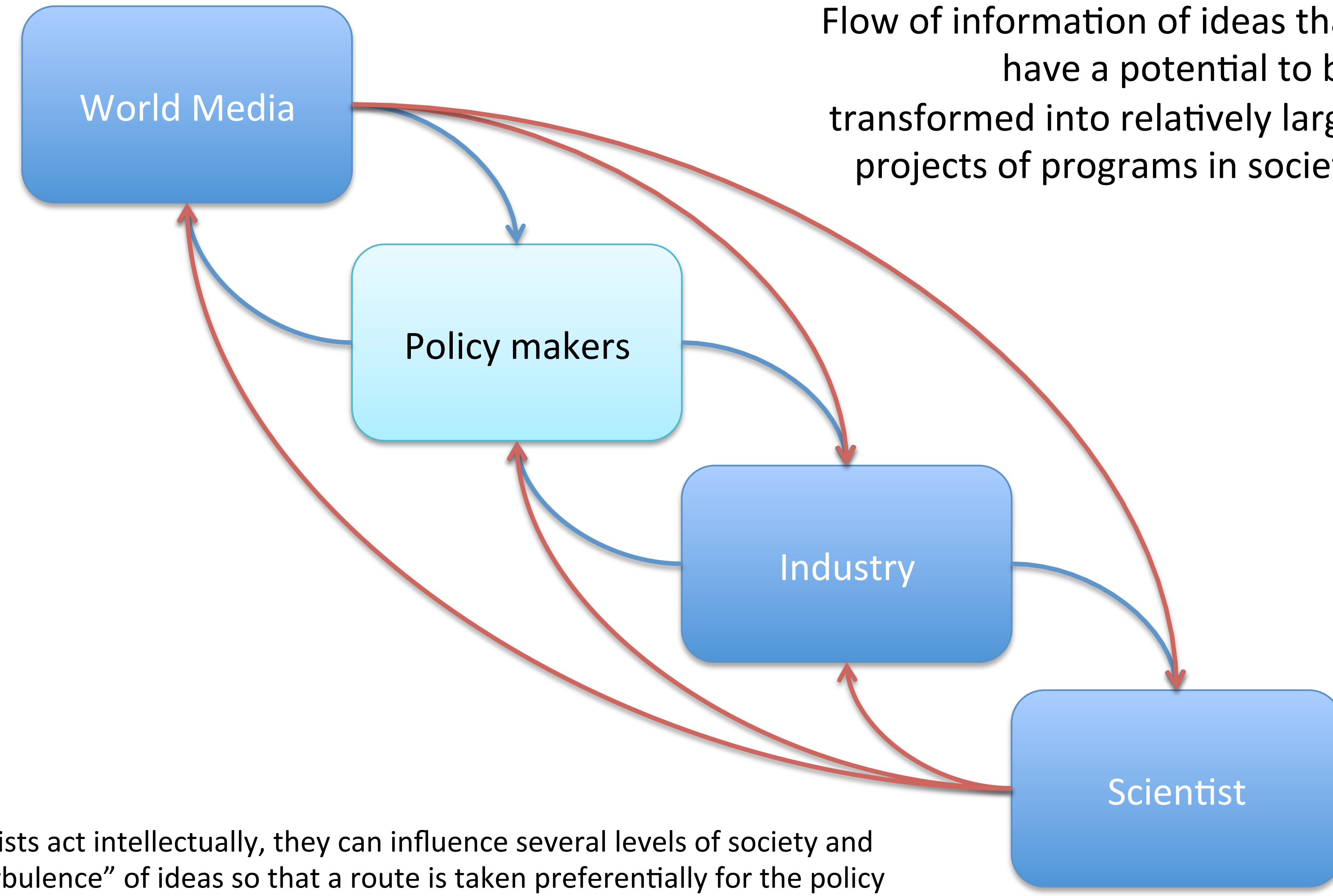
1) Multiplicar por 7 em média o ICV nas áreas em preto
2) Aumentar 3,5 vezes o ICV nas áreas em vermelho
3) Dobrar ICV nas áreas em azul

Fonte: Sec. Planejamento / Prefeitura de São Paulo.
http://www.prefeitura.sp.gov.br/cidade/secretarias/upload/planejamento/Verde%2010_2013.xls
Responsável: Secretaria Municipal do Verde e do Meio Ambiente

A ESSÊNCIA DA ADAPTAÇÃO

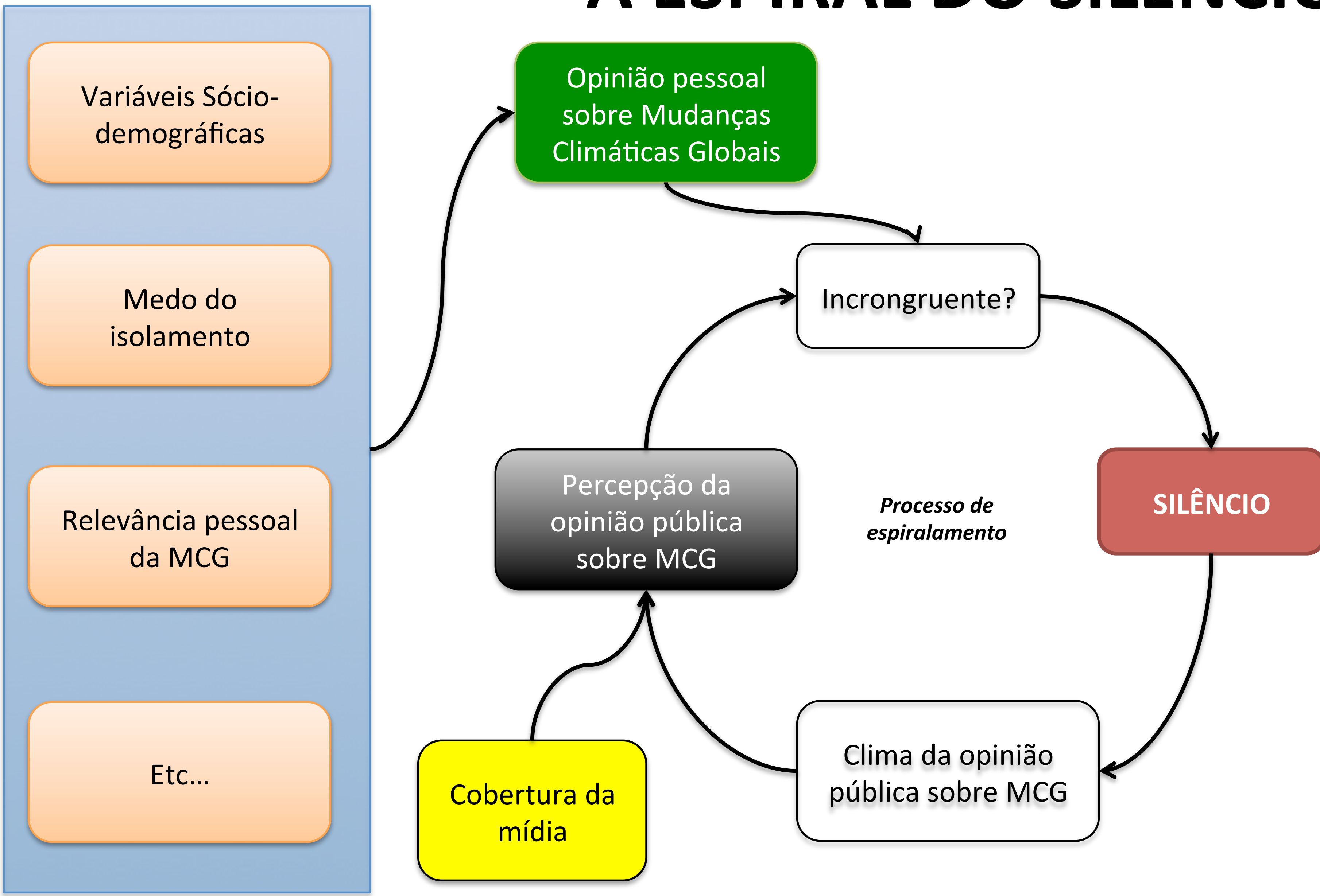

SCOPING
Identify Risks, Vulnerabilities, and Objectives
Establish Decision-Making Criteria
IMPLEMENTATION
Review and Learn
Implement Decisions
Monitor
ANALYSIS
Identify Options
Assess Risks
Evaluate Tradeoffs

Flow of information of ideas that have a potential to be transformed into relatively large projects of programs in society

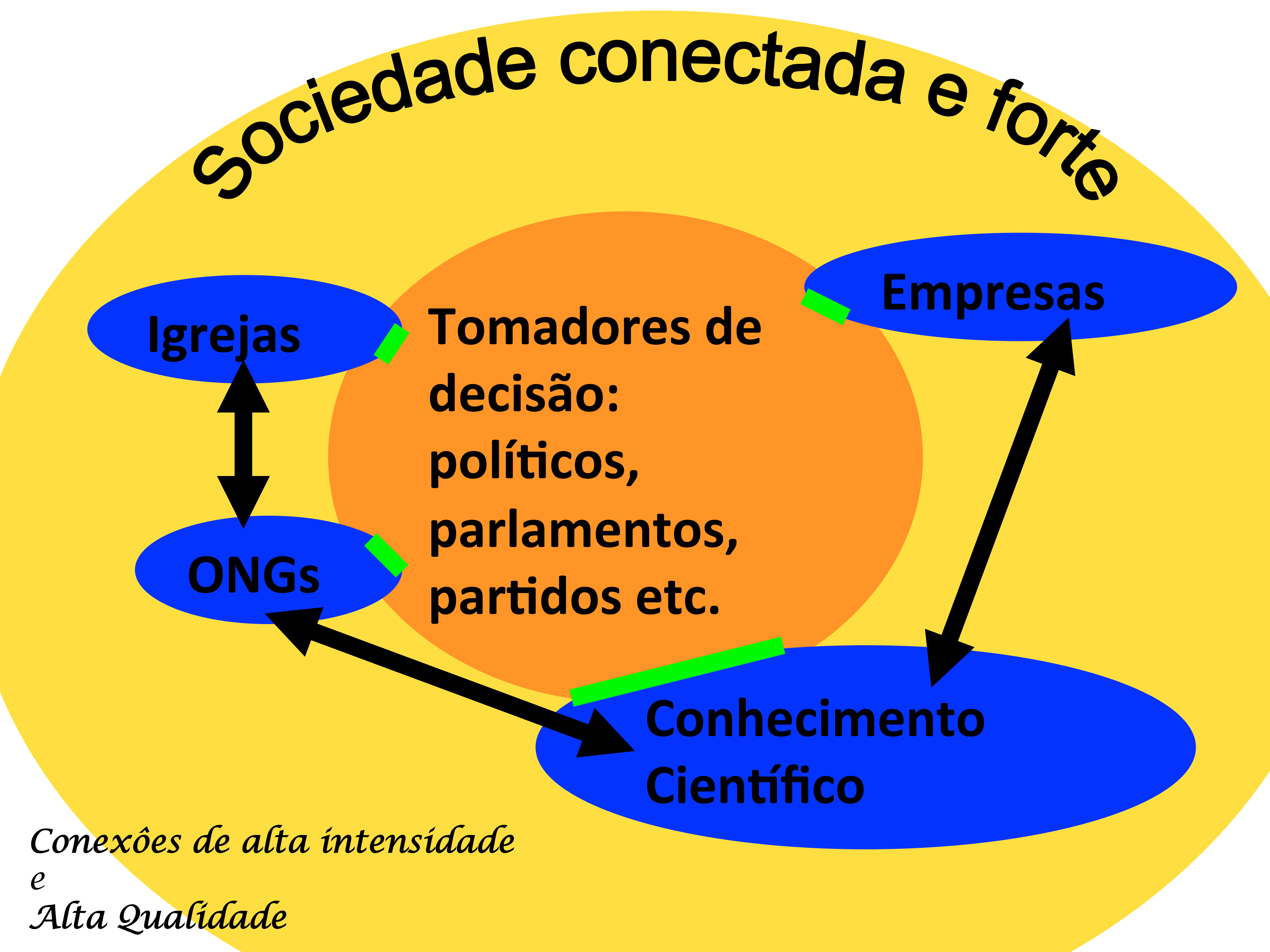


When scientists act intellectually, they can influence several levels of society and provoke "turbulence" of ideas so that a route is taken preferentially for the policy makers. The latter is key in the society because this level will decide whether or not to invest in a given idea. Policy makers also have strong influence on industry and usually prompt access to the media. When scientists cannot reach Policy Makers, they can try to influence the indirecty. One of the most effective ways is by reaching world media.

A ESPIRAL DO SILÊNCIO



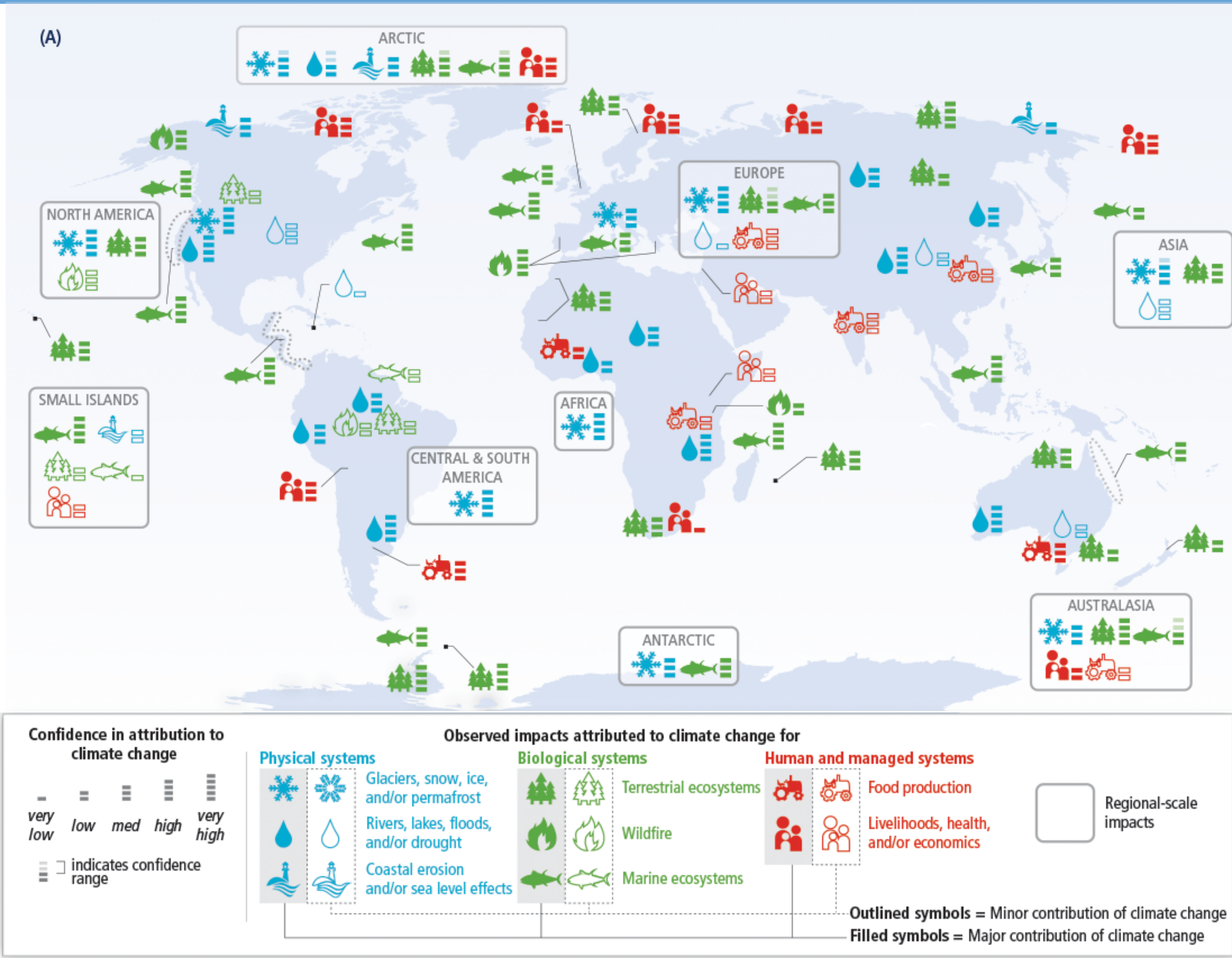
Scheufele, D.A. (2007) Opinion climates, spirals of silence, and biotechnology: public opinion as a heuristic for scientific decision making In D. Brossard, J. Shanahan & T.C. Nesbit (Eds.) The public, the media and agricultural biotechnology. An international casebook. pp.231-241. Cambridge, MA: Oxford University Press/CABI.



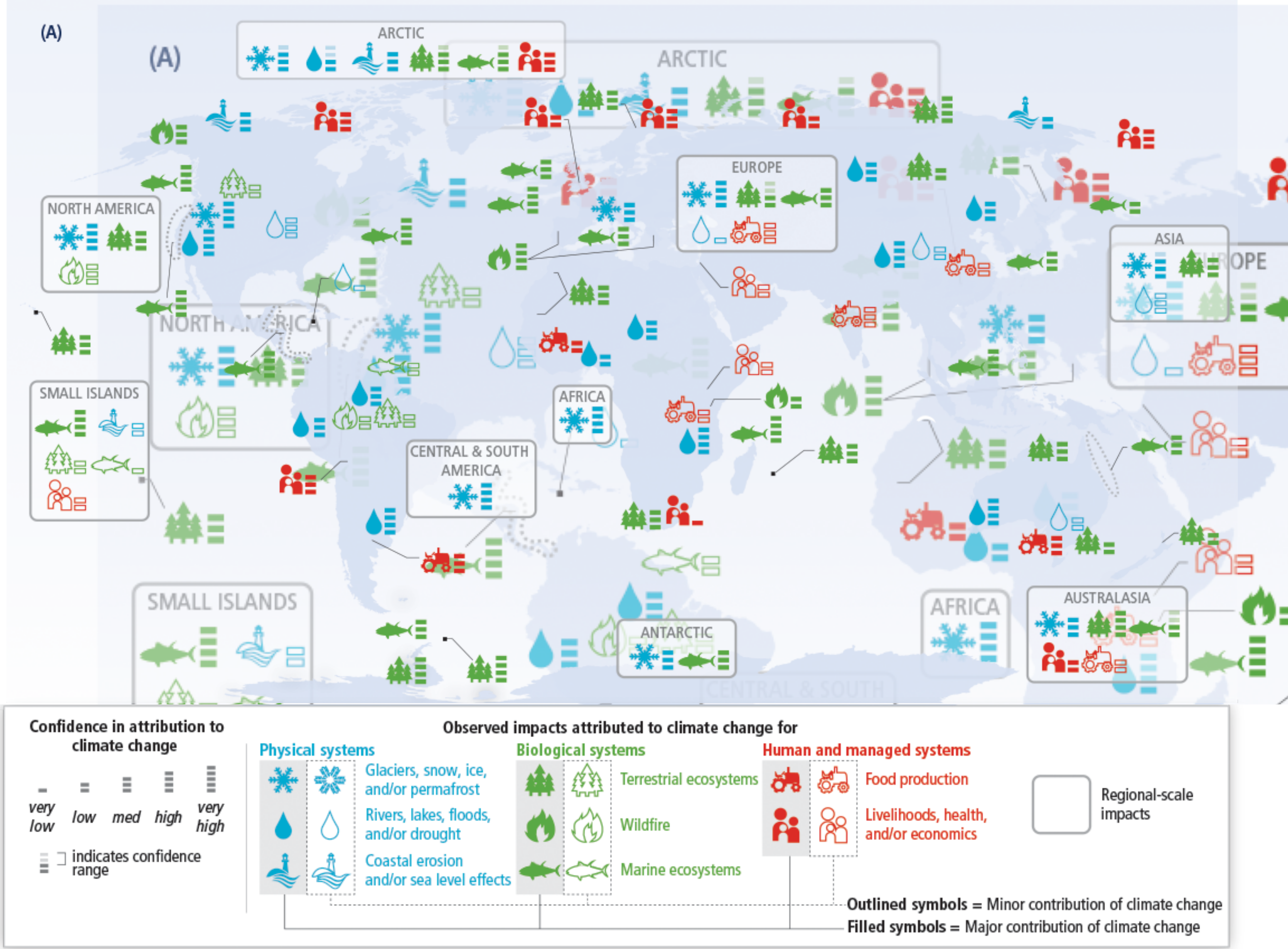
Sociedade conectada e forte
Igrejas
Tomadores de decisão: políticos, parlamentos, partidos etc.
Empresas
ONGs
Conhecimento Científico
Conexões de alta intensidade
e
Alta Qualidade

Obrigado

msbuck@usp.br
http://msbuckeridge.wordpress.br



(A)
ARCTIC
NORTH AMERICA
EUROPE
ASIA
SMALL ISLANDS
AFRICA
CENTRAL & SOUTH AMERICA
ANTARCTIC
AUSTRALASIA
Confidence in attribution to climate change
very low
low
med
high
very high
indicates confidence range
Observed impacts attributed to climate change for
Physical systems
Glaciers, snow, ice, and/or permafrost
Rivers, lakes, floods, and/or drought
Coastal erosion and/or sea level effects
Biological systems
Terrestrial ecosystems
Wildfire
Marine ecosystems
Human and managed systems
Food production
Livelihoods, health, and/or economics
Regional-scale impacts
Outlined symbols = Minor contribution of climate change
Filled symbols = Major contribution of climate change


(A)
ARCTIC
NORTH AMERICA
EUROPE
ASIA
SMALL ISLANDS
AFRICA
CENTRAL & SOUTH AMERICA
ANTARCTIC
AUSTRALASIA
Confidence in attribution to climate change
very low
low
med
high
very high
indicates confidence range
Observed impacts attributed to climate change for
Physical systems
Glaciers, snow, ice, and/or permafrost
Rivers, lakes, floods, and/or drought
Coastal erosion and/or sea level effects
Biological systems
Terrestrial ecosystems
Wildfire
Marine ecosystems
Human and managed systems
Food production
Livelihoods, health, and/or economics
Regional-scale impacts
Outlined symbols = Minor contribution of climate change
Filled symbols = Major contribution of climate change

Chapter 27. Central and South America

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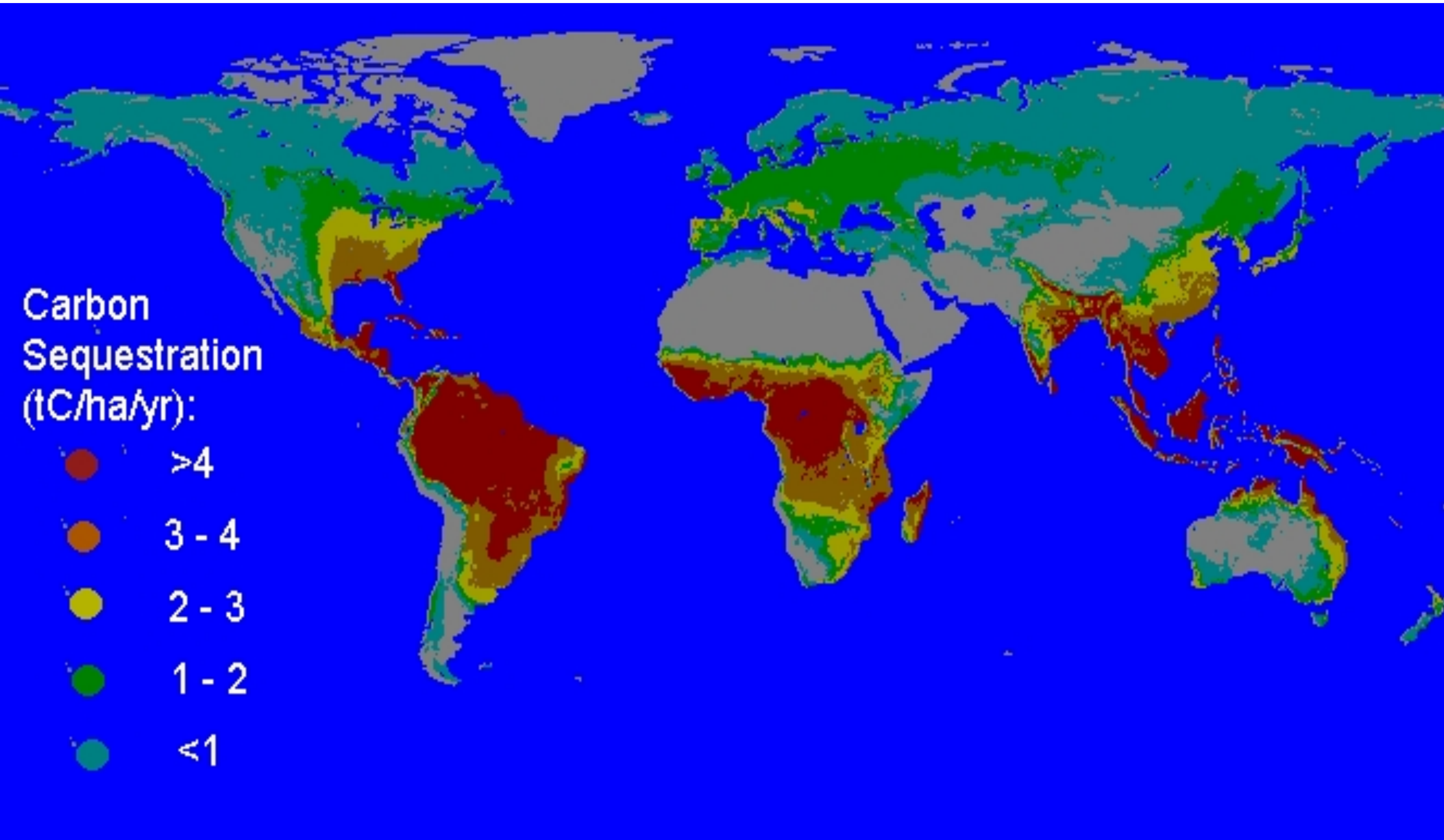
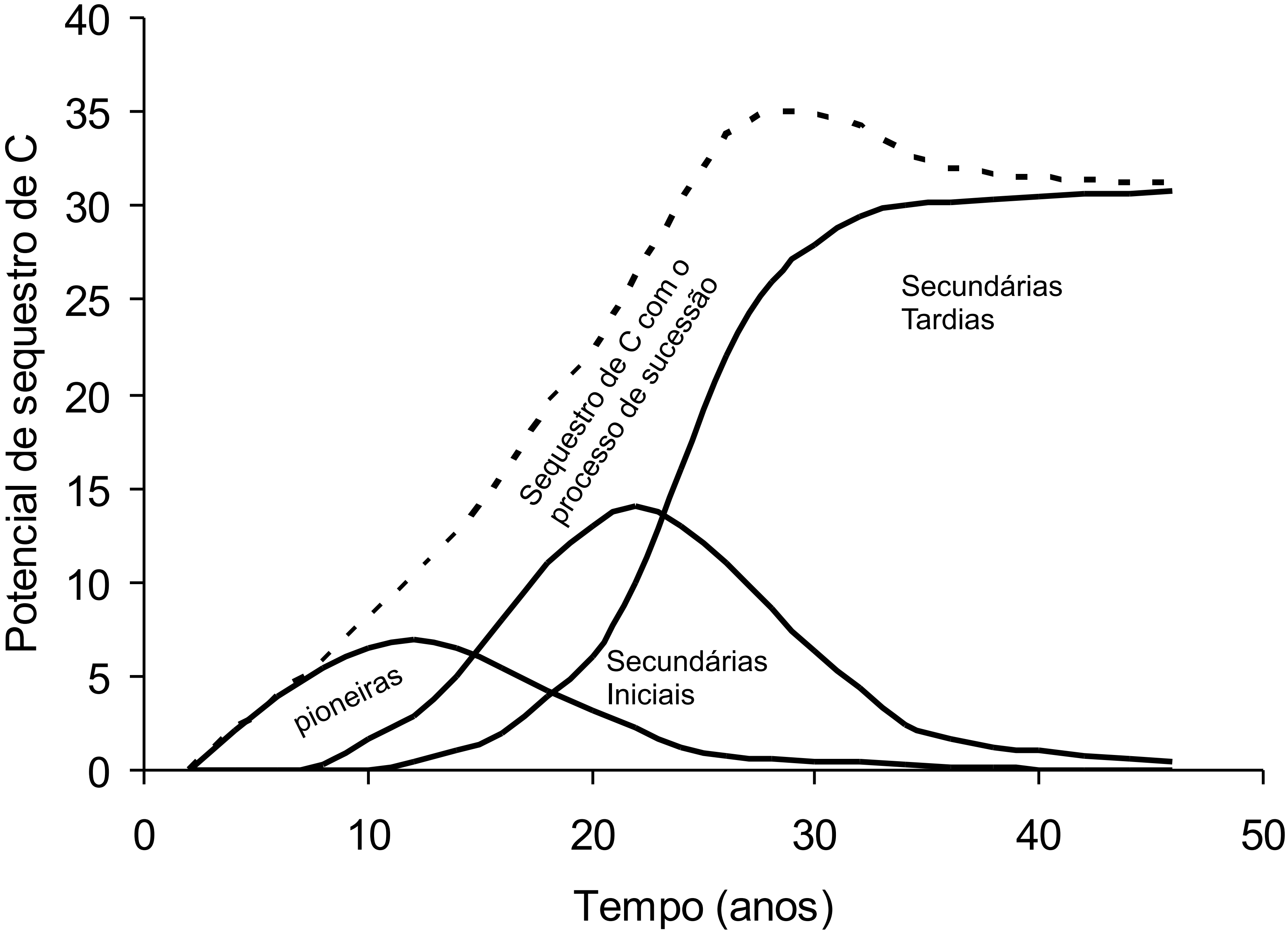
Global carbon stocks in vegetation and top 1 m of soils (based on WBGU, 1998).

Biome	Area (10^6 km^2)	Carbon Stocks (Gt C) *Vegetation*	*Soils*	*Total*
Tropical forests	17.6	212	216	428



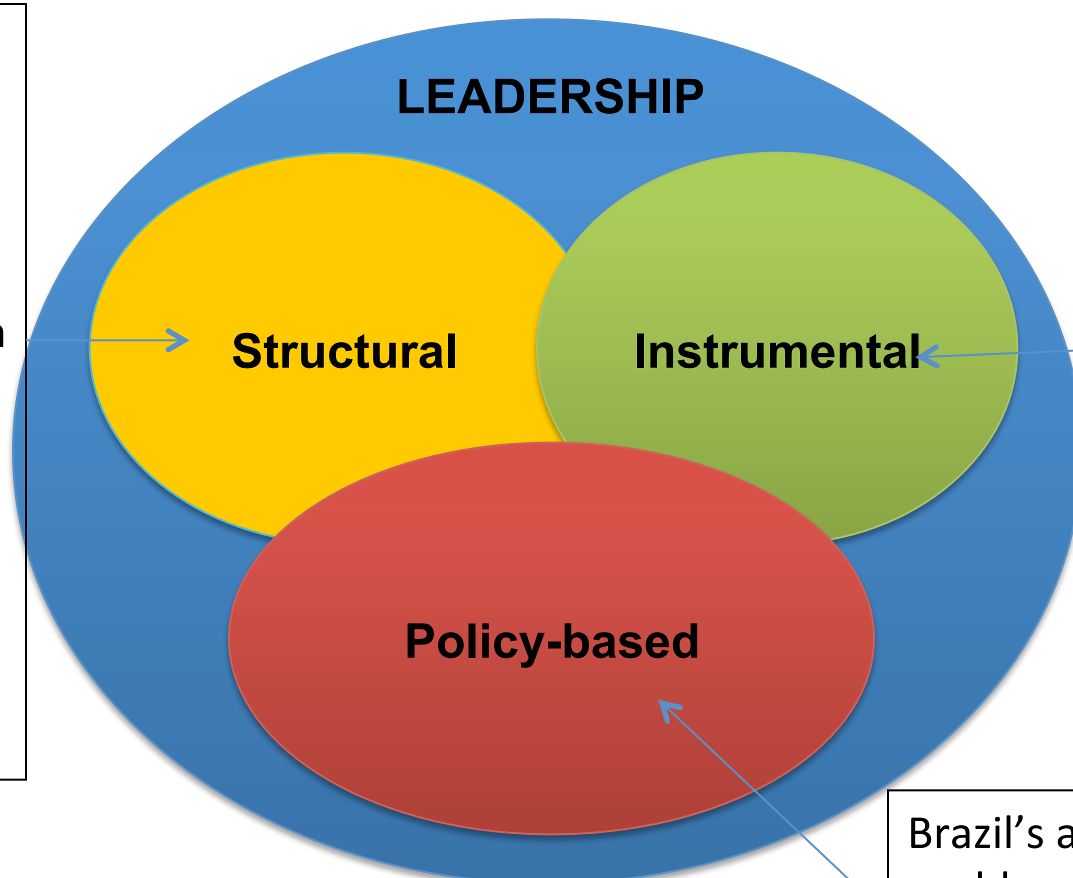


Potencial de sequestro de C
40
35
30
25
20
15
10
5
0
0
10
20
30
40
50
Tempo (anos)
Sequestro de C com o
processo de sucessão
Secundárias
Tardias
Secundárias
Iniciais
pioneiras

Leadership Typologies

- This paper is based on a framework by Papa & Gleason (2012)

Whether Brazil has the resources and will to deliver on its pledges to assist African nations to develop their biofuels markets in a sustainable way



How well Brazil can use diplomatic skills to pursue issue-linkages and engineer winning coalitions.

Brazil's ability to frame problems, promote particular policy solutions and implement them.

Stavros Afionis, Nicola Favretto, Marcos Buckeridge, Lidsay Stringer

Conclusion

Policy-based leadership

Structural leadership

Instrumental leadership