Current Mediterranean forest regeneration depends on land use in the recent past

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1. Introduction & Hypothesis

Ecosystems ***regeneration dynamics*** **is determined by both** ***past and present*** **contingencies**

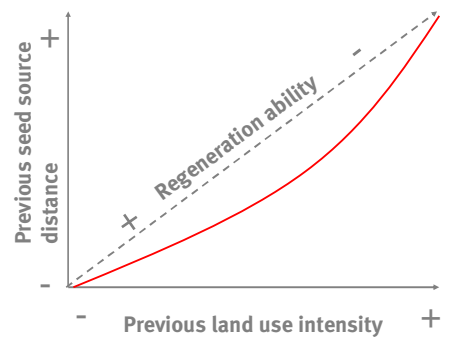
Internal ecological memory **consists of biological legacies in that site and includes surviving organisms, organic materials, and environmental patterns that** ***persist in time*** **and serve as foci for regeneration and re-colonization**

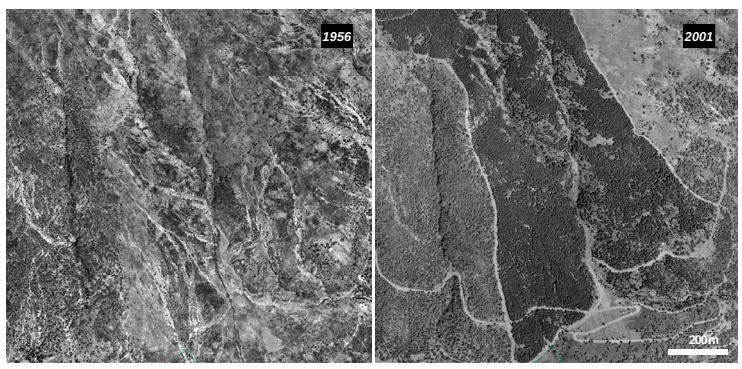
The ***ecosystem transformation*** **associated with intensive forestry drastically** ***reduces the biological legacies*** **within the planted area**

Our hypothesis are:

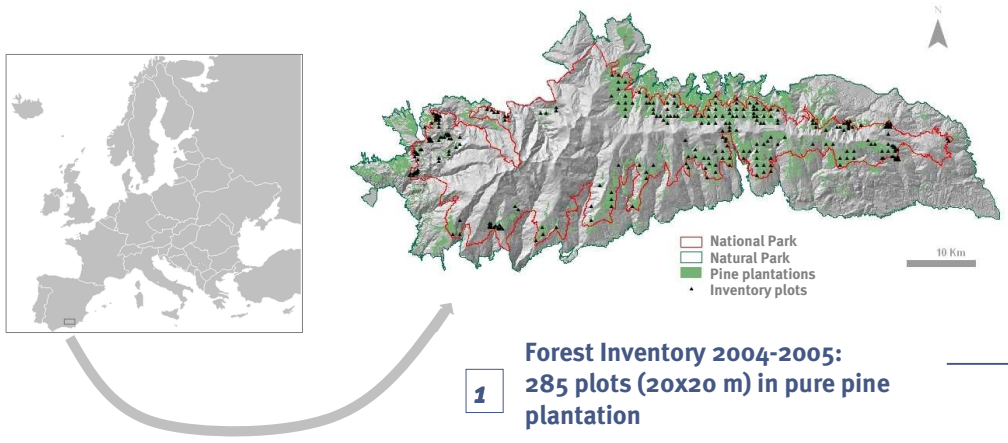
1 **Higher land use intensity previous pine plantation, fewer biological legacy and therefore, less current native species regeneration ability**

2 **Higher seed source distance previous pine plantation, less colonization ability and therefore, less current regeneration ability**





2. Study site & Methodology



Pine plantations are widely distributed in Mediterranean basin, and their naturalization is a current problem for ecologists, land managers and landscape restorers

18.000 has. of pine plantation in Sierra Nevada National Park

1 **Forest Inventory 2004-2005: 285 plots (20x20 m) in pure pine plantation**

Quercus **spp. regeneration abundance in each plots (5 m radius)**

Detailed photointerpretation on 1956 orthophoto and vectorial operations

2 **Land use in 1956 per plot**

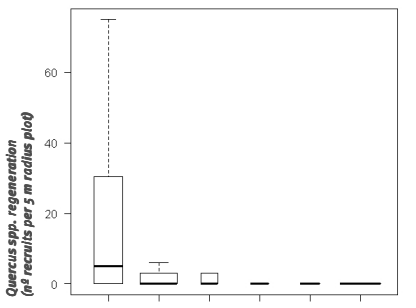
3 **Nearest** ***Quercus*** **spp. patch distance in 1956 per plot**

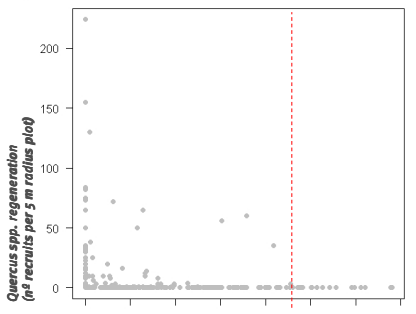
4 **Zero-inflated Poison model**

3. Results

1 **Land use previous to pine plantation establishment has a prevalent role in current** ***Quercus*** **spp. regeneration abundance, although propagule source distance has also influenced (Akaike criterion)**

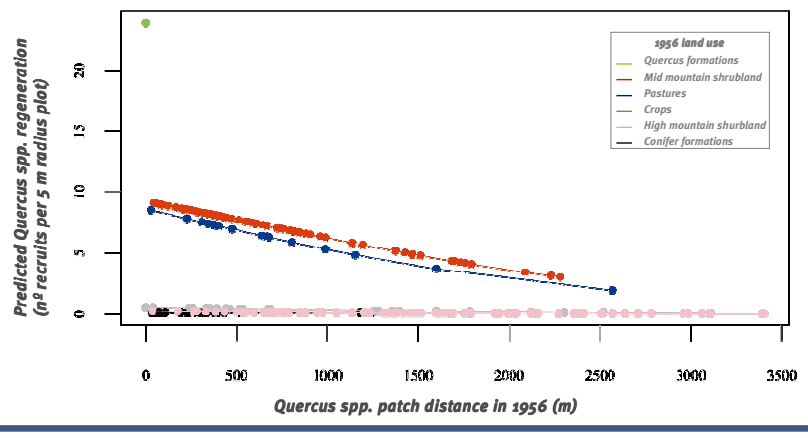
Model	*AIC*	*ΔAIC*	*Df*
1956 seed distance + 1956 land use	2987.25	0.00	14
1956 land use	2991.45	4.20	12
1956 seed distance	3500.45	513.20	4
Null model	3667.64	680.39	2





2 **Our results show a potential regeneration gradient in pine plantation strongly related to previous land-use intensity (crops, pastures, mid-mountain shrubland and** ***Quercus*** **spp) (p< 0.001)**

3 **Propagule source distance in 1956 condition current regeneration presence-absence (p = 0,008)**



4. Conclussions

- **Our results support a prevalent role of ecological memory; the recuperation of community diversity within plantations strongly depends on the internal ecological memory → *Quercus* forest regeneration ability under pine plantations in Mediterranean mountain largely depend on previous land use history, although nearby, well-conserved areas which can also provide propagules for colonization from outside the plantation**

- **This allows us to select and prioritize areas for naturalization silvicultural activities in conifer plantations based on expected success in native vegetation development**