Traditional forest management and biodiversity in a lowland wood remnant in North-East Italy

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Forest Research in the Big Data Era

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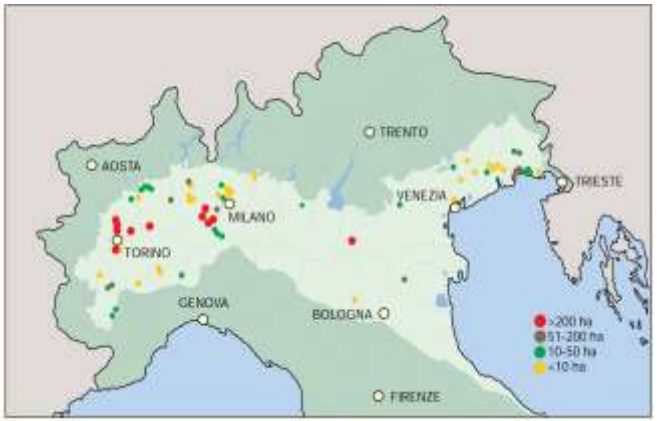
Background

- Since the Roman age, strong land use change
- In European lowlands remnants of natural forests are rare, small, fragmented and often endangered
- Nature conservation networks

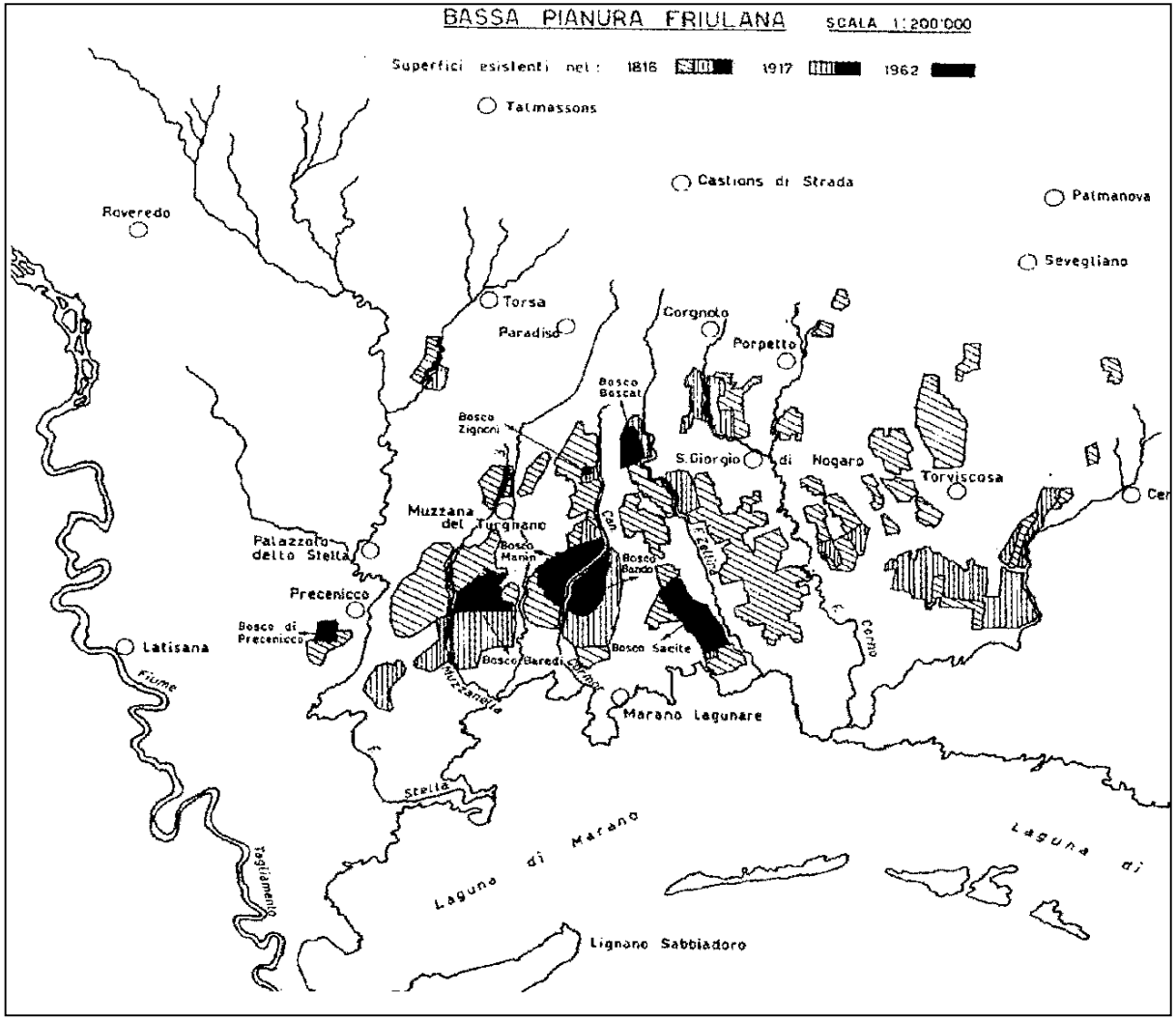


Background

Forest area in Friuli Venezia Giulia Plain

1816-1962

(Paiero, 1965)



Background

- Traditional management: coppice with standards, rotation period 8-10 years
- Rotation periods have been elongated (18-20 years)
- Abandonment and/or conversion into high forests

Aims of the study

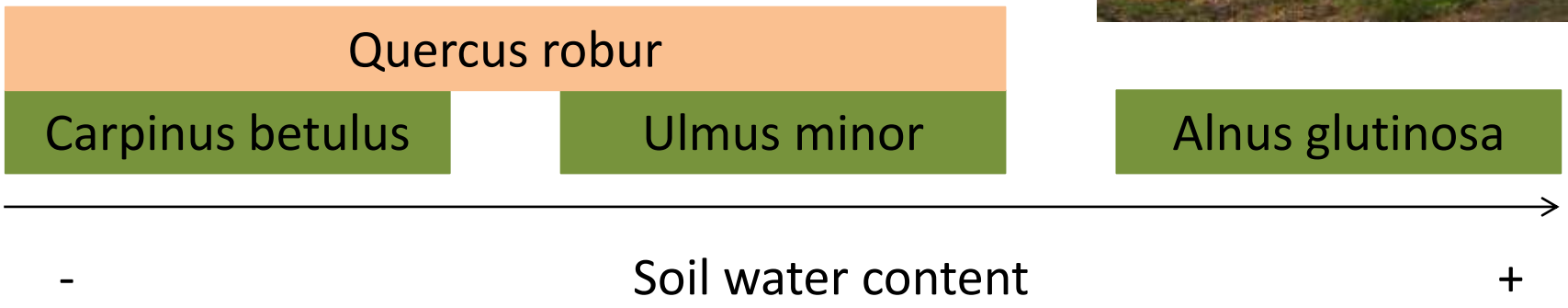
- How does coppicing influence plant biodiversity in plain forests ?
- Is the conversion to high forest a win strategy to sustain biodiversity and for conservation ?

Materials and methods: study area

- A wood remnant (162 ha) named “Selva di Arvonchi”
- Altitude: 1-3 m a.s.l.
- Collective property levied by civic uses
- Sub-continental climate, (T=13.2°C; Rain=1087 mm)
- Natura 2000 - Special Areas of Conservation

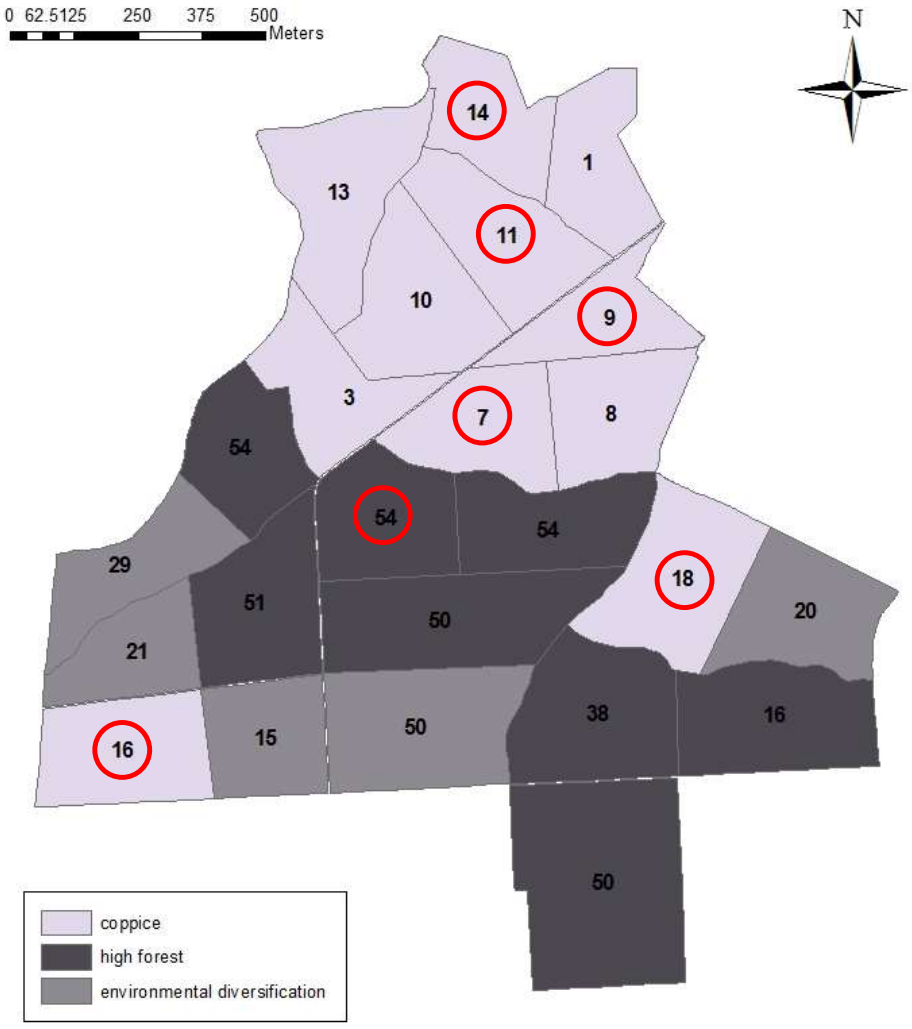
Material and methods: study area

- Vegetation: *Asparago tenuifolii - Quercetum roboris*
- Oak die-back



Materials and methods: sampling design

- Chronosequence approach
- Five 100 m^2 plots per stand
- Classical dendrometric measurements
- Two seasonal vegetation surveys



Materials and methods: data analysis

- Data were pooled for each stand:
  - Stem density, basal area and standing volume
  - Taxonomical diversity (Shannon index)
  - Functional diversity (richness – Frich, evenness – Feve, divergence - FDiv)

- Data elaborations:
  - Forest structure and species diversity
  - Understory species assemblage

Results: changes in forest structure

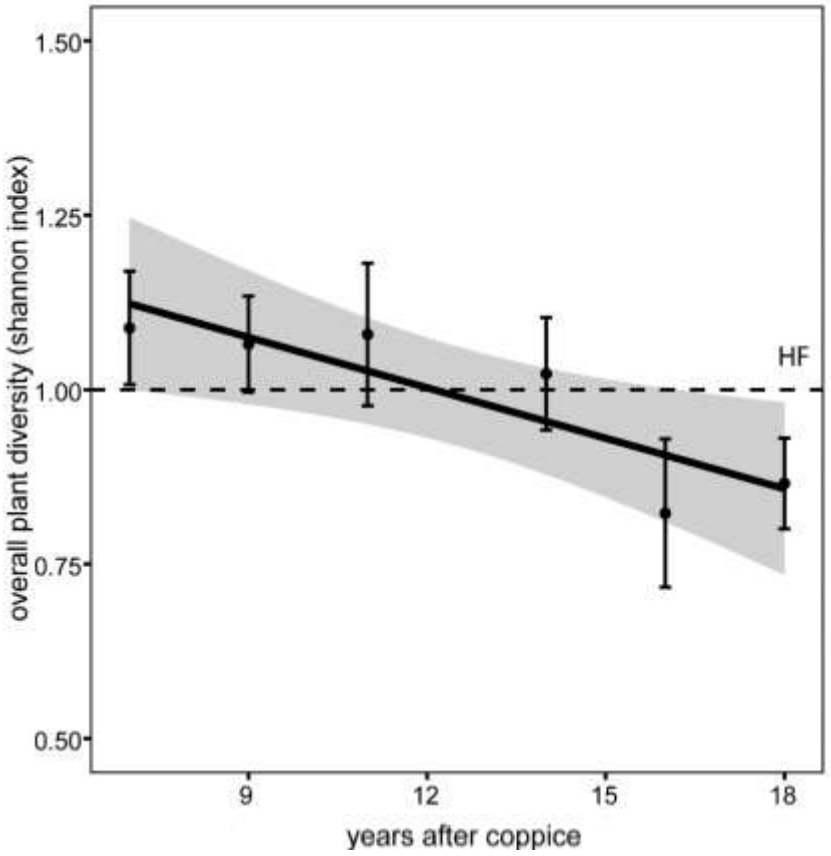
Forest type	Age	N ha^{-1}	G (m^2 ha^{-1})	V (m^3 ha^{-1})
Coppice-with-standards	7	1519±419	13.2±1.4	119.6±17.2
	9	1812±503	19.5±4.5	183.4±59.5
	11	2051±498	13.2±3.7	98.6±28.8
	14	2371±357	26.0±2.3	245.0±43.4
	16	2789±151	22.6±5.1	191.2±59.9
	18	3787±631	31.7±3.7	248.0±42.8
High forest	54	1894±295	26.1±4.0	238.5±43.2

Mean ± s.e.

Coppice:

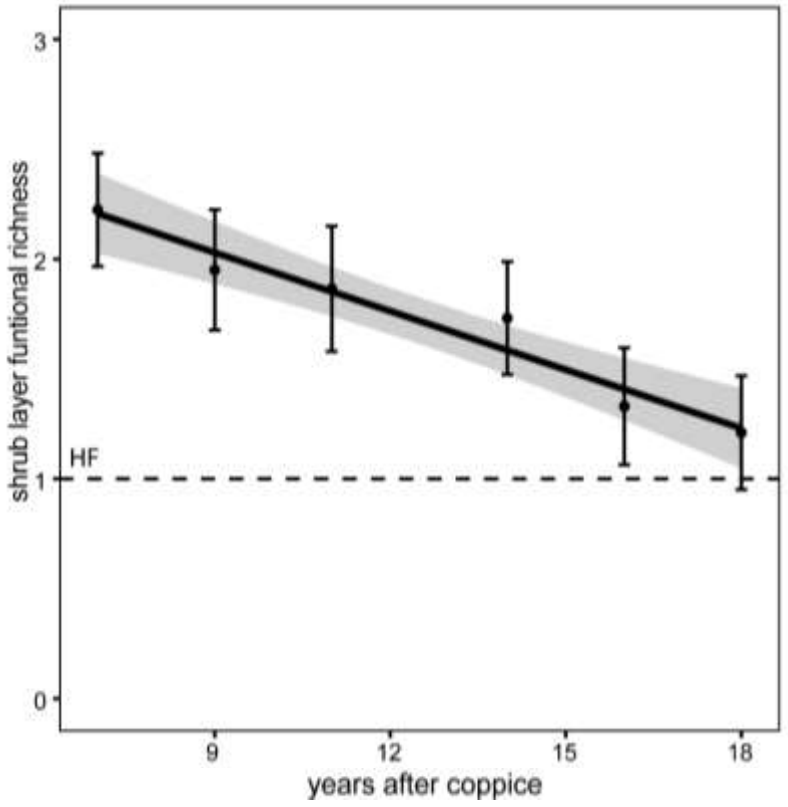
- +183 stems ha^{-1} yr-1; R^2=0.90; p=0.004
- +0.49 m^2 ha^{-1} y^{-1}; R^2=0.73; p=0.03
- +0.49 m^3 ha^{-1} y-1; R^2=0.53; p=0.10

Results: changes in plant diversity



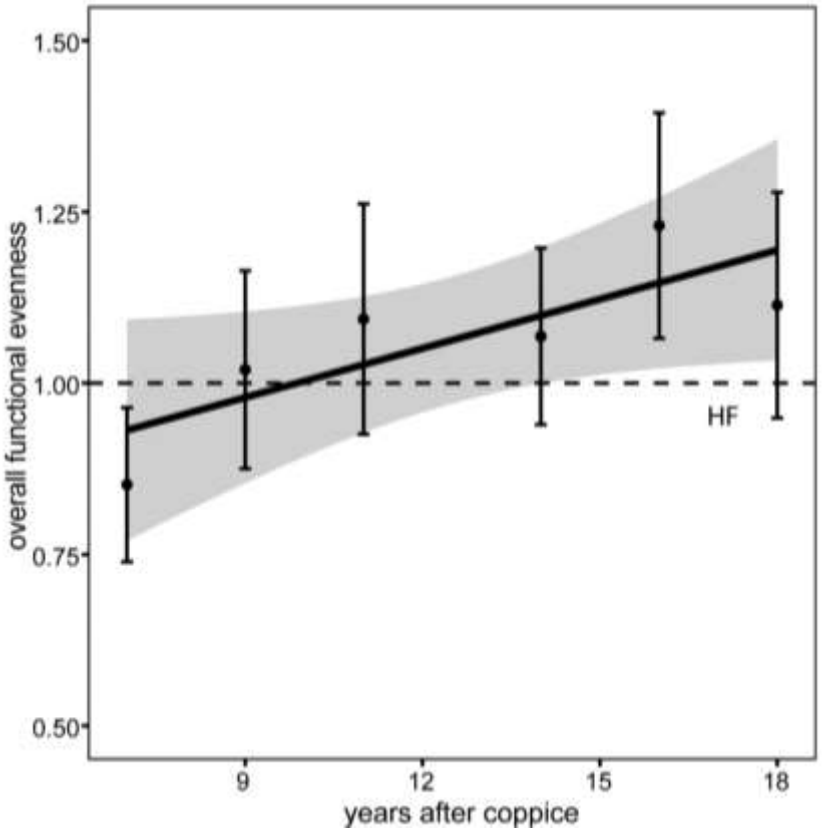
Diversity index		overall			herbs			shrub		
		coef	p-value	R^2	coef	p-value	R^2	coef	p-value	R^2
H’	Itercept	1.292	<0.001	0.71	1.293	<0.001	0.51	1.701	<0.01	0.54
	Slope	-0.024	0.022		-0.025	0.067		-0.048	0.059	

Results: changes in functional richness



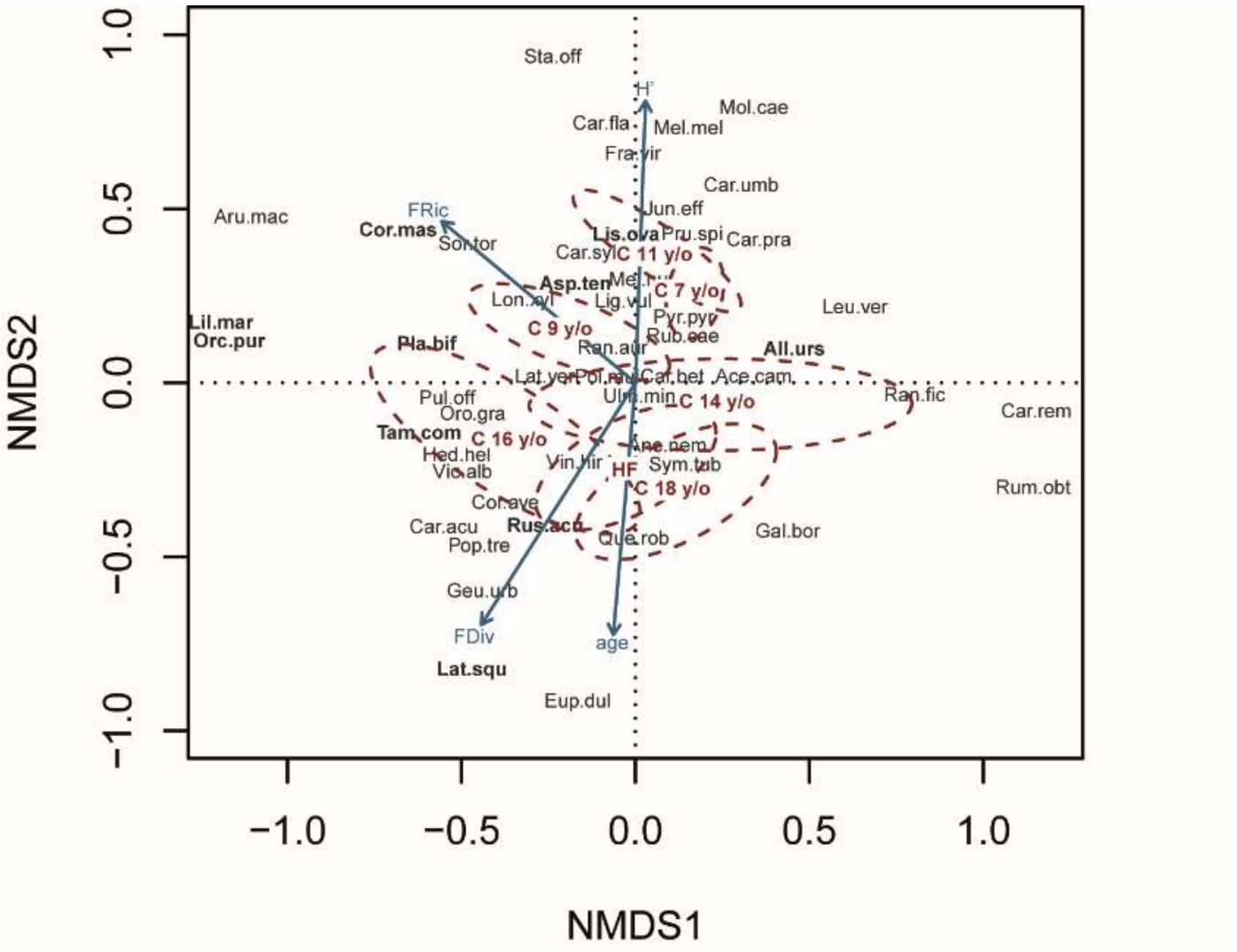
Diversity index		coef	p-value	R^2
Frich	Intercept	2.829	<0.001	0.94
	Slope	-0.089	<0.001	

Results: changes in functional evenness



Diversity index		coef	p-value	R^2
Feve	Intercept	0.764	<0.01	0.57
	Slope	0.024	0.051	

Results: changes in plant composition



Conclusions/1

- Coppice-with-standards, ruled by reasoned forest management plans, helps to maintain a higher heterogeneity under several aspects
- Abandonment of coppicing → habitat oversimplification, weakening of functions and loss of crucial species
- High forest stands sustain the diversity of species sensitive to disturbances

Conclusions/2

- The simultaneous presence of coppices and stands converted to high forests is the best solution to sustain biodiversity in plain forests as already seen in other woods

Thanks for your attention

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