Use of open source platform and free satellite data to map and monitor MLs

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Final Event, 13 December 2021, Teleconference

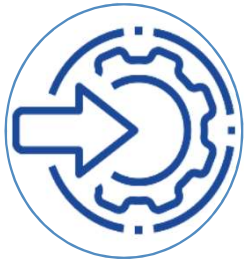
T4.1 “Pilot case study: Use of open source platform and free satellite data to map and monitor MLs”

Development of a **national or regional marginality** detection system

Implement the model and analyse results in the **pilot sites**

Comparison and analysis of the regional marginality

(European level - Task 2.3)



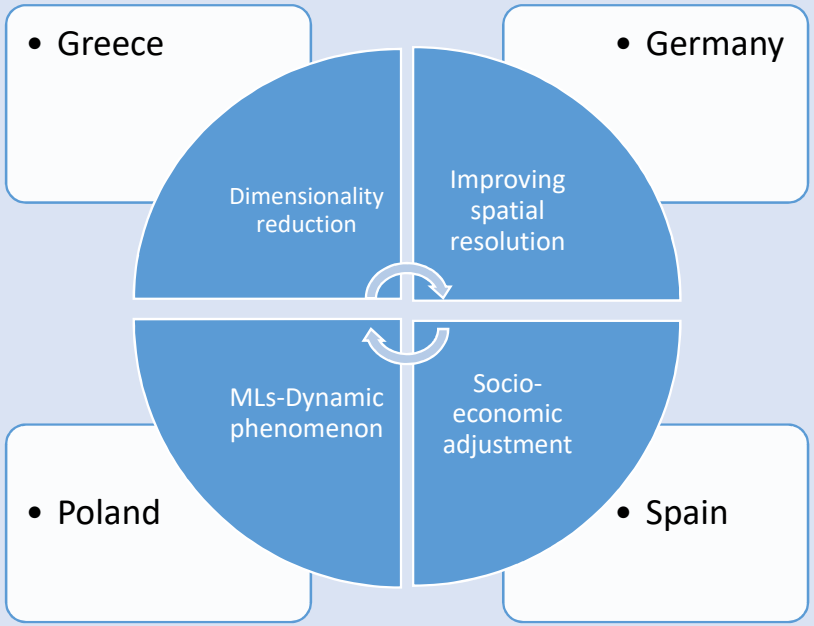
Feedback in order to **include local aspects in the MLs algorithm**

Improvement of the classification of marginal lands in terms of **suitability**

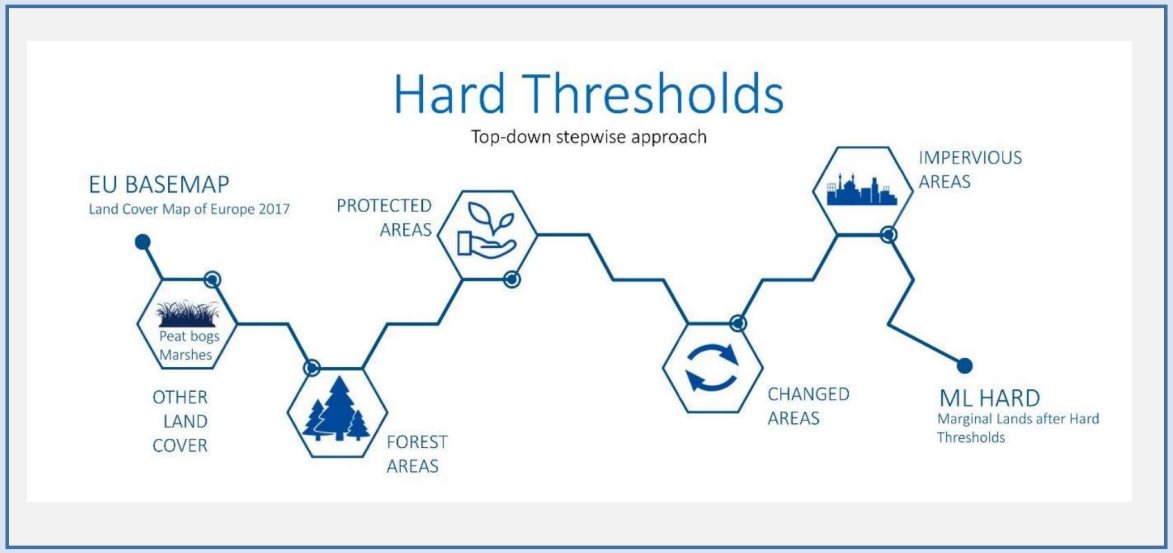
Objectives of the Task 4.1 T4.1 “Pilot case study : Use of open source platform and free satellite data to map and monitor MLs”

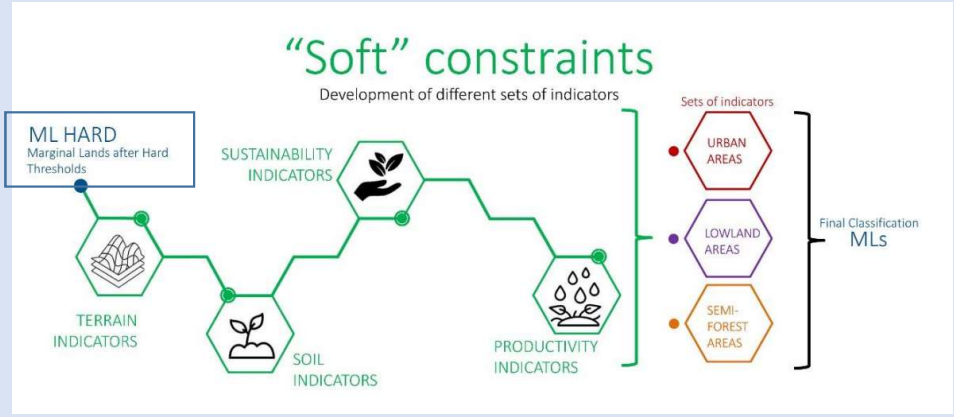
T4.1 “Pilot case study: Use of open source platform and free satellite data to map and monitor MLs”

Feedback in order to include local aspects in the MLs algorithm



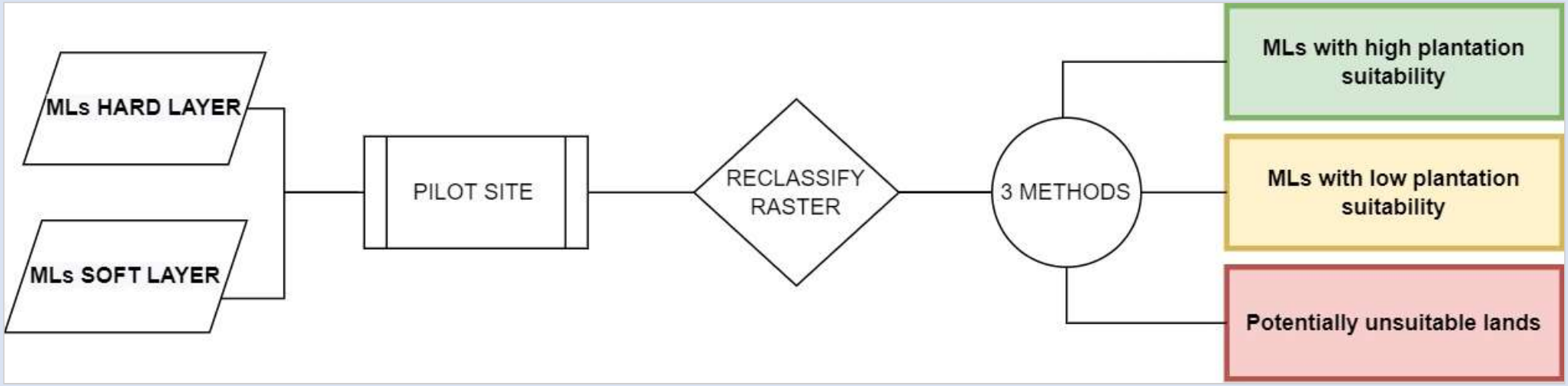
MAIL's detection system scheme
General overview





Source: Maria Tassopoulou

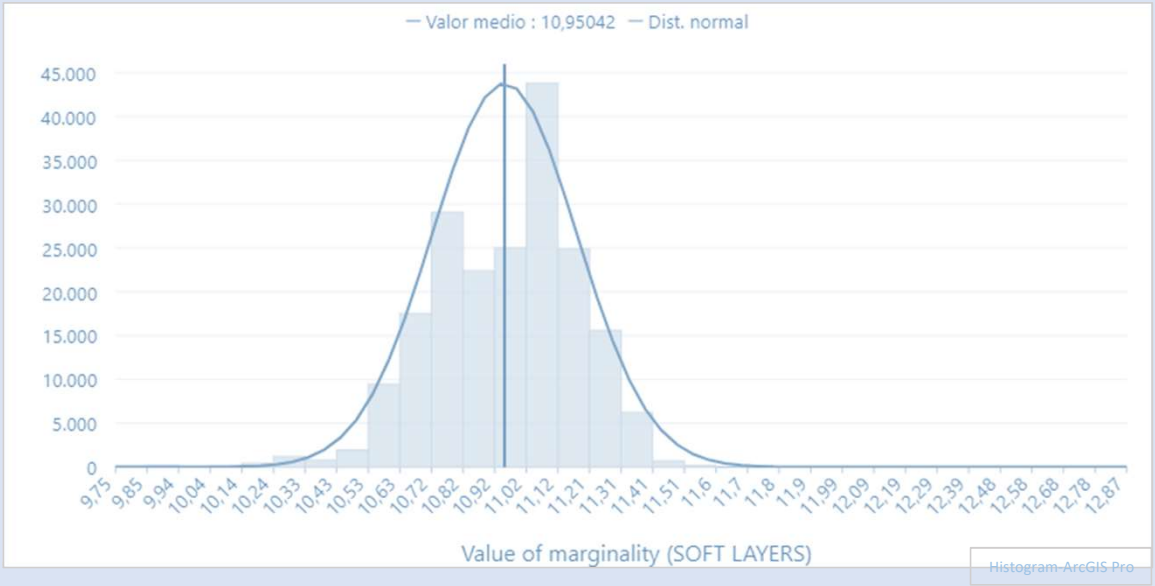
MAIL's detection system scheme.
Pilot case study



MAIL's detection system scheme.
Classification Methodology

- **Method A** Equal interval classification of the values obtained in the MLs layer
- **Method B** interval for the 25th and 75th percentile of the values obtained in the MLs layer.
- **Method C** interval for the 33rd and 66th of the values obtained in the layer MLs.

Tierras Altas (Soria) Pilot Site.



Histogram of the values obtained in the MLs layer.

Germany

Characteristics of the system:

Coverage:

National level

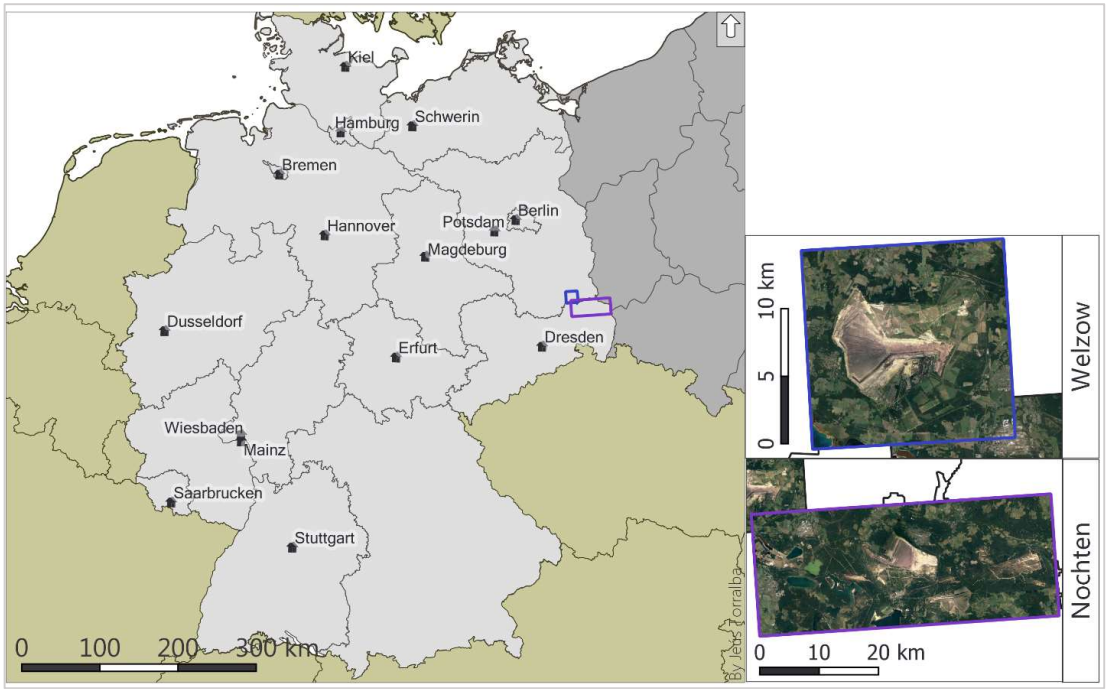
Methology:

Same indicators as main MAIL Methodology

used in a double weighting process

Data sources:

European, National and regional open source platforms



Workflow schemes

Development of a national or regional marginality detection system

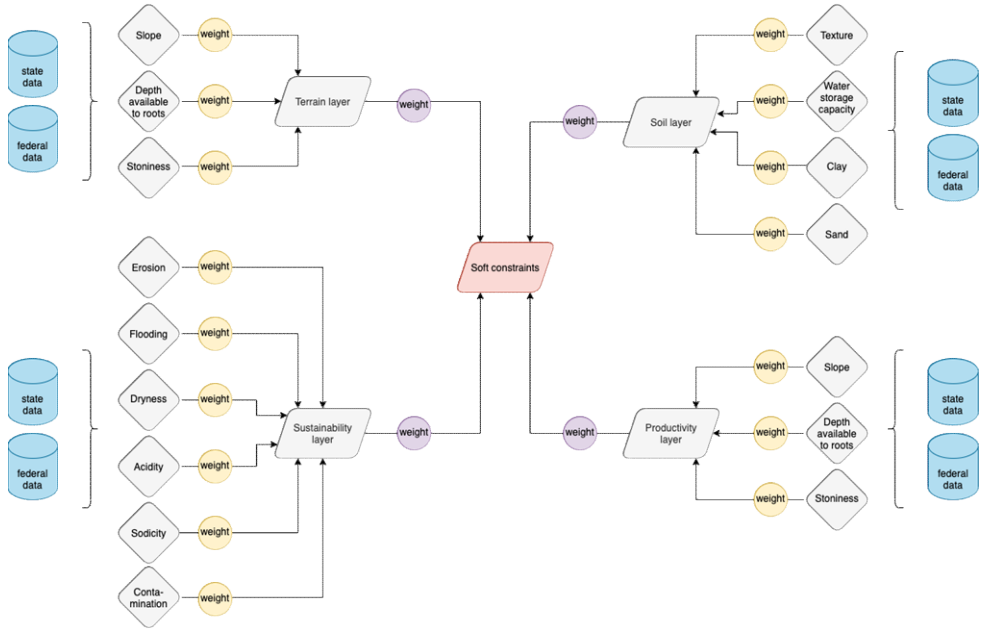
Germany

Hard thresholds

exclude:

- croplands
- impervious areas
- changed areas
- Forest areas
- Protected areas
- other land cover

Soft thresholds



Data sources used for the identification and classification of MLs

Development of a national or regional marginality detection system

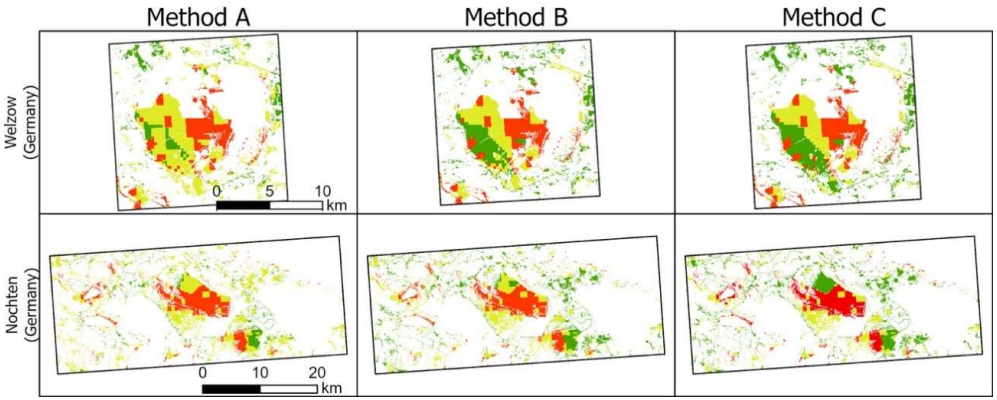
Germany

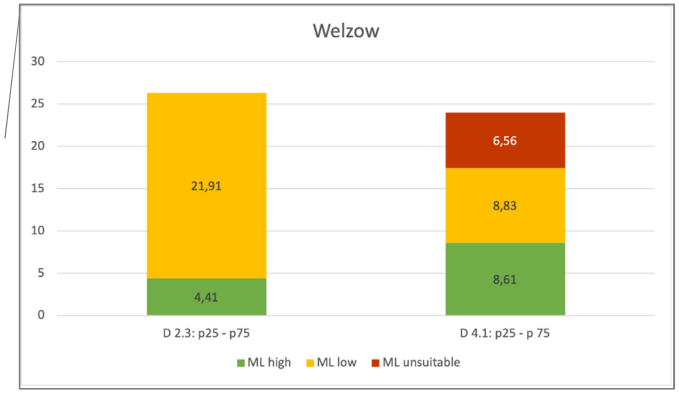
Federal Environment Agency (Umweltbundesamt)	Project Website S2GLC	Copernicus – Land Monitoring Service	German Aerospace Center (DLR)	Daten- & Kartendienst der LUBW (Landesanstalt für Umwelt Baden-Württemberg)
Umweltatlas Bayern – Natur, Suchbegriff „Schutzgebiete“	FIS-Broker	Landwirtschafts- und Umweltinformationssystem Brandenburg (LUIS-BB) - VertiGIS WebOffice OSIRIS	Die Senatorin für Klimaschutz, Umwelt, Mobilität, Stadtentwicklung und Wohnungsbau	Transparenzportal Hamburg
HLNUG (Hessisches Landesamt für Naturschutz, Umwelt und Geologie)	Niedersächsischer Landesbetrieb für Wasserwirtschaft, Küsten- & Naturschutz	OGC-Geodatendienste LANIS Rlp	Geoportal Saarland	Sachsen.de
lvermgeo.sachsen-anhalt - MetaVer (MetadatenVerbun)	Information und Technik Nordrhein-Westfalen – OpenGeodata.NRW	Open-Data Schleswig-Holstein	Geoportal-Th.de	Geoportal.MV

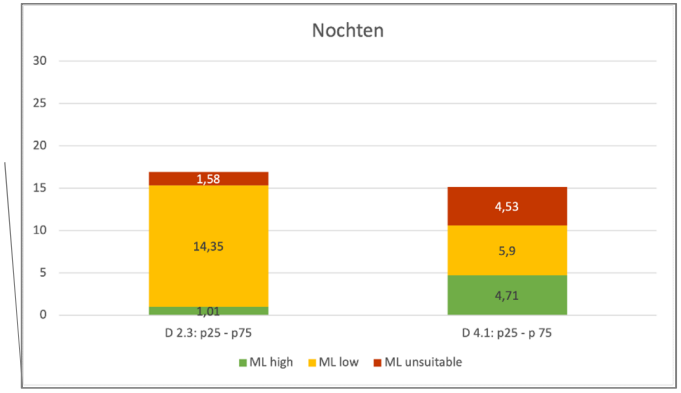
Detection and classification of marginal lands

Implement the model and analyse results in the **pilot sites**

Germany





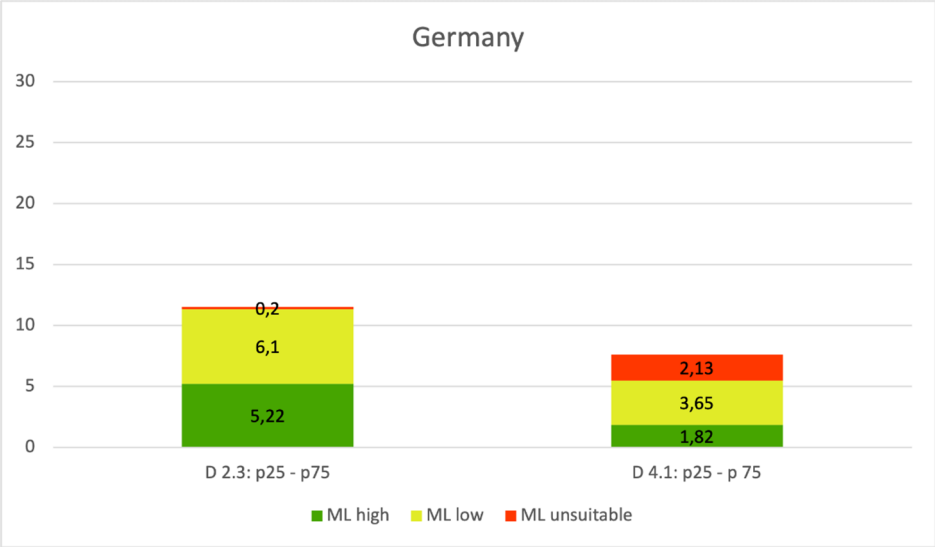


Comparison and analysis of the regional marginality (European level)

Germany

Results and comparison

- The methodology executed in task 4.1 detects less Marginal Lands then task 2.3.
- Methodology 4.1. approximates a normal distribution of marginality



Greece

Characteristics of the system:

Coverage:

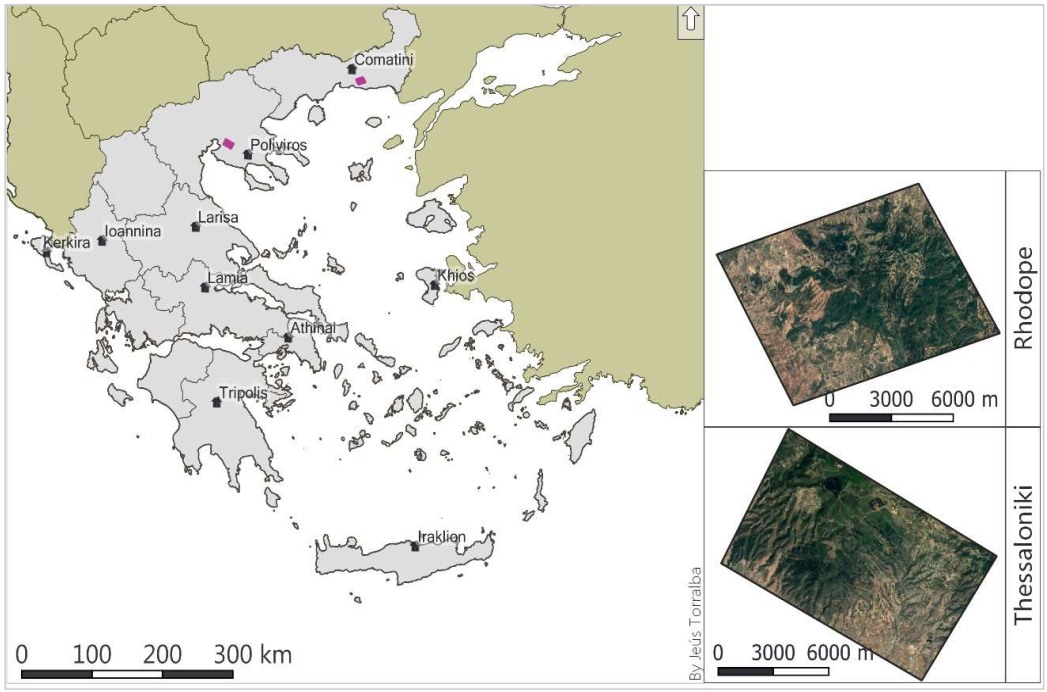
National level

Methology:

Selection of most relevant indicators and according to data availability at national level

Data Sources:

National and regional open source platforms

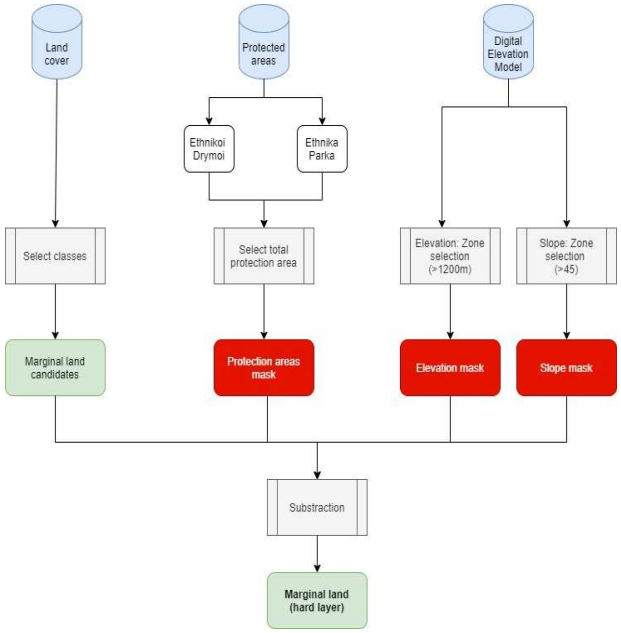


Workflow schemes

Development of a national or regional marginality detection system

Greece

Hard thresholds



Soft thresholds

	Indicator	Classes	Score
Terrain and soil		[0% - 10%]	10
	Slope	[10% - 45%]	5
		[>45%]	1
		[1, 2, 3]	10
	Depth	[4, 5, 6]	5
		[7, 8, 9]	1
		[S, SE, SW]	10
	Aspect	[E, W, flat]	5
		[N, NE, NW]	1
		[700mm – 1500mm]	10
	Rain	[300mm – 700mm]	5
		[250mm -300 mm]	1
Sustainability		[1, 2, 3]	10
	Erosion	[4, 5, 6]	5
		[7, 8, 9]	1
Productivity		[1]	10
	Forestry Capacity	[2, 3, 4]	5
		[5]	1

Development of a national or regional marginality detection system

Greece

Data sources used for the identification and classification of MLs

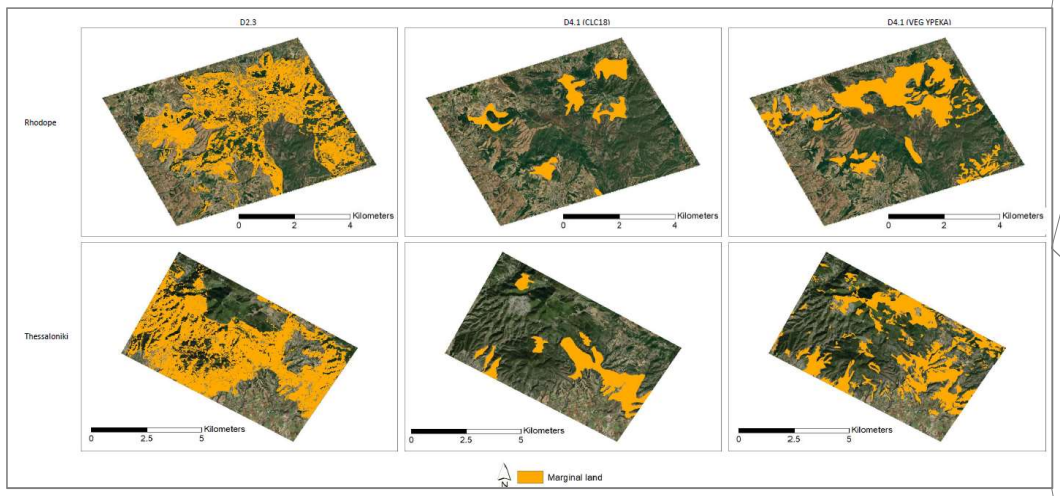
Combined data from databases, websites and a government reports

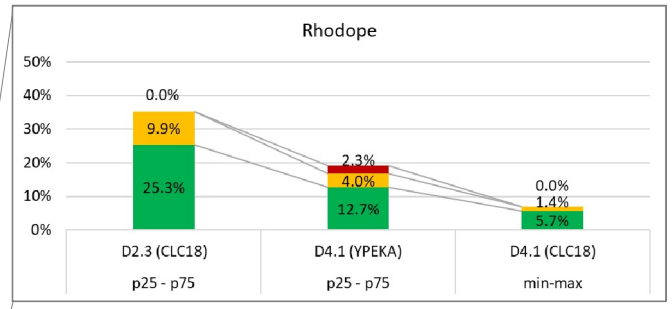
Copernicus – Land Monitoring Service	Department of forests - ΥΠΕΚΑ	Internal	Hellenic Mapping and Cadastral Organization (ΟΚΧΕ)
Ministry Environment & Energy (ΥΠΕΚΑ)	Ministry of Agriculture (Υπ. Γεωργίας, ΕΘ.Ι.ΑΓ.Ε.)	geoclima.aegean.gr (Γεώκλιμα)	Geodata.gov.gr

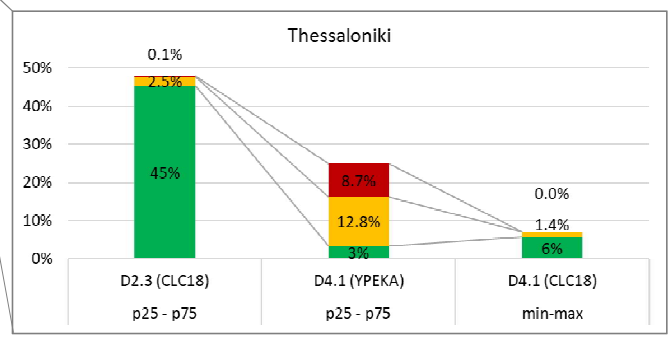
Detection and classification of marginal lands

Implement the model and analyse results in the **pilot sites**

Greece





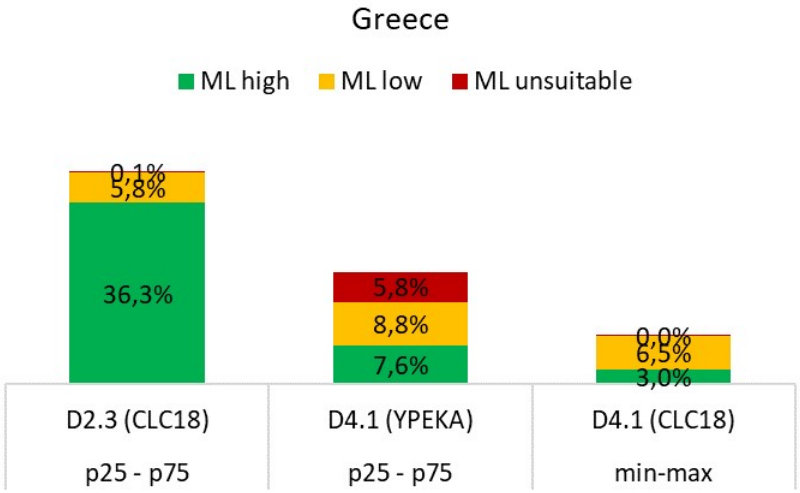


Comparison and analysis of the regional marginality (European level)

Greece

Results and comparison

- Methodology developed in T2.3 overestimates marginality for Greece in comparison with the methodology developed in T4.1. This probably happens due to better description of local aspects by the second methodology and by the fact that considers scrubbed areas as transitional forested areas and not as potentially marginal.
- Using YPEKA as hard layer was found more appropriate to MAIL´s scope in comparison with CLC18 as it seems to describe better the marginality and detect potential lands for future afforestation projects.



Spain

Characteristics of the system:

Coverage:

National and regional level

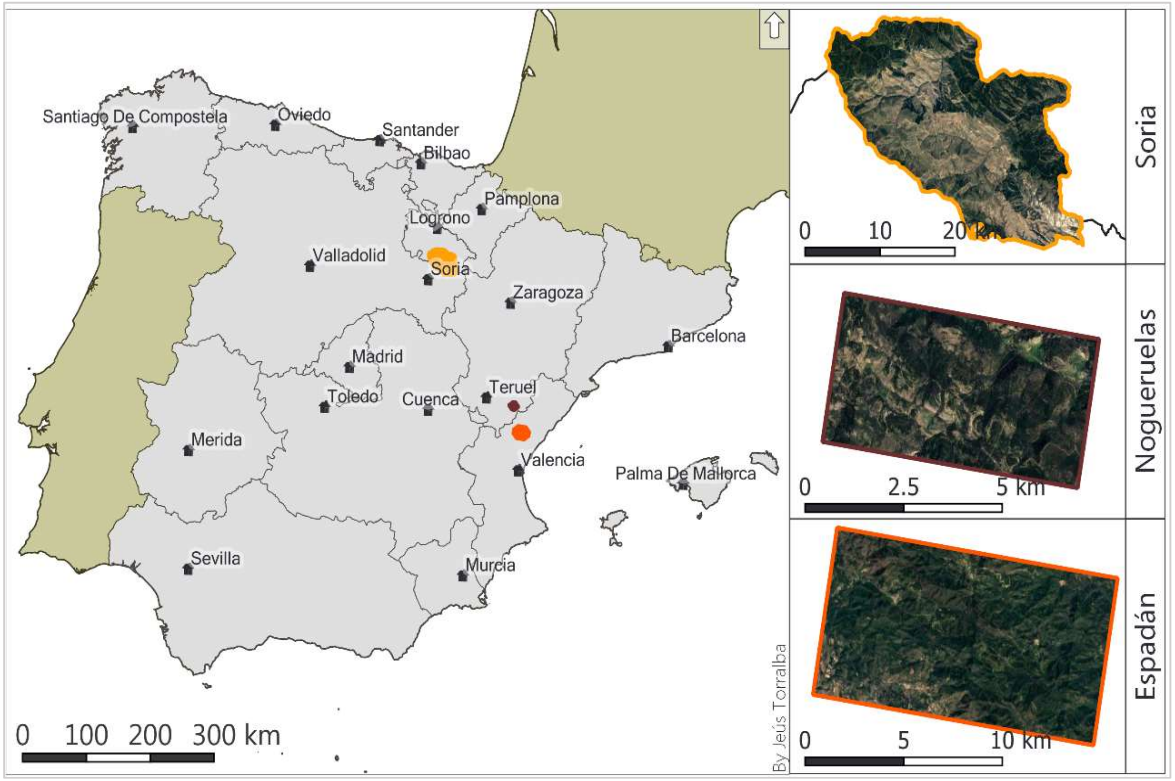
(Case of study: Castilla y León)

Methology:

Selection of most relevant indicators and according to data availability at national level and regional level.

Data sources:

European, National and regional open source platforms

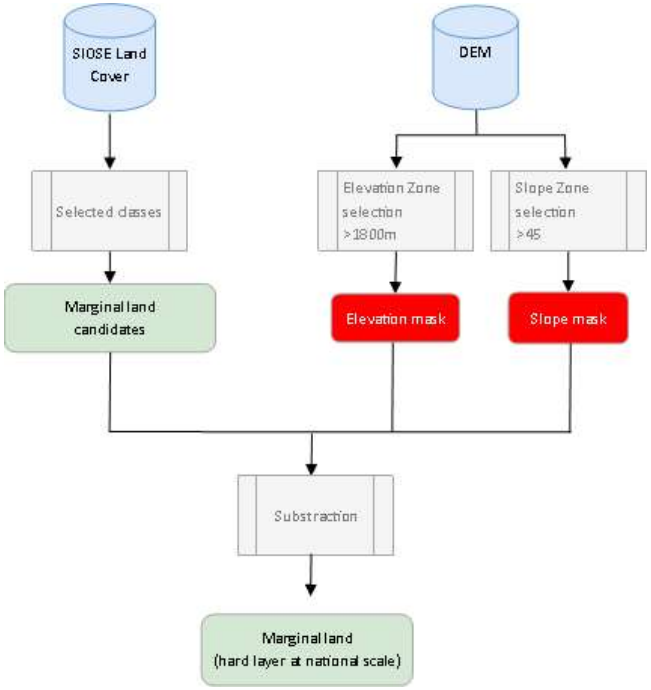


Workflow schemes

Development of a national or regional marginality detection system

Spain

Hard thresholds



Soft thresholds

	Indicator	Classes	Score
Terrain and soil	Slope	[0% - 10%]	10
		[10% - 35%]	5
		[35%-45%]	1
	Aspect	[N, NE, NW]	10
		[E, W, flat]	5
		[S, SE, SW]	1
	Available Water Capacity (AWC)	[>0,12]	10
		[0,1 – 0,12]	5
		[<0,1]	1
	Depth roots	[>50 cm]	10
		[30 cm – 50 cm]	5
		[<30 cm]	1
Sustainability	Erosion	[<25 T/ha/año]	10
		[25-100 T/ha/año]	5
		[>100 T/ha/año]	1
Forestry productivity	Forestry productivity	[>700mm, 10-15C]	10
		[500-700, 7-10C]	5
		[<500, 5-7C]	1

Development of a national or regional marginality detection system

Spain

Data sources used for the identification and classification of MLs

Organismo Autónomo Centro Nacional de Información Geográfica (CNIG)

Ministry for the Ecological Transition and the Demographic Challenge (MITECO)

Geographical Information System for agricultural data, Ministry of Agriculture, Fisheries and Food

Castile-Leon Agriculture Technology Institute ITACYL

State Meteorological Agency (AEMET)

The Spatial Data Infrastructure of Castilla y León (IDECyL)

European Soil Data Centre (ESDAC)

The Spatial Data Infrastructure of Spain (IDEE)

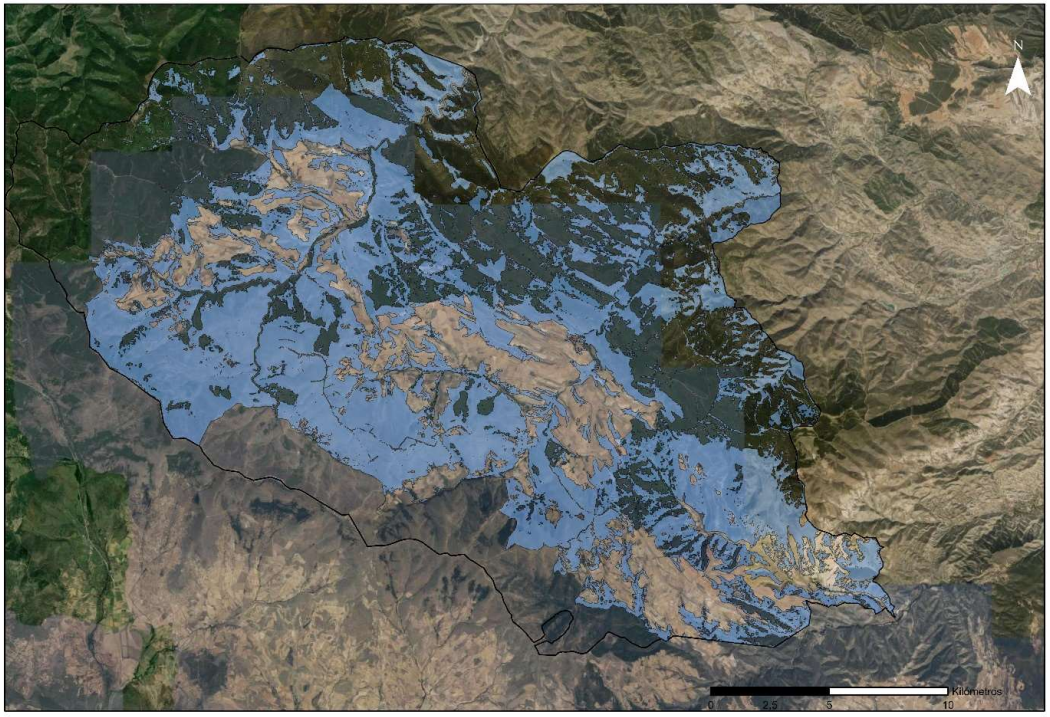
EU database on Natura 2000

Use of the National Information System on Land Cover and Land Use (SIOSE)

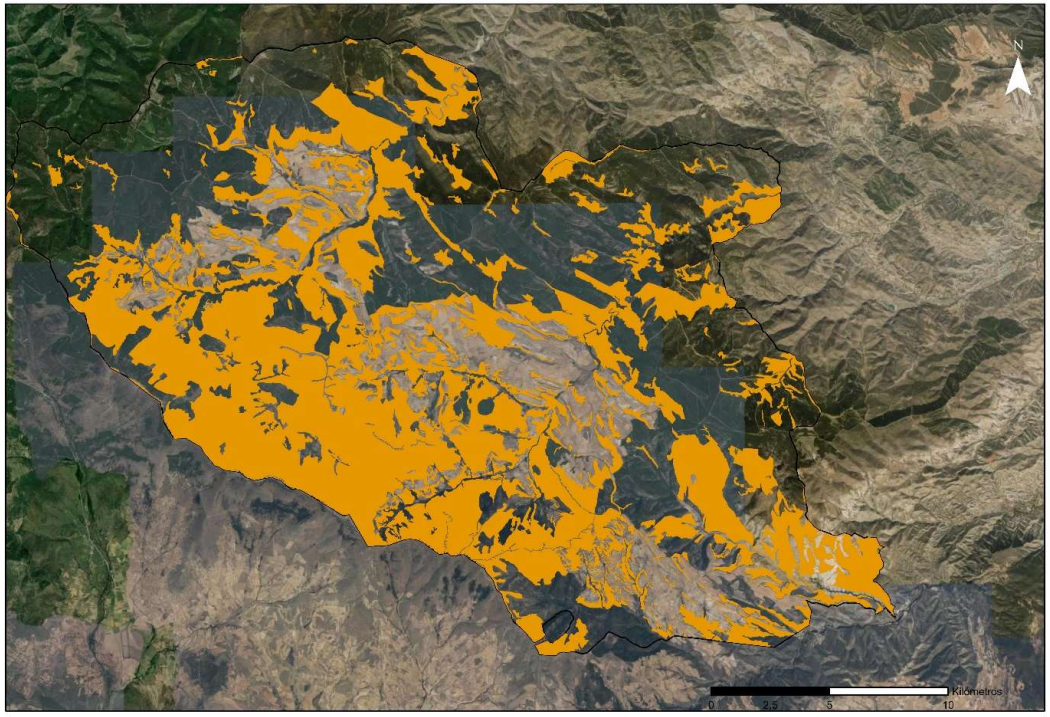
SIOSE	CODIIGE	Cover
300	320	Grassland
320	330	Scrubs
333	333	Bare soils
334	334	Burnt areas
600	-	SIOSE and labelling-based composite covers

1. Associations with the presence of forest trees with a value of fraction of tree cover in the range 0-20%, excluding pastures, olive groves, vineyards and plantations with fruit harvesting.
2. Recent forest plantations with low cover have been excluded through the attribute plantation, riparian formations, areas with firebreak function and areas with timber exploitation.
3. Grassland, scrub and bare ground associations without attributes of firebreak function or timber harvesting.

Detection and classification of marginal lands

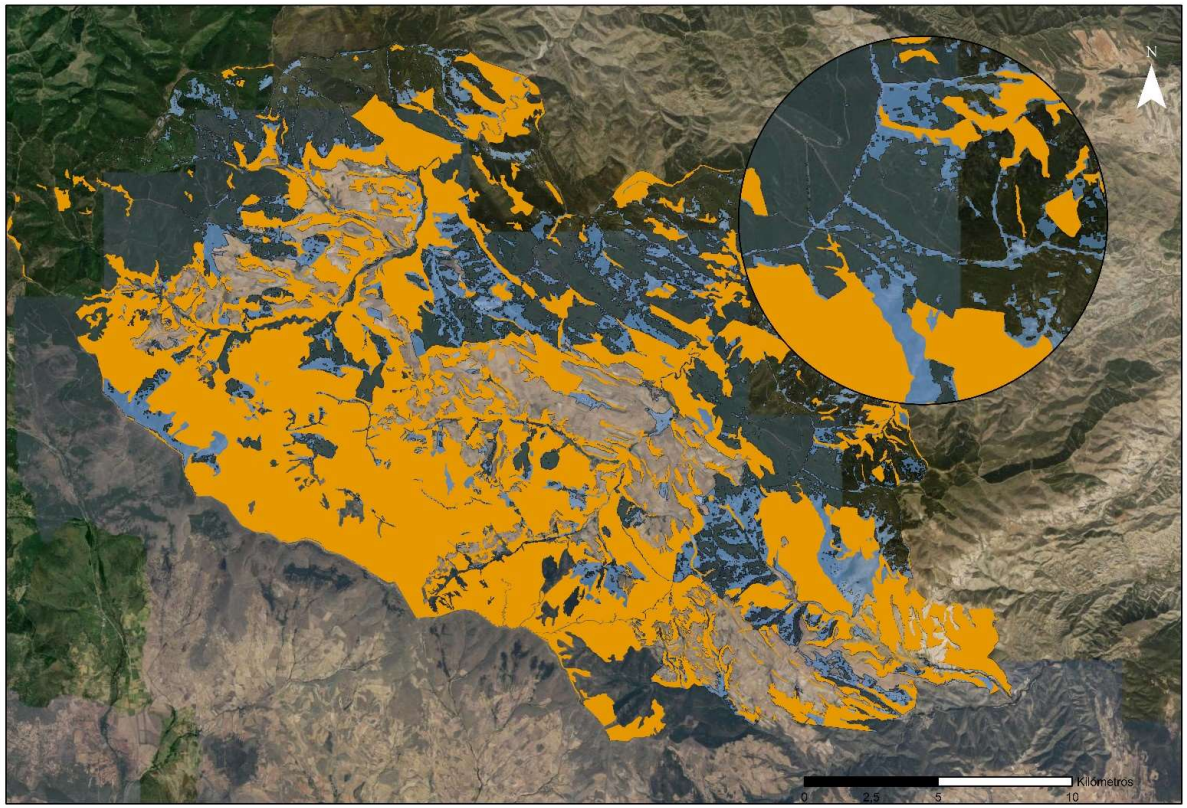


T2.3: 26.10 % of area



T4.1: 39.92 % of area

Detection and classification of marginal lands



Case of study: Forest firebreaks

MAIL National methodology

Main MAIL Europe methodology

Map of the pilot area "Tierras Altas" (Soria) according to MAIL Europe methodology (Blue) and MAIL National methology (Orange)

Detection and classification of marginal lands

Case of study: Riparian formation

MAIL National methodology

Main MAIL Europe methodology

Map of the pilot area "Tierras Altas" (Soria) according to MAIL Europe methodology (Blue) and MAIL National methology (Orange)

Detection and classification of marginal lands

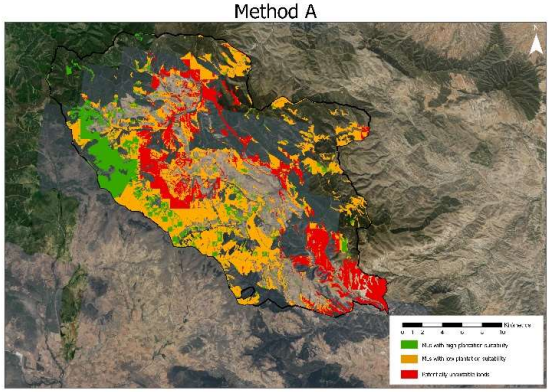
Tierras Altas (Soria) Pilot Site.

Implement the model and analyse results in the **pilot sites**

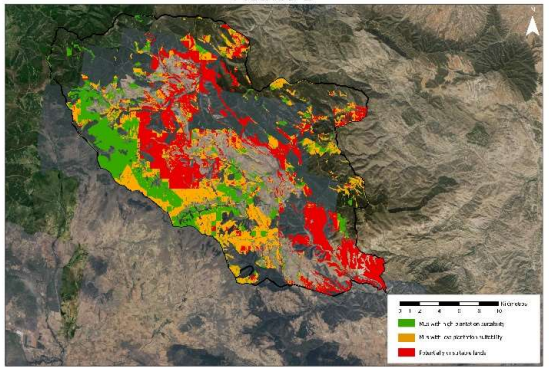
Spain

ML high ML low ML unsuitable

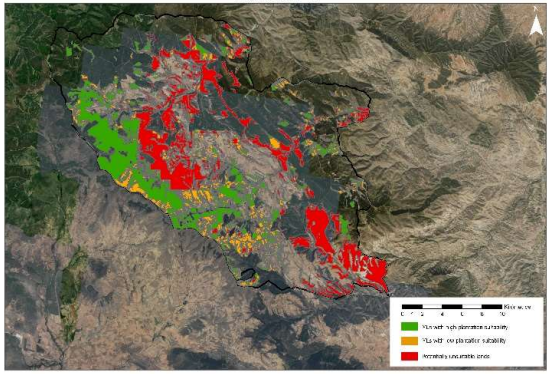
Method A

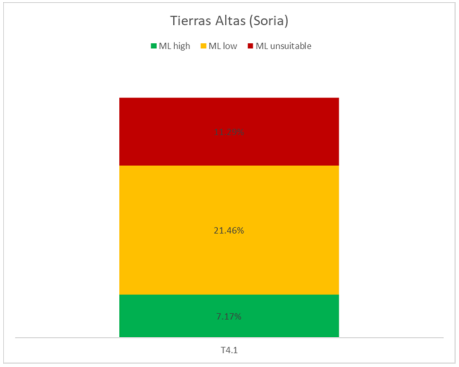


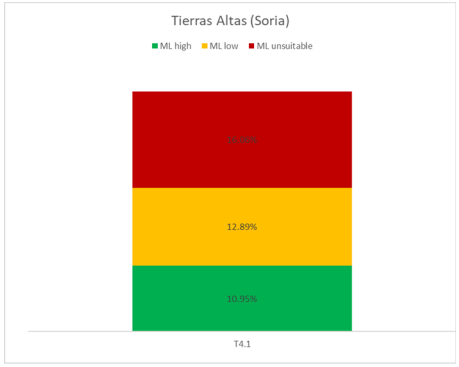
Method B

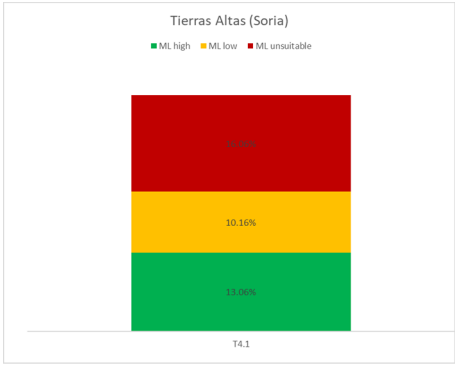


Method C





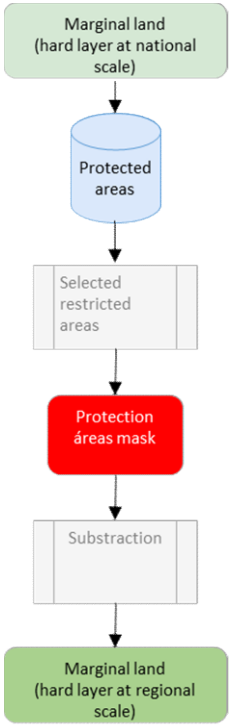




Development of a national or regional marginality detection system

Castile and León

Hard thresholds



Soft thresholds

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		[10% - 35%]	5
		[35%-45%]	1
	Aspect	[N, NE, NW]	10
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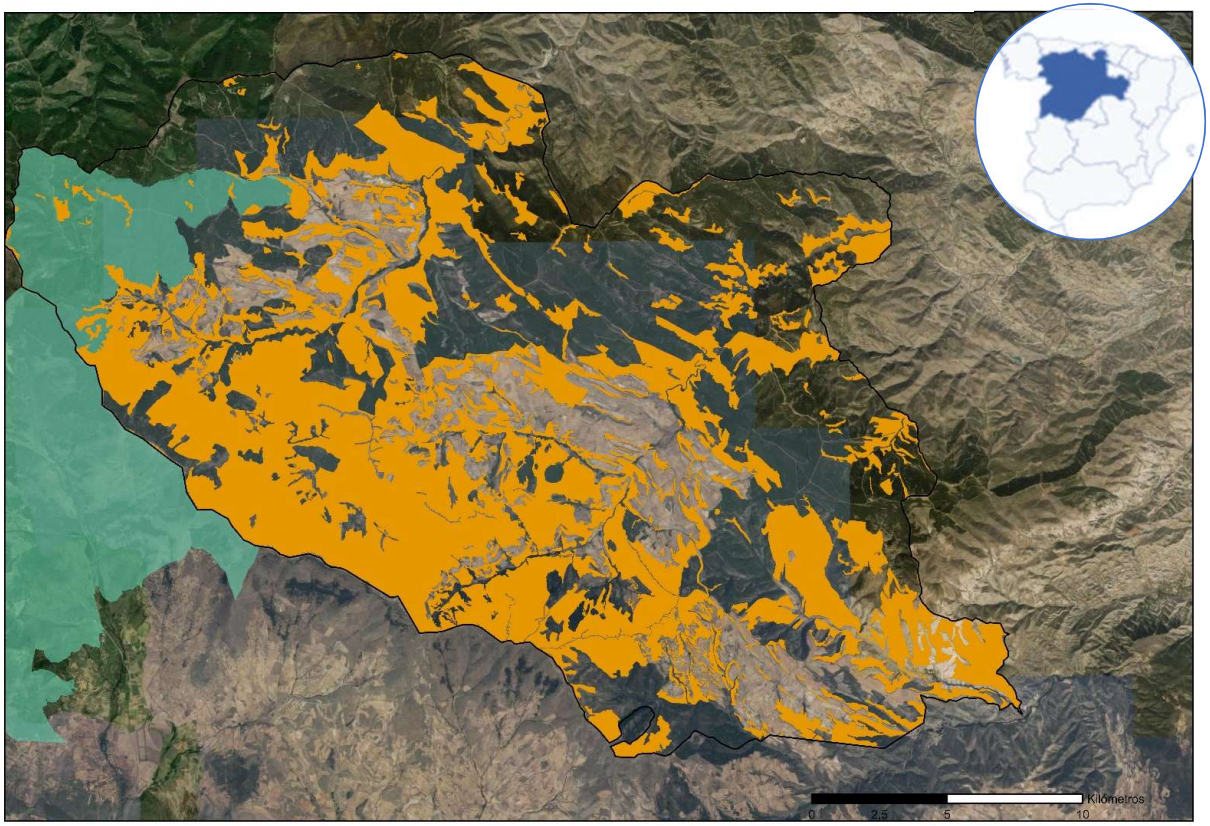
		[S, SE, SW]	1
	Available Water Capacity (AWC)	[>0,12]	10
		[0,1 – 0,12]	5
		[<0,1]	1
	Depth roots	[>50 cm]	10
		[30 cm – 50 cm]	5
		[<30 cm]	1
Sustainability	Erosion	[<25 T/ha/año]	10
		[25-100 T/ha/año]	5
		[>100 T/ha/año]	1
Forestry productivity	**Reclassified in terms of viability and productive potential**		

Detection and classification of marginal lands



Case of study: Network of Protected Natural Areas

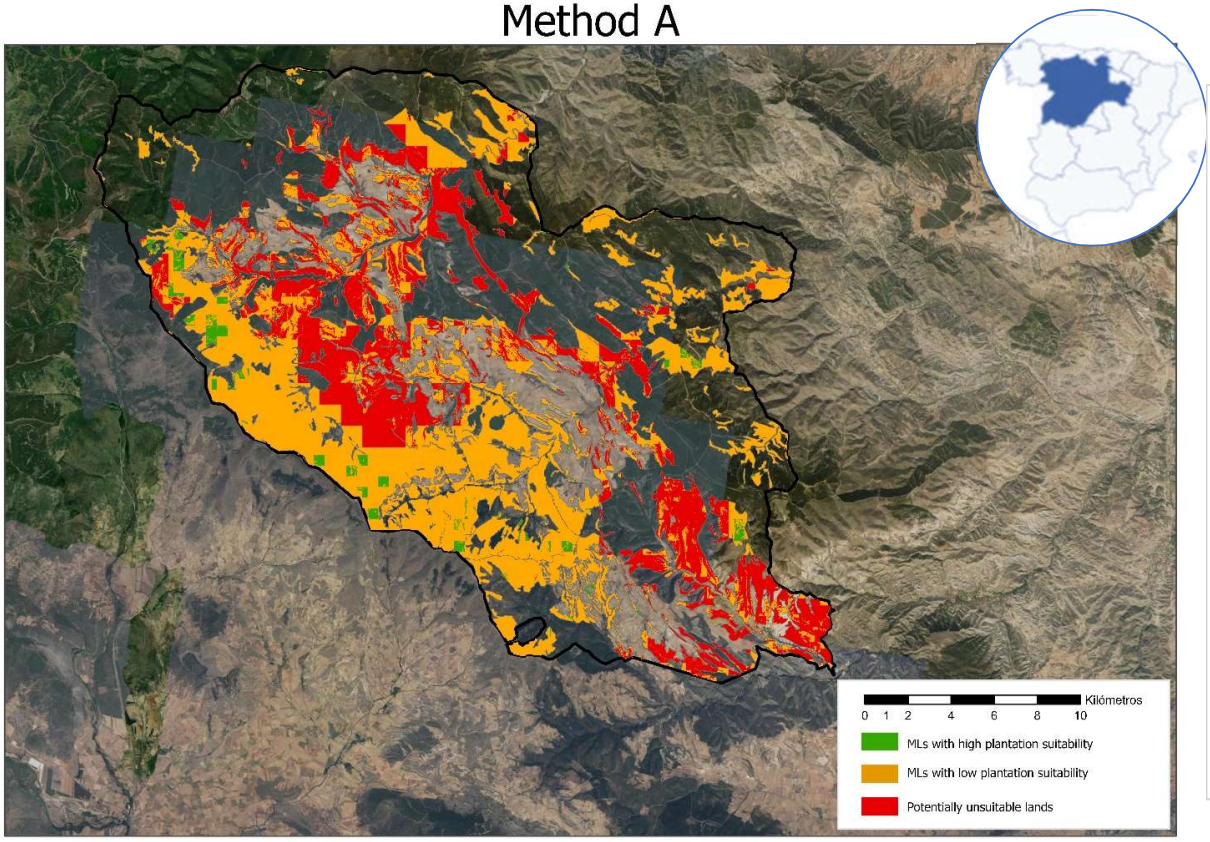
Order FYM/648/2016 of 6 July

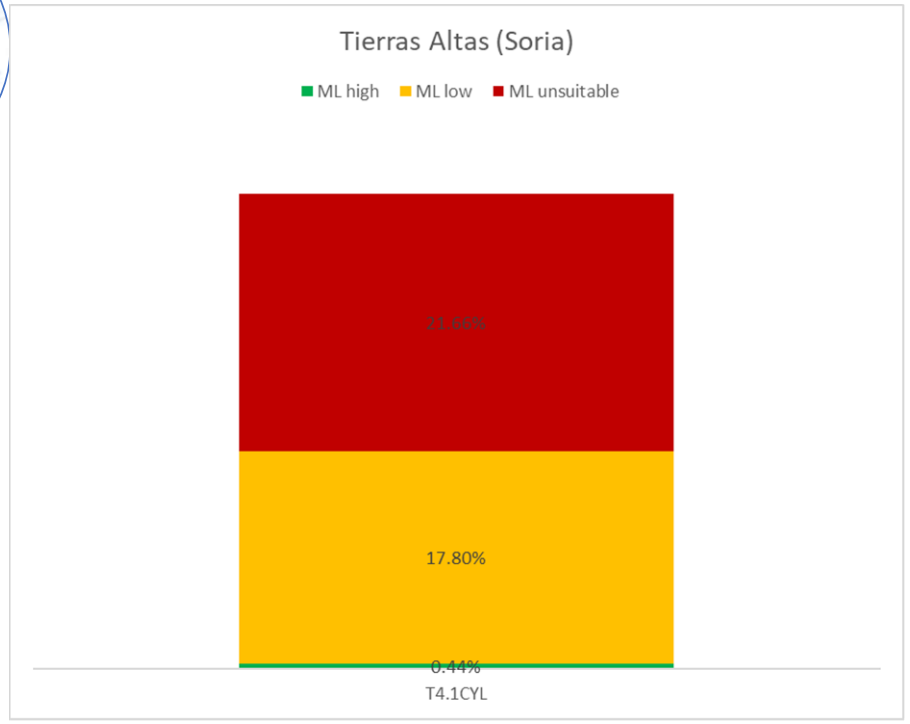
- SPAs out of object as areas to be reforested
- SPAs eligible for reforestation

Map of the pilot area "Tierras Altas" (Soria) according MAIL National methology and Protected Natural Areas hardlayer

Detection and classification of marginal lands

Method A



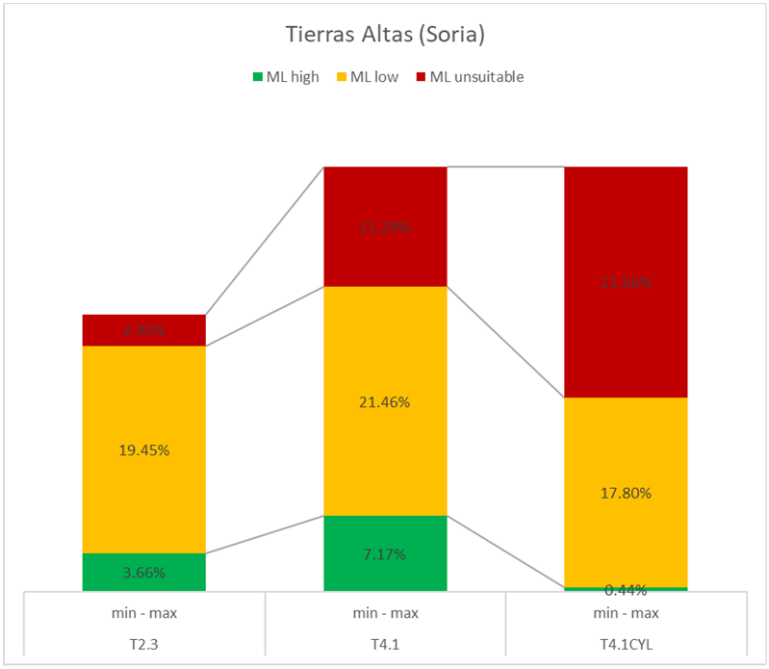


Comparison and analysis of the regional marginality (European level)

Spain

Results and comparison

- The application of the appropriate threshold of tree cover values according to the **national forest definition**, instead of the common value of 30%, is essential for downscaling the model.
- The use of SIOSE labelling achieves model fit in **areas of scrub or sparse woodland** exclude riparian protection functions and forest firebreaks.
- The application of regional information related to **regional regulations** adjusts the detection of LGMs and improves the weighting of the level of marginality with the biophysical characteristics of the region.



Poland

Characteristics of the system:

Coverage:

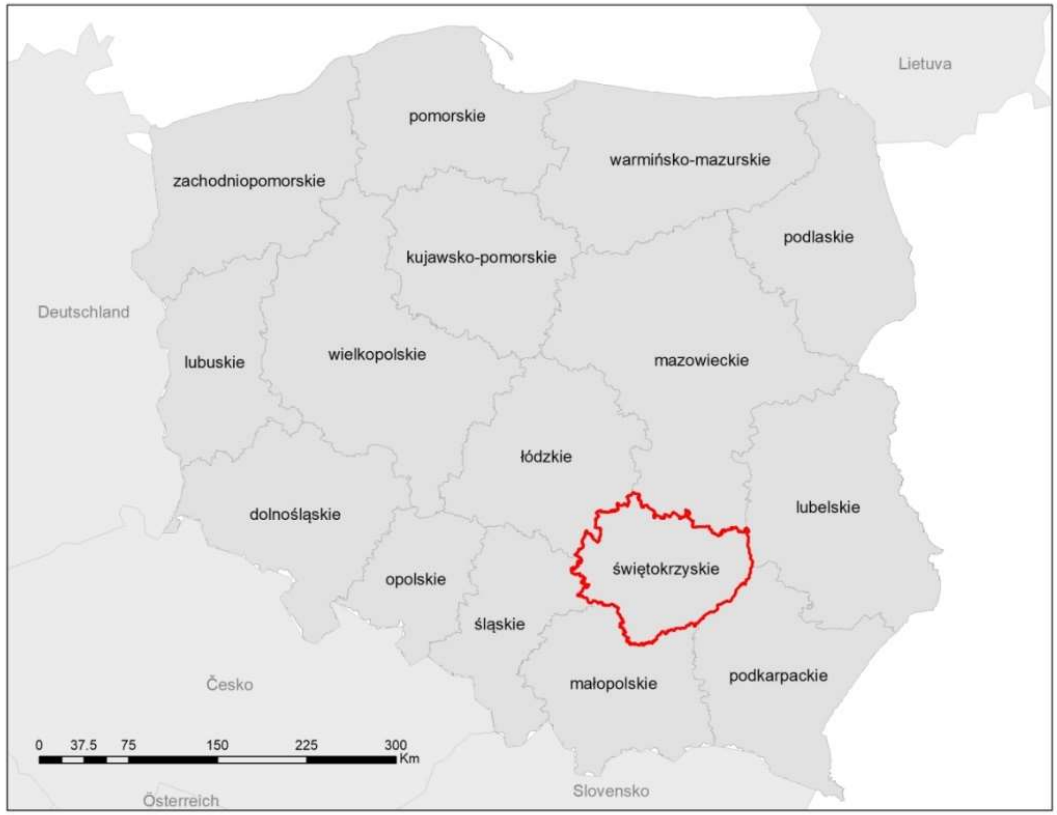
Voivodeship (province) level

Methology:

Adjusted MAIL Metodology

Data sources:

European, National and regional open source platforms



Development of a national or regional marginality detection system

Poland

Hard thresholds

Head Office of Geodesy and Cartography (GUGiK)

The National Database of Topographic Objects (10k scale)

exclude:

- water
- impervious areas
- forest areas
- agriculture
- protected areas

Soft thresholds

Copernicus – Land Monitoring Service

DEM

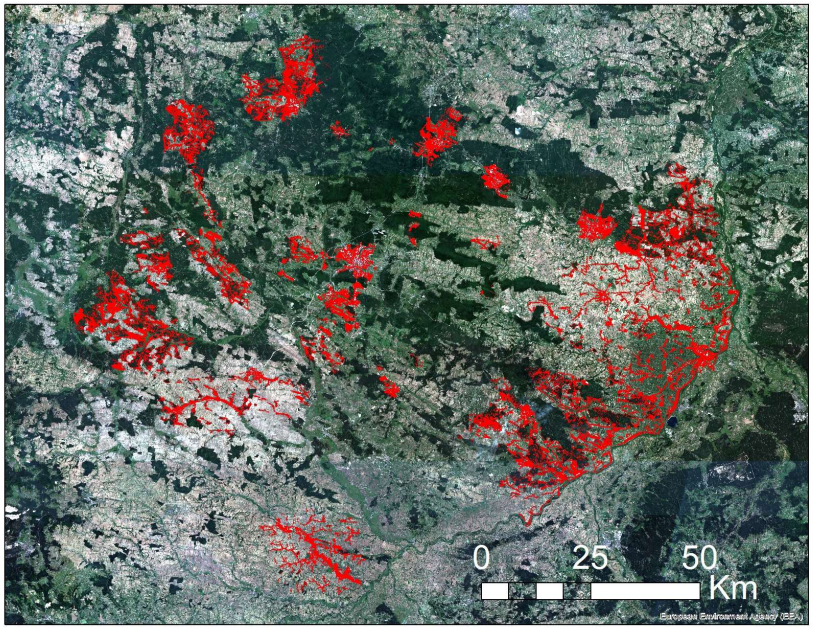
Voivodship Office of Geodesy and Cartography

Soil quality parameters

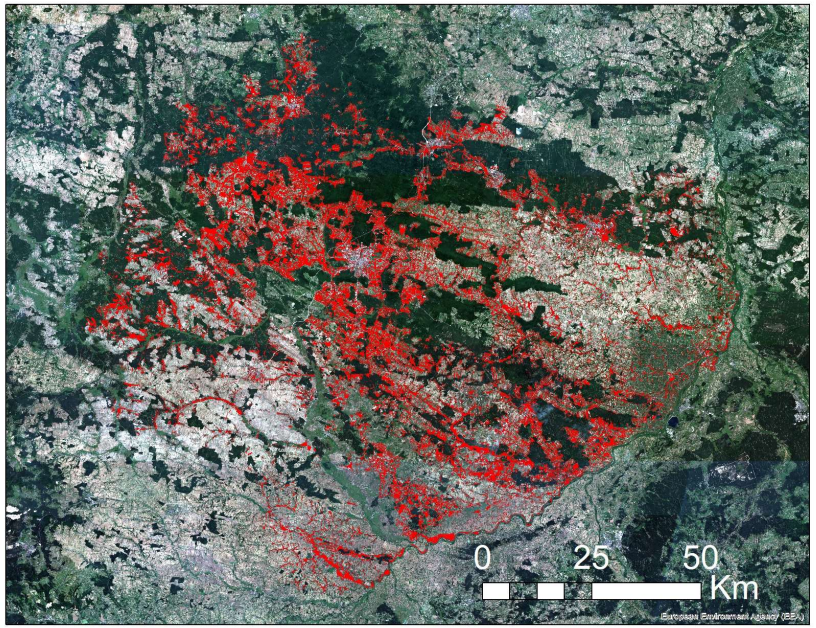
Implement the model and analyse results in the **pilot sites**

Poland

Detection marginal lands



T2.3: 4% of area



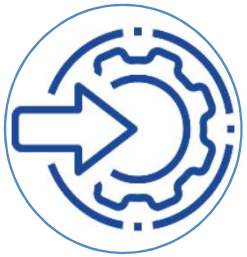
T4.1: 15% of area

Comparison and analysis of the regional marginality (European level)

Poland

Results and comparison

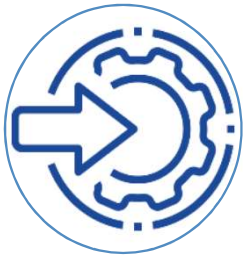
- Key to the identification of MLs is the pre-analysis of available information, which depends on the location and extent of the study area.
- Use of land cover based on **Topographic Objects** enriches the information in hard layers
- Different data sources may provide more up-to-date information.



Feedback in order to include local aspects in **the MLs algorithm**

Comparison on general aspects (T4.1 › T2.3):

- The methodology used in task 2.3 gives a good overview of potential marginal lands on a Pan-European level.
- By keeping the methodology scheme, it is possible to adapt the model according to the availability of information and to implement local datasets.
- The usage of local data along with thresholds adapted to state laws and regulations is benefitting the site selection process and produces more accurate results.
- Especially the use of national data for the hard thresholds improve the detection of MLs.
- The application of the appropriate threshold of tree cover values according to the national forest definition, instead of the common value of 30%, is essential for downscaling the model.
- ML areas are very dynamic phenomenon; depending on location different data sources may provide more up-to-date information.



Feedback in order to include local aspects in **the MLs algorithm**

Comparison on general aspects (T4.1 › T2.3):

On local level

- On local/regional level – combination of both approaches should provide the best results: multi criteria system based on national data + multi-temporal analysis of satellite data
- Detail of layers related to vegetation / forest / land coverage description can be considered as a key factor for accuracy improvement.
- The MLs detection and classification system is improved by integrating land uses and functions related to ecosystem service categories (Regulating, Provisioning, Cultural and Supporting services).

Improvement of the classification of marginal lands in terms of **suitability**

Marginal lands in terms of suitability

On local level:

- Dynamic and variability are key concepts for marginal land identification.
- The **dynamics of land systems** related to ecosystem services and social and economical aspects (e.g. landscape perception, land ownership, accessibility and economic viability) are constantly occurring without being reflected in land cover.
- Improve understanding of **complex socio-ecological** systems and develop eco-social indicators for the detection of MLs at local level.

Thank you for your attention!

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