Workshop finale
del progetto LIFE
FutureForCoppiceS

Gestione sostenibile dei boschi cedui: indicazioni per il futuro dall'eredità di prove sperimentali

LIFE FutureForCoppiceS

Shaping future forestry for sustainable coppices in southern Europe: the legacy of past management trials

SFM indicators and their application to coppice forests

Indicatori di GFS e loro applicazione ai boschi di origine cedua

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PROJECT OBJECTIVE 1

- Testing, demonstrating and disseminating the value of SFM indicators in coppice forests
- Testare, dimostrare e divulgare il valore degli indicatori di GFS nei boschi cedui

SFM Criteria and Indicators

12 CONSOLIDATED INDICATORS

26 NEW INDICATORS

FOREST RESOURCES AND GLOBAL CARBON CYCLES

Growing stock
Diameter distribution
Carbon stock

Growth efficiency
Total above ground tree biomass

FOREST ECOSYSTEM HEALTH AND VITALITY

Soil condition
Defoliation
Forest damage

Chlorophyll content
Leaf traits | Chlorophyll *a* fluorescence
Stand growth

PRODUCTIVE FUNCTIONS OF FORESTS

Increment and fellings*
Non-wood goods_marketed mushroom production*
Roundwood (firewood)*

BIOLOGICAL DIVERSITY IN FOREST ECOSYSTEMS

Tree species composition
Introduced tree species
Deadwood
Threatened forest species

Forest herbaceous species | Native herbaceous species
Alien herbaceous species | Herbaceous species of interest
Wood decayin fungi | Epiphytic lichens
Forest breeding birds | Edible mushrooms

PROTECTIVE FUNCTIONS (SOIL AND WATER)

Bryophyte cover
Flood retention
Ground litter depth
Overstorey cover | Understorey cover

SOCIO-ECONOMIC FUNCTIONS

Contribution of forest sector to GDP
Net revenew

Energy from wood sesources* | Recreation*
Trade in wood* | Work force*

**Consolidated Indicators but calculated at the stand or management unit level*

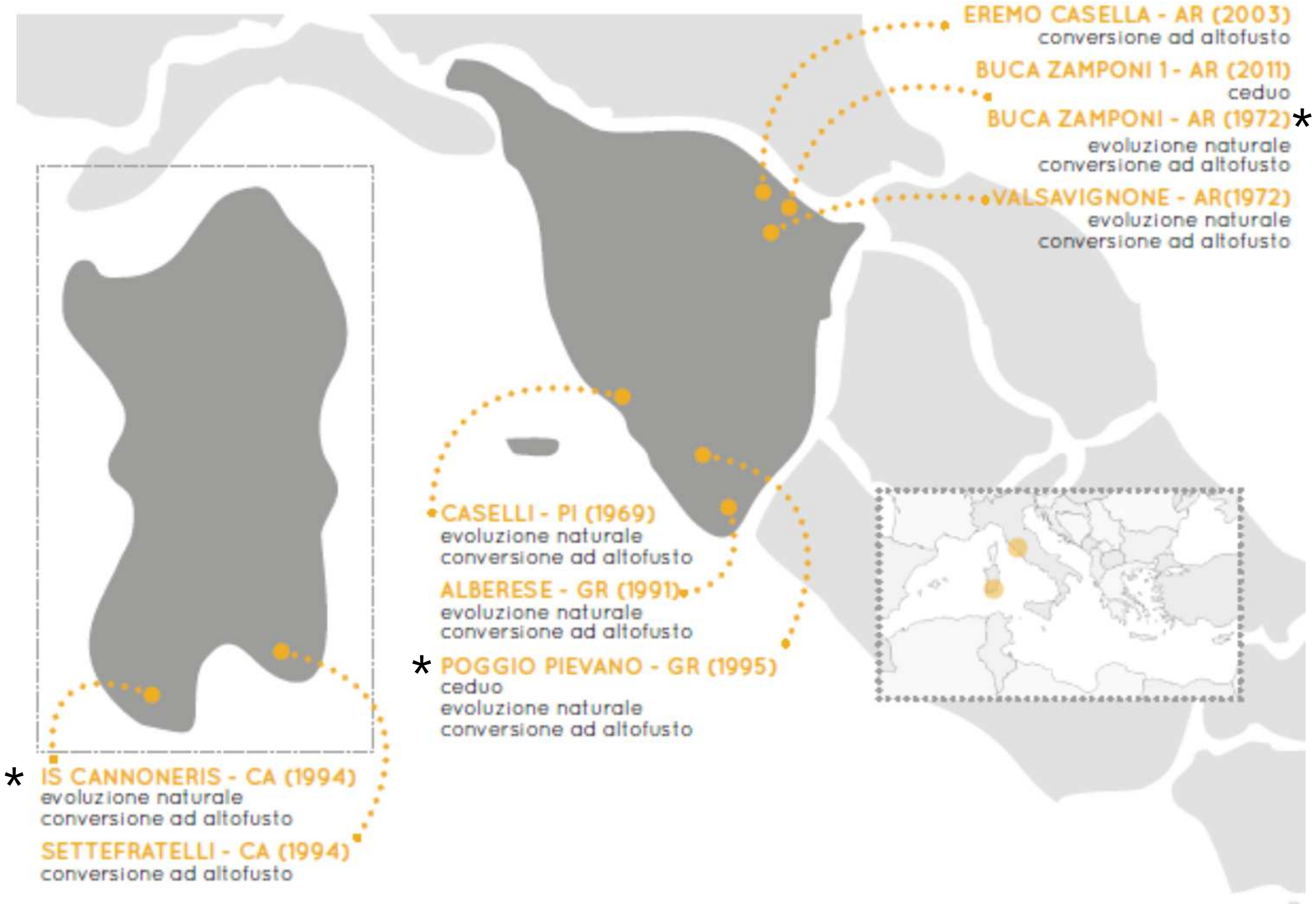
SFM Criteria and Indicators

12
consolidated indicators

45 areas
9 sites

26
new indicators

18 areas
3 sites*



i. Data from historical series
ii. Data collected during the project

A. Indicator appropriateness evaluation

Valutazione dell'appropriatezza degli indicatori

		Low	Medium	High
Criteria	Applicability	1	2	3
	Replicability	1	2	3
	Costs	3	2	1

		Appropriateness
Score	8-9	Highly appropriate indicator
	6-7	Appropriate indicator
	≤ 5	Scarcely appropriate indicator

B. Indicator ability to discriminate management options

Capacità degli indicatori di discriminare le opzioni di gestione

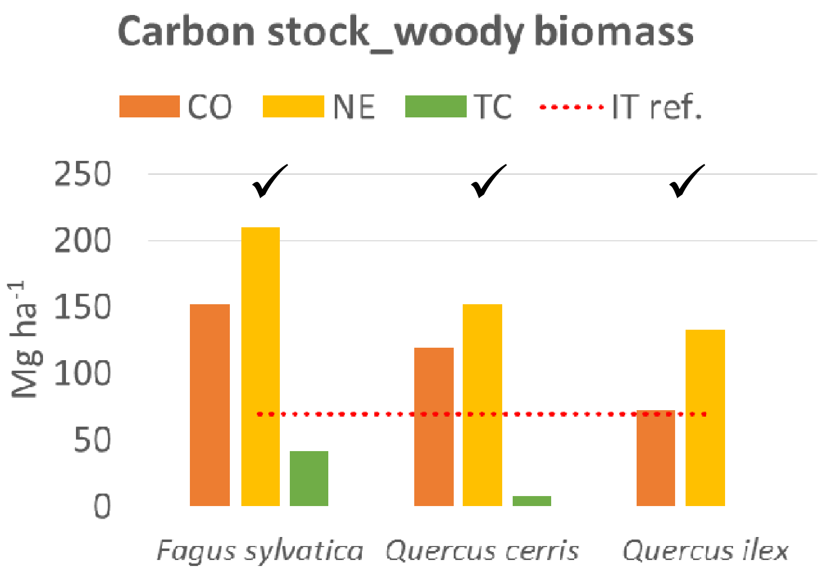
- ANOVA / Kruskal-Wallis test

Criterion 1: FOREST RESOURCES AND GLOBAL CARBON CYCLES
- A -

Appropriateness	Consolidated indicator	New indicator
Highly appropriate	Growing stock [m^3 ha^{-1}] Carbon stock_woody biomass [Mg ha^{-1}]	Total above ground tree biomass [Mg ha^{-1}]
Appropriate	Diameter distribution [n]	Growth efficiency
Scarcely appropriate	Carbon stock_soil C content [g kg^{-1}]	-

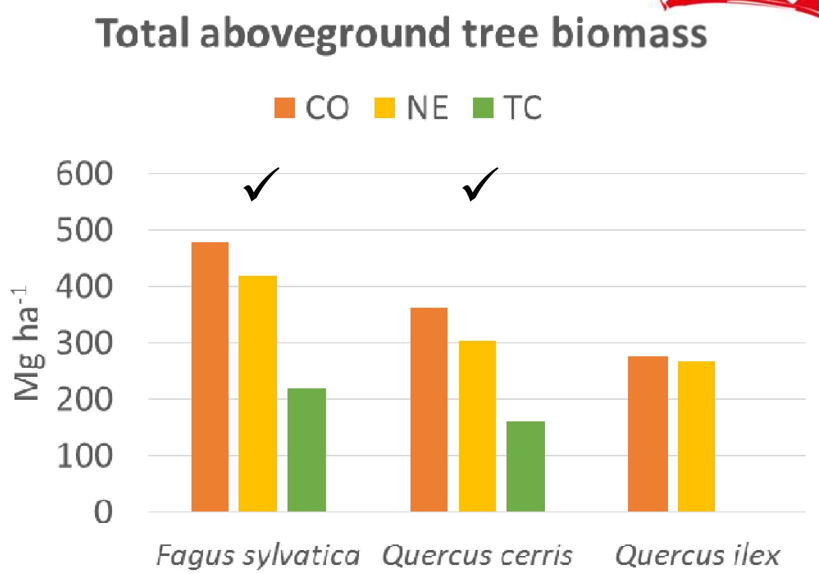
Criterion 1: FOREST RESOURCES AND GLOBAL CARBON CYCLES
- B -

Stock di carbonio nella massa in piedi



*FOREST EUROPE, 2015

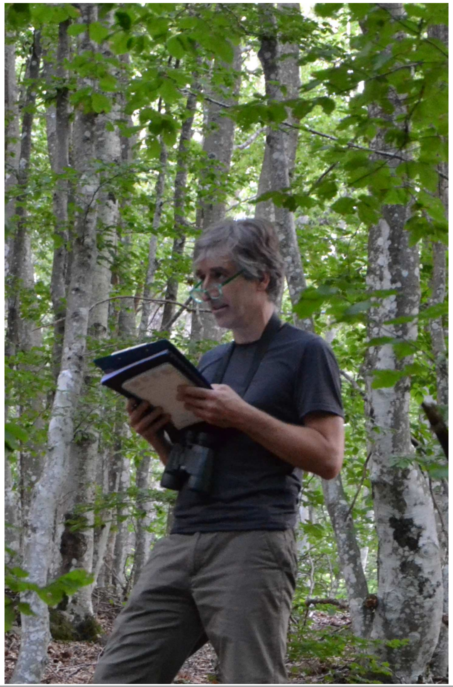
Biomassa epigea totale



✓ Statistically significant differences among management options ($P<0.05$)

Criterion 2: FOREST ECOSYSTEM HEALTH AND VITALITY
- A -

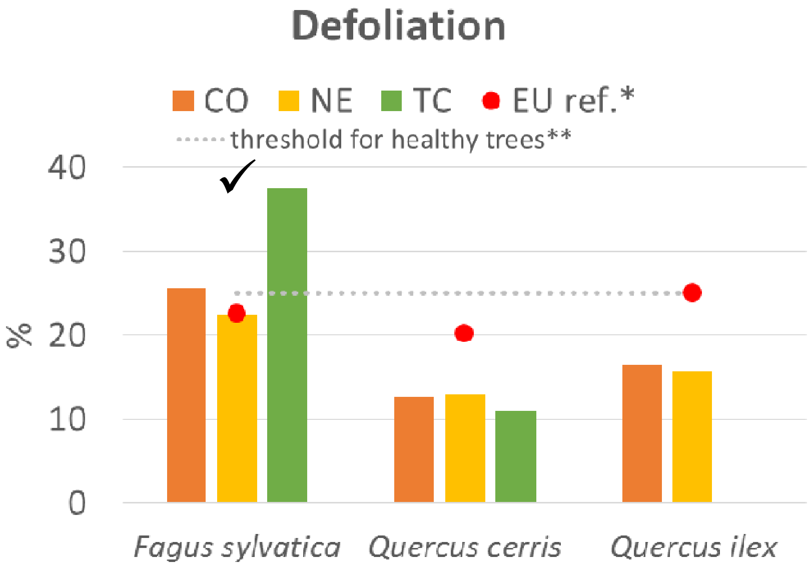
Appropriateness	Consolidated indicator	New indicator
Highly appropriate	Defoliation [%] Forest damage [n]	Chlorophyll content [SPAD] Leaf traits Chlorophyll a fluorescence [a.u.]
Appropriate	Soil condition	Stand growth_biomass [Mg ha^{-1} y^{-1}] Stand growth_volume [m^3 ha^{-1} y^{-1}]
Scarcely appropriate	-	-



Criterion 2: FOREST ECOSYSTEM HEALTH AND VITALITY

- B -

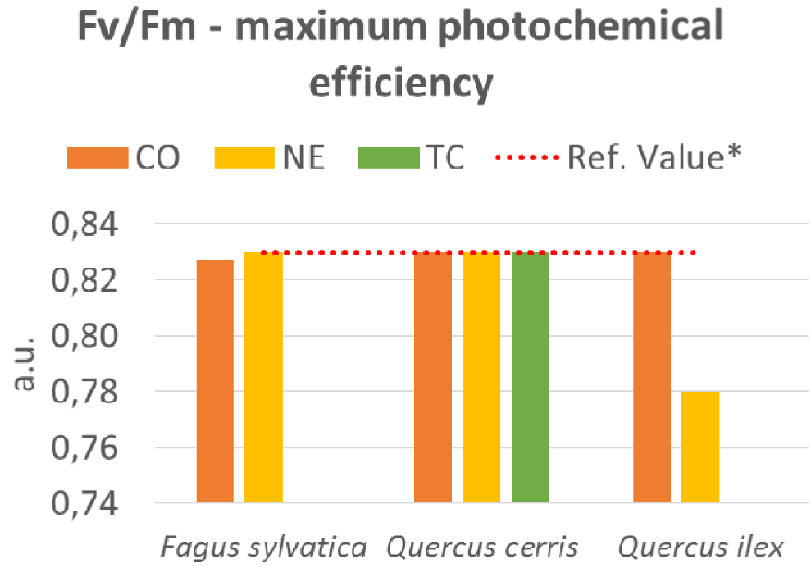
Defogliazione



*Timmermann et al. 2017,
Technical Report of ICP Forests

**FOREST EUROPE, 2015

Max efficienza fotochimica



*Kalaji et al. 2014

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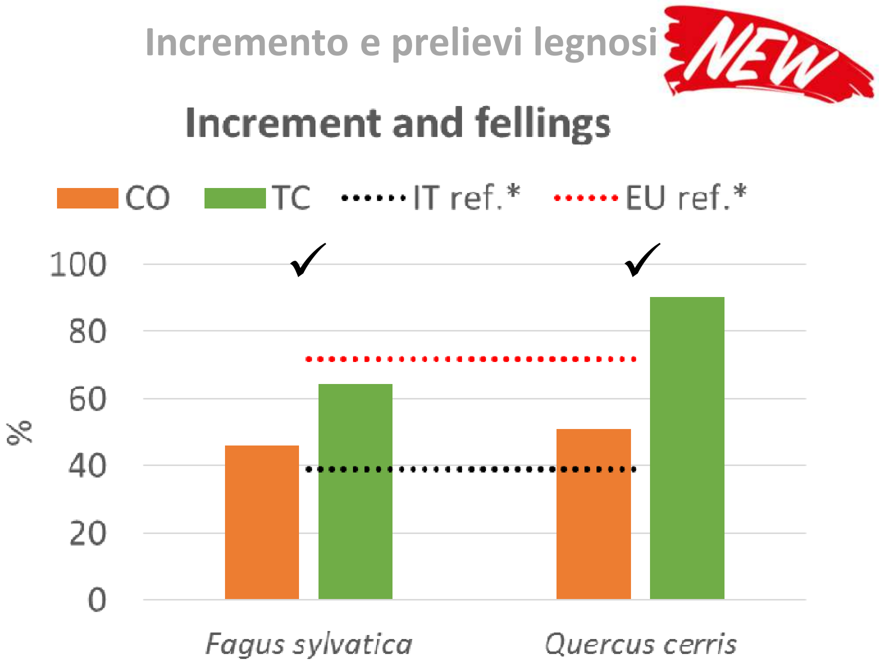
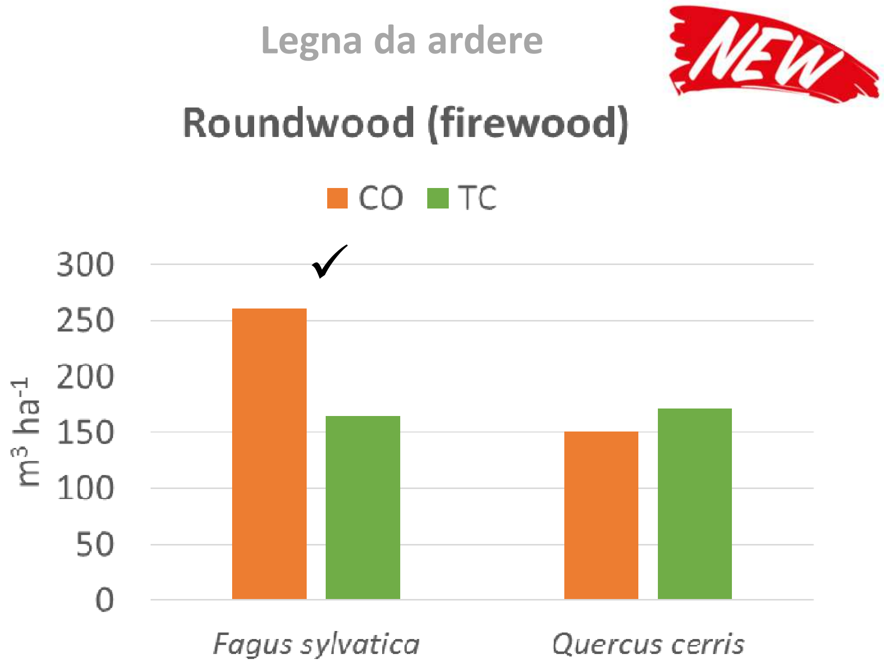
Criterion 3: PRODUCTIVE FUNCTIONS OF FORESTS
- A -

Appropriateness	Consolidated indicator	New indicator
Highly appropriate	-	-
Appropriate	-	Increment and fellings [%] Roundwood (firewood) [m^3 ha^{-1}]
Scarcely appropriate	-	Non-wood goods_Marketed mushrooms production [€ ha^{-1}]

Criterion 3: PRODUCTIVE FUNCTIONS OF FORESTS
- B -





*FOREST EUROPE, 2015

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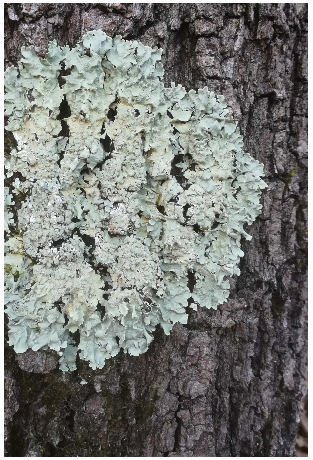
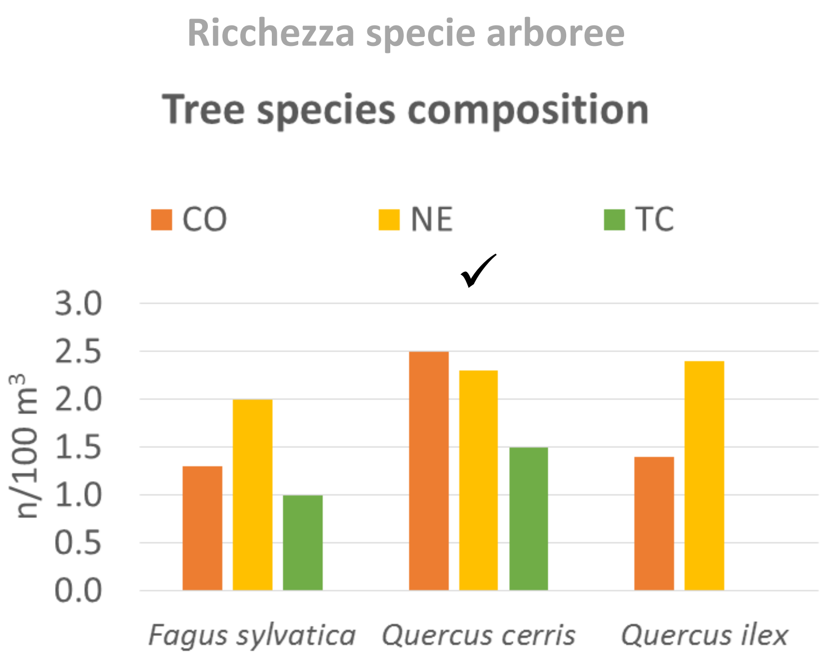
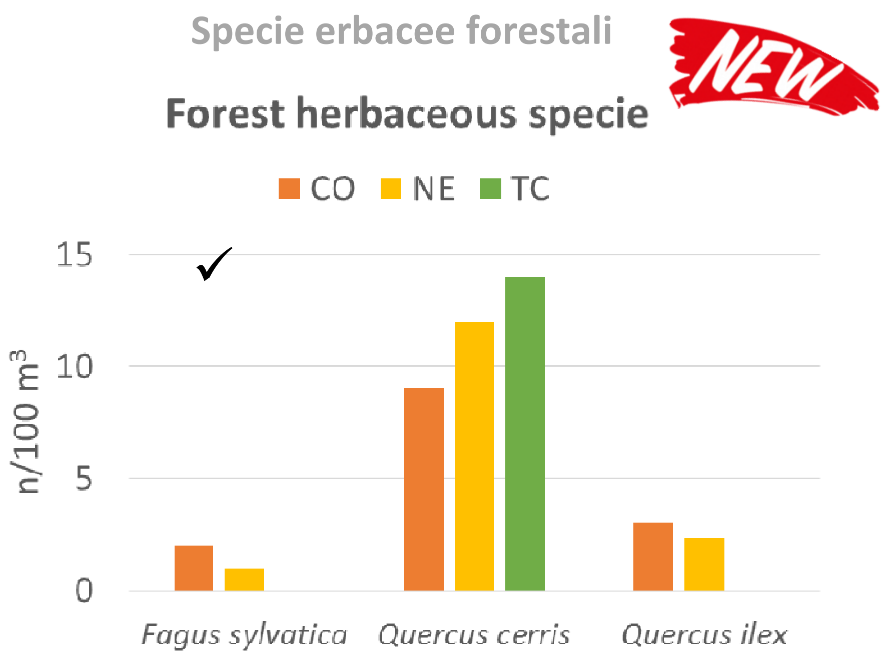
Criterion 4: BIOLOGICAL DIVERSITY IN FOREST ECOSYSTEMS
- A -

Appropriateness	Consolidated indicator	New indicator
Highly appropriate	Tree species composition [n]	Forest herbaceous species [n] Native herbaceous species [n]
Appropriate	-	Epiphytic lichens [n] Wood decaying fungi [n]
Scarcely appropriate	-	Edible mushrooms [n; g] Forest breeding birds [n]



Criterion 4: BIOLOGICAL DIVERSITY IN FOREST ECOSYSTEMS
- B -





*FOREST EUROPE, 2015

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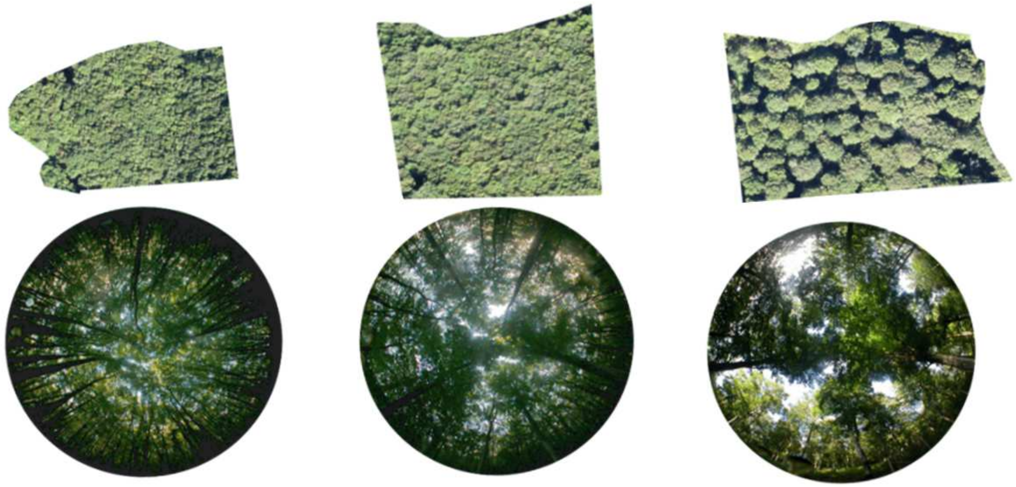
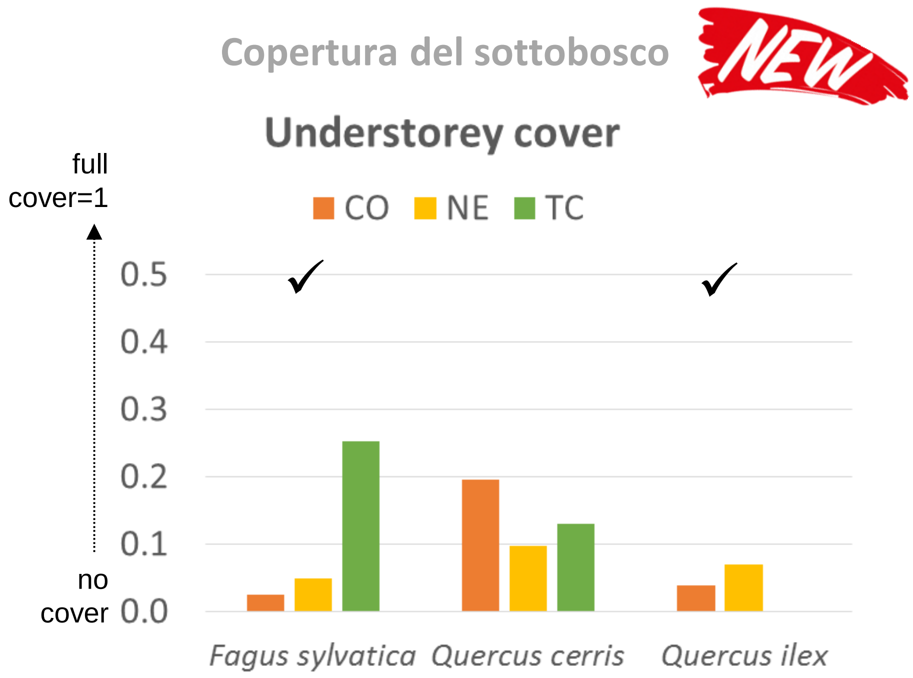
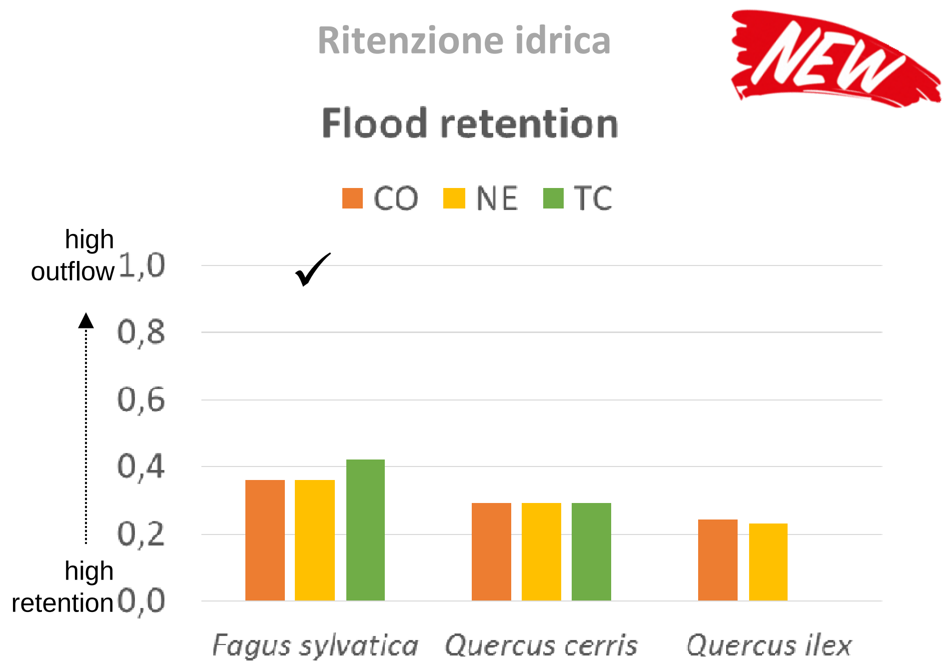
Criterion 5: PROTECTIVE FUNCTIONS (SOIL AND WATER)
- A -

Appropriateness	Consolidated indicator	New indicator
Highly appropriate	-	Overstorey cover Understorey cover
Appropriate	-	Flood retention
Scarcely appropriate	-	Bryophyte cover Ground litter depth



Criterion 5: PROTECTIVE FUNCTIONS (SOIL AND WATER)
- B -





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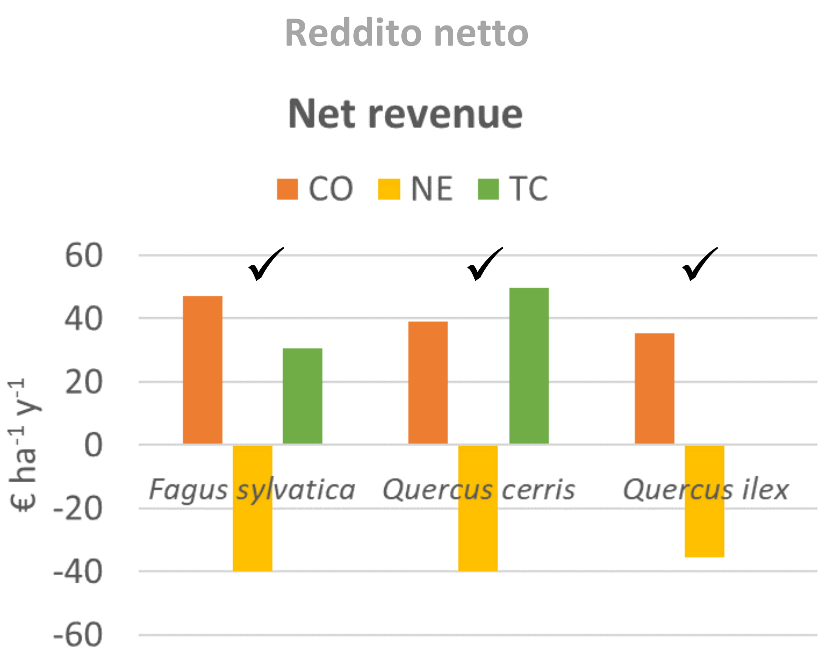
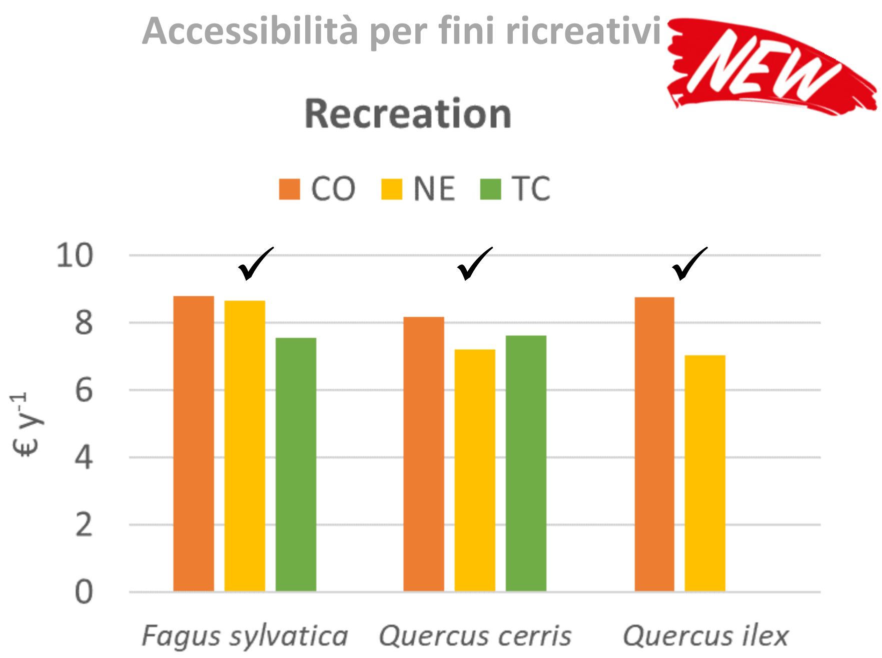
Criterion 6: SOCIO-ECONOMIC FUNCTIONS
- A -

Appropriateness	Consolidated indicator	New indicator
Highly appropriate	Net revenue	Energy Recreation
Appropriate	Contribution of forest sector to GDP	-
Scarcely appropriate	-	Trade in wood Work force

Criterion 6: SOCIO-ECONOMIC FUNCTIONS
- B -





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