



Instituto
Internacional para
Sustentabilidade



CSRIO



UNIVERSIDADE FEDERAL
DO RIO DE JANEIRO

Predicting Atlantic Forest natural regeneration: drivers, benefits and costs

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ADVANTAGES

DISADVANTAGES

Forest Landscape Restoration

Restoration targets will be reached only if cost-effective approaches are identified and competition with agricultural land uses is low

ALTERNATIVE: NATURAL REGENERATION

- **More cost-effective**
- **Less applied by
policy-makers**

Natural
regeneration
uncertainty

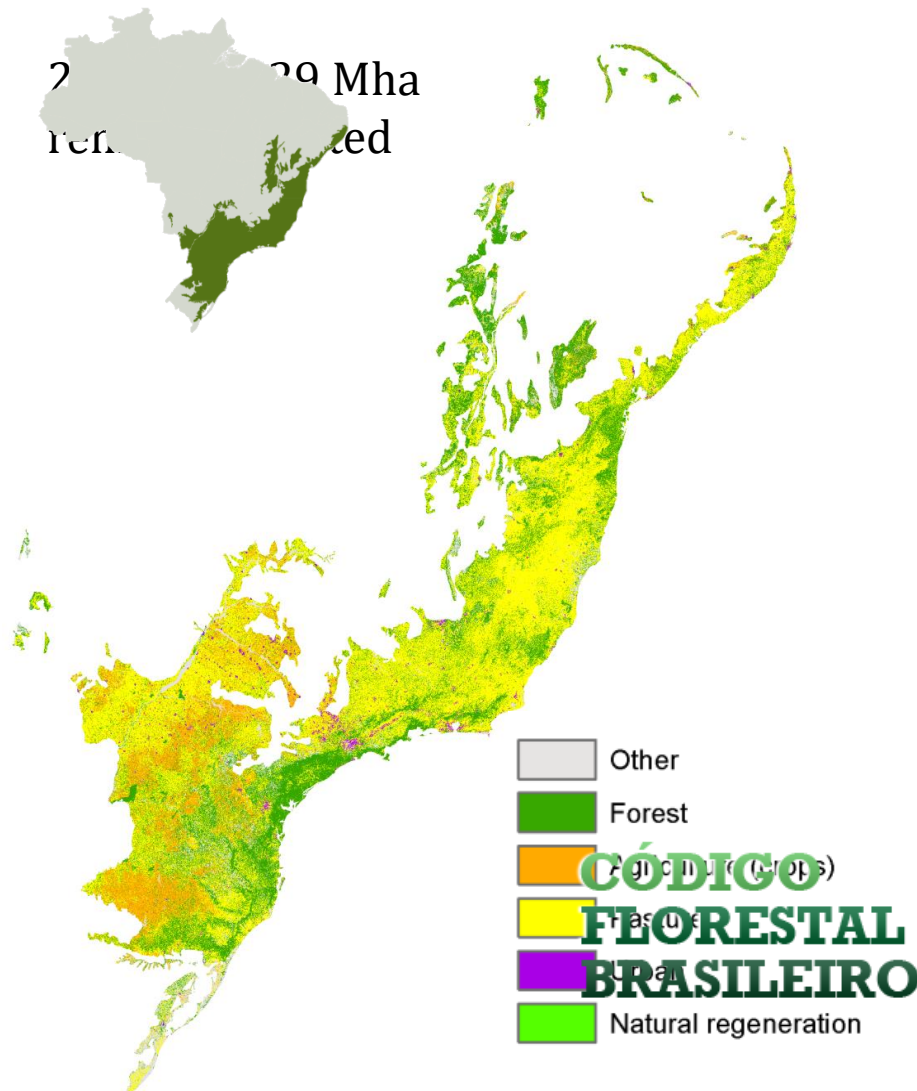
Although predicting the potential amount and location of natural regeneration through the time is extremely difficult, such knowledge is critical to assist policy-makers and stakeholders achieve restoration targets and deliver socio-environmental benefits at low cost

scales

Environm
ental
drives

Socioeco
nomic
drivers

Potential for natural regeneration within 80 Mha of the Brazilian Atlantic Forest



1

Document where natural regeneration occurred

2

Identify environmental and socio-economic drivers

3

Estimate where and how much area could be regenerated in different scenarios

4

Quantify post-reforestation benefits & costs for each scenario



PLANO NACIONAL DE RECUPERAÇÃO DA VEGETAÇÃO NATIVA





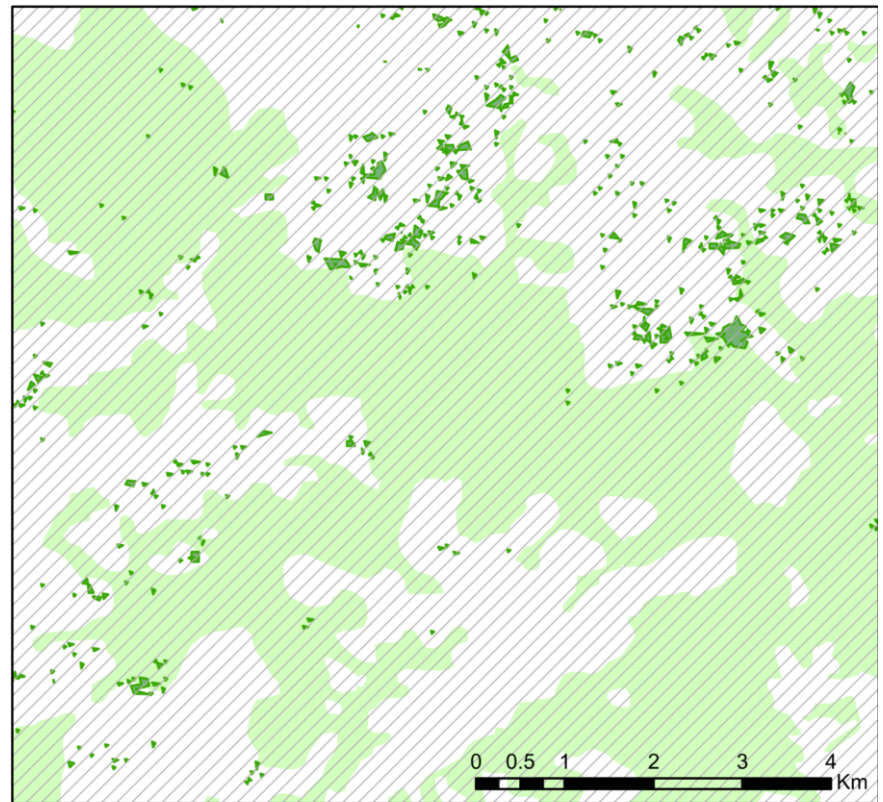
Natural regeneration between 1996-2016

High resolution remote-sensing data + geospatial mapping to exclude any areas of regrowth that resulted from commercial forestry operations

2,43 M ha

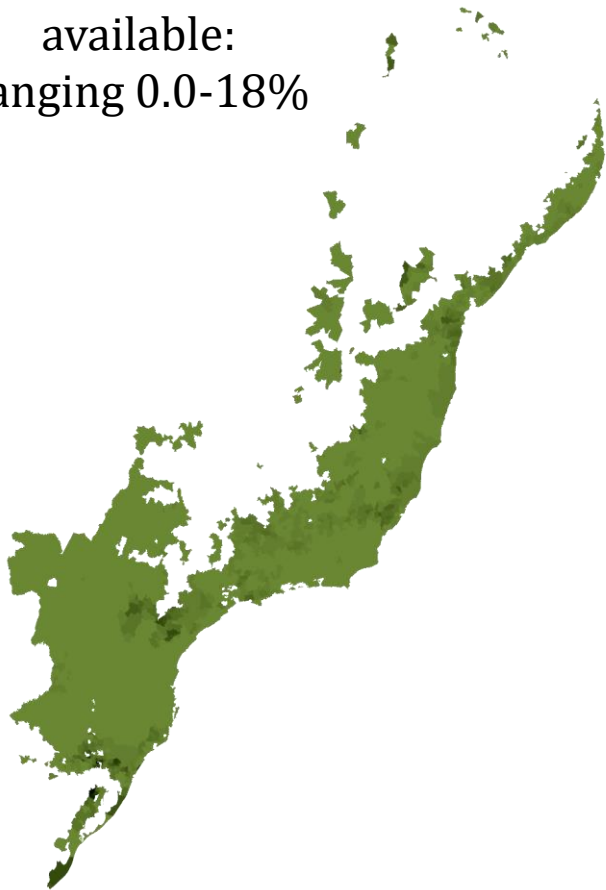


-  Atlantic Forest
-  Existing natural regenerated areas



Amount of natural regeneration

Area regenerated
expressed as % of area
available:
ranging 0.0-18%



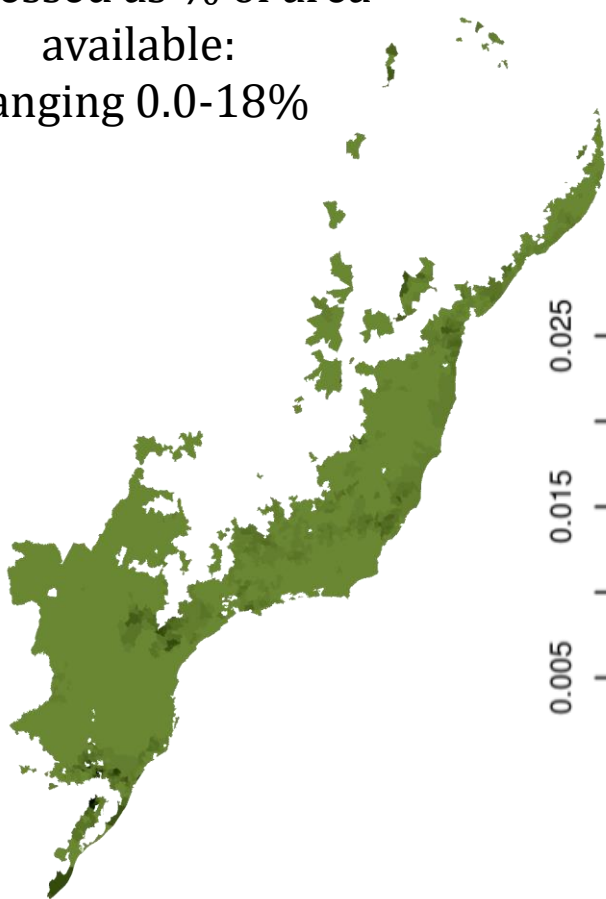
55.8% of variance explained by 10 variables:
i) landscape conditions,
ii) climate,
iii) topological relief,
iv) soil properties,
v) agricultural production

Up to 37 potential variables considered

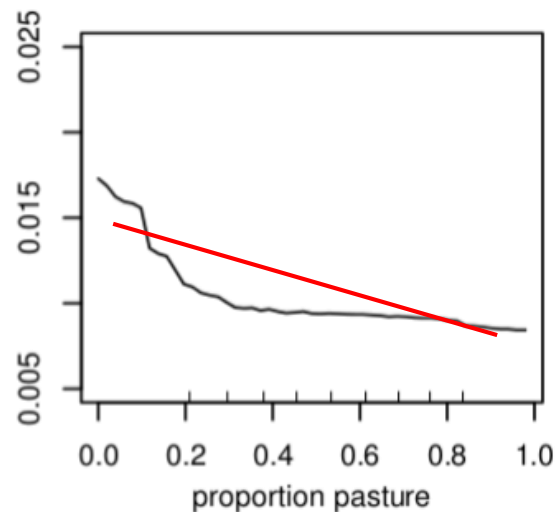
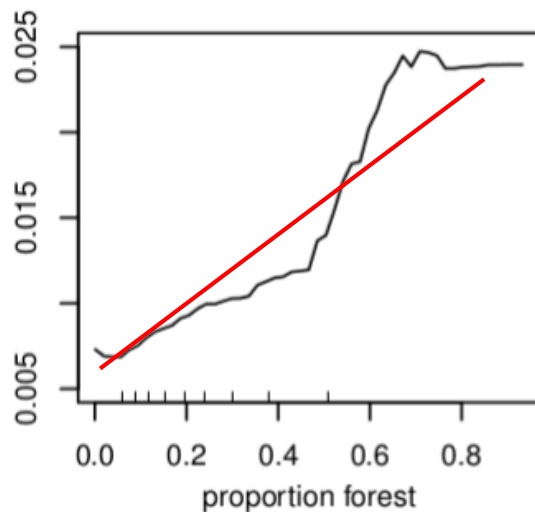
ENVIRONMENTAL				SOCIO-ECONOMIC		
Relief	Soil	Landscape	Climate	Social	Infrastructure	Production
Elevation	Bulk density	Pasture (2000 & 2016)	Annual precipitation	Rural pop. 2010	Km of roads 2016	Industrial GDP 2010
Slope	PH	Agriculture (2000 & 2016)	Precipitation in the four driest months	Urban pop. 2010	Proximity to road 2016	Increase in (2000-2015): i) temporary agriculture, ii) permanent agriculture, iii) poltry suine honey, iv) meat
Aspect	Soil texture fraction sand	Forest (2000 & 2016)	Seasonality	HDI 2013	Number of companies 2014	Loggin value 2014
Topographical Position Index	Cation exchange capacity	Urban areas (2000 e 2016)	Mean annual temperature	Immigration 2010	Proximity to urban areas (2000 & 2016)	Previous land use intensity (1990-2000): i) planted pasture, ii) crop soybean, iii) crop maize, iv) crop sugarcane
		Proximity to forest (2000 & 2016) Proximity to river (2000 & 2016)		Land tenure inequality		

Amount of natural regeneration

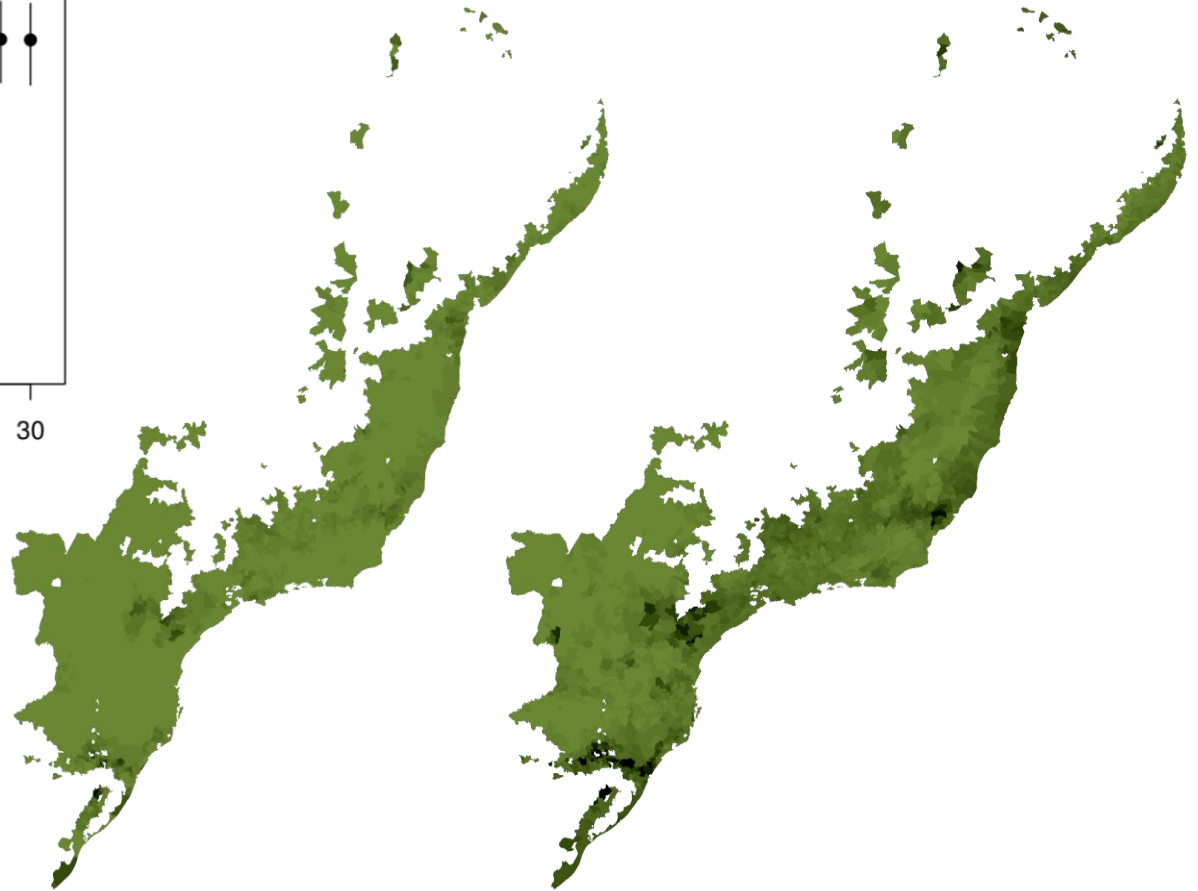
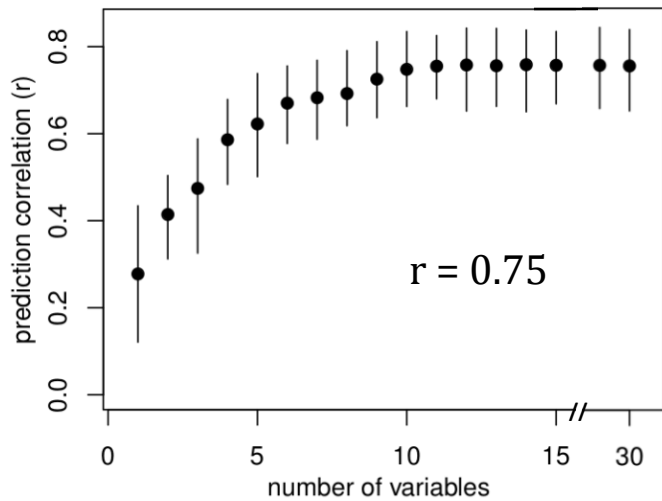
Area regenerated
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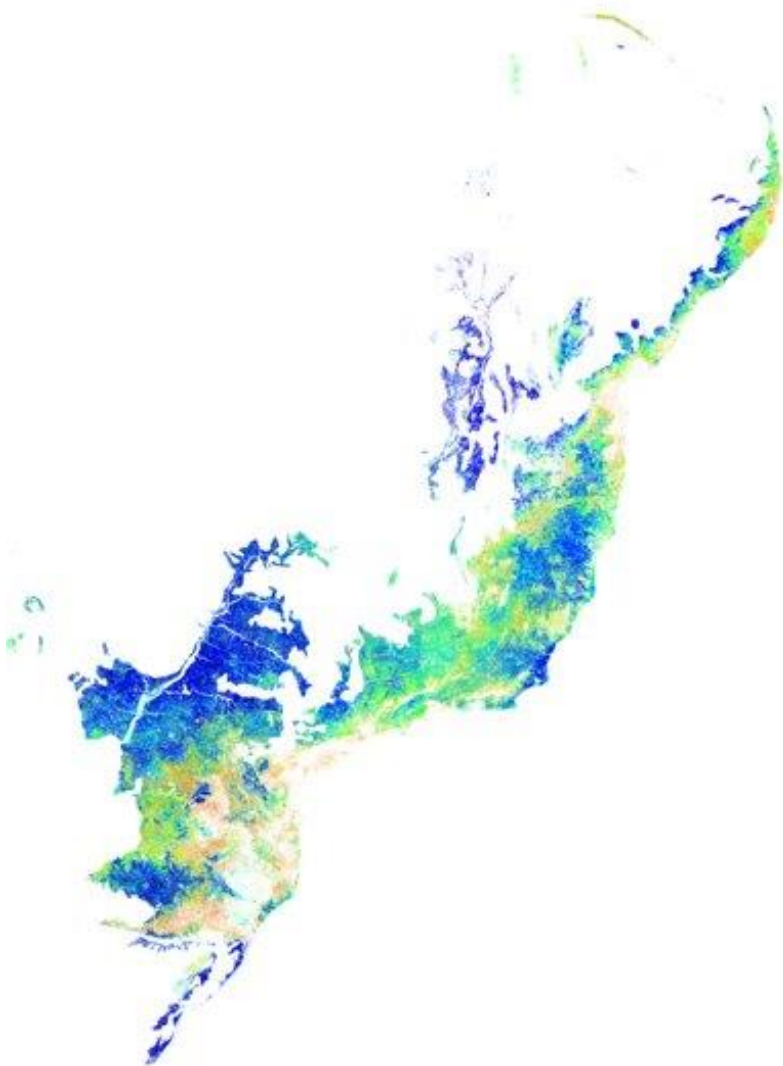
55.8% of variance explained due to 10 variables:
landscape conditions, climate, topological relief, soil
properties and agricultural production



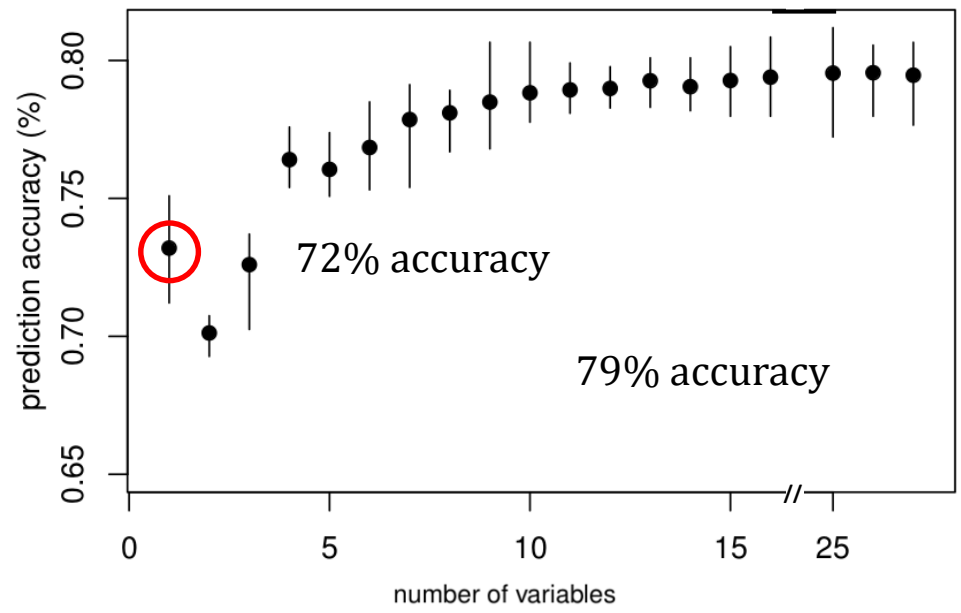
Observed and predicted amount of natural regeneration



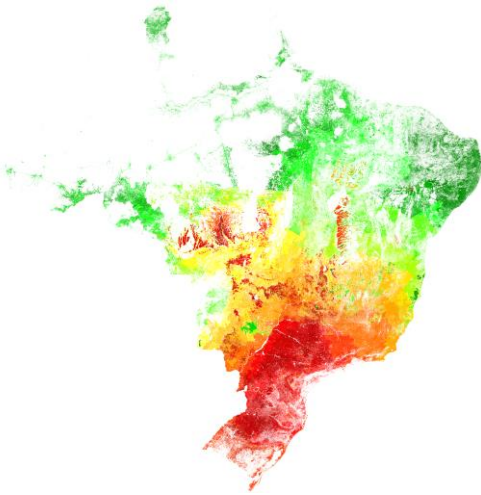
Presence and absence of natural regeneration



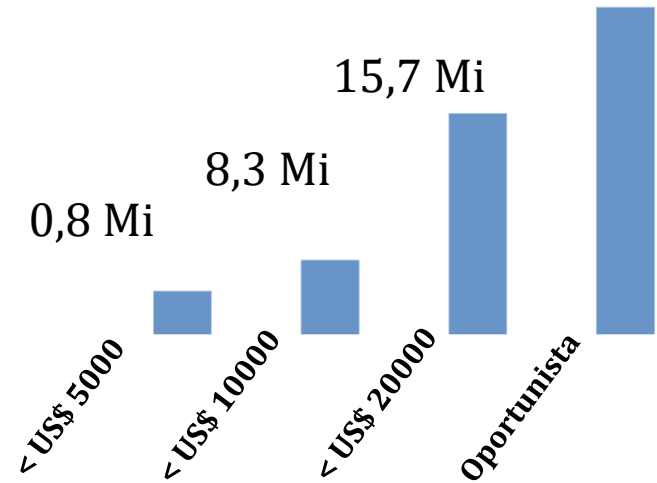
75% of regeneration sites occurred within 186 m of other forested areas



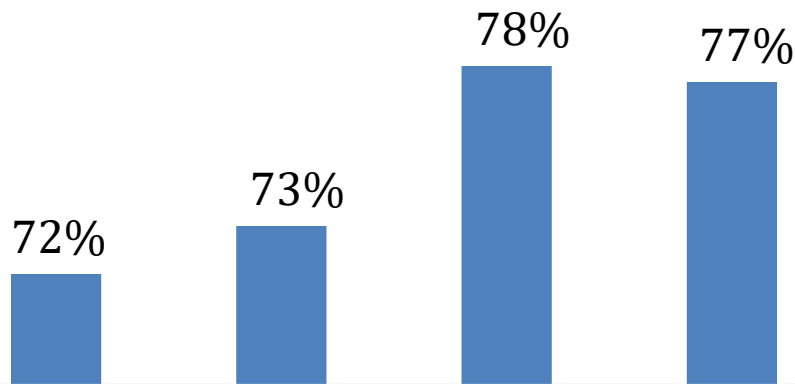
Custos e benefícios ao minimizar conflitos



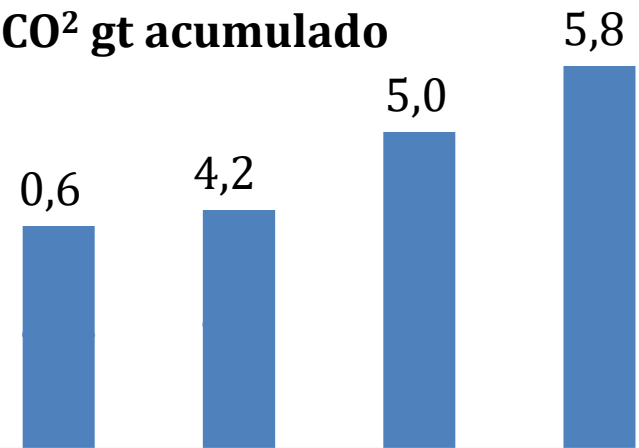
Área regenerada (ha) 21,7 Mi



% redução custo de implementação



CO² gt acumulado



General approach

- Assist policy-makers to reduce restoration costs and delivers socio-environmental benefits
- Window of opportunities for large-scale natural regeneration in the Atlantic Forest
- Prioritizing natural forest regeneration in areas that are opportunities for
 - Central challenge is to maximize return-on-investment, especially through a planned natural regeneration

