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Resurveying alpine grasslands in central and southern Apennines (Italy)

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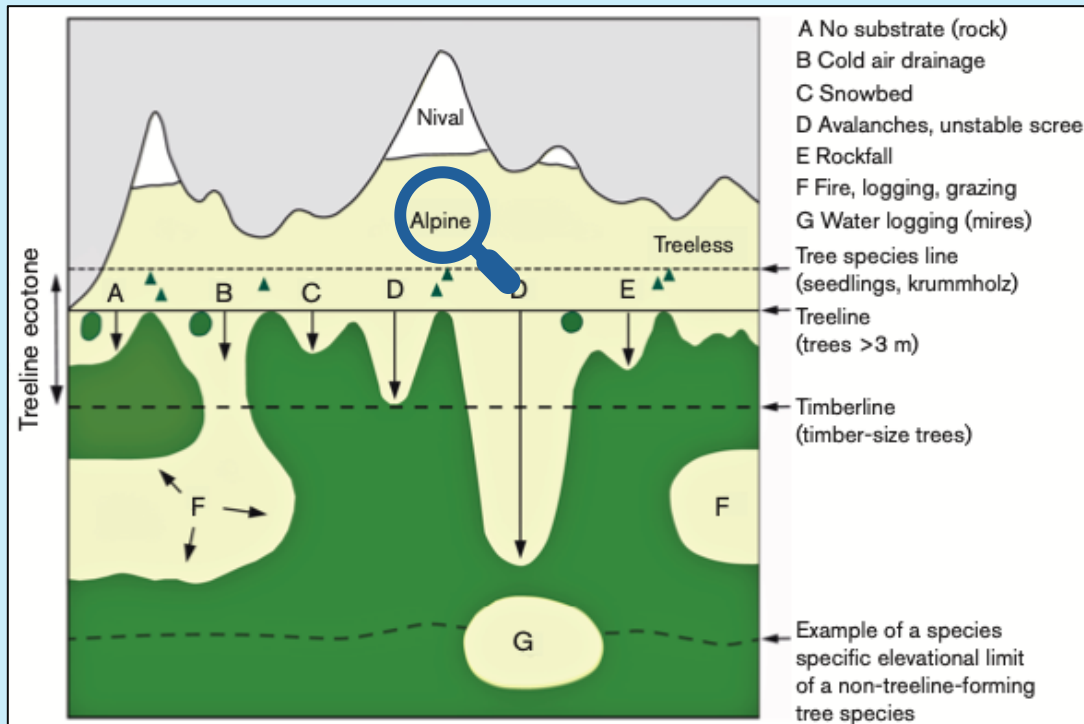
PhD Course in Molecular, Cellular and Environmental Biology (MCEB), XL cycle



Roma Tre



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Bioclimatic mountain belts (Körner, 2012).

Alpine grasslands:

- <3% of European terrestrial area;
- about 20% of European vascular plants;
- highly specialized communities, rich in endemic and rare species;
- refuge for many organisms;
- several ecosystem services (*i.e.* nutrient cycling, carbon sequestration, biomass production, habitat for pollinators, soil formation and protection, water and climate regulation and recreation).

Main threats:



acceleration of the rate of biodiversity loss;



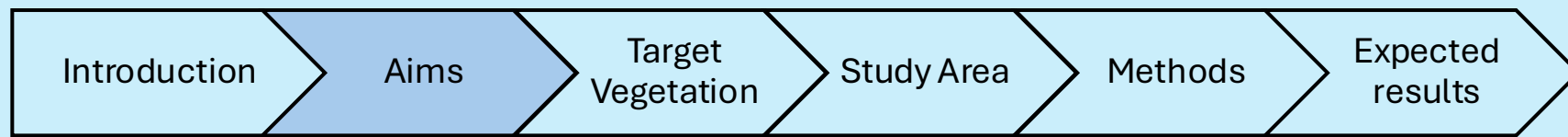
faster warming of mountain summits:
 ↑ evapotranspiration;
 ↓ mean precipitations and snow cover duration;



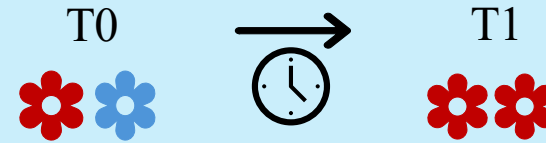
floristic thermophylization + homogenization of summit vegetation;



→ monitoring ecosystems!
 Habitats Directive
 92/43/EEC.



First comprehensive report of temporal trends → revisitation study of historical vegetation plots.
in central and southern Apennines

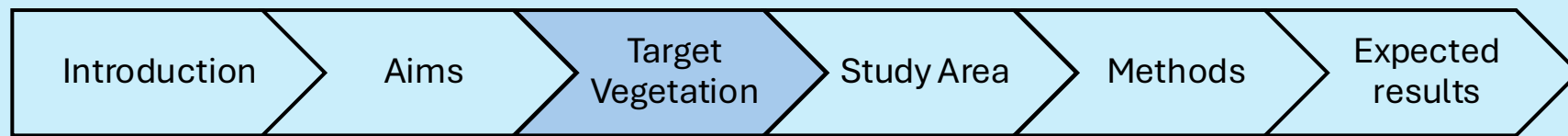


Project objectives:

WP1 - investigate temporal trends in diversity (taxonomical, α - β - γ) and in community composition and structure (species and total cover, species frequency, Ellenberg indicators);

WP2 - examine community functional trends (life forms) and unravel the main plants' ecological strategies (interspecific trait variation, CSR spectrum);

WP3 - analyze different patterns of change among study areas (latitudinal gradient).



Sesleria, *Carex* and *Nardus* dominated communities (described by phytosociological classes *Elyno-Seslerietea* and *Nardetea strictae*) → Habitats 6170 and 6230*.



Sesleria spp.



Carex spp.



Nardus spp.

Habitat type		III Report (2007-2012)			IV Report (2013-2018)		
		ALP	CON	MED	ALP	CON	MED
6170 - Alpine and subalpine calcareous grasslands	36.12 - Boreo-Alpic calcareous snow-patch communities	FV	FV	FV	U2	U1	U1
	36.41 - Closed calciphile alpine grasslands						
	36.42 - Wind edge naked-rush swards						
	36.43 - Calciphilous stepped and garland grasslands						
	36.38 - Oro-Apennine closed grasslands						
6230* - Species-rich Nardus grasslands, on siliceous substrates in mountain areas and submountain areas in Continental Europe	35.1 - Atlantic mat-grass swards and related communities	U2	U1	U1	U1	U2	U2
	36.31 - Alpic mat-grass swards and related communities						
	35.72 - Southern italian matt-grass swards and related communities Ranunculo-Nardion p.						

List of target habitats and their conservation status: FV - “Favourable”, U1 - “Unfavourable- Inadequate”, U2 - “Unfavourable-Bad” (Ercole *et al.*, 2021).

Introduction

Aims

Target
Vegetation

Study Area

Methods

Expected
results



Sibillini Mountains

Gran Sasso massif

Pollino massif

Project study area.



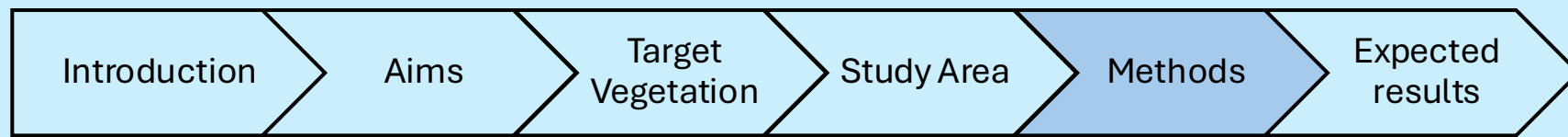
Sibillini Mountains
(2476 m s.l.m.): site A.



Gran Sasso massif
(2914 m s.l.m.): site B.



Pollino massif (2267 m s.l.m.): site C.



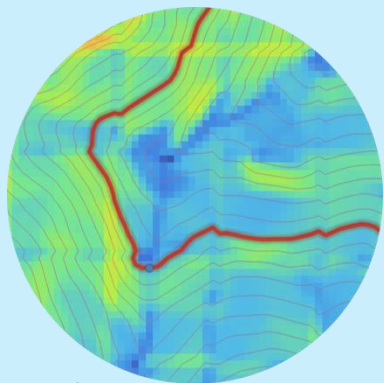
WP1: Analyzing temporal trends in vegetation.

Requirements for historical vegetation data to be selected:

- surveyed at least 20 years ago;
- occurring in the alpine belt;
- must contain enough informations and metadata to relocate the plot with good accuracy.

Resurvey → springs and summers 2025 and 2026.

Biases to be minimized during the resampling:



relocation error;



observer bias;



seasonal bias.

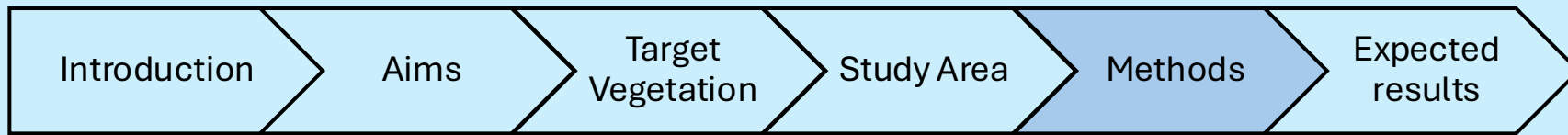
→ 95 vegetation plots

(T0 in the temporal analysis).

	Sibillini (A)	Gran Sasso (B)	Pollino (C)
H 6170	19	20	14
H 6230*	14	12	16

Selected historical vegetation plots from Biondi et al. (1999; 2000), Tomaselli et al. (2003), Catorci et al. (2008), Costanzo et al. (2009), Di Pietro (2010).

→ T1 in the temporal analysis.



WP2: Investigating community functional strategies.

Functional trends (T0-T1) → change in life forms (all the species).

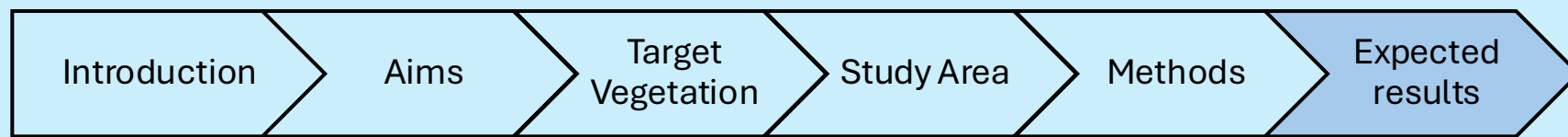
Interspecific trait variation and CSR spectrum → functional traits to be measured in springs and summers 2025 and 2026 (dominant species):

- Height;
- Leaf traits: SLA, LA, LDMC.

WP3: Unravelling different patterns of change among study areas.

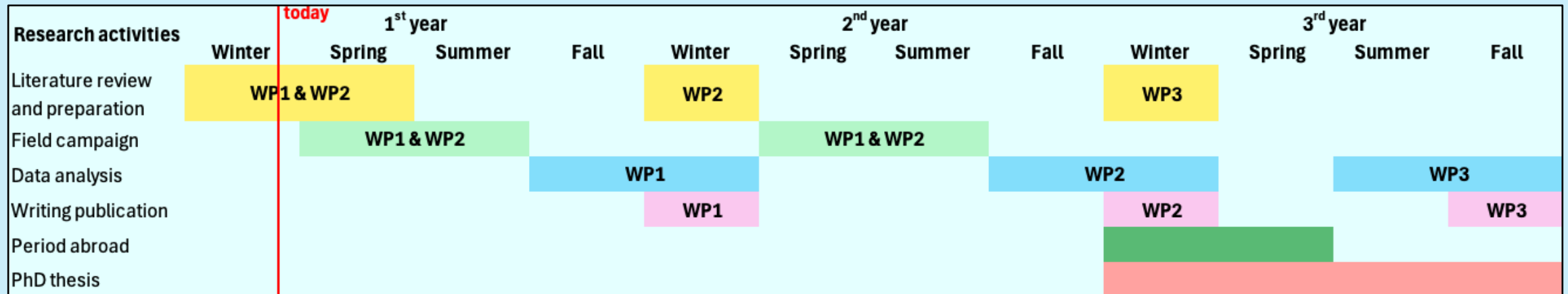
WP1 and WP2 data → latitudinal gradient from site A to site C.

Climatic drivers → ca. 15 iButtons, measuring soil temperature and humidity.



Expected results:

- significant changes in communities structure and composition;
- defining monitoring and conservation strategies;
- increase the knowledge about the recent transformations of Habitat 6170 and Habitat 6230*;
- basis for future investigations.



Expected project timeline.

Thank you for your attention!

