EGU General Assembly 2025

A Machine-Learning-Based Procedure to Assess Land Degradation and Restoration Potential in the Mediterranean

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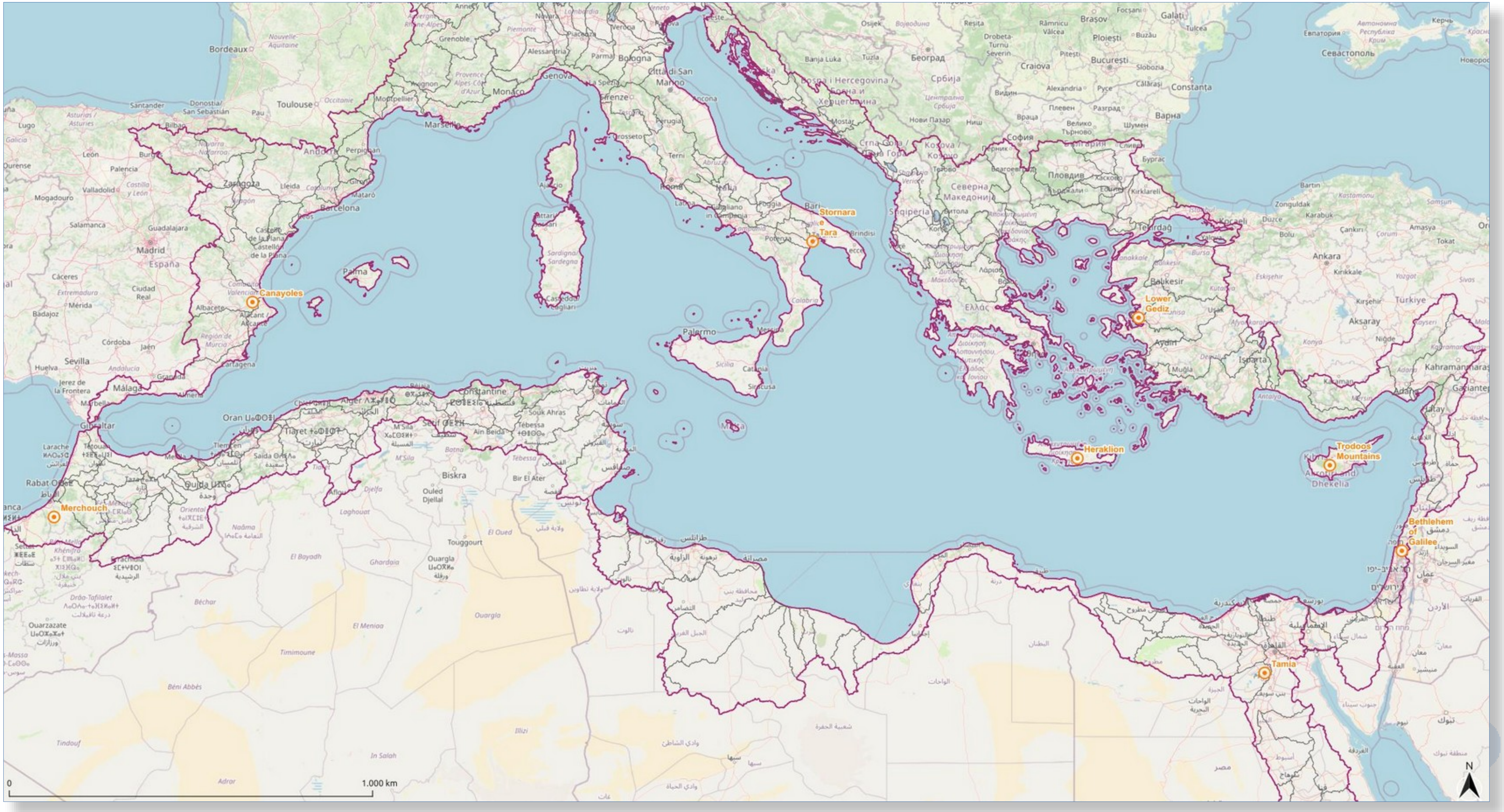
SoftWater

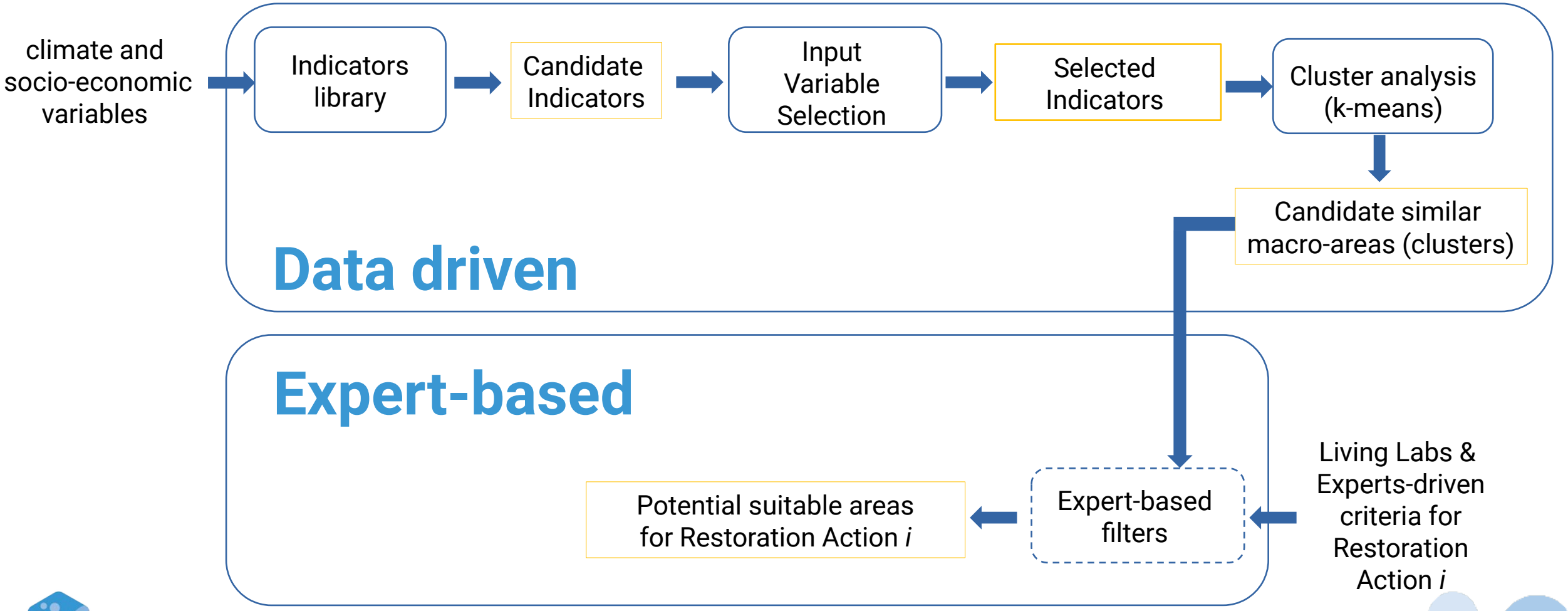
REACT4MED project

Inclusive Outscaling of Agro-ecosystem REstoration ACTions for the MEDiterranean

Out and Up-scaling to Mediterranean region

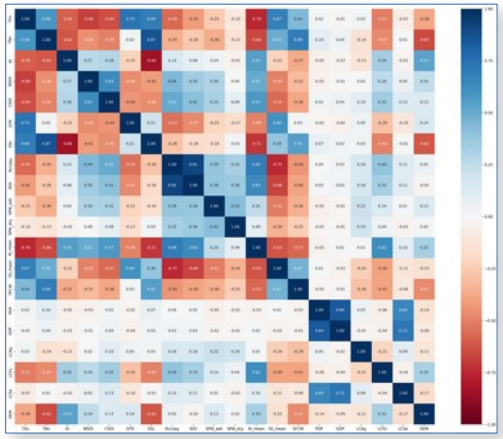


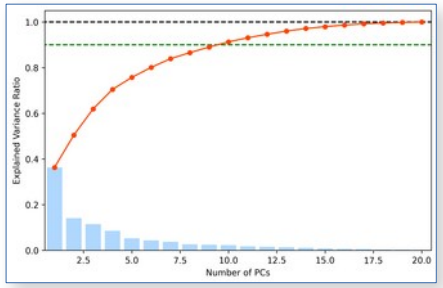
Methodology

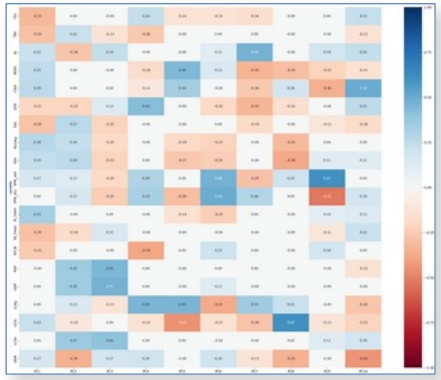


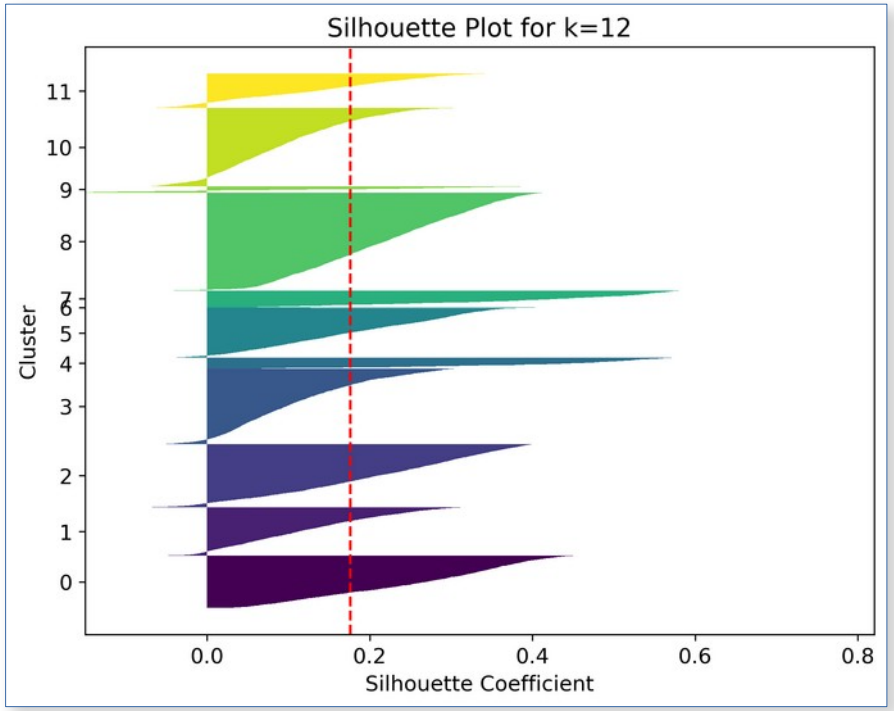
Machine learning-based tool

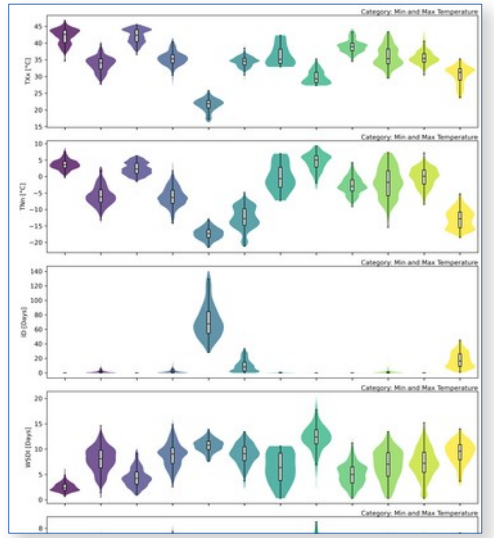
climate and socio-economic variables → Indicators library → Candidate Indicators → Input Variable Selection → Selected Indicators → Cluster analysis (k-means)











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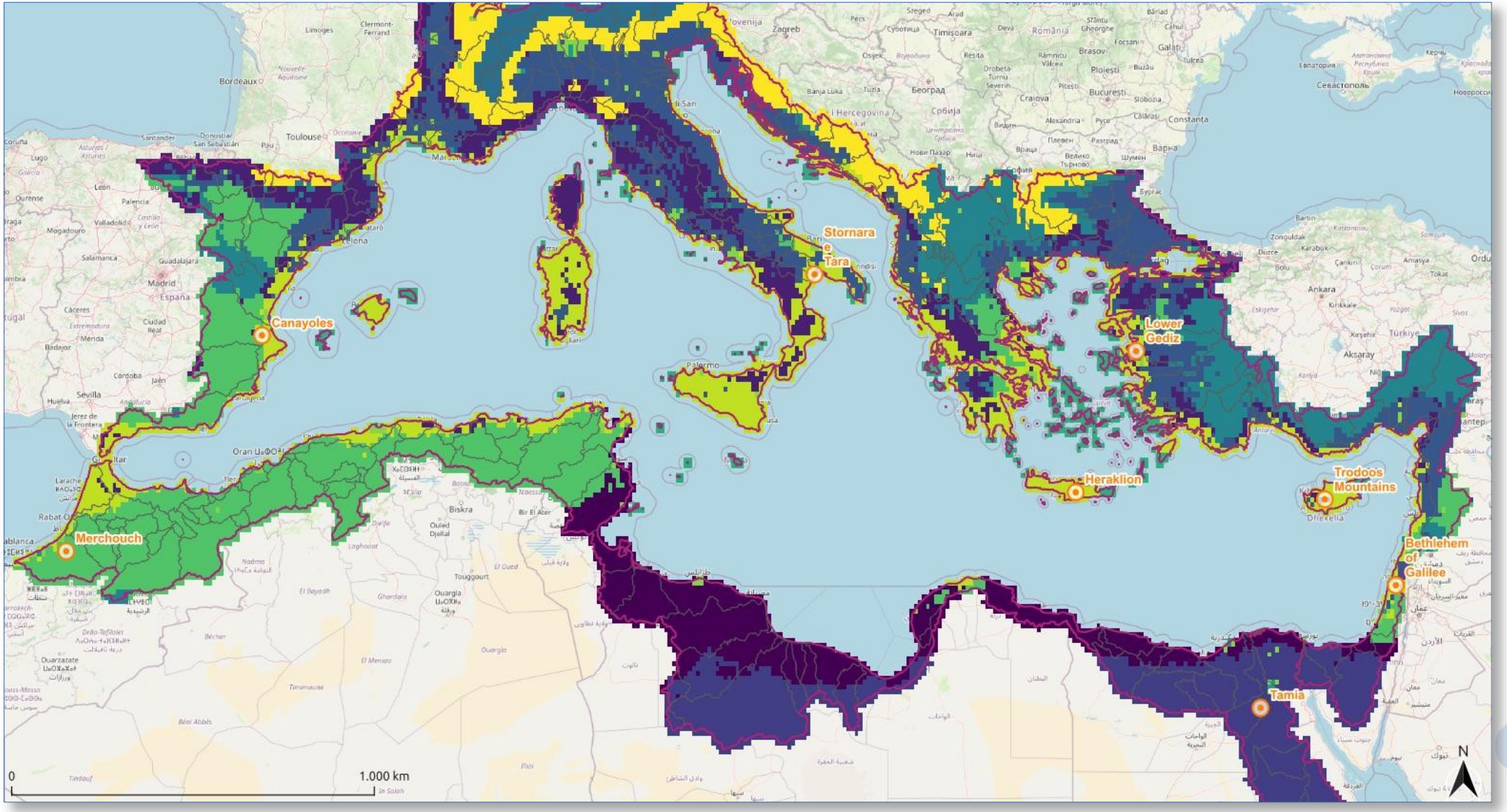
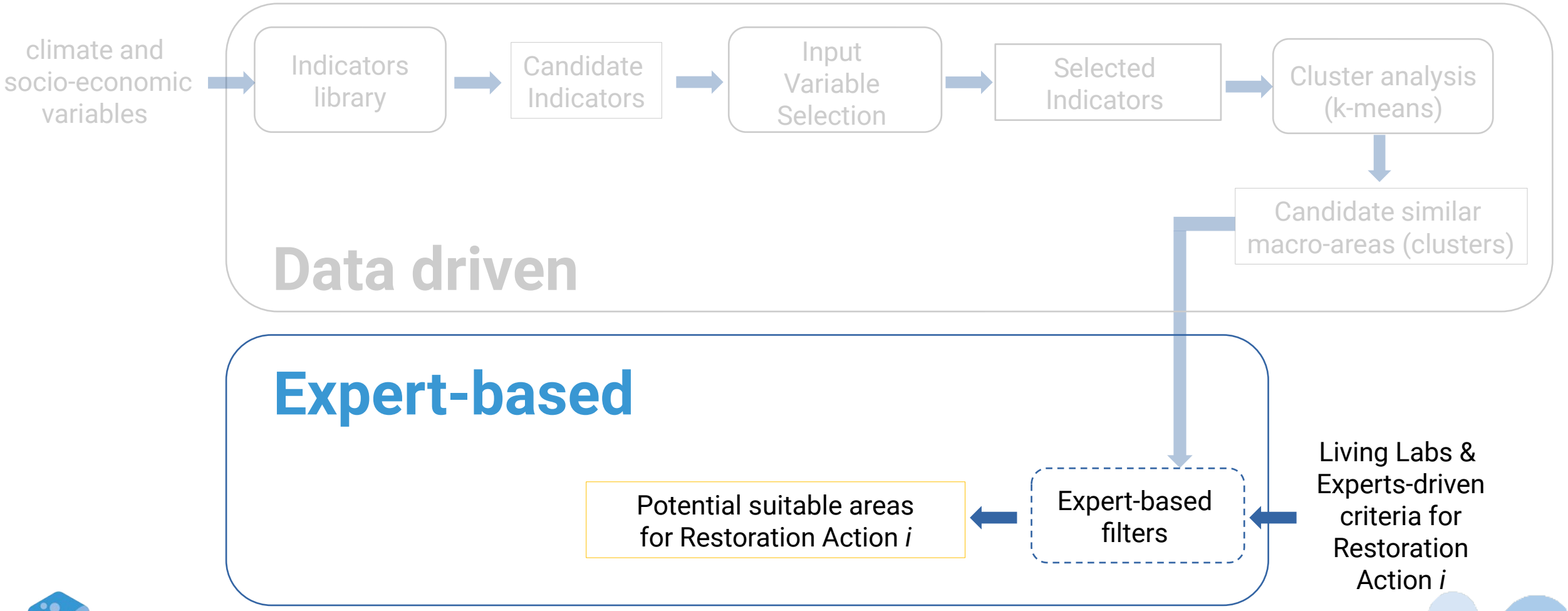
Similar macro-areas: 12 clusters



Methodology

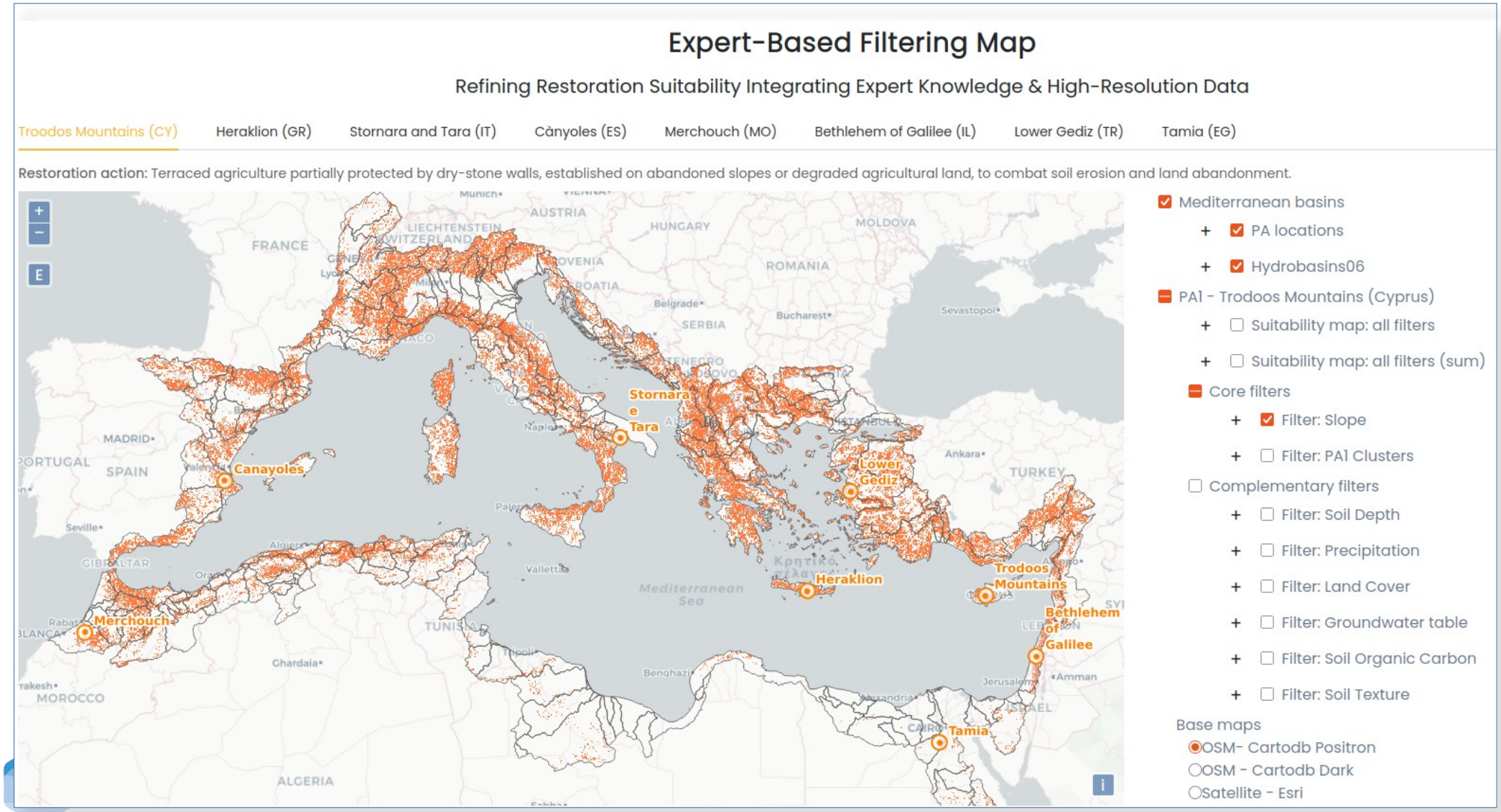


Expert-based filter

Restoration action: dry stone terraces mantainance and reconstruction – Trodoos Mountains (Cy)

Filter name	unit	Bench terraces criteria	Dataset	Spatial extent	Spatial resolution
Slope (%)	%	15 - 60 (8.53° - 30.96°)	Copernicus 90-m DEM (slope)	World	90 m
Soil depth (cm)	cm	> 20	Global 1-km Gridded Thickness of Soil, Regolith, and Sedimentary Deposit Layers, Oak Ridge National Laboratory (ORNL)	World	1 km
Soil texture (top soil)		all classes except fine and very fine with more of 35-40% clay	Soil texture map in 12 USDA classes , available at each depth (0, 5, 15, 30 cm)	World	250 m
Soil organic carbon (top soil 0-30 cm)	t/ha	> 4 t/ha (assuming a bulk density of 1.3 g/cm³)	GSOC v1.5 is the first global soil organic carbon content map (country-based) from GloSIS (FAO)	World	1 km
Land cover		shrub, herbaceous vegetation, cropland	CORINE Land Cover 2018 (vector/raster 100 m), Europe, 6-yearly	Europe	100 m
Rainfall, average	mm/yr	300 - 1000 (0.82 - 2.74 mm/d)	LanDs PrAvg (current long-term annual average)	Med	about 12 km
Groundwater table	m	> 2 m below ground surface (< -2 m)	Groundwater table depths (10-year mean from 2004-2014 annual means)	World	30 arc sec (1 km)

Expert-based filter: Slope filter



Filter

Boolean mask

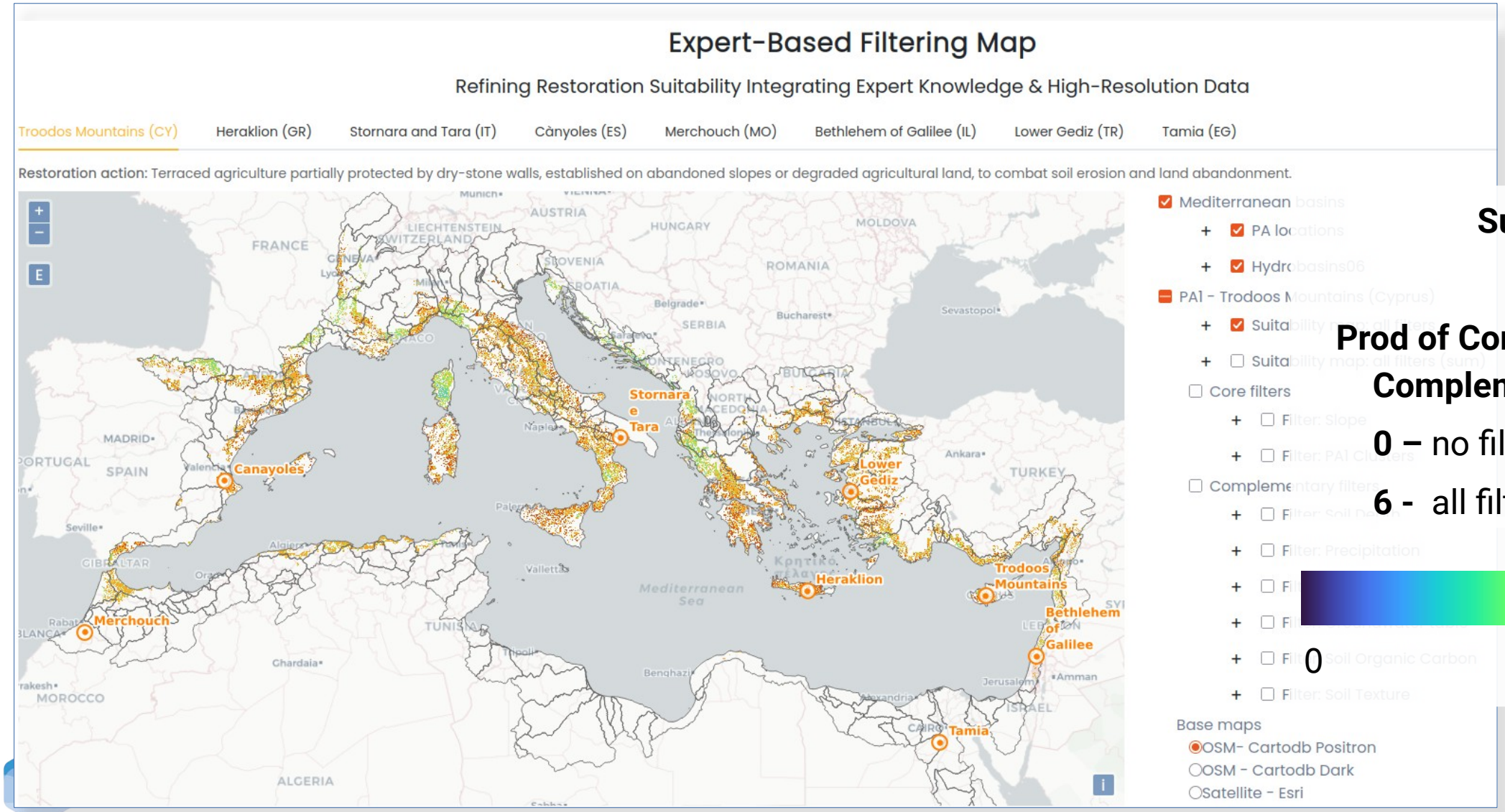
where:

0 – not satisfied

1 – satisfied

(15% < slope < 60%)

Expert-based filter: Suitability map



Suitability

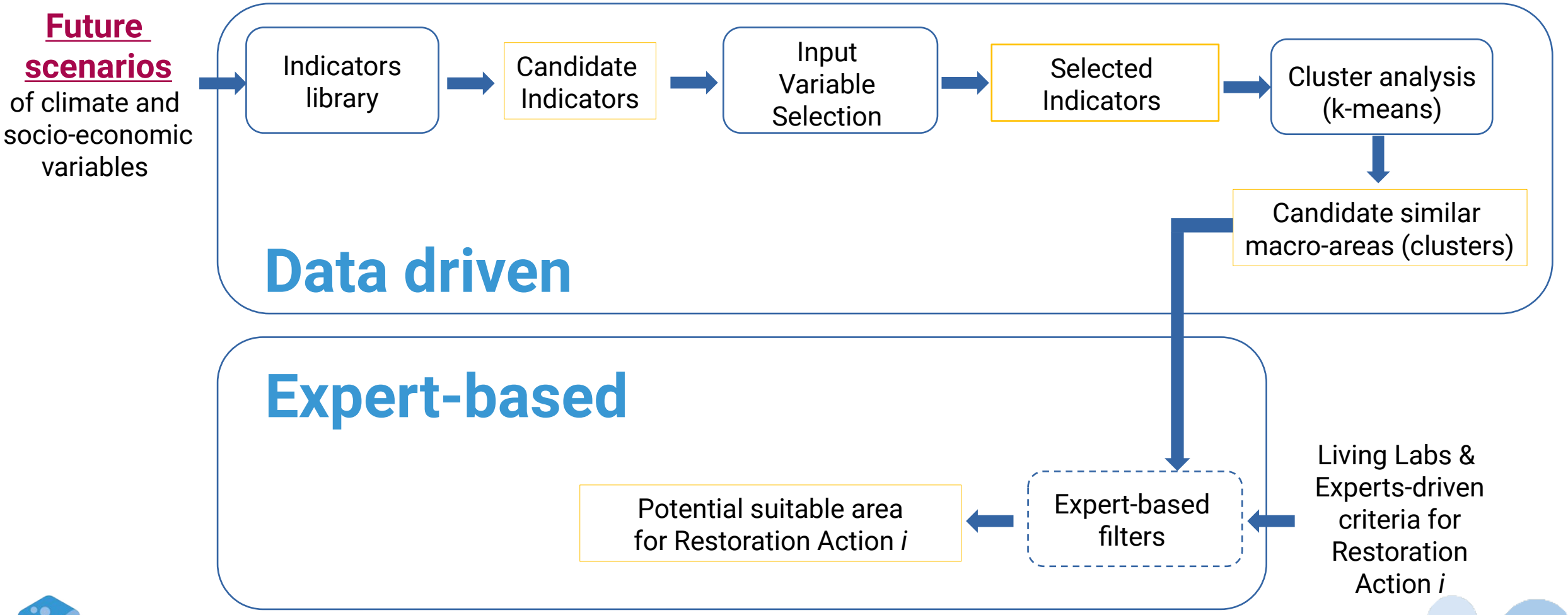
Prod of Core filters * Sum of Complementary filters:

0 – no filter not satisfied

6 - all filters satisfied

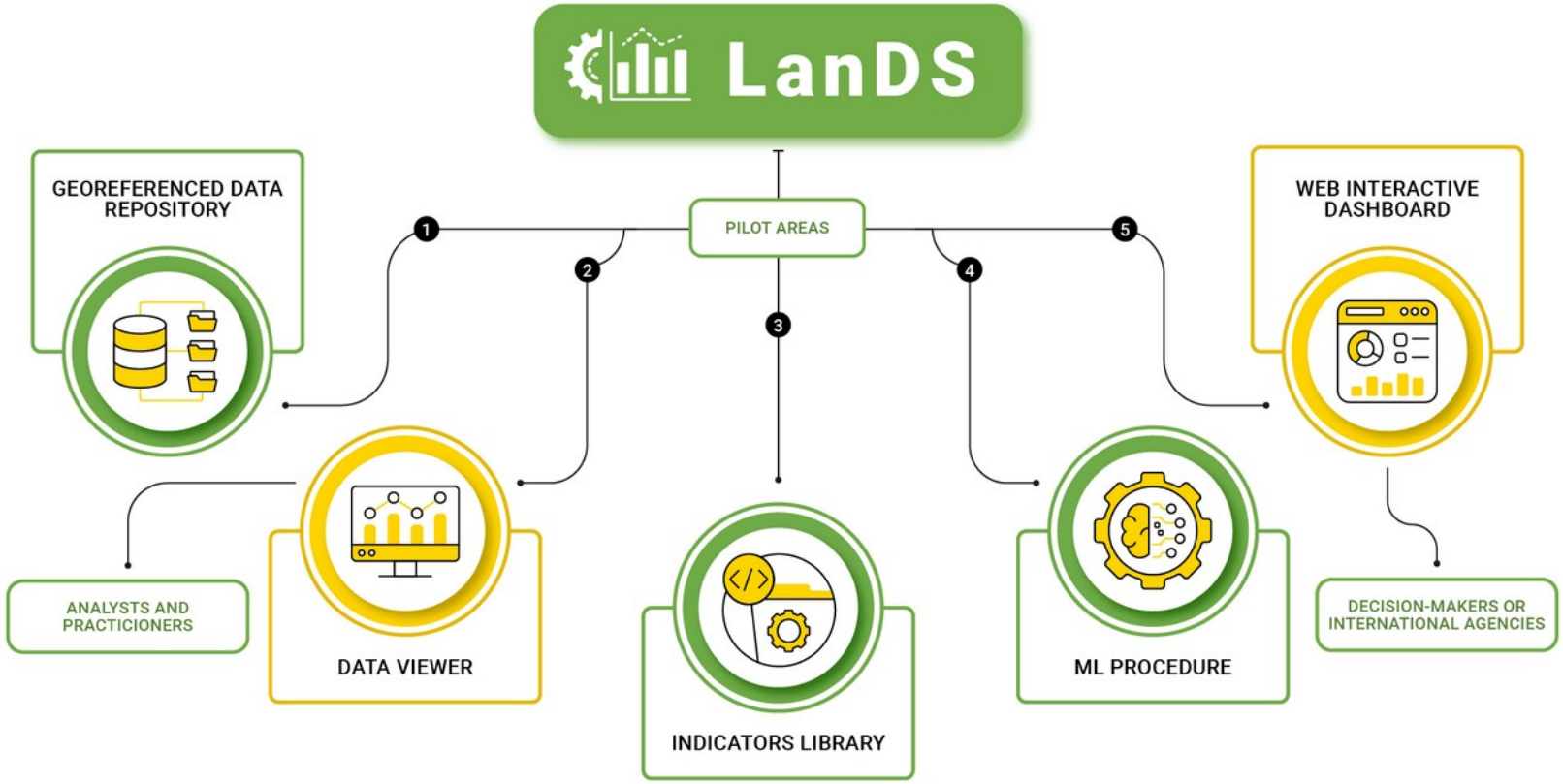
0 6

Methodology: future suitability



The LanDS Toolbox

Design of a **decision-support toolbox** to support **out- and upscaling** of best land restoration practices against land degradation



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Room 2.92

Matta et al.

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THANKS!

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