

**The Brazilian Atlantic Forest: How much is left, how is the remaining forest distributed and what are the possible consequences of climate change**

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# **The Brazilian Atlantic Forest: How much is left, and how is the remaining forest distributed? Implications for Conservation**

*Ribeiro, MC, Metzger, JP, Martensen, AC, Ponzoni, FJ & Hirota, MM.  
2009.*

Biological Conservation Vol: 142-6 Pp: 1141-1153

# **The Brazilian Atlantic Forest: a shrinking biodiversity hotspot**

*Ribeiro, MC, Martensen, AC, Metzger, JP, Tabarelli, M, Scarano, F,  
Fortin, MJ*

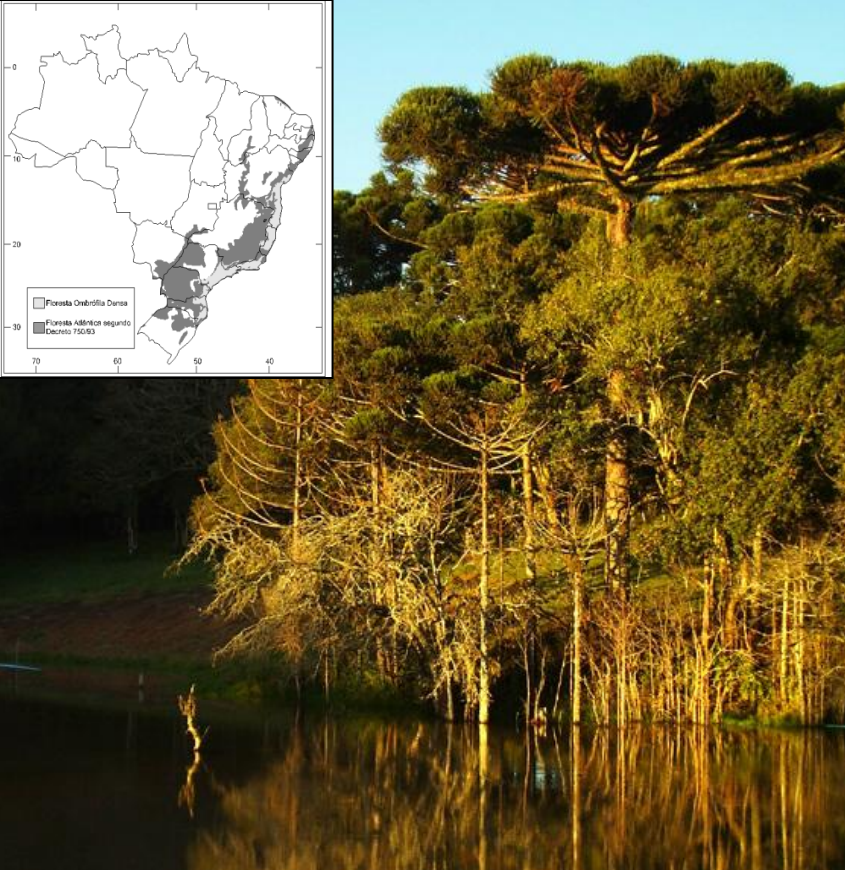
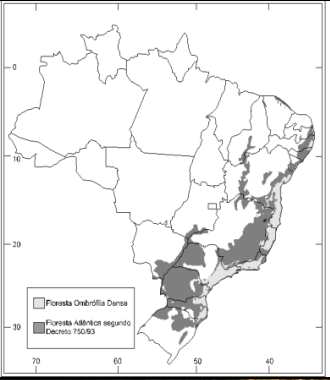
*In Press.* Zachos, FE, Habel, JC. (eds.), Biodiversity Hotspots, Springer  
Publishers

# Top Biodiversity hot spot!



Up to 8% of the world's species!

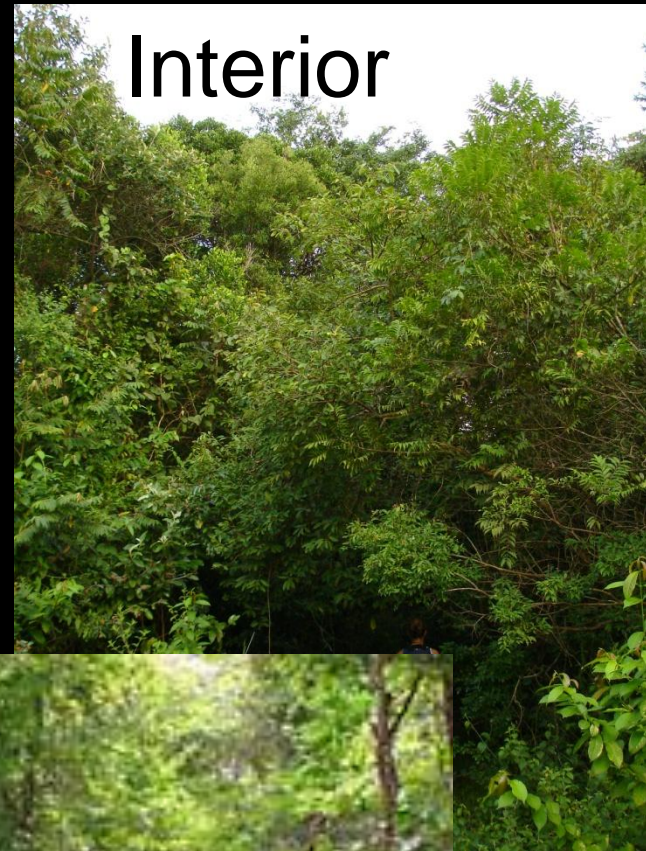
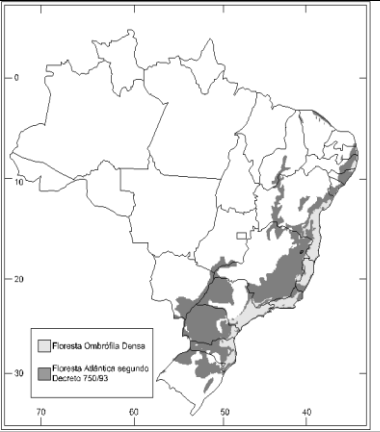




North  
-  
South



29 of latitudinal variation



coastal



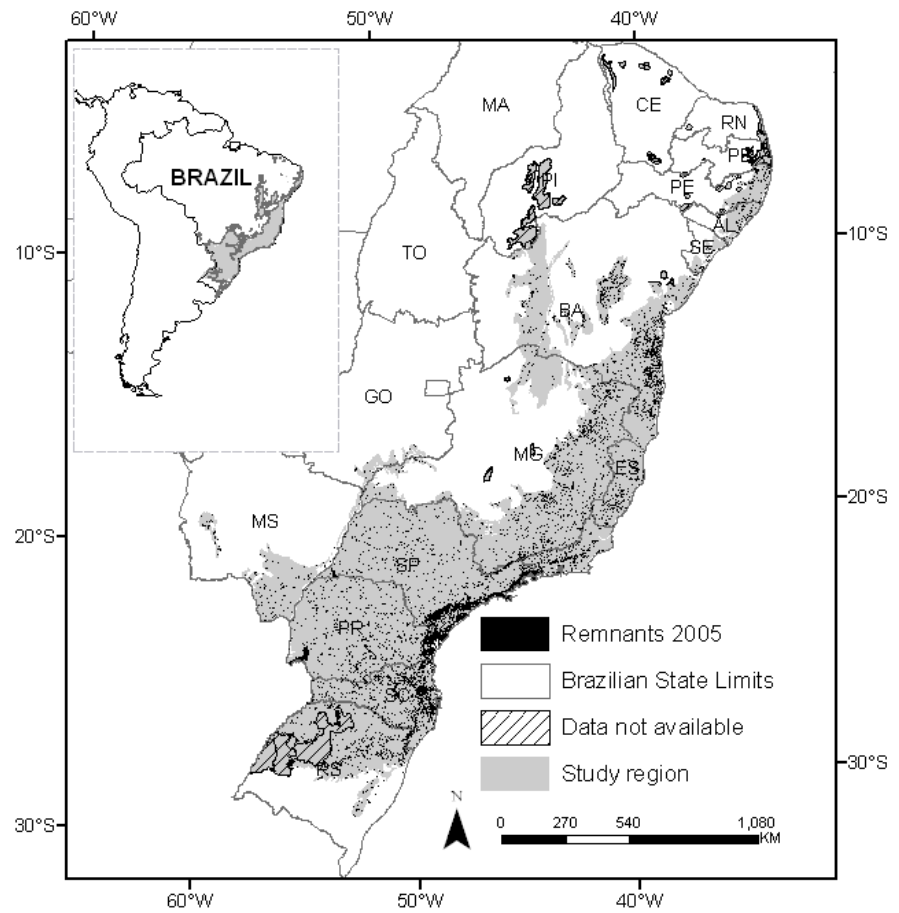
25 of longitudinal variation

# Complex relief



# Atlantic Forest landscape structure

- Amount of Forest (% of remaining forest)
- Forest Configuration
  - Fragment size distribution
  - Edge/Interior
  - Conectivity, by different gap-crossings
    - Area source
    - Matrix type
  - Isolation
    - Importance of small fragments
- Conservation structure
  - Conservation units
  - Distance to Conservation Units



# How much is left?

11.26 % forests

0.47 % mangles and restingas

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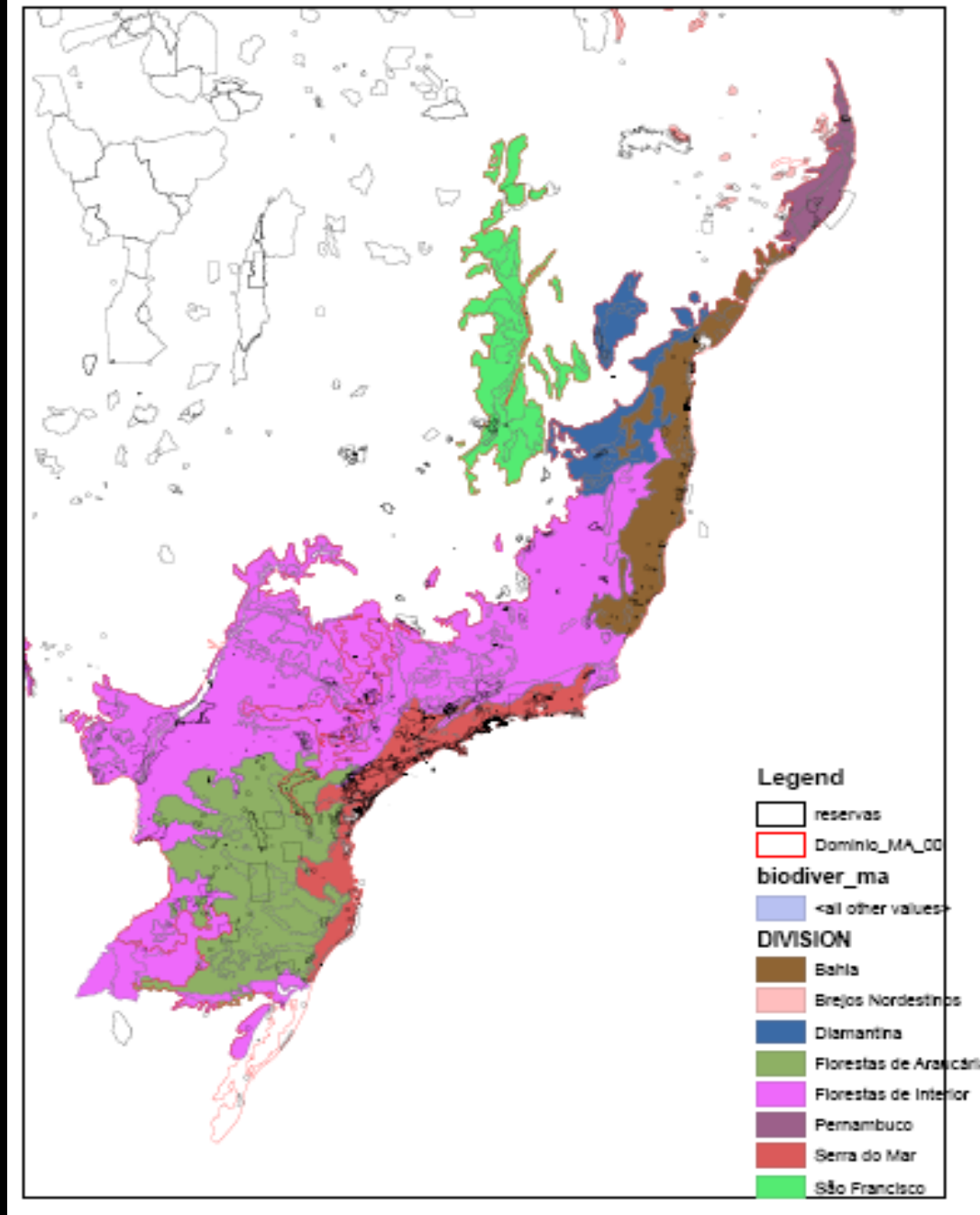
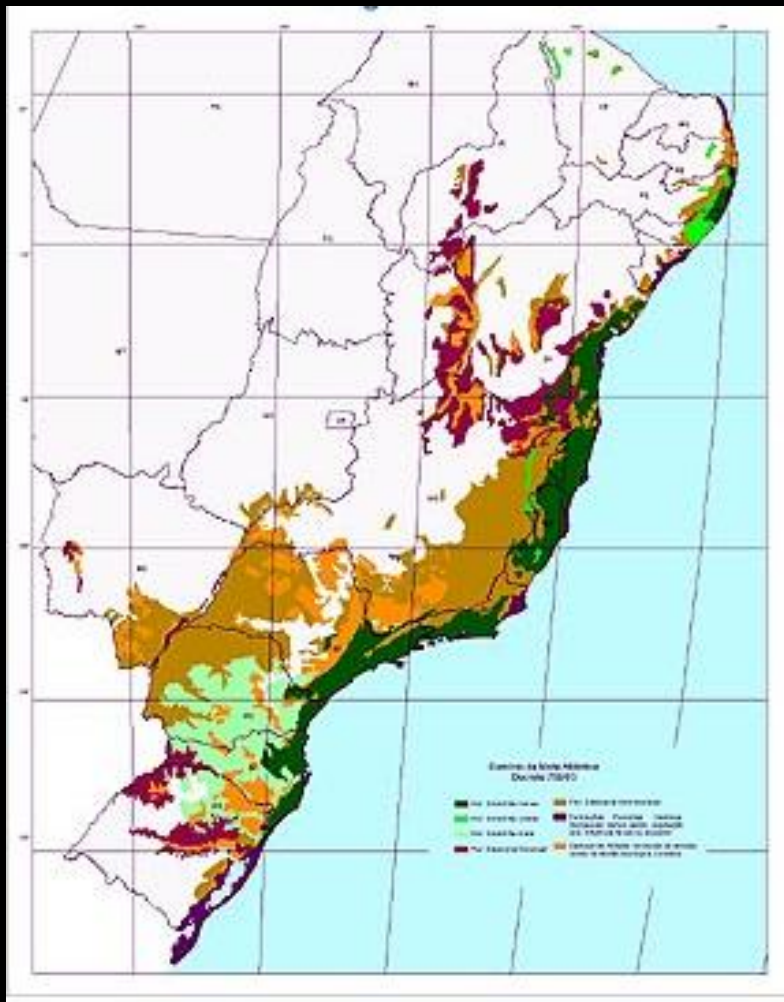
**11.73 % Total**

Mapping error : Mapped as forest and it is not: 3%

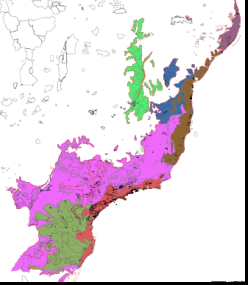
Mapped as non-forest and it is: 37%

**Today : 11.4 a 16%**



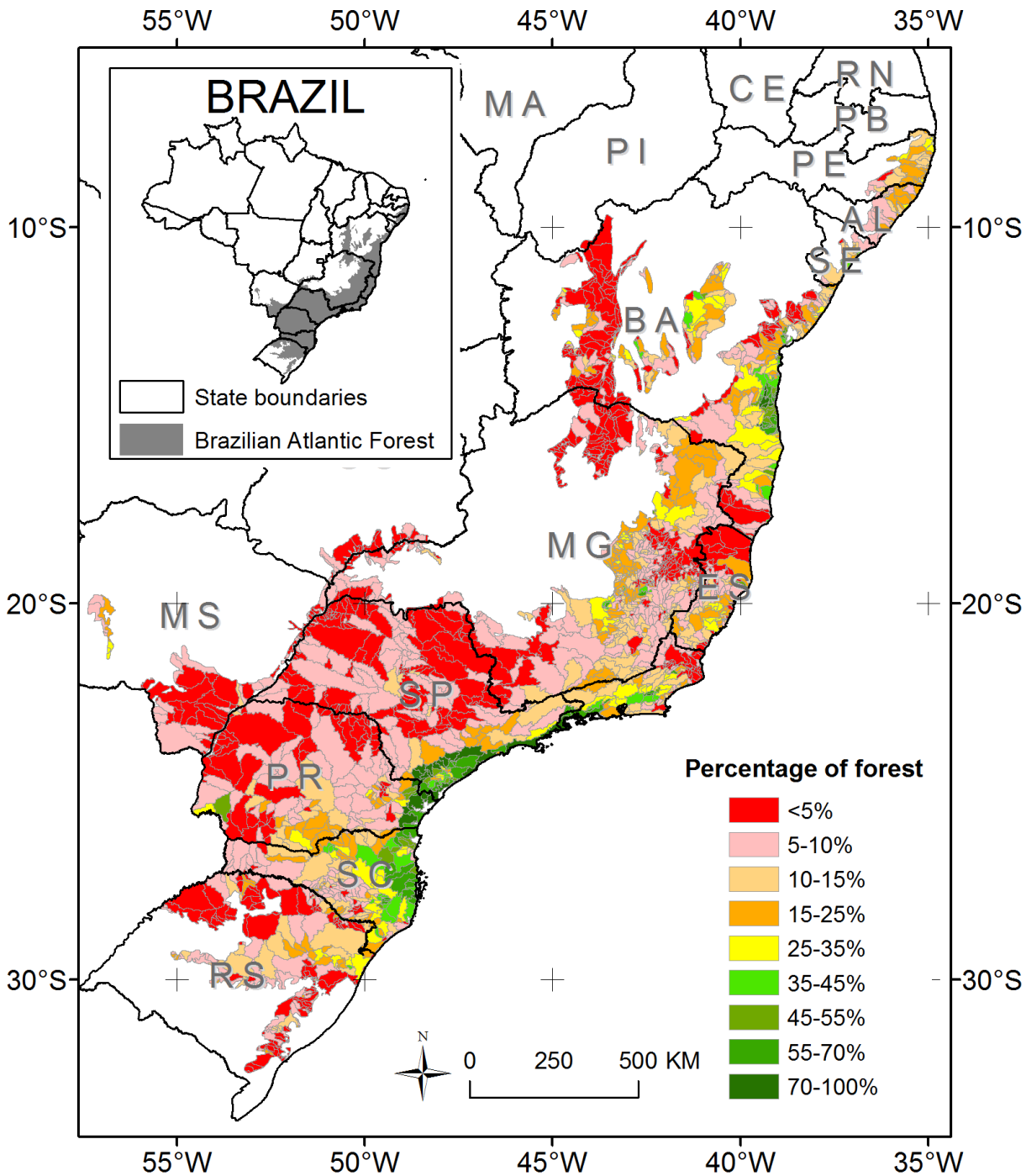


# Atlantic Forest heterogeneity



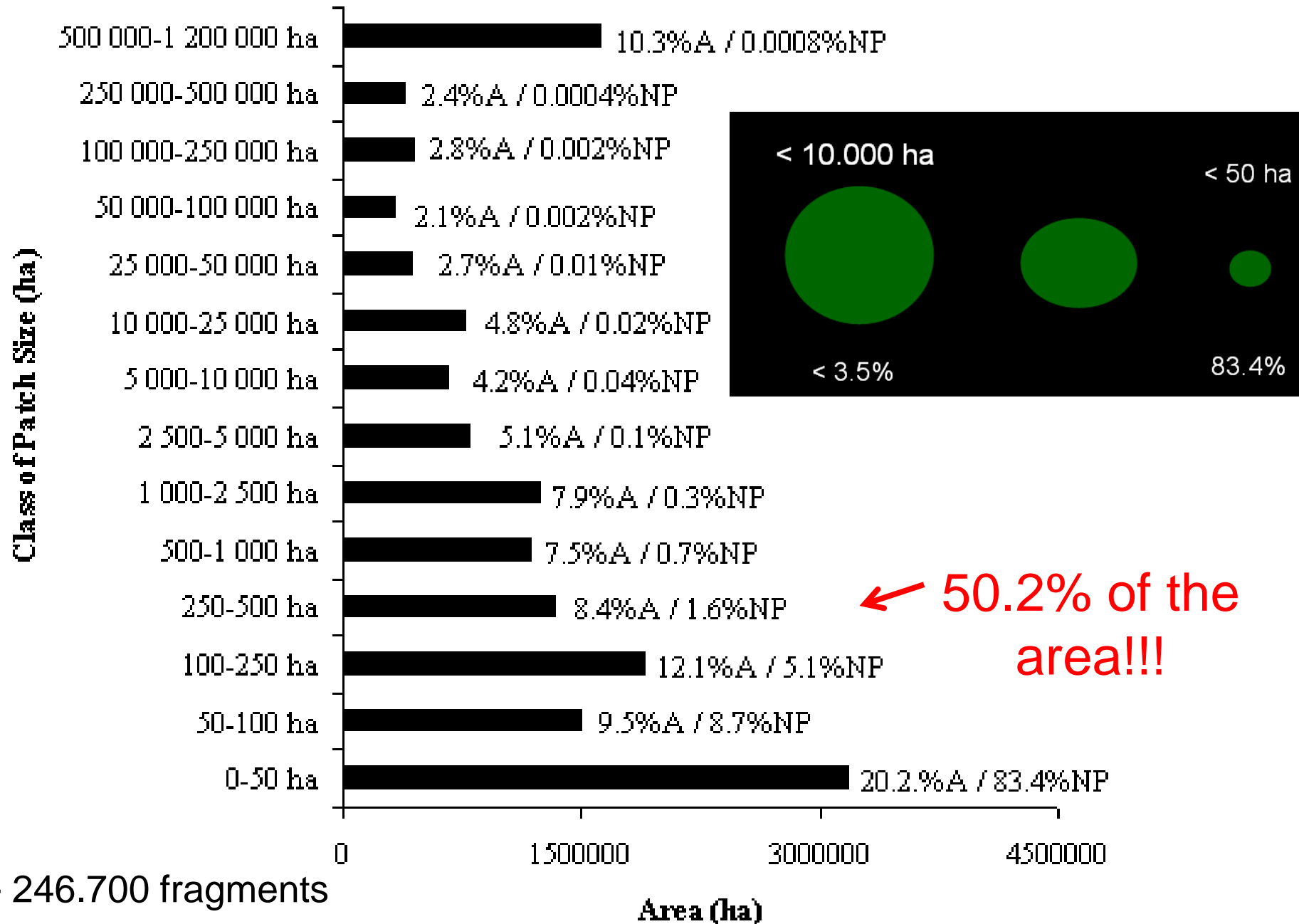
# Where it remains...

Biogeographical subregion	Forest today (ha)	% original
Araucaria	3 202 134	12,6
Bahia	2 162 287	17,7
Brejos Nordestinos	13 656	16,0
Diamantina	1 109 727	13,5
Interior	4 840 188	7,1
Pernambuco	379 818	12,1
Serra do Mar	4 169 797	36,5
São Francisco	499 866	4,7



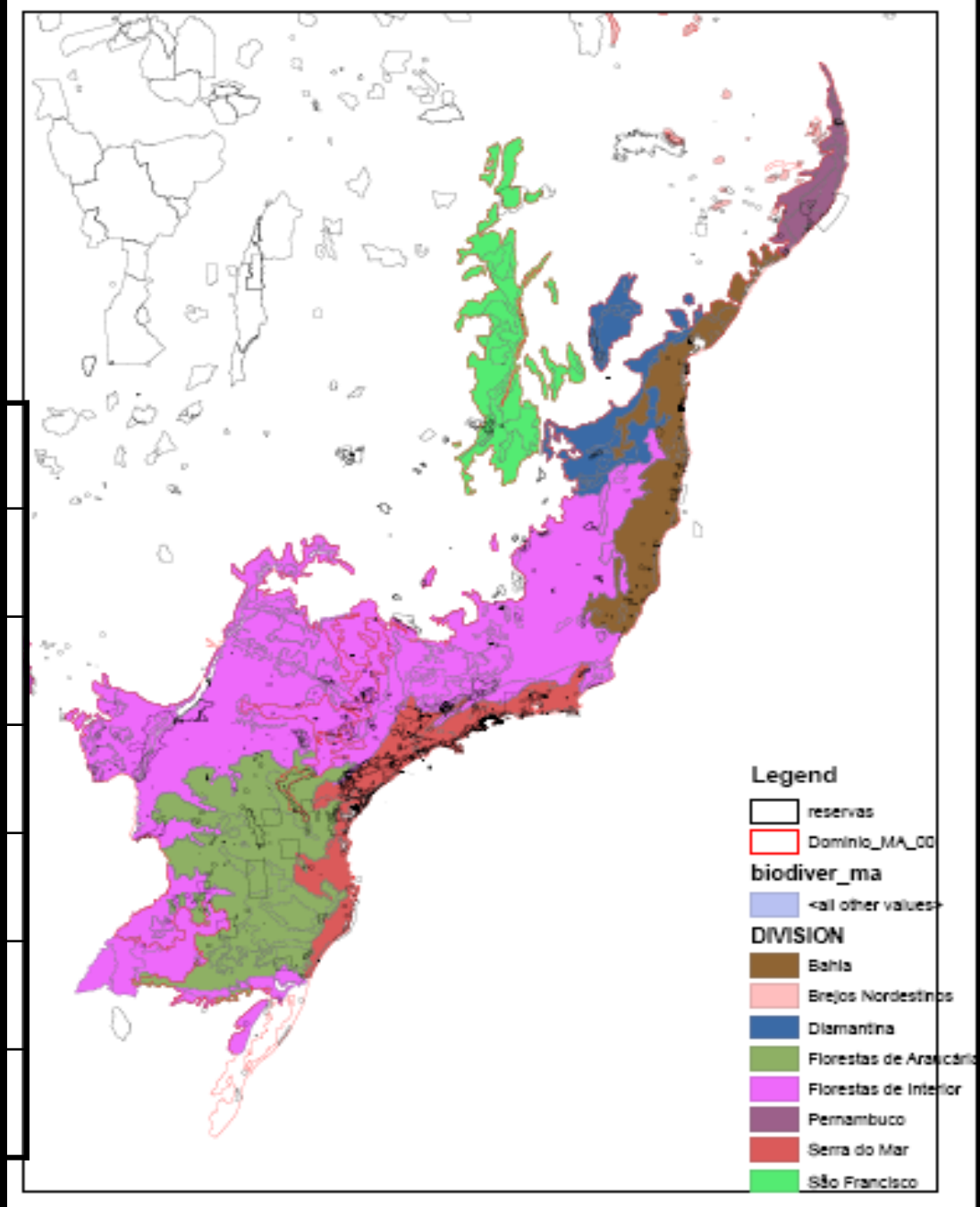
% of Forest  
2650 sub  
watersheds  
(5a. Order)

# Fragment Size

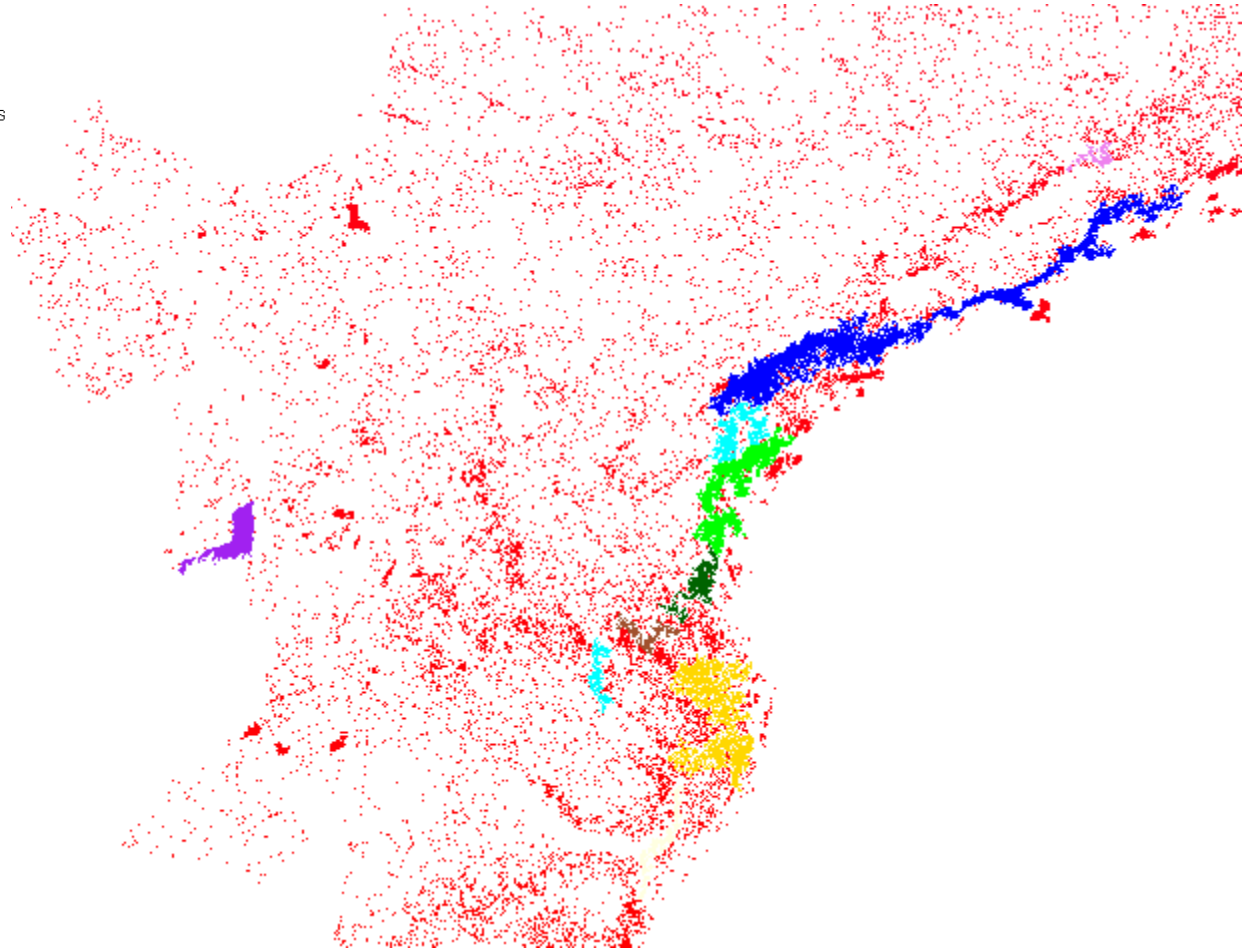
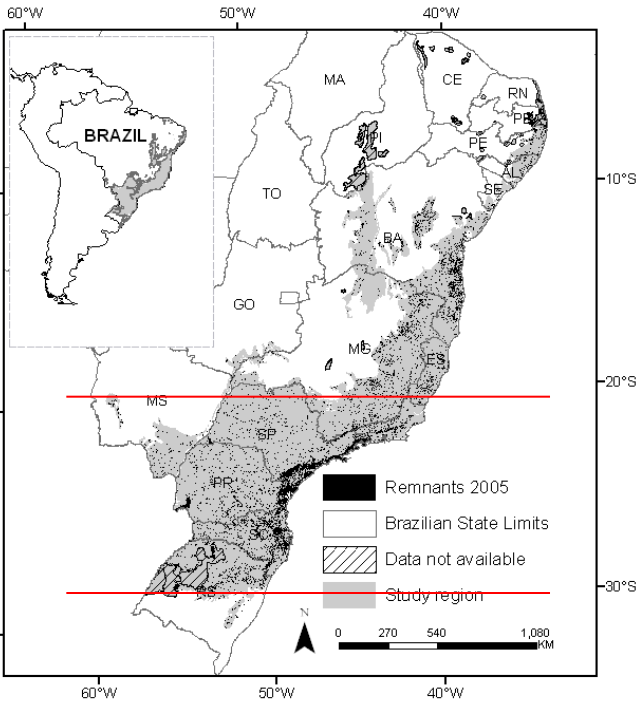


# Where are the large ones?

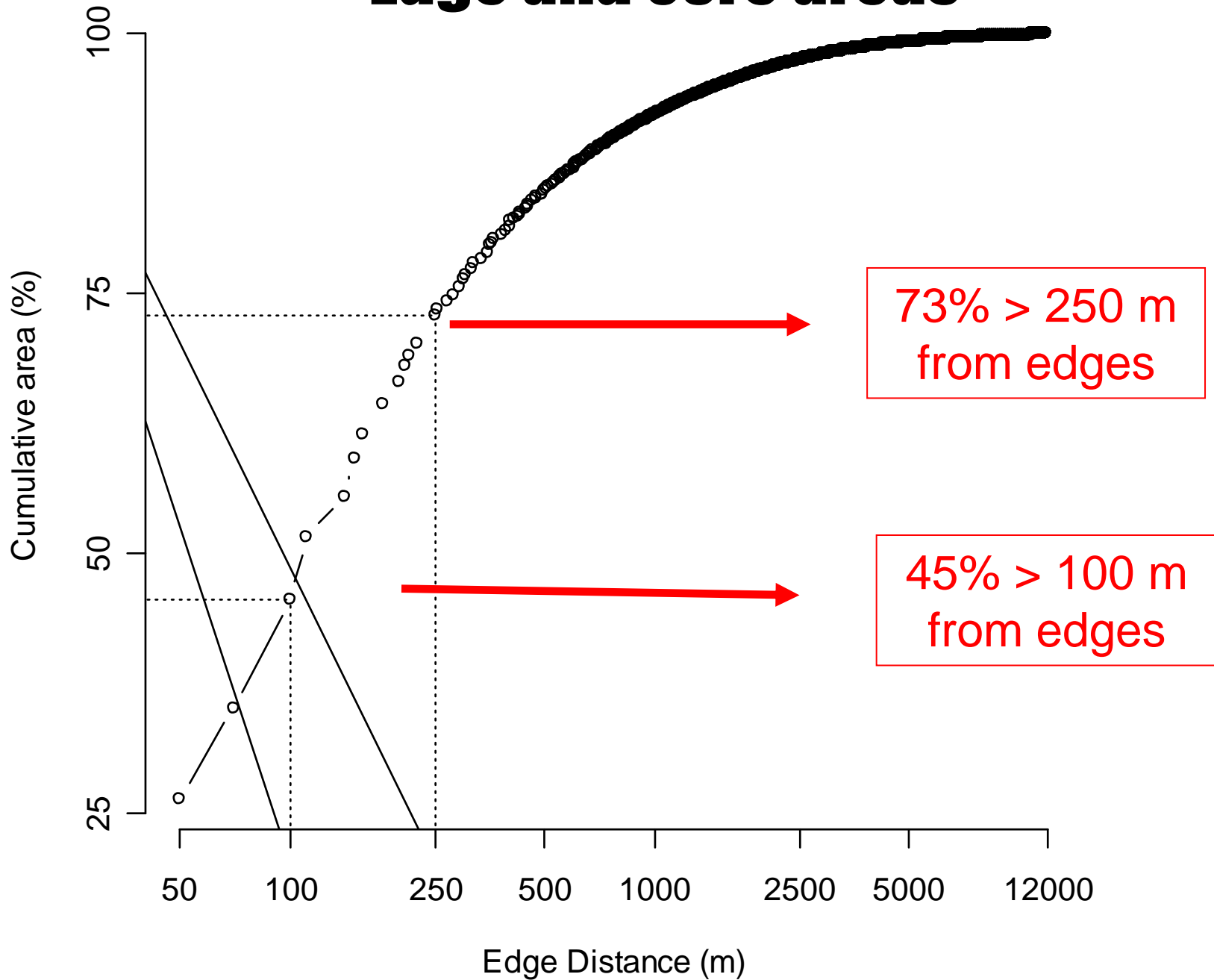
Bahia	< 25.000
Diamantina	< 25.000
Araucária	< 250.000
Interior	< 250.000
Pernambuco	< 5.000
S. Francisco	< 10.000
Serra do Mar	> 1,2 M



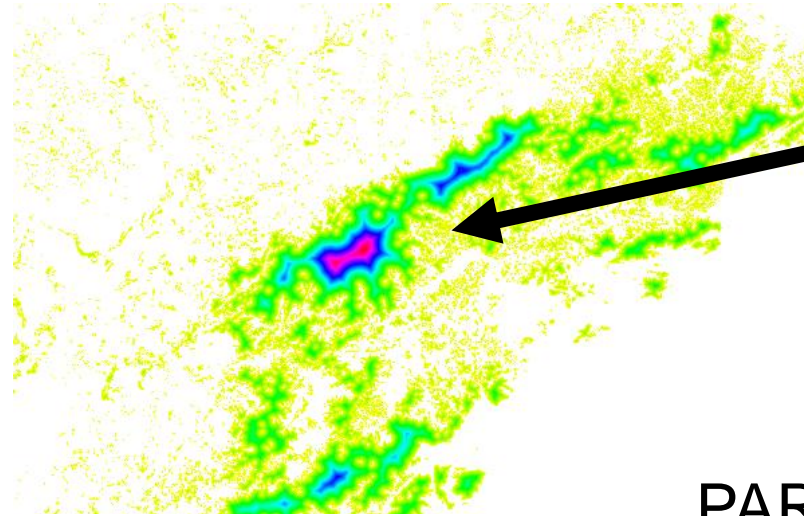
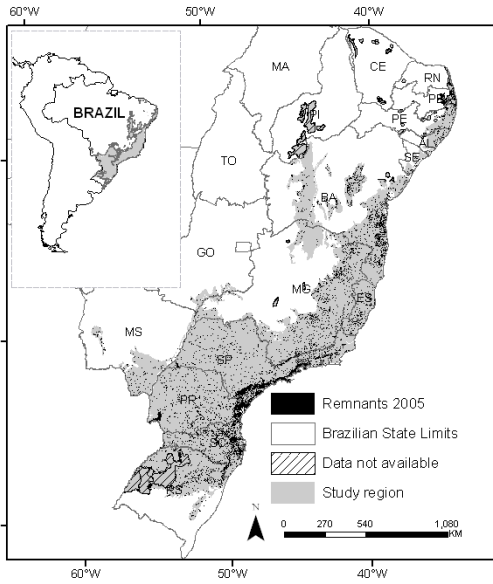
# Larger patches



# Edge and core areas

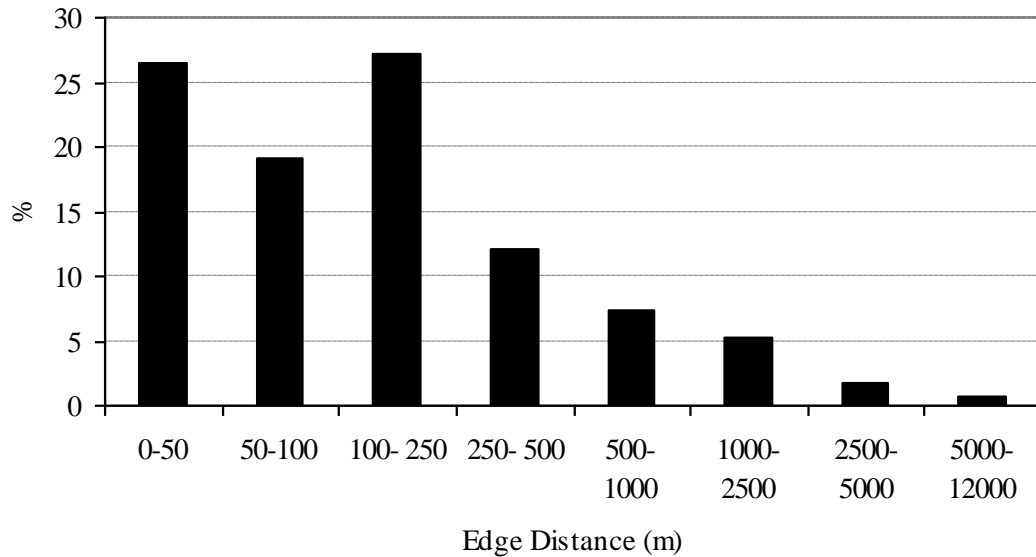


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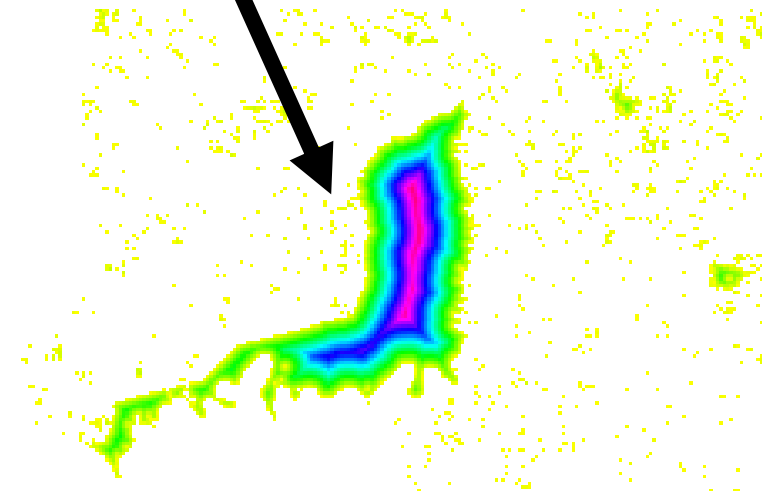


Paranapiacaba

12 km



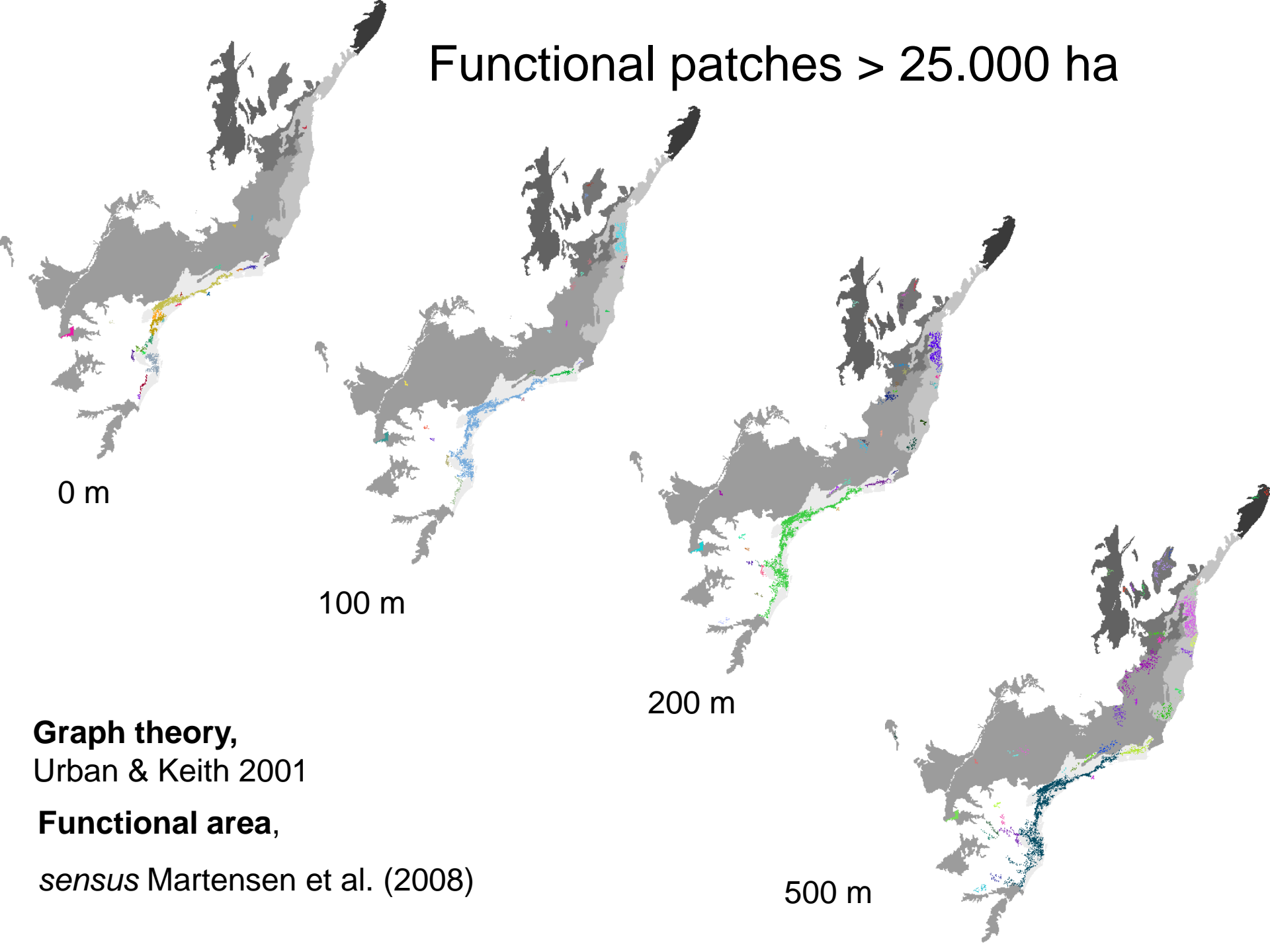
PARNA Iguaçu







# Functional patches > 25.000 ha



0 m

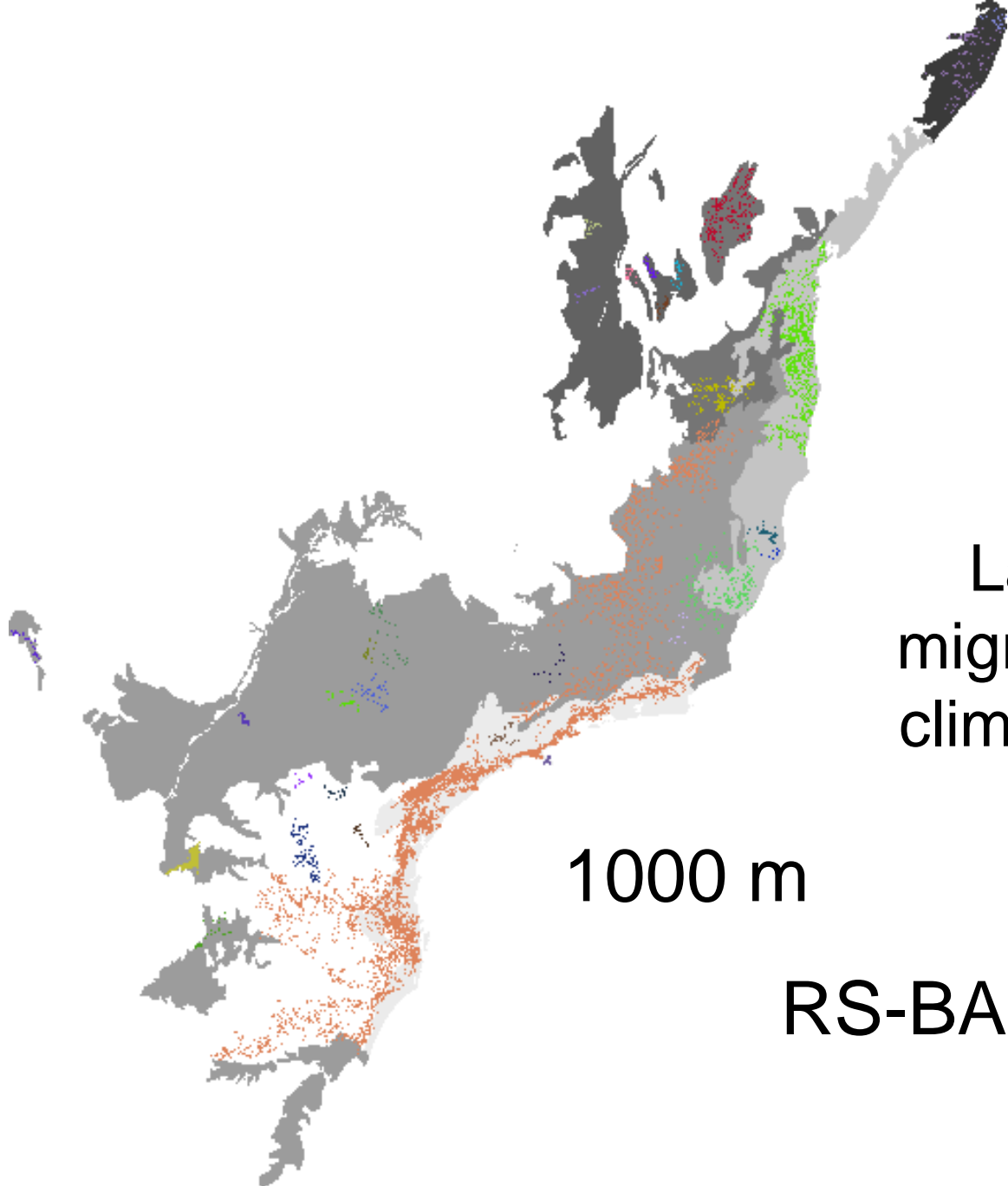
100 m

200 m

500 m

**Graph theory,**  
Urban & Keith 2001

**Functional area,**  
*sensus* Martensen et al. (2008)

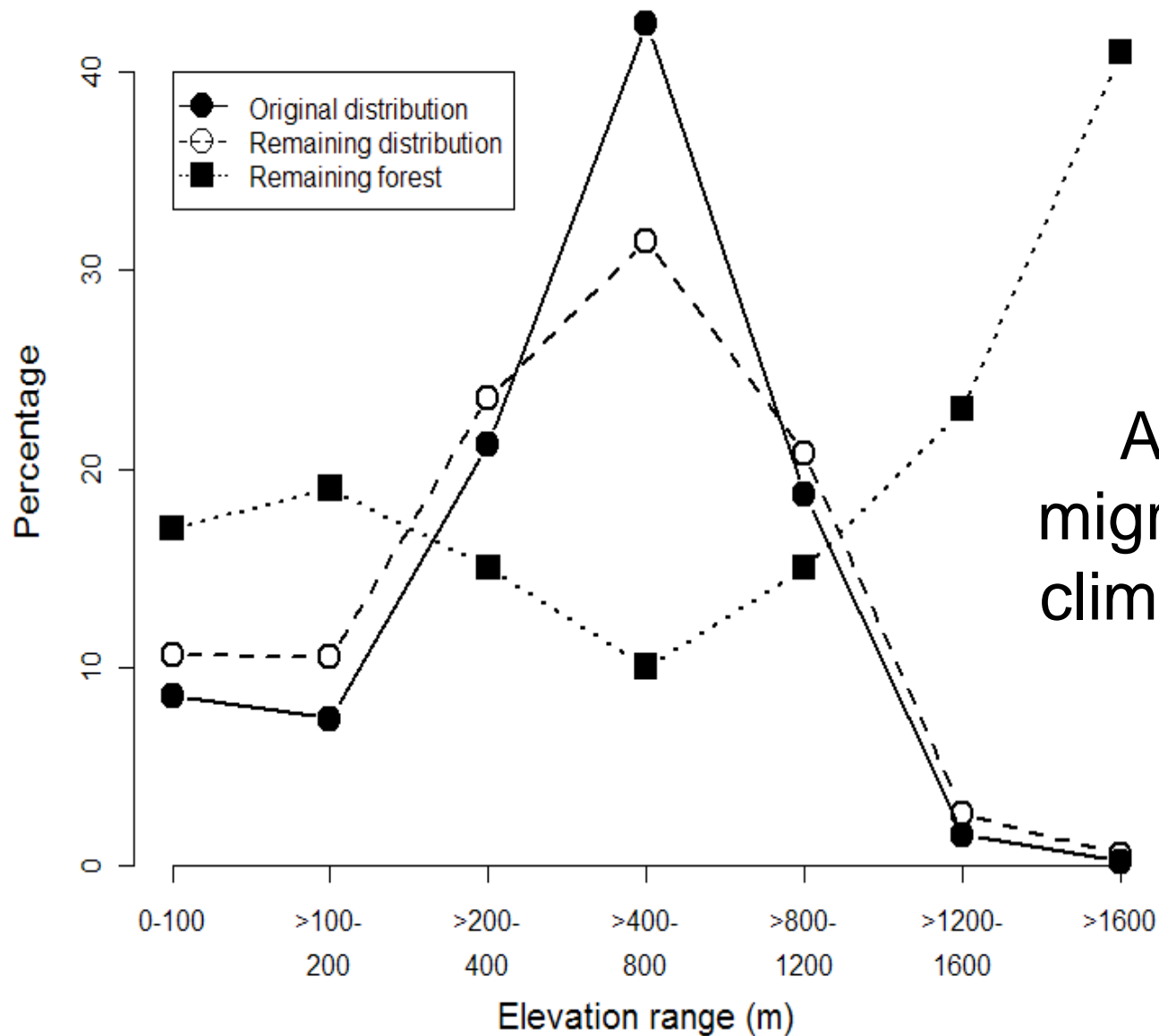


Latitudinal  
migration given  
climate change

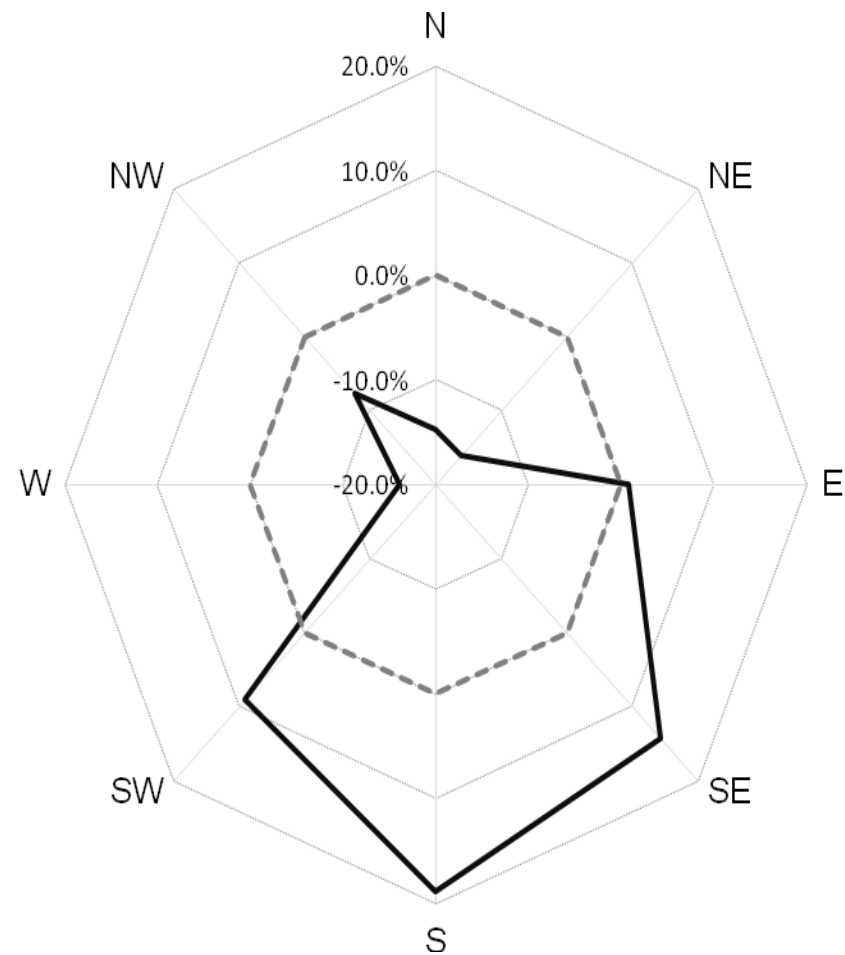
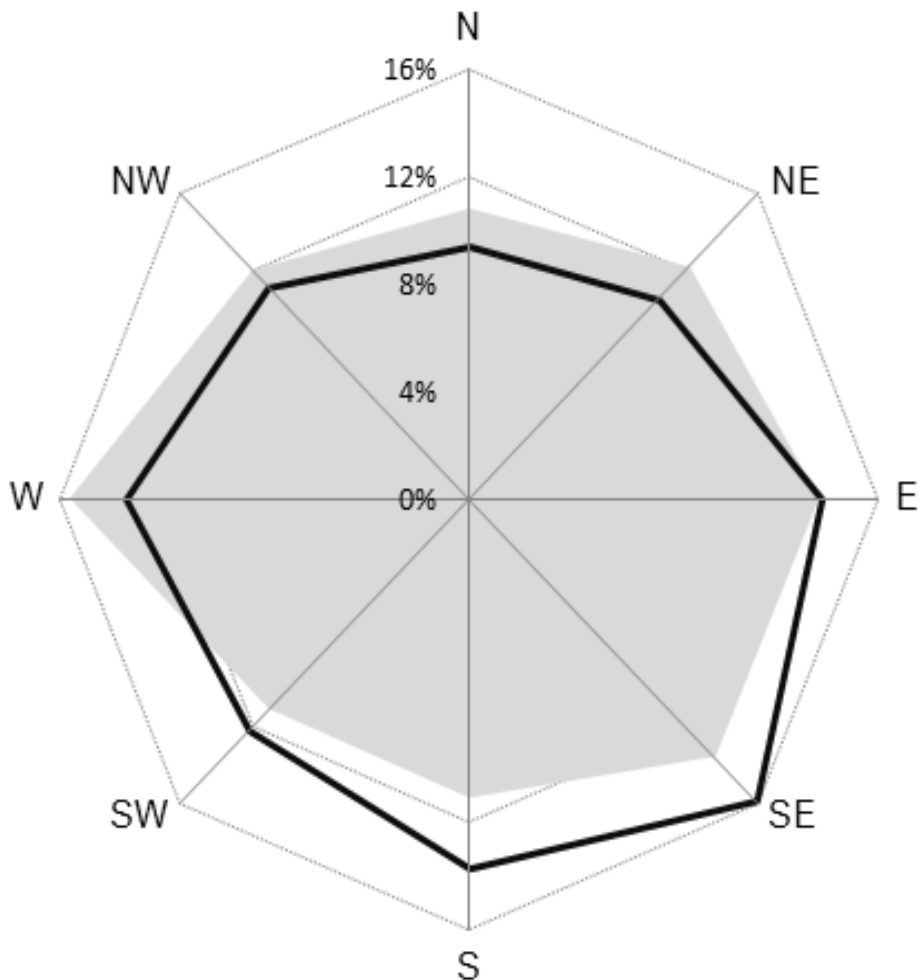
1000 m

RS-BA

# Elevation range

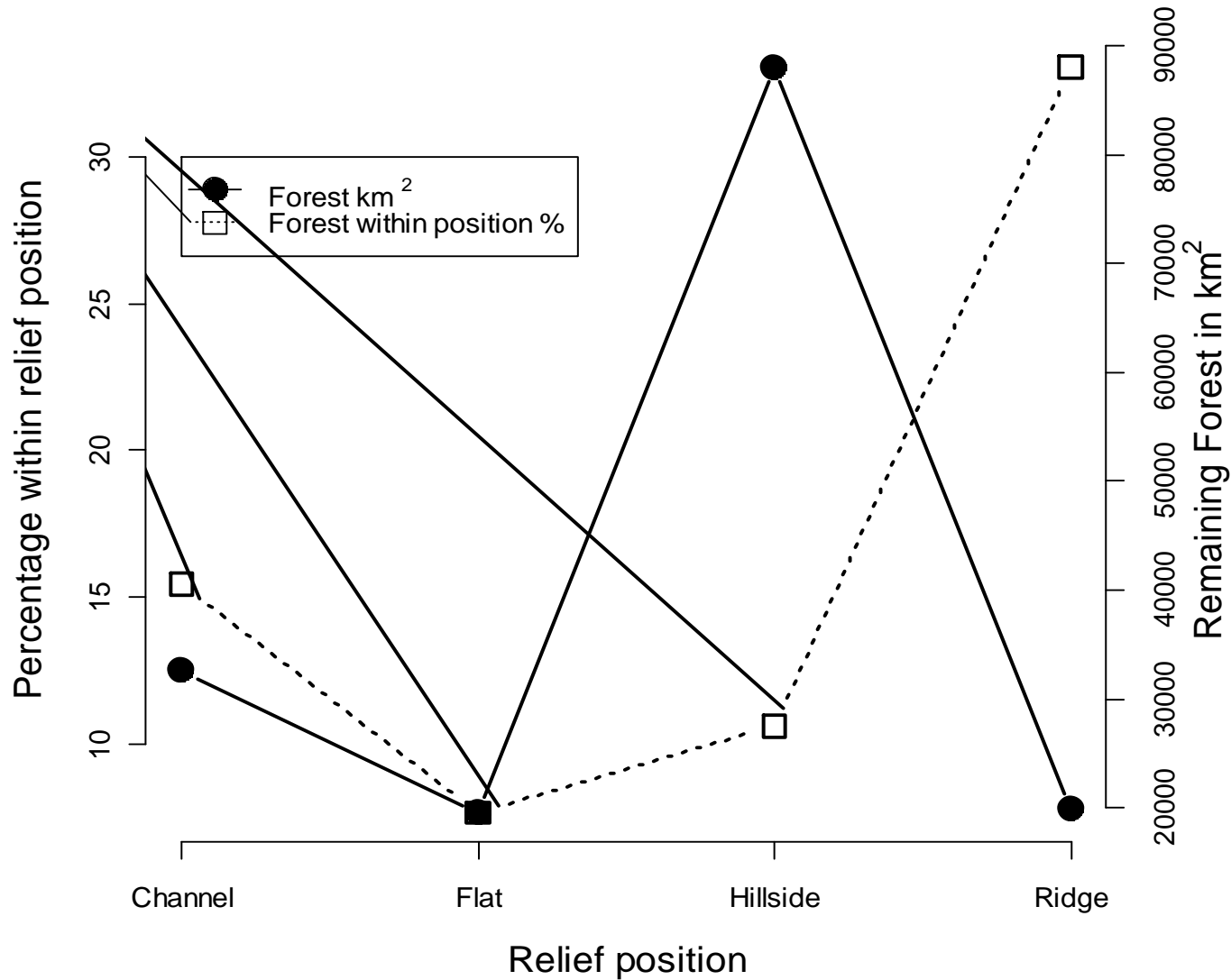


# Orientation

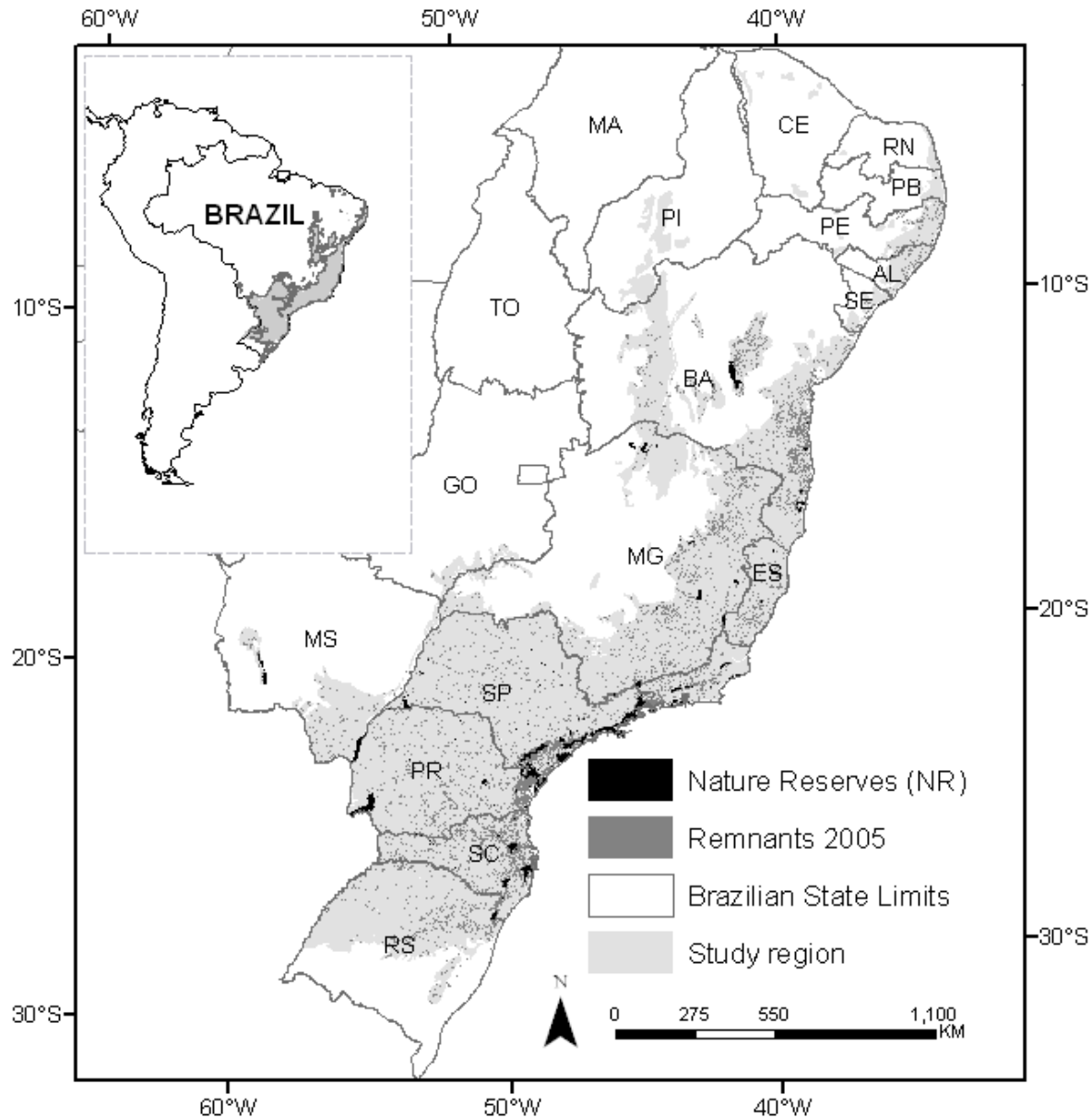


■ Original orientation ■ Remaining forest

# Relief position

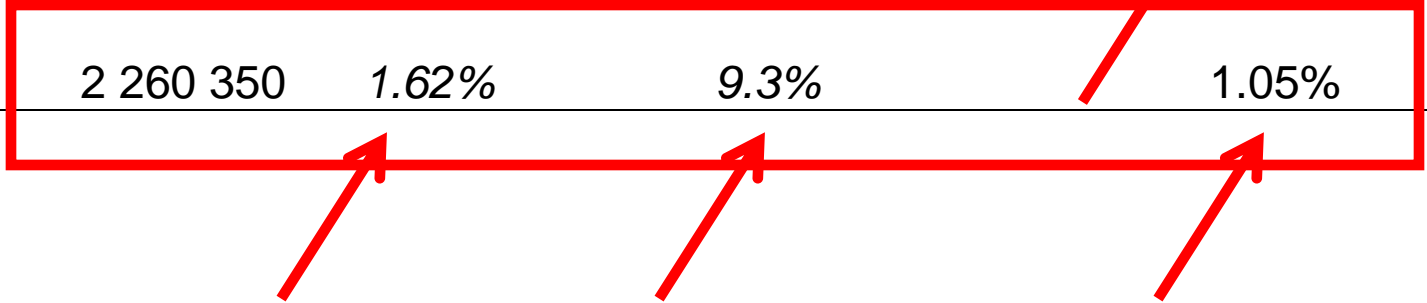


# Conservation Units - distances



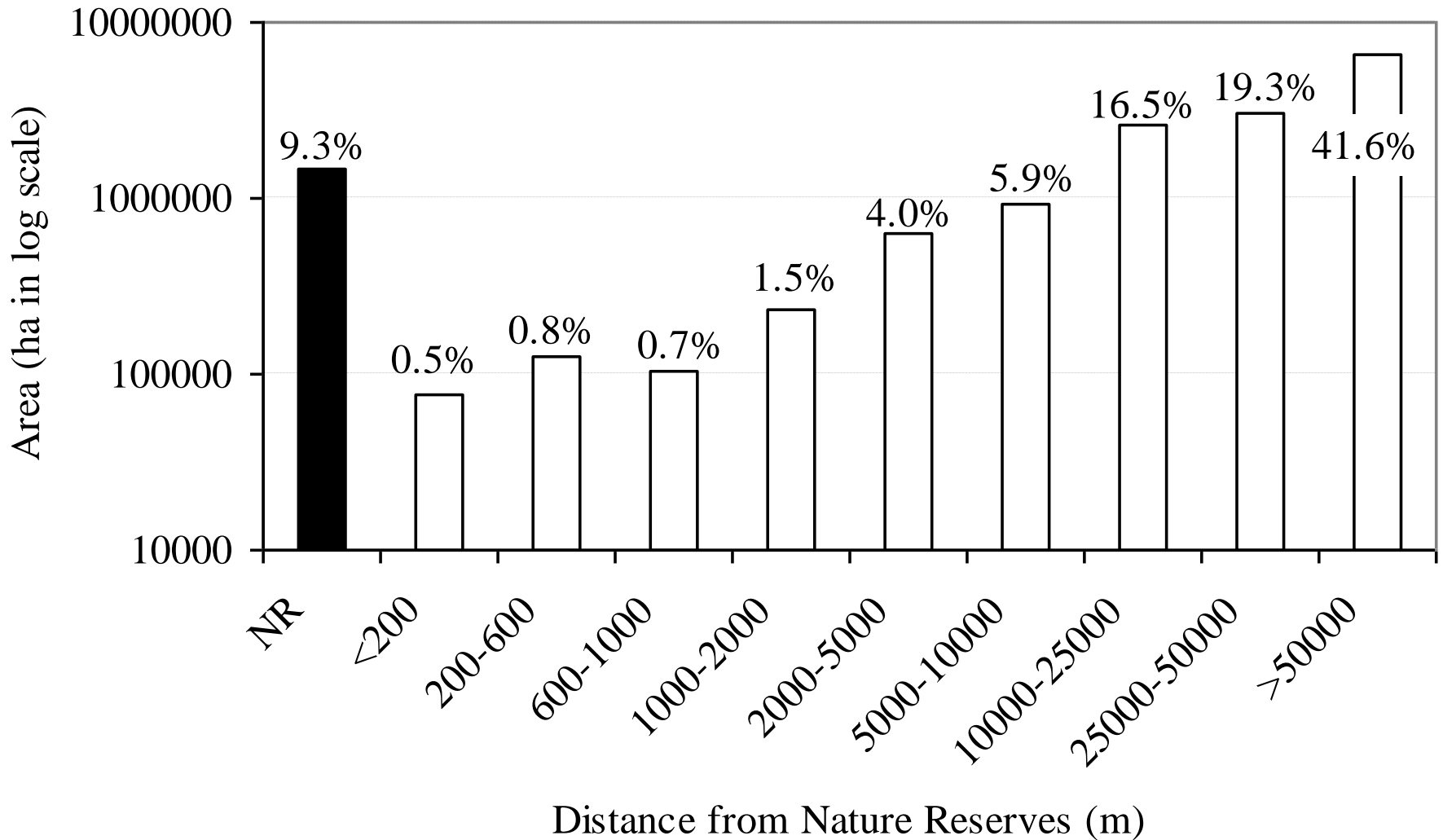
# Conservation Units

BSR	Protected area		Remaining forest protected %	% of original area protected forest
	(ha)	%		
Araucaria	164 651	0.65%	3.1%	0.39%
Bahia	113 447	0.93%	4.2%	0.70%
Diamantina	151 412	1.85%	1.1%	0.15%
Interior	561 381	0.82%	6.8%	0.48%
Pernambuco	4 314	0.14%	1.0%	0.12%
Serra do Mar	1 201 848	10.53%	25.2%	8.11%
São Francisco	63 297	0.59%	2.4%	0.11%
<b>TOTAL</b>	<b>2 260 350</b>	<b>1.62%</b>	<b>9.3%</b>	<b>1.05%</b>





# Conservation Units - distances



Connectedness of reserves – climate change

# Final conclusions

- i) More forest than previous estimations
  - Especially given the inclusion of young forests (20-40 yr/old) and < 100 ha
- ii) However, way less than the governmental estimations Probio (27%)
- iii) The vast majority of the remnants are very small (<50ha; 83% of the patches)
- iv) Almos half of the remaining forest (45%) is less than 100 m from forest edges, and 73% is less than 250 m from any edge, what suggests a strong influence of the matrix
- v) There is 256 000 ha at 2,5 km from any edge, and 57000 ha further than 5km from any edge (12km is the deeper that you can get)

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# Final conclusions

- vi) Species with some dispersal capacity thru matrix (<100m) can significantly increase the access to functional areas
- vii) Small fragments (i.e. < 200ha) have a very important function in reducing the isolation between larger ones
- viii) The conservation units (integral protection) encompass a small proportion of the actual remnants, and around 1% of the original forest cover
- ix) A large fraction of the remnants (61%) are further than 25 km from any Conservation Unit

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Thank you!!!

Contact: [martensen@terra.com.br](mailto:martensen@terra.com.br)

