AdaptForChange

improve the success of reforestation in drylands as an adaptation to climate change

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Increasing the effectiveness of native forest regeneration and reforestation: towards climate-change adaptation in drylands

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Introduction

The recent expansion of the semiarid climate to all the region of the south of Portugal and the growing impact of climate change demands local adaptation.

The growth of the native forest represents a strategy at the ecosystem level to adapt to climate change since it increases resilience and increases also de delivery of ecosystem services.

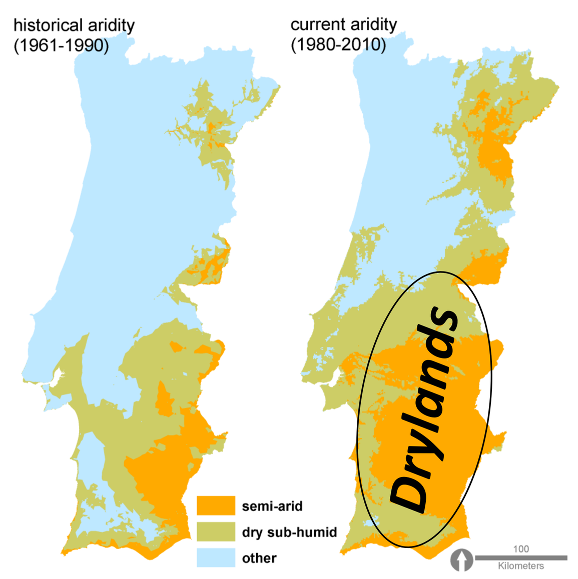
Moreover decreases susceptibility to desertification. For that reason, large areas have been reforested in the south of Portugal with the native species holm oak and cork oak but with a low rate of effectiveness.

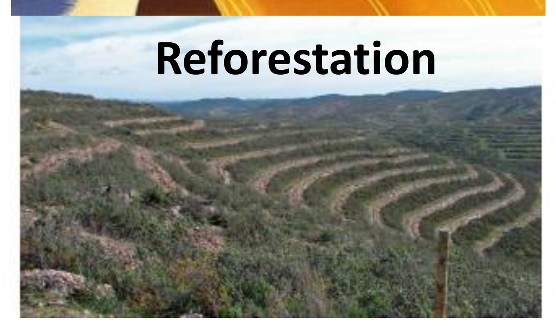
Aim

Our goal in this work is to show how the cost-benefit relation of the actions intended to expand the forest of the Portuguese semiarid can be lowered by taking into account the microclimatic conditions and high spatial resolution management.

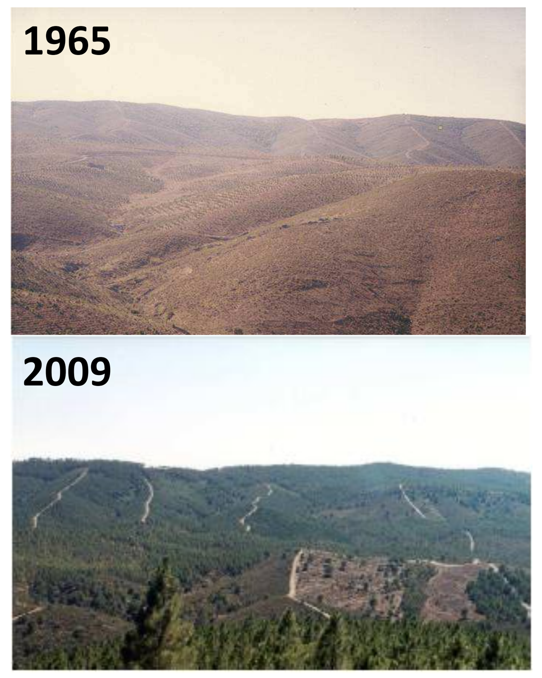
Material & Methods

The Drylands in Portugal



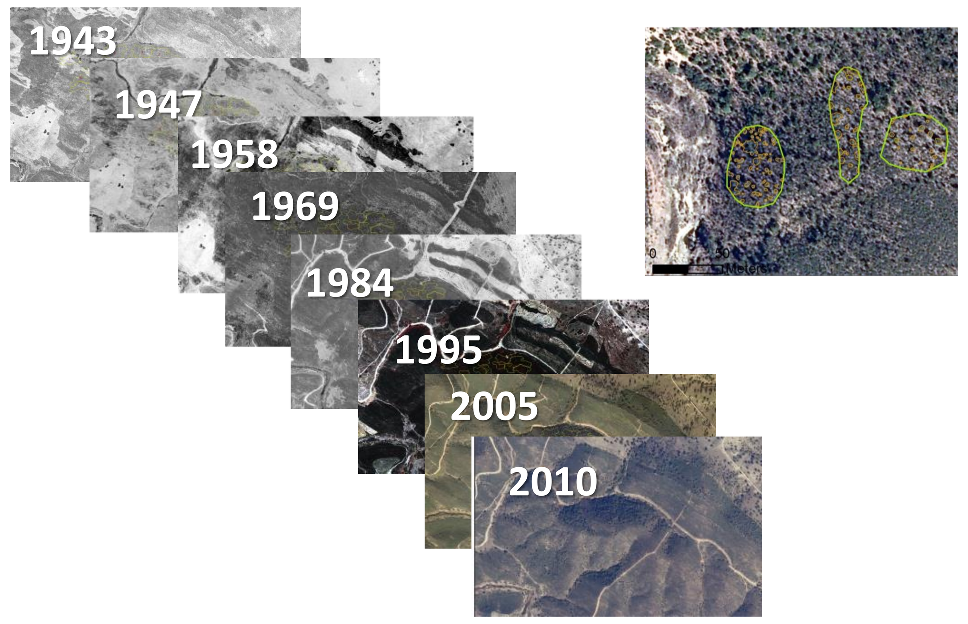


Reforestation efforts since agriculture abandonment in the 50`s-60`s

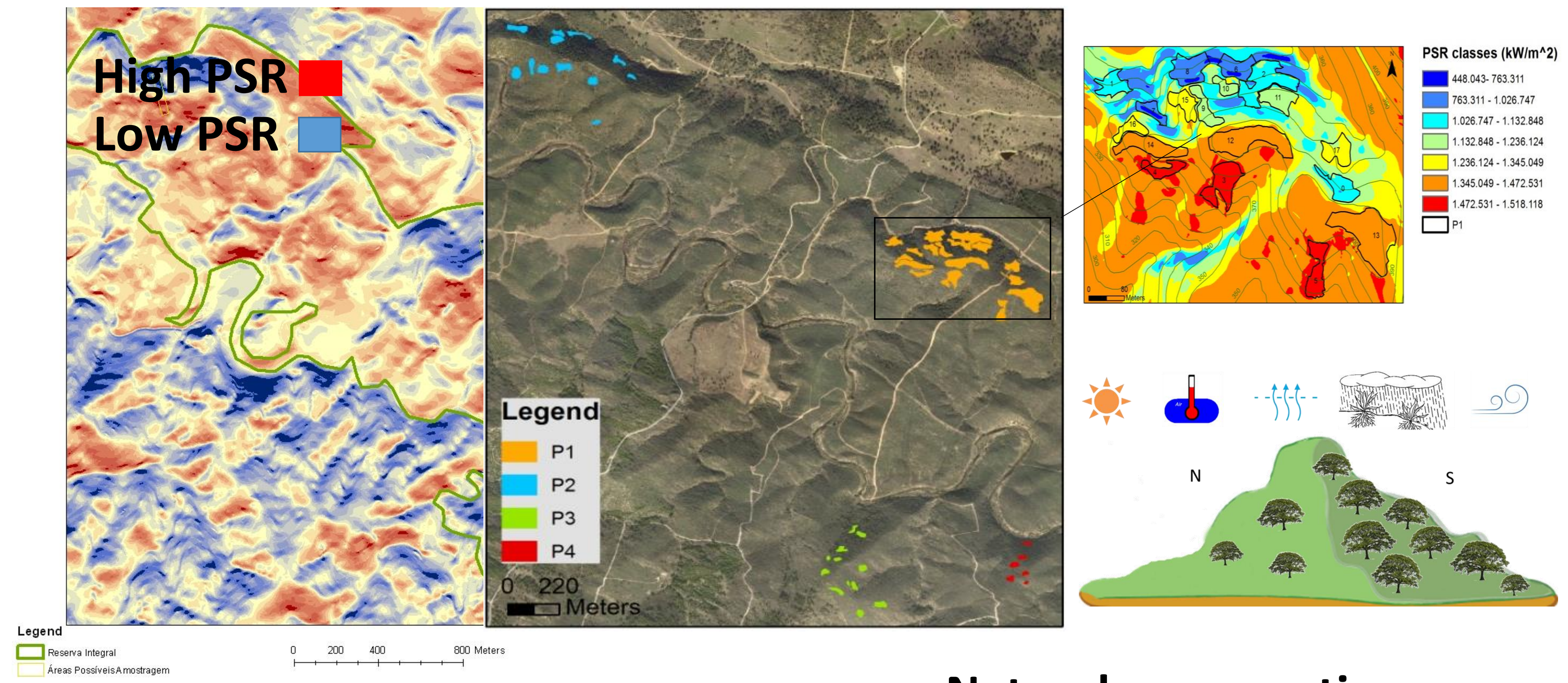


Results

% of Holm oak photo-interpretation



Potential Solar Radiation PSR

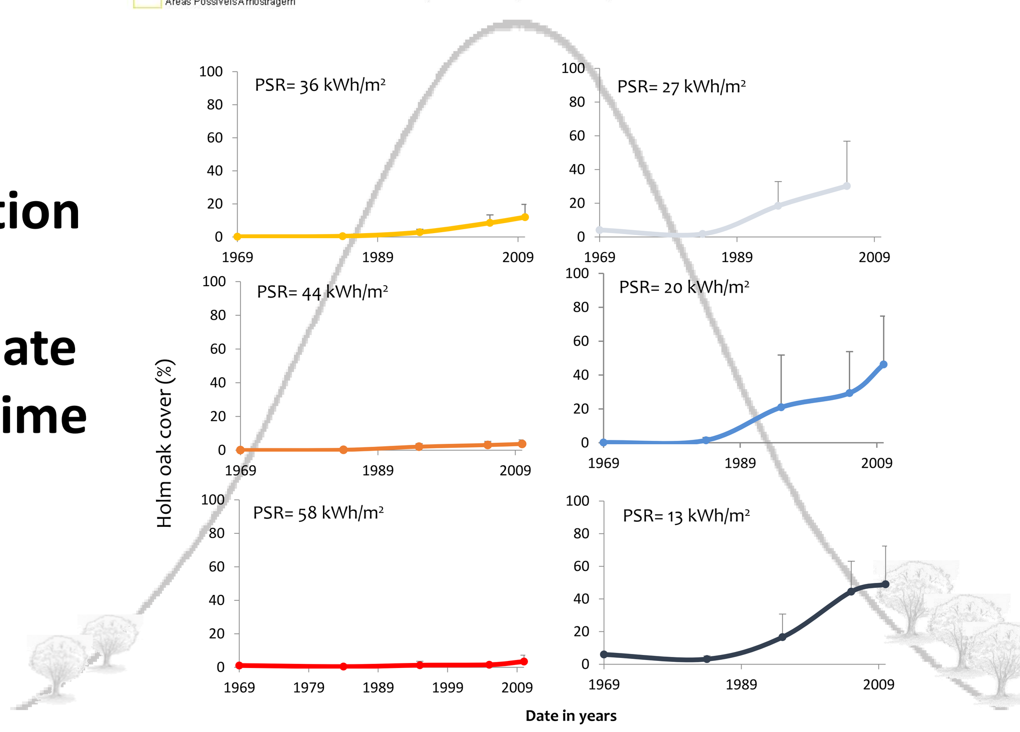


Building the model

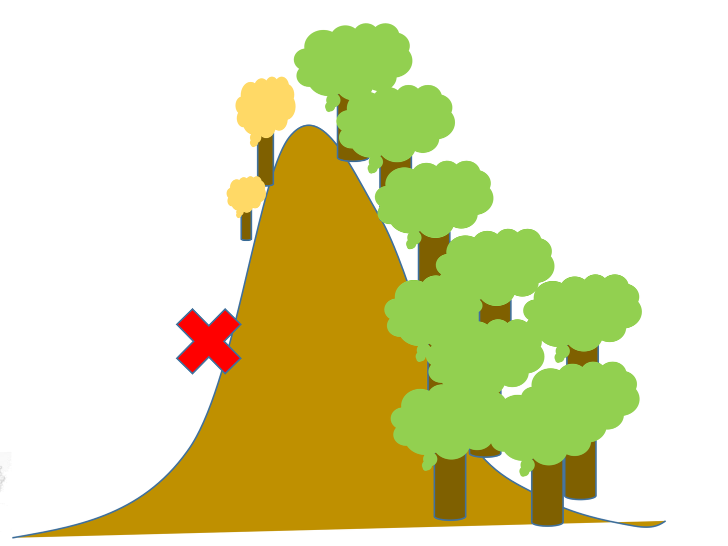
Variables
Altitude (m)
Slope (º)
PSR 12 months (Wh/m²)
Amplitude of PSR (Wh/m²)
PSR of January (Wh/m²)
Tree cover before agriculture abandonment (%)
Tree cover before agriculture abandonment in a 30 m buffer (%)
Standard deviation of the precipitation since the abandonment (mm)
Years of Abandonment

	ModA			ModB			ModC		
Intercept	-4.80	±	3.04	6.24	±	1.16***	1.68	±	**0.29*** **
PA	0.47	±	0.10***	0.081	±	0.006***	0.072	±	**0.006*** **
PSR1	$-8x10^{-5}$	±	$0.6x10^{-5}$***	$-8x10^{-5}$	±	$0.6x10^{-5}$***	$-8x10^{-5}$	±	**$0.6x10^{-5}$*** **
RSD	0.036	±	0.018^{+}	-0.030	±	0.007***			
PA x RSD	-0.002	±	0.001***						
R^2	0.72			0.69			**0.66**		
AIC	**421.5**			**433.9**			**447.5**		

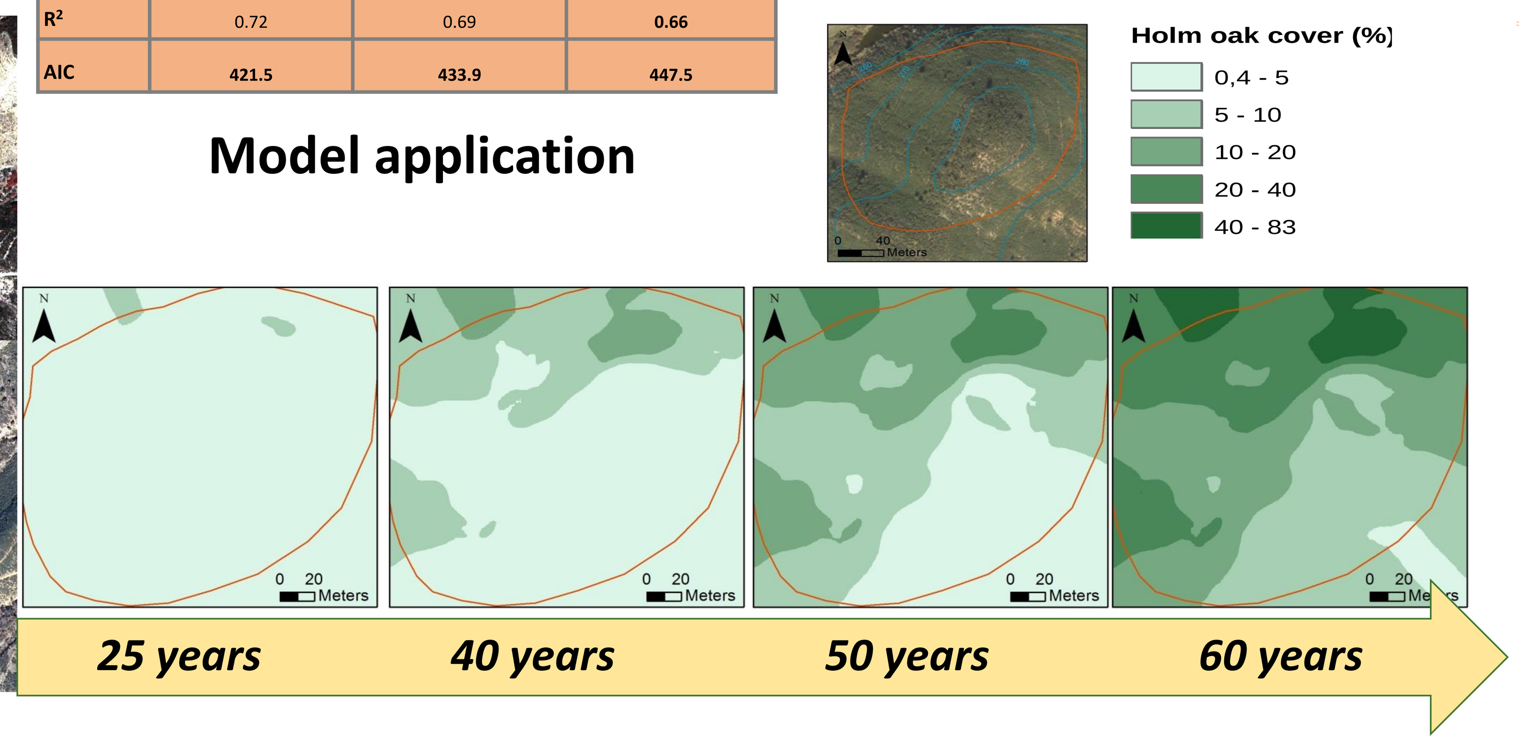
Regeneration along microclimate and over time



Natural regeneration conceptual model



Model application



Final Remarks

This model gives us the rate of native forest regeneration after a disturbance with high spatial resolution. Based on this model the territory was classified in: i) easy regeneration areas; ii) areas with the need of assisted reforestation, using methods that increase water and soil conservation; iii) areas of difficult reforestation because of the costs.