LIFE14 CCM/IT/000905

Socio-economic impact of the LIFE project FoResMit

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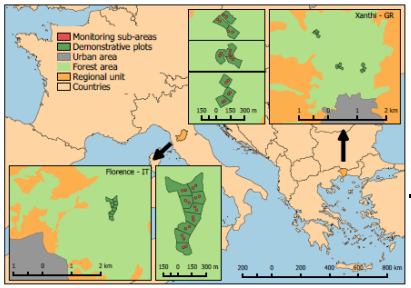
Capacity Building for Croatia's National Contact Point for the LIFE Programme
LIFE14 CAP/HR/000014

REPUBLIC of CROATIA
Ministry of Environment and Energy

FoResMit: recovery of degraded coniferous Forests for environmental sustainability Restoration and climate change Mitigation

Reference	Duration	Budget	Location
LIFE14 CCM/IT/905 **Climate change Mitigation**	4 years 01-SEP-2015 to 31-AUG - 2019	Total budget 1.465.443 € EU contribution 879.264 €	Tuscany (Italy) Greece (Thrace)



FoResMit partners:

crea
Consiglio per la ricerca in agricoltura e l'analisi dell'economia agraria

CITTÀ METROPOLITANA DI FIRENZE

ΔΗΜΟΚΡΙΤΕΙΟ ΠΑΝΕΠΙΣΤΗΜΙΟ ΘΡΑΚΗΣ

HELLENIC REPUBLIC
DECENTRALIZED ADMINISTRATION of MACEDONIA & THRACE
GENERAL DIRECTORATE of FORESTS & RURAL AFFAIRS
XANTHI FOREST DIRECTORATE

Environmental problem: pine forest degradation

Increased fire risk

Susceptibility to adversities (insects/pathogens)

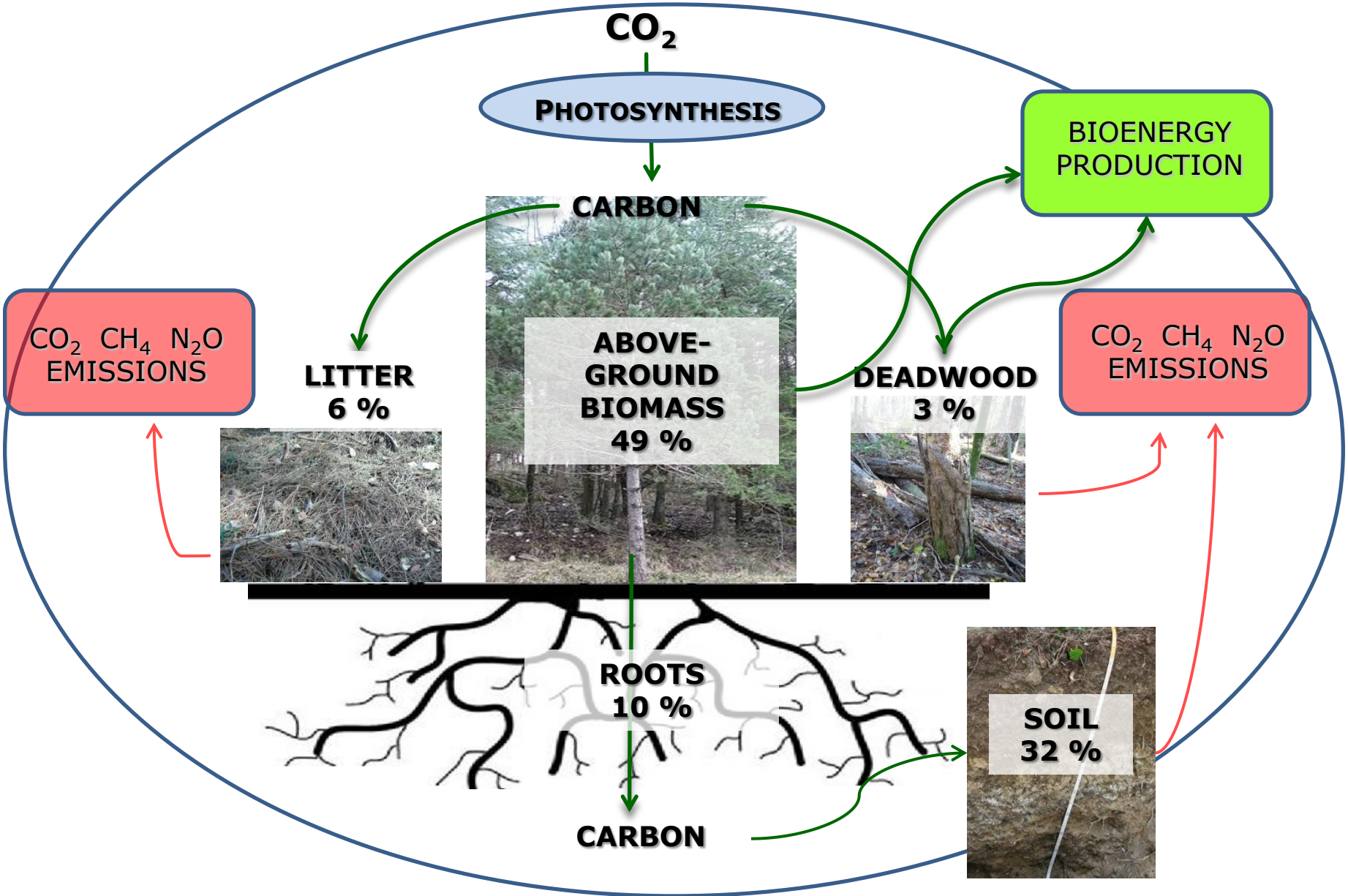
Low productivity

REDUCED POTENTIAL FOR C SEQUESTRATION

Absence of regeneration

Reduced recreational actractiveness

multidisciplinary approach (soil – vegetation – atmosphere)



FoResMit impact

1. ENVIRONMENTAL

- Increased C sequestration
- Control of green-house gas production
- Forest stability and regeneration

TRADE-OFF AND SYNERGY ANALYSES

2. ECONOMIC

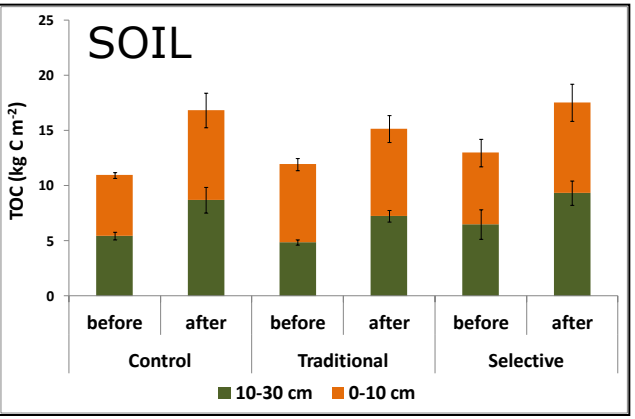
- Use of biomass for bioenergy production and fossil fuel substitution
- wood-chain analysis

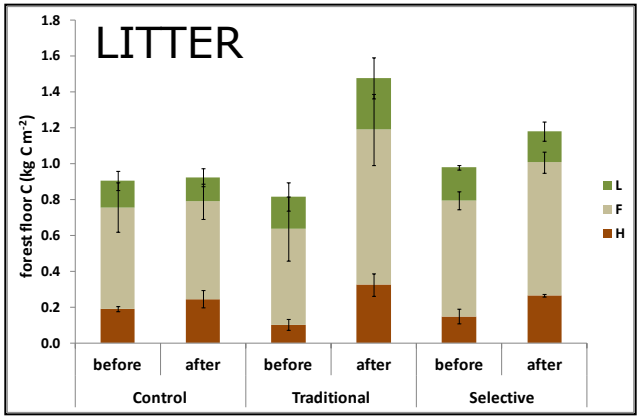
3. SOCIAL

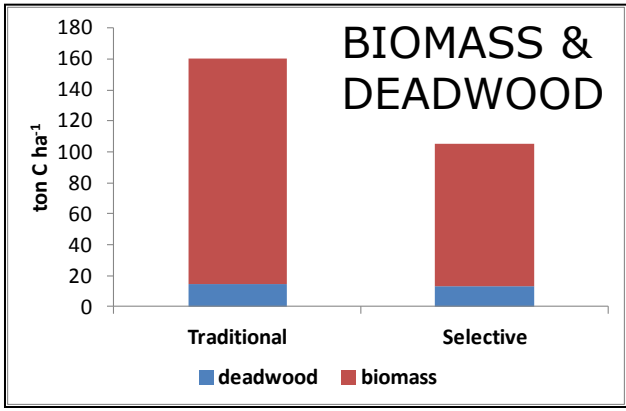
- Periurban forest landscape attractiveness
- Increase of recreational value

1. ENVIRONMENTAL

C POOLS







C SEQUESTRATION

SOIL - LITTER

Delta of measured organic C (g kg m^{-2})

i) before and after thinning intervention

ii) Percentage difference from Control

DEADWOOD

Deadwood biomass removed with thinning * deadwood C stock (g kg m^{-2}) before and after thinning intervention

ABOVE- and BELOWGROUND BIOMASS

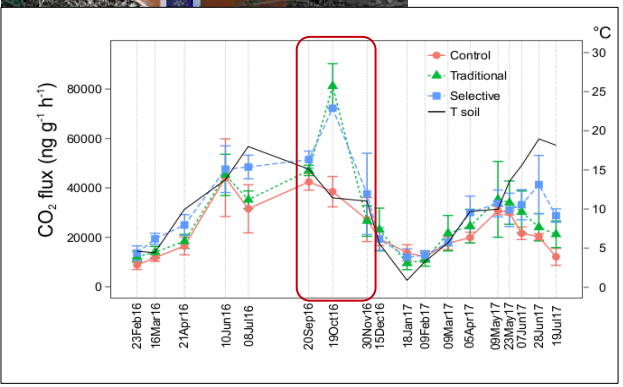
$C = [(I \cdot BEF \cdot WBD) + (I \cdot R \cdot WBD)] \cdot 0.5$

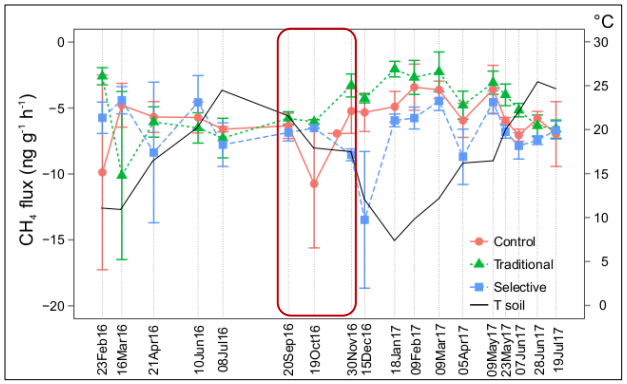
I = annual increment of volume (m^3 ha^{-1} yr^{-1})
BEF= biomass expansion factor
WBD= wood basic density, *R*= root-to-shoot ratio
0.5 (C content coefficient)

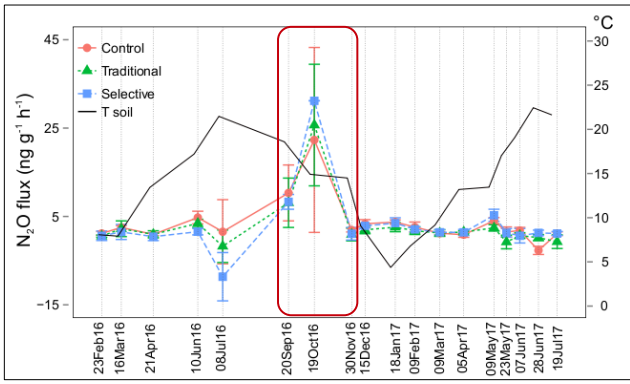
Fossil fuel substitution

1. ENVIRONMENTAL

CO_2, CH_4, N_2O FLUXES

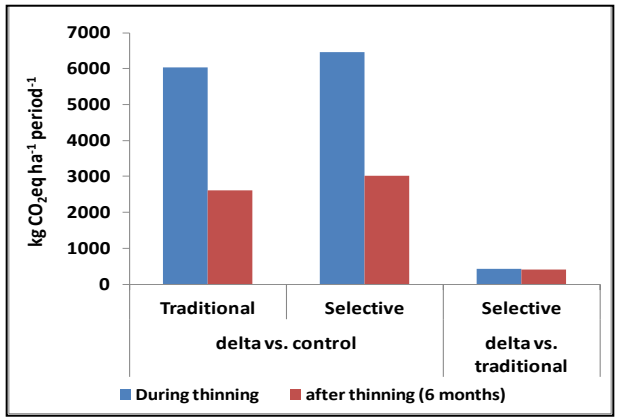


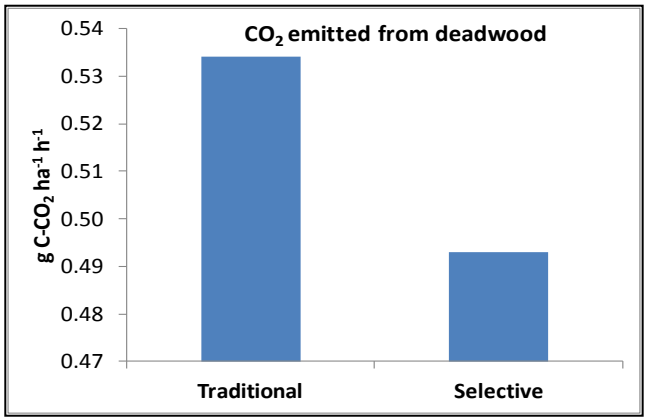




C-CO_2 EQUIVALENTS (CO_2 + CH_4 + N_2O)

C SEQUESTRATION





C credits

2. ECONOMIC – C CREDITS

Governance of the results of the LIFE FoResMit Project in the carbon voluntary market. C credits will be used:

i) for the continuous maintenance of the improved forest practices and
ii) to reduce the CO_2 emissions produced by other sectors at regional level

First attempt: **Quantification of the CO_2 emission and environmental sustainability of a cultural event** ("*Maggio in Centro*" held in the municipality of the Project):

1. Direct measurements of:

- ✓ Waste (number of waste baskets and volume for each waste basket);
- ✓ Total number of visitors (count of visitors 10 minutes every hour).

2. Administration of semi-structured questionnaires to the following actors:

- ✓ Organizers of the "*Maggio in Centro*" event (Sesto Fiorentino municipality and "*La Rocchetta*" association were interviewed);
- ✓ Exhibitors (all 18 during the 3-day event were interviewed);
- ✓ Sample of visitors (61 visitors of the event were interviewed).

2. ECONOMIC – C CREDITS

ENVIRONMENTAL IMPACTS		CO_2 ECONOMIC VALUES		ECONOMIC RESULTS	
Climate change	83.27 t CO_2 eq.	EUA (Min)	474,50 €	Events income	33,021.38 €
Particulate matter	0.16 t PM_{10} eq.	EUA (Max)	504,47 €	Direct proficts from products	29,021.38
Photochemical oxidant formation	0.53 t NMVOC eq.	CER (Min)	33,30 €	Gross profits	671.22 €
Terrestrial acidification	0.44 t SO_2 eq.	CER (Max)	34,13 €	Net profits	97.67 €
Freshwater eutrophication	0.01 t N eq.			VAT and taxes	6,995.86 €

EUA = European Union Allowances
CER = Certified Emission Reductions

<u>Work in progress</u>:
How many ha of thinning should be realized in order to compensate emissions from such events?

2. ECONOMIC – BIOENERGY PRODUCTION

Wood – energy chain analysis. Costs vs. profits considering all phases: felling, logging, chips production, transportation

2. ECONOMIC – BIOENERGY PRODUCTION

PROFITS	Thinning type	Selective	Traditional	u. m.
	Surface (ha)	4.73	5.35	ha
	Mean production	144.6	96.4	t /ha
	Total production	684	516	t
	Economic value	32,146	24,252	€
COSTS	FELLING and LOGGING	20,032	15,105	€
		4,235	2,823	€/ha
	CHIPS PRODUCTION	6,087	4,590	€
		1,287	858	€/ha
	TRANSPORTATION	6,665	5,026	€
		1,409	939	€/ha
	Works direction, marking, taxes and sale	3,764	2,839	€
	Total costs	36,548	27,560	€
		53.4		€/t
	Total costs (without transportation)	29,882	22,534	€
		6,318	4,212	€/ha
	Chips costs	43.7		€/t

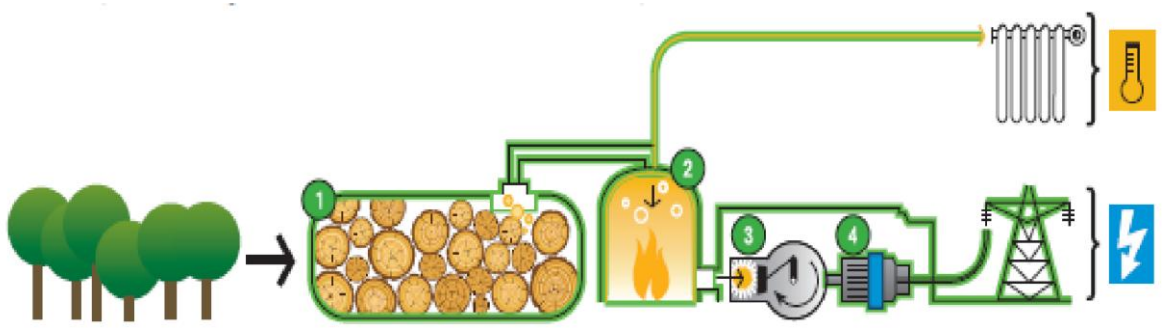
ECONOMICALLY SUSTAINABLE FOR A CHIPS PRICE HIGHER THAN 44 €/t AT LANDING

2. ECONOMIC – BIOENERGY PRODUCTION

	WOODCHIPS	u.m.	METHANE	u.m.	FUEL OIL	u.m.
CALORIFIC POWER	2.81	MWh/t	10	kWh/mc	11.63	MWh/t
PLANT EFFICIENCY	0.79		0.85		0.25	
THERMAL ENERGY PRODUCED	1,809	MWh	1,809	MWh		
ELECTRIC ENERGY PRODUCED	487.2	MWh			487.2	MWh
AMOUNT	1,200	t	212,890	mc	167.5	t
TONS OIL EQUIVALENT (TOE)	0	TOE	174	TOE	164	TOE
CO_2 EMISSIONS (Kg CO_2)	0	t	504.6	t	475.7	t

1 t of fuel oil = 0.98 TOE; 1000 mc methane = 0.82 TOE

2.9 kgCO_2 emitted per kg oil (Hellrigl B.. 2001)



3. SOCIAL

Currently, the annual visitors of Monte Morello periurban forest (*status quo* scenario) are 18,475 visitors yr^{-1}.

Impact on:
Aesthetic value, recreational facilities, social benefits
↓
Economic implication

ANNEX 1

QUESTIONNAIRE

The questionnaire has been realized in the framework of the LIFE project FoResMit (LIFE14 CCM/IT/000905) "Recovery of degraded coniferous Forests for environmental sustainability Restoration and climate change Mitigation". The project aims at testing and verifying the effectiveness of management options for the restoration of degraded coniferous forests in meeting climate change mitigation objectives. The present research is aimed at investigating the touristic value of the black pine peri-urban forest of Monte Morello, located in Italy (Tuscany Region) near the metropolitan area of Florence.

Thank you for the collaboration.

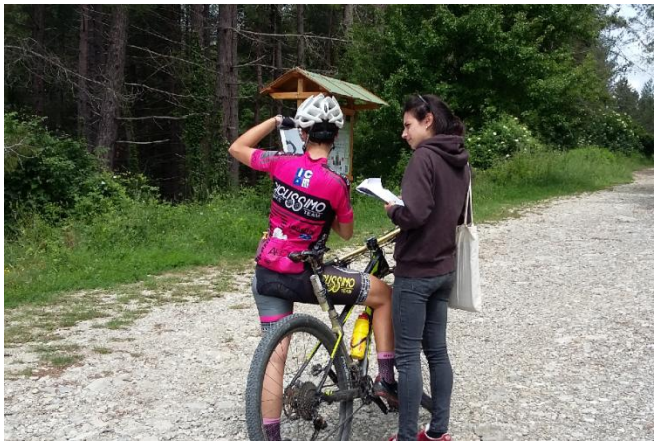
SECTION 1- PERSONAL INFORMATION

1.1. Gender
☐ Male ☐ Female

1.2. What is your age?
☐ Less than 25 years old
☐ 25-44 years old
☐ 45-64 years old
☐ More than 65 years old

1.3. What is your level of education?
☐ Elementary school degree
☐ High school degree
☐ University degree
☐ Post-University degree

1.4. What is your actual job?
☐ Employed in the public sector
☐ Employed in the private sector
☐ Housewife
☐ Student
☐ Pensioner
☐ Unemployed
☐ Other



Semi-structured questionnaire **to 261 visitors** of Monte Morello forest formed by 15 questions (2 open-ended and 13 closed-ended questions) divided in 4 thematic sections.

"Personal information"

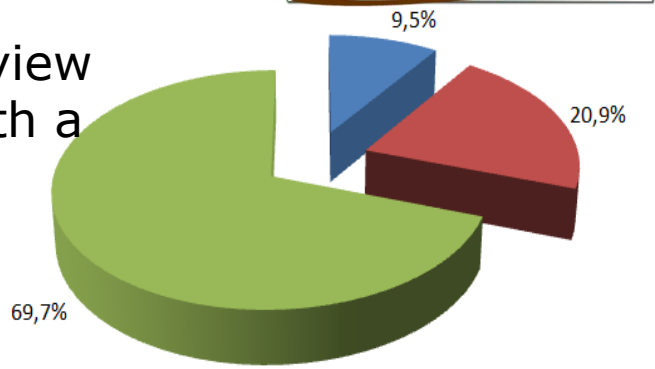
"Recreational use of forest"

"Benefits provided by urban forest landscape"

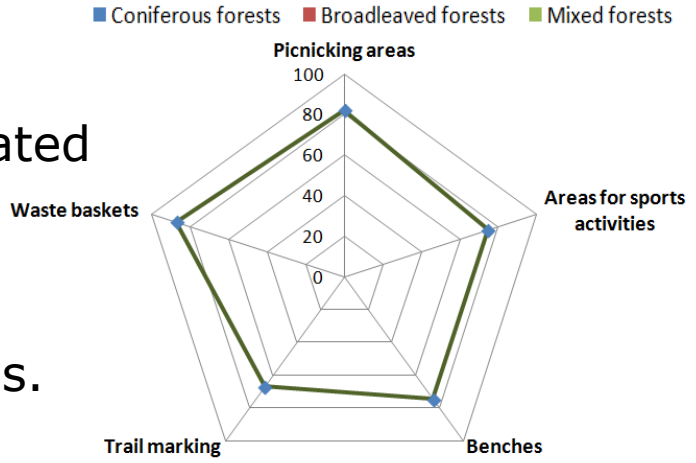
"Preferences and perceptions towards the urban forest landscape"

3. SOCIAL

1. The preferred forest from the aesthetic point of view is a **mixed forest** (69.7% of total respondents) with a **random distribution of trees** in the space and a **differentiated horizontal and vertical stand structure** (54.7%).



2. 48% think that the **recreational facilities improve the attractiveness** of the area (mean 3.17 in a 5-point Likert scale). The most appreciated facilities are waste baskets and picnicking areas. The urban forest landscape after the traditional thinning is considered most suitable for sports activities, while others for contemplative activities.

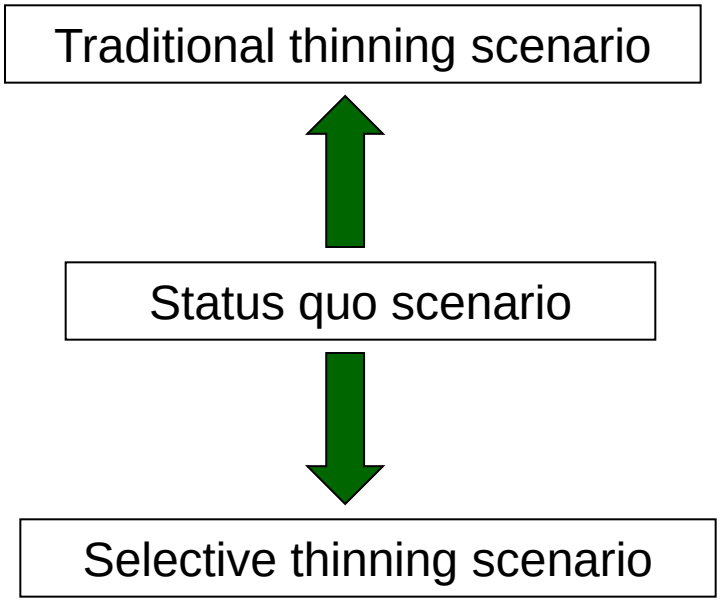


3. The most important benefit provided by Monte Morello urban forest is the **tourism-recreation** followed by the improvement of **air quality** and the **biodiversity conservation**.

	Tourism-recreation	Biodiversity	Air quality	Protection	Cultural values	Timber and fuelwood	Job opportunities
Total (*n*=201)	4.74	4.49	4.62	4.00	4.09	2.69	2.47

Economic implication

After the traditional thinning an increase of visitors by 7.8% is assumed (19,916 visitors), while after the selective thinning an increase of visitors by 29.4% is assumed (23,908 visitors).



The estimated - with Travel Cost Method - consumer surplus is **10.04 € per visit**.

The current economic importance of recreational benefits is 179.2 € ha^{-1} yr^{-1} (*status quo* scenario), while in future years the economic importance of recreational benefits could increase to 193.2 € ha^{-1} yr^{-1} in the case of traditional thinning scenario and to 231.9 € ha^{-1} yr^{-1} in the case of selective thinning scenario.




COMMUNICATION & DISSEMINATION

WEBSITE
www.lifeforesmit.com/

NETWORKING

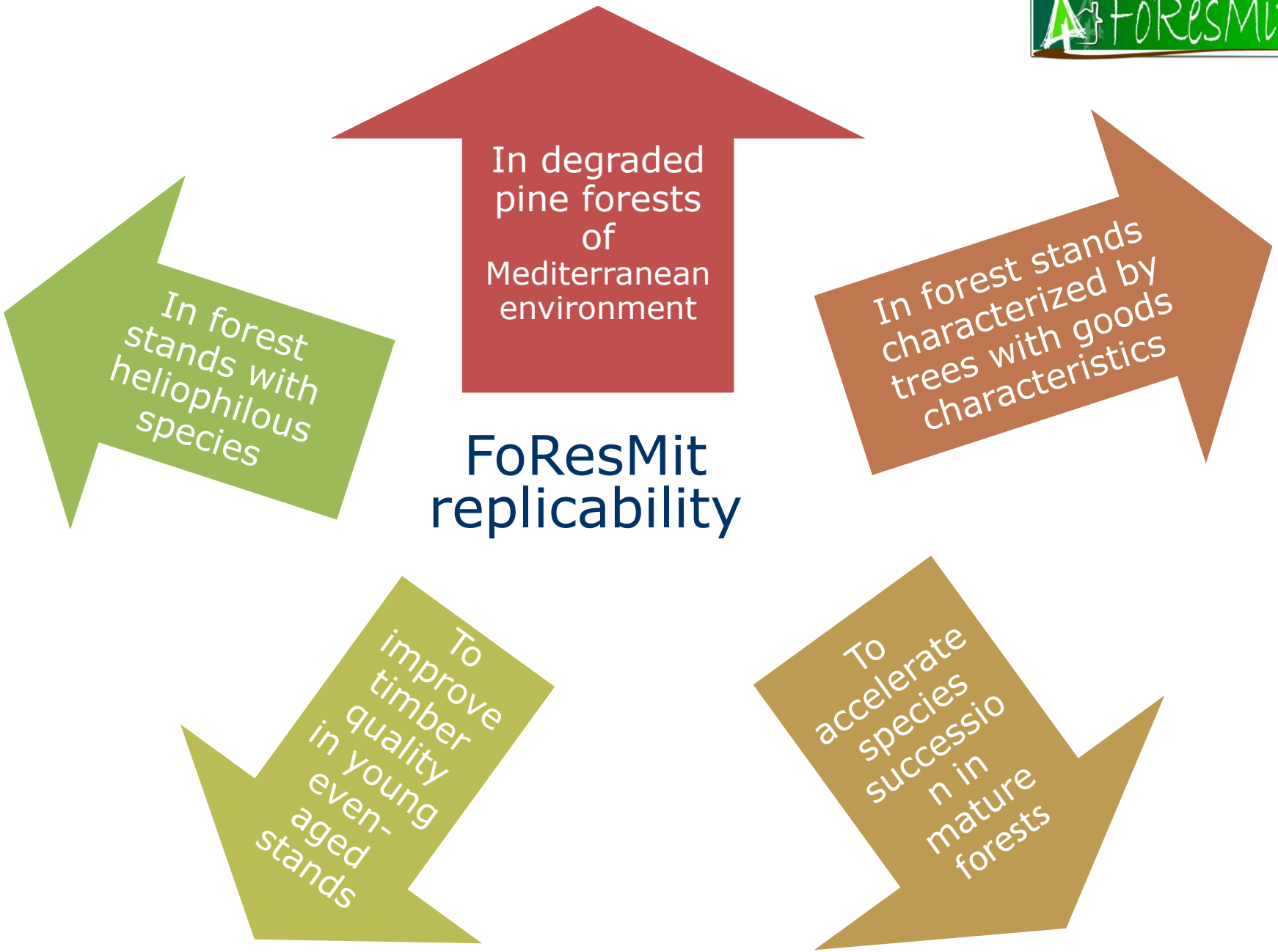
INFORMATIVE BOARDS

- ✓General public
- ✓public administrations
- ✓Environmental NGOs
- ✓forest-wood chain actors
- ✓actors of tourism sector
- ✓Universities and research institutes

WORKSHOPS, SEMINARS CONFERENCES

PRESS RELEASE MANUAL

DIFFUSION MATERIAL


In degraded pine forests of Mediterranean environment
In forest stands characterized by trees with goods characteristics
To accelerate species successio n in mature forests
To improve timber quality in young even-aged stands
In forest stands with heliophilous species
FoResMit replicability

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Isabella De Meo
Deadwood and social perception

Ugo Chiavetta
Forest inventory and geomatics

Gianluigi Mazza
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Alessandro Elio Agnelli
Soil and GHG