



Grant Agreement 823805 MAIL H2020 MSCA RISE 2018

Web application for ML's management



This project has received funding from the European Union's Horizon 2020 research and innovation programme under the Marie Skłodowska-Curie grant agreement No 823805

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MAIL Final Conference, 13.12.2021

Development team

- Marek Ruciński (CBK PAN)
- Jesús Torralba Pérez (UPV)
- Fernando Bezares Sanfelip (CESEFOR)
- Pablo Crespo Peremarch (UPV)
- Zoi Touloudi (AUTH)
- Georgios Spanos (AUTH)
- Dzhaner Emin (IABG)
- Eleftherios Mystakidis (HOMEOTECH)
- Francisco Gallego (CESEFOR)
- ... and many other Mail Secondees and Coordinators

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Objectives

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- To present selected outcomes of the project

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- To enable users the analysis of CO₂ sequestration potential of marginal lands

Objectives

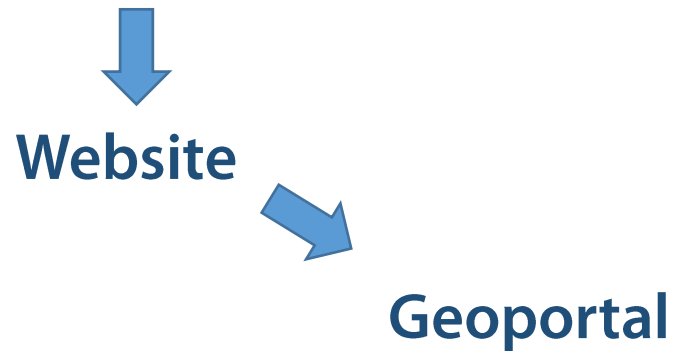
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Website

Objectives

- To present selected outcomes of the project
- To provide user friendly interface presenting maps and results of marginal lands analysis in spatial domain
- To enable users the analysis of CO2 sequestration potential of marginal lands



Objectives

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- To enable users the analysis of CO₂ sequestration potential of marginal lands



Mail Map Portal

Requirements

Requirements



Requirements



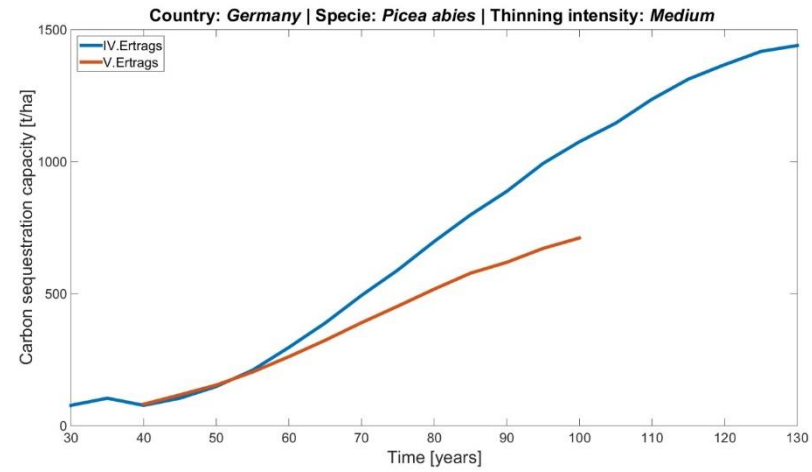
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Requirements



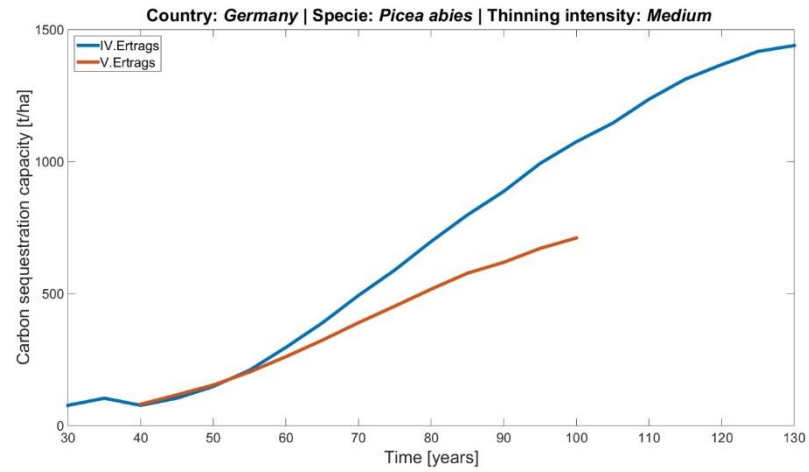
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Requirements



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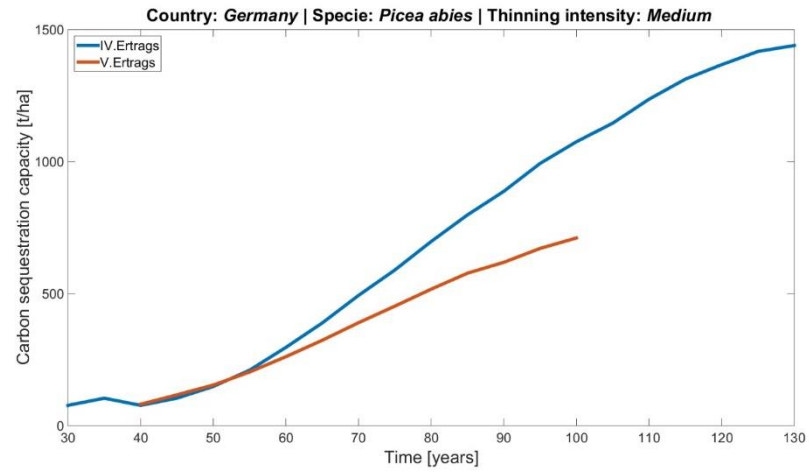


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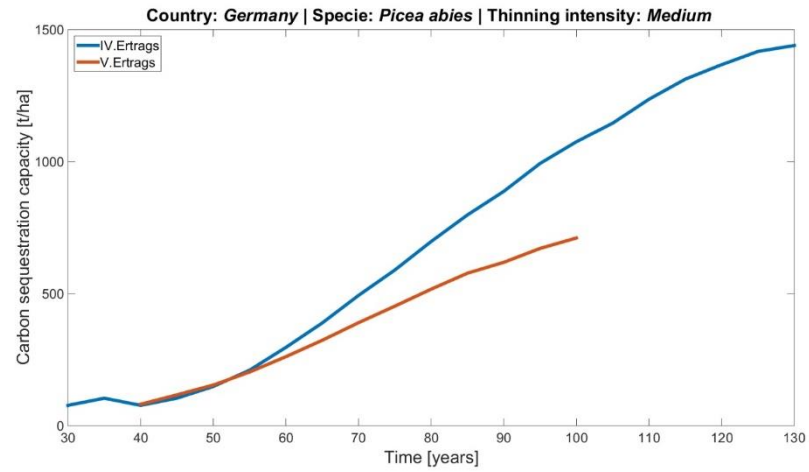
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Requirements



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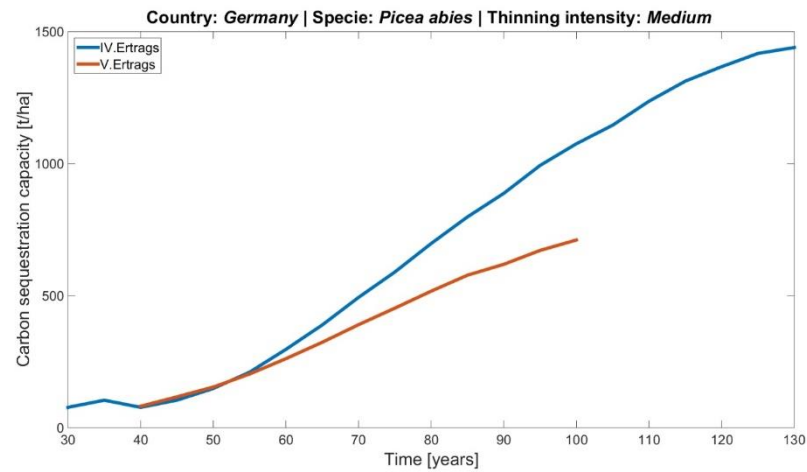


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Requirements



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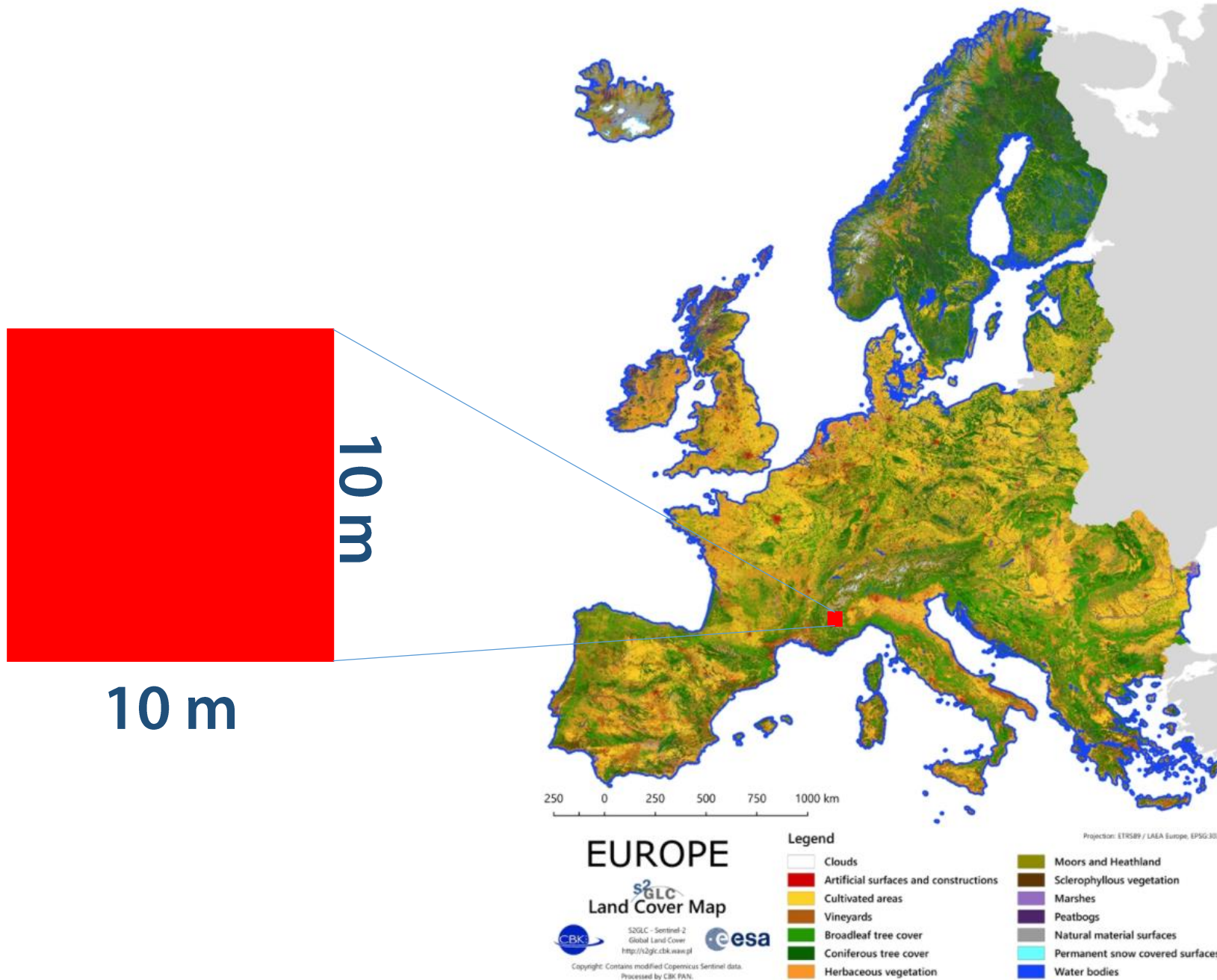


Land Cover Map of Europe 2017



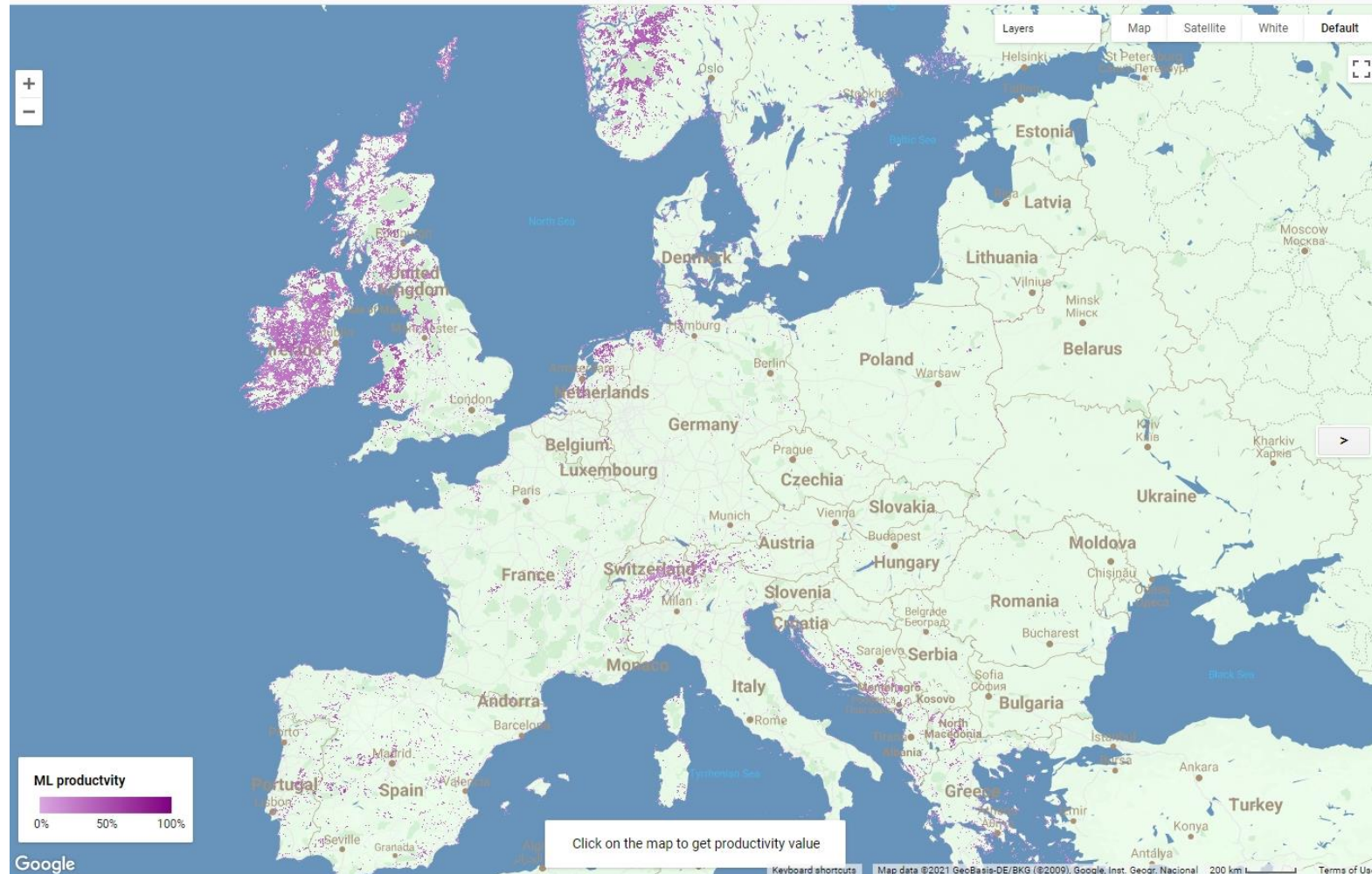
Source: <https://s2glc.cbk.waw.pl/>

Land Cover Map of Europe 2017



Source: <https://s2glc.cbk.waw.pl/>

Google Earth Engine



Marginal Lands in Europe

www.marginallands.eu

Marginal Lands Toolbox

Project provides tools for marginal land detection and monitoring such as:

- Marginal lands productivity
- Marginal lands identification based on existing databases
- Marginal lands detection using Sentinel - 1 SAR data
- TBA

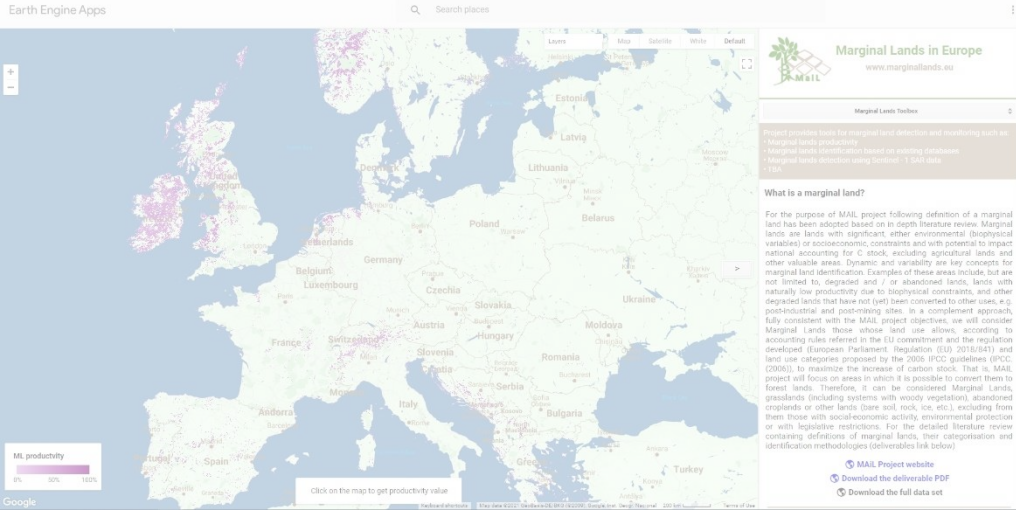
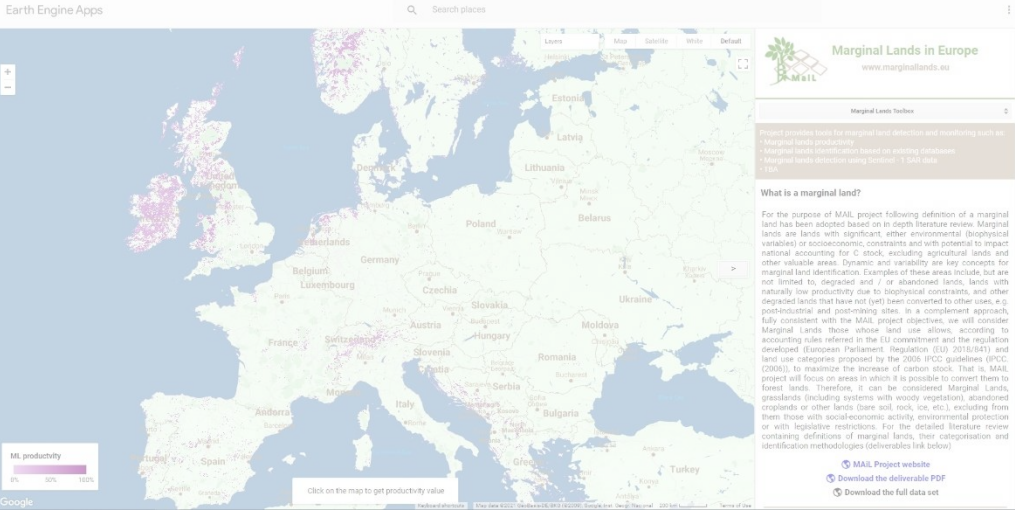
What is a marginal land?

For the purpose of MAIL project following definition of a marginal land has been adopted based on in depth literature review. Marginal lands are lands with significant, either environmental (biophysical variables) or socioeconomic, constraints and with potential to impact national accounting for C stock, excluding agricultural lands and other valuable areas. Dynamic and variability are key concepts for marginal land identification. Examples of these areas include, but are not limited to, degraded and / or abandoned lands, lands with naturally low productivity due to biophysical constraints, and other degraded lands that have not (yet) been converted to other uses, e.g. post-industrial and post-mining sites. In a complement approach, fully consistent with the MAIL project objectives, we will consider Marginal Lands those whose land use allows, according to accounting rules referred in the EU commitment and the regulation developed (European Parliament. Regulation (EU) 2018/841) and land use categories proposed by the 2006 IPCC guidelines (IPCC. (2006)), to maximize the increase of carbon stock. That is, MAIL project will focus on areas in which it is possible to convert them to forest lands. Therefore, it can be considered Marginal Lands, grasslands (including systems with woody vegetation), abandoned croplands or other lands (bare soil, rock, ice, etc.), excluding from them those with social-economic activity, environmental protection or with legislative restrictions. For the detailed literature review containing definitions of marginal lands, their categorisation and identification methodologies (deliverables link below)

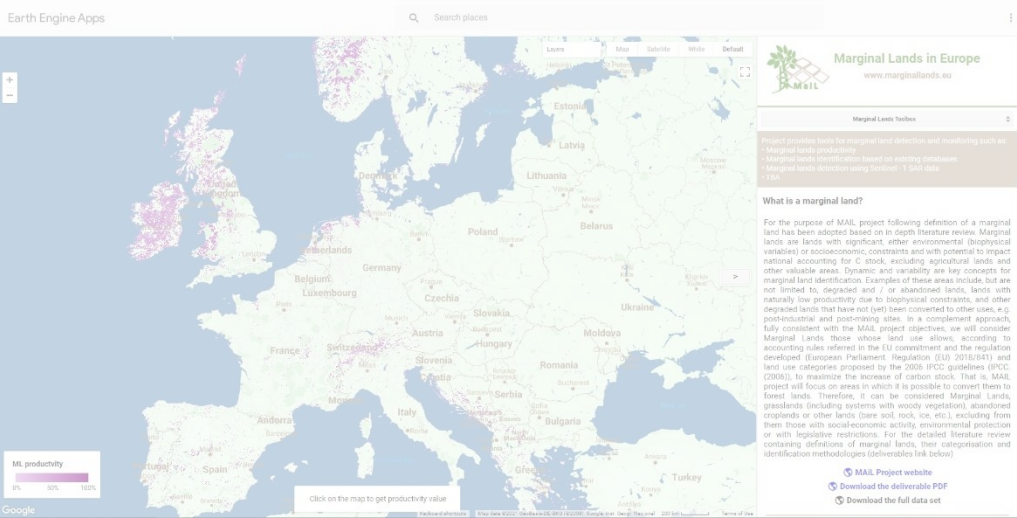
[MAIL Project website](#)

[Download the deliverable PDF](#)

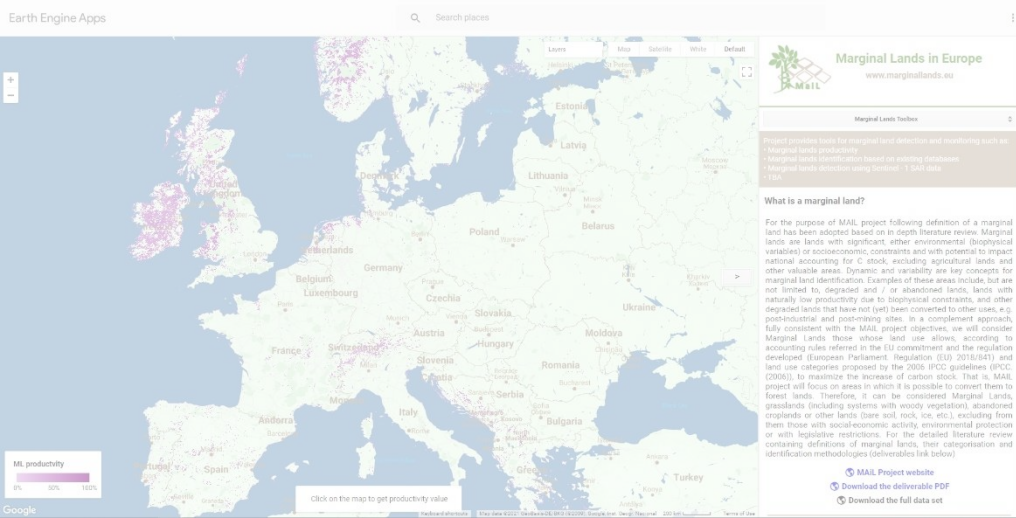
[Download the full data set](#)



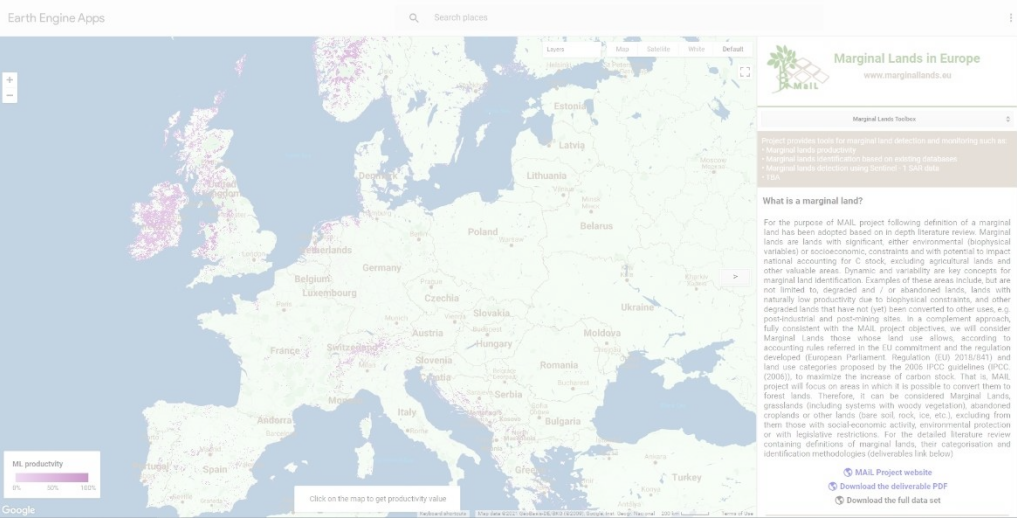
Marginal Lands mapping



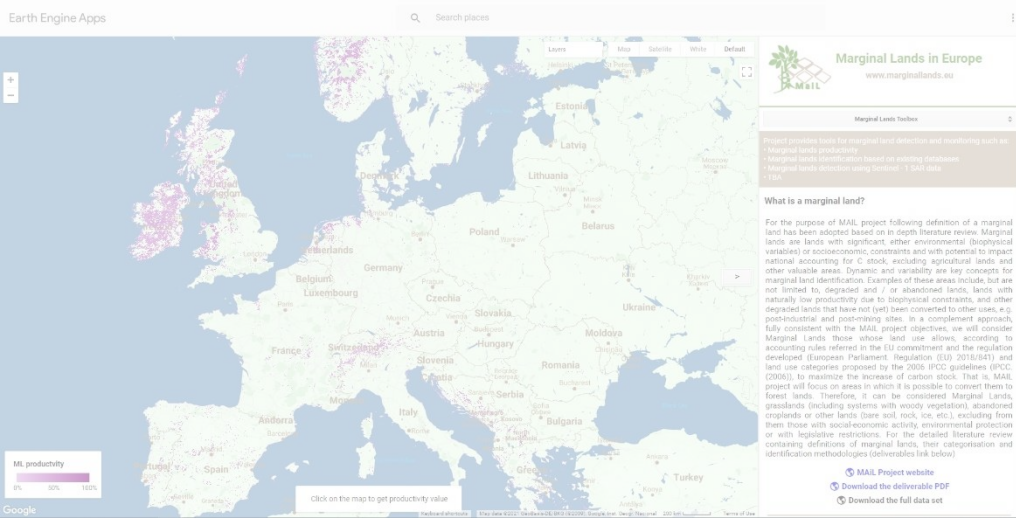
Decision Support System



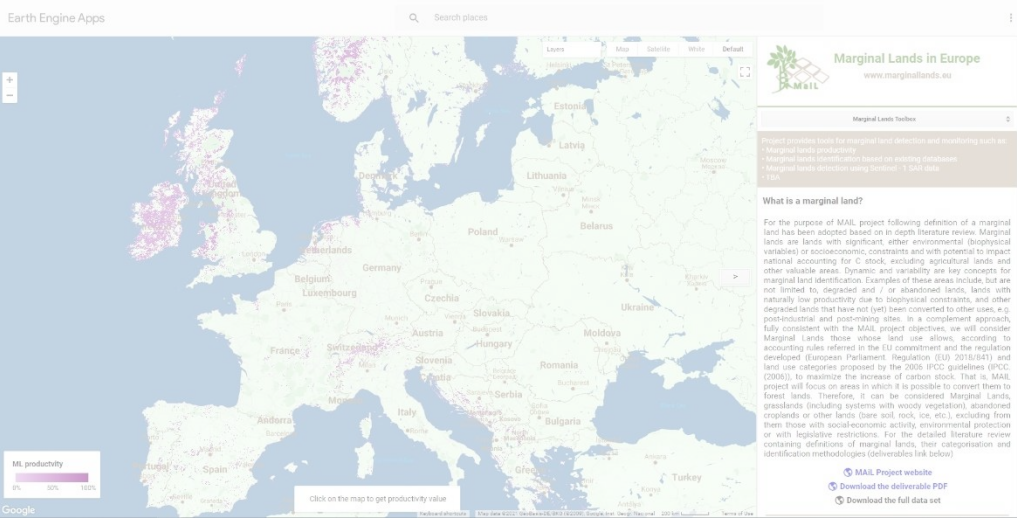
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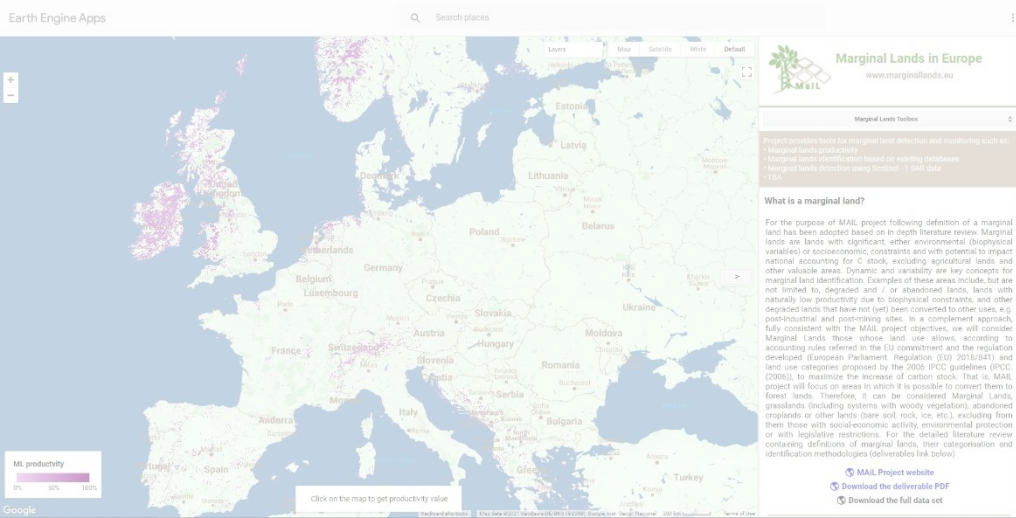
Decision Support System



Marginal Lands mapping



Decision Support System



Products – Layers – Maps

- **Marginal Lands Productivity**

Products – Layers – Maps

- **Marginal Lands Productivity**
- **ML Productivity classes**

Products – Layers – Maps

- **Marginal Lands Productivity**
- **ML Productivity classes**
- **Multi-temporal MLs monitoring**

Products – Layers – Maps

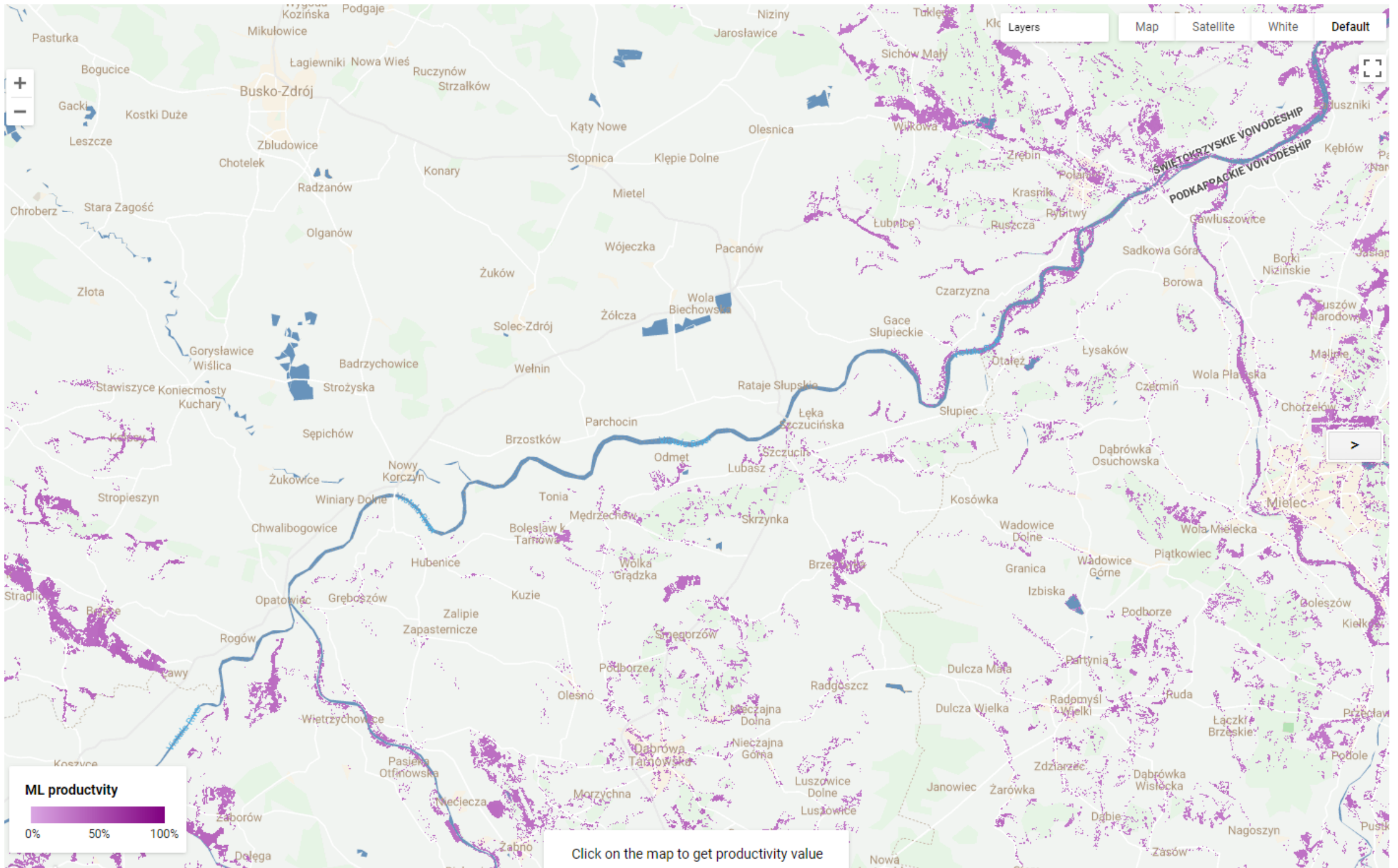
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- ML Productivity classes
- Multi-temporal MLs monitoring

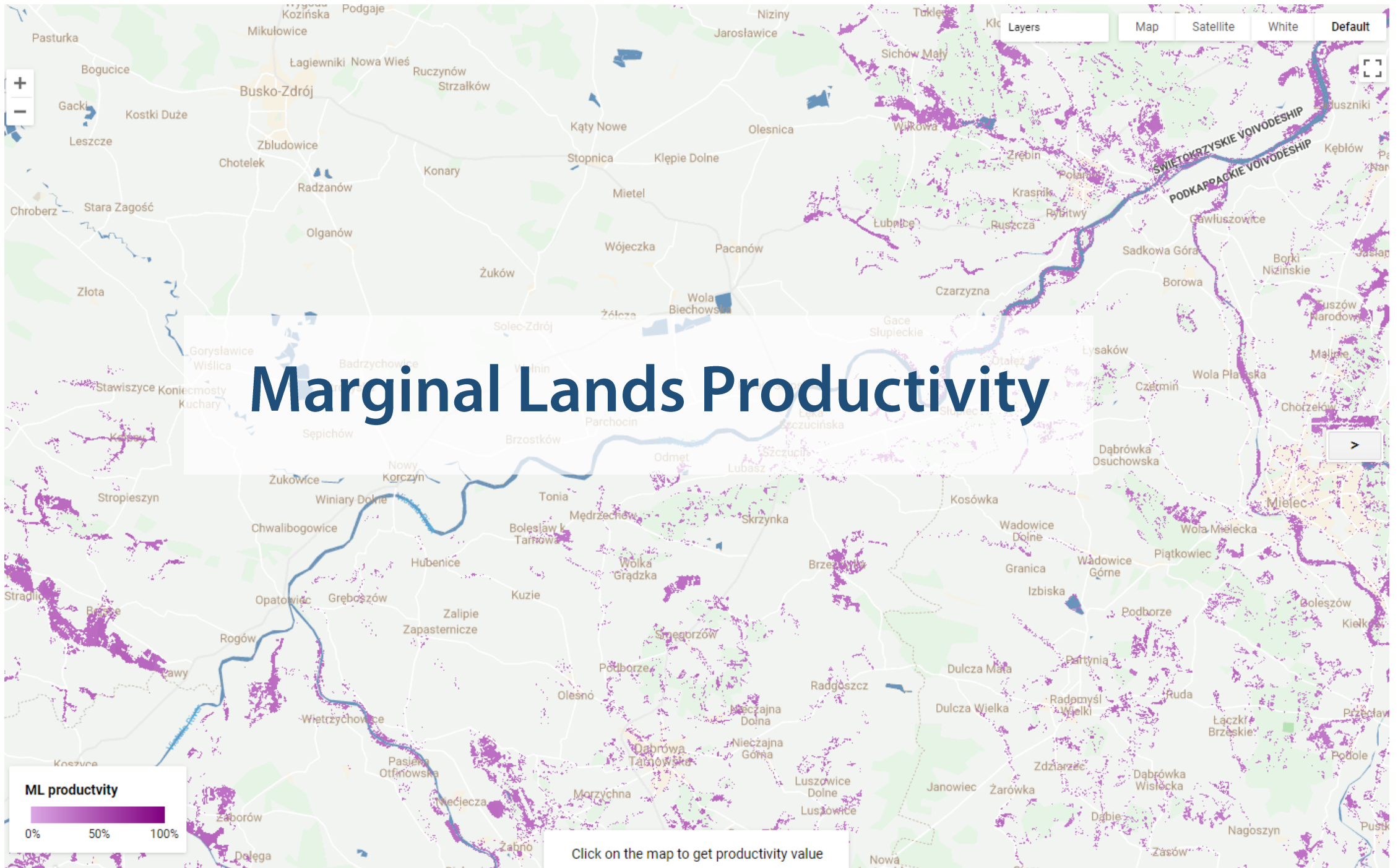
Products – Layers – Maps

- Marginal Lands Productivity
- ML Productivity classes
- Multi-temporal MLs monitoring



14:15 – 14:30













Marginal Lands Productivity

Base Map

- 2017-2018
- Based on existing databases

Enhanced Map

- User defines the date



Click on the map to get productivity value

Marginal Lands Productivity

Base Map

- 2017-2018
- Based on existing databases

Enhanced Map

- User defines the date
- Based on satellite images



Click on the map to get productivity value

Marginal Lands Productivity

Base Map

- 2017-2018
- Based on existing databases
- AOI: Europe

Enhanced Map

- User defines the date
- Based on satellite images



Click on the map to get productivity value

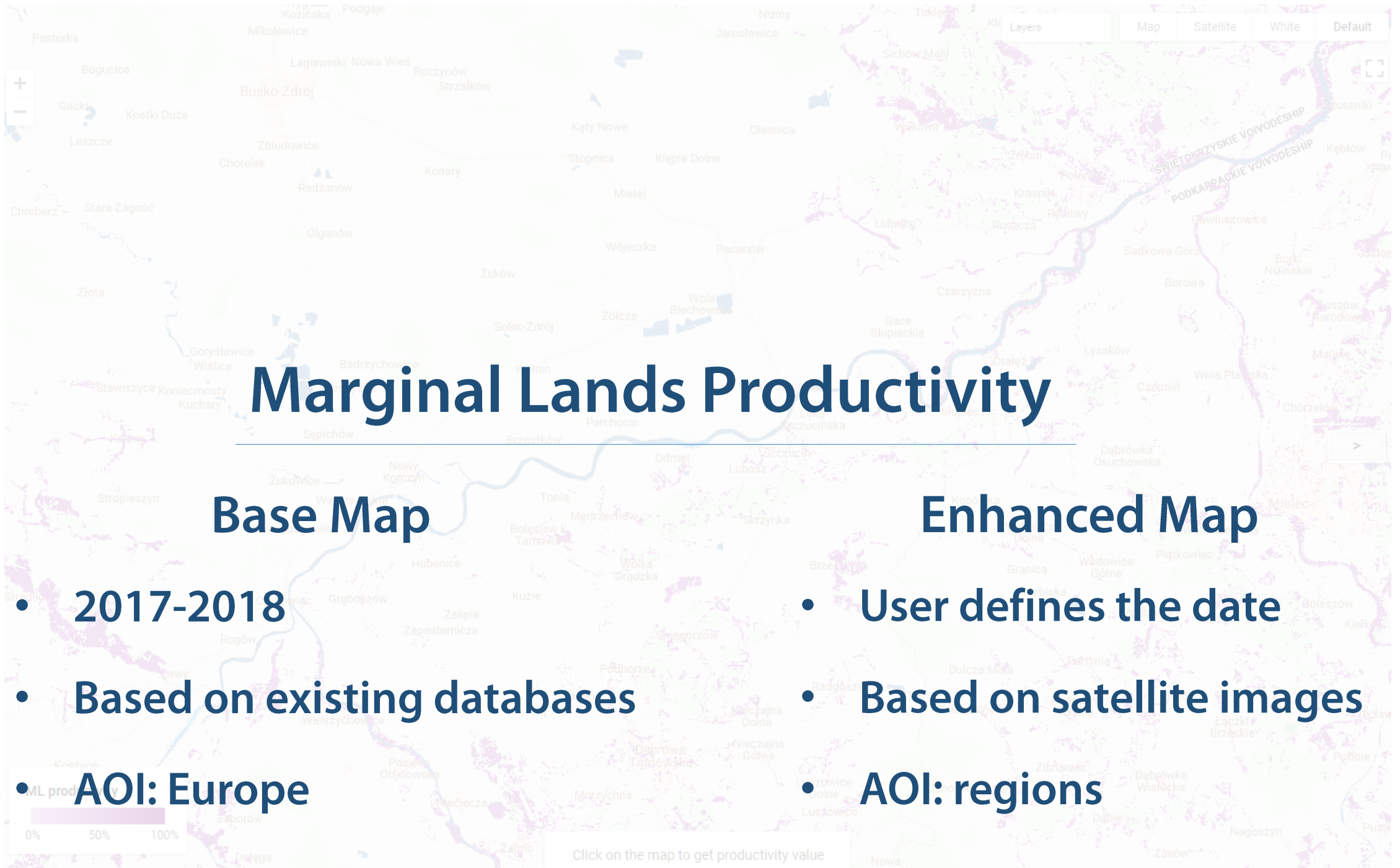
Marginal Lands Productivity

Base Map

- 2017-2018
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- AOI: Europe

Enhanced Map

- User defines the date
- Based on satellite images
- AOI: regions



Marginal Lands Productivity

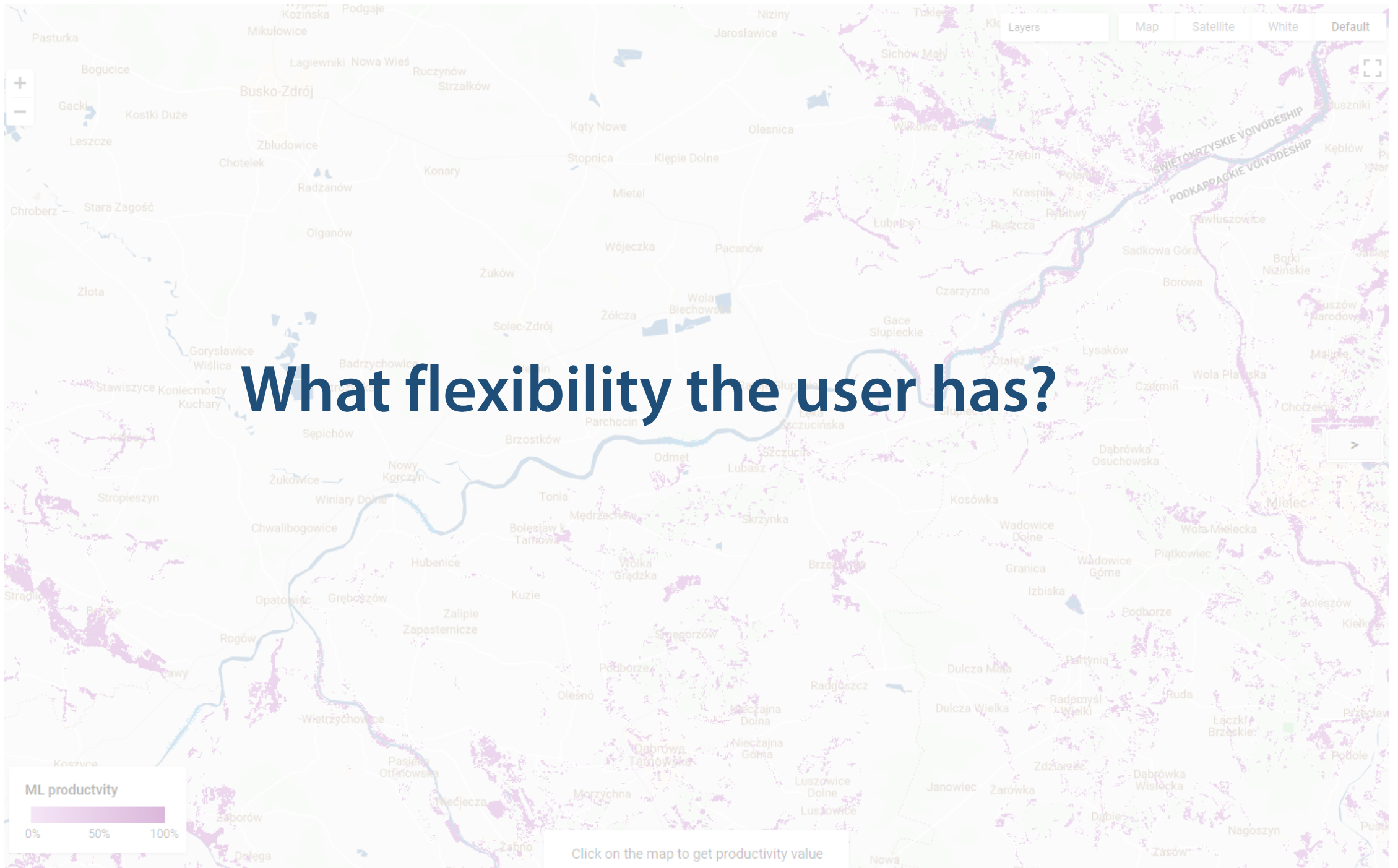
Base Map

- 2017-2018
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- AOI: Europe

Enhanced Map

- User defines the date
- Based on satellite images
- AOI: regions

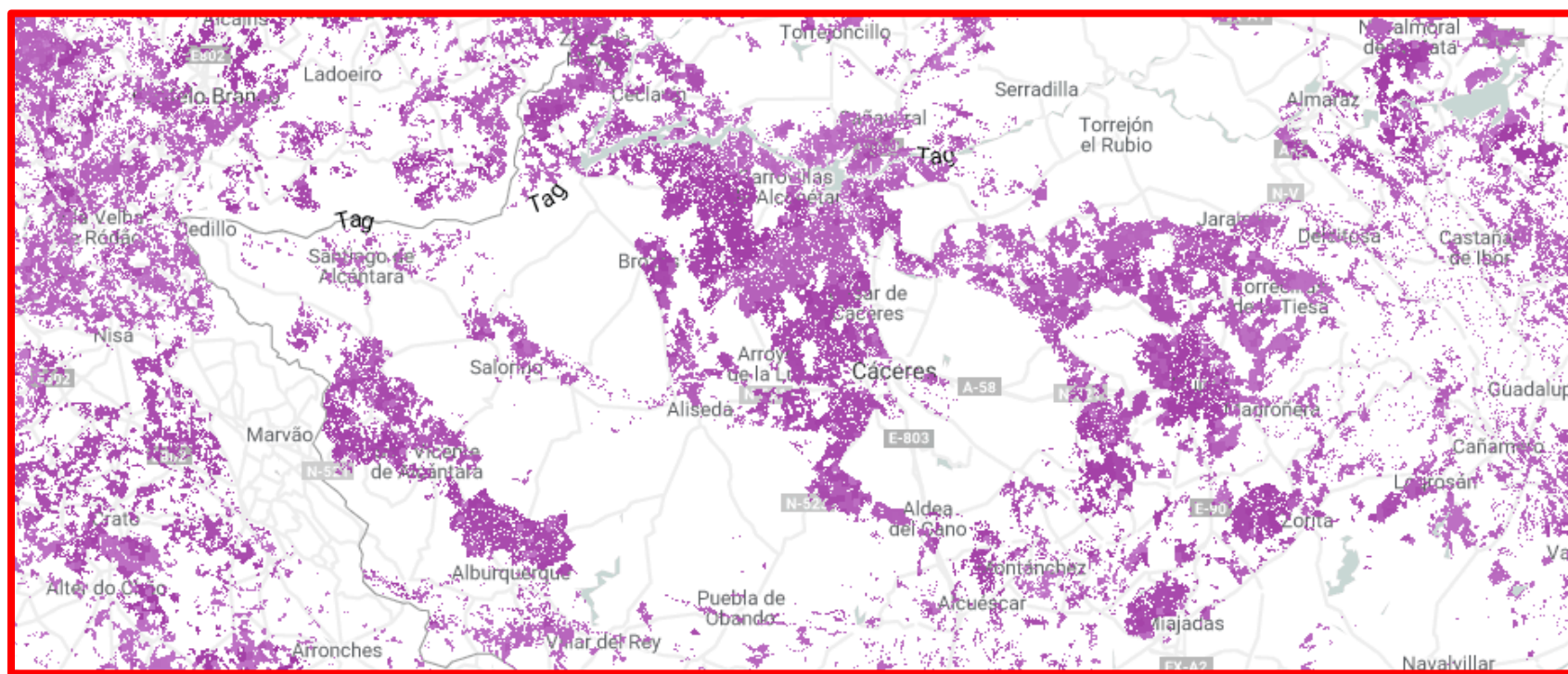




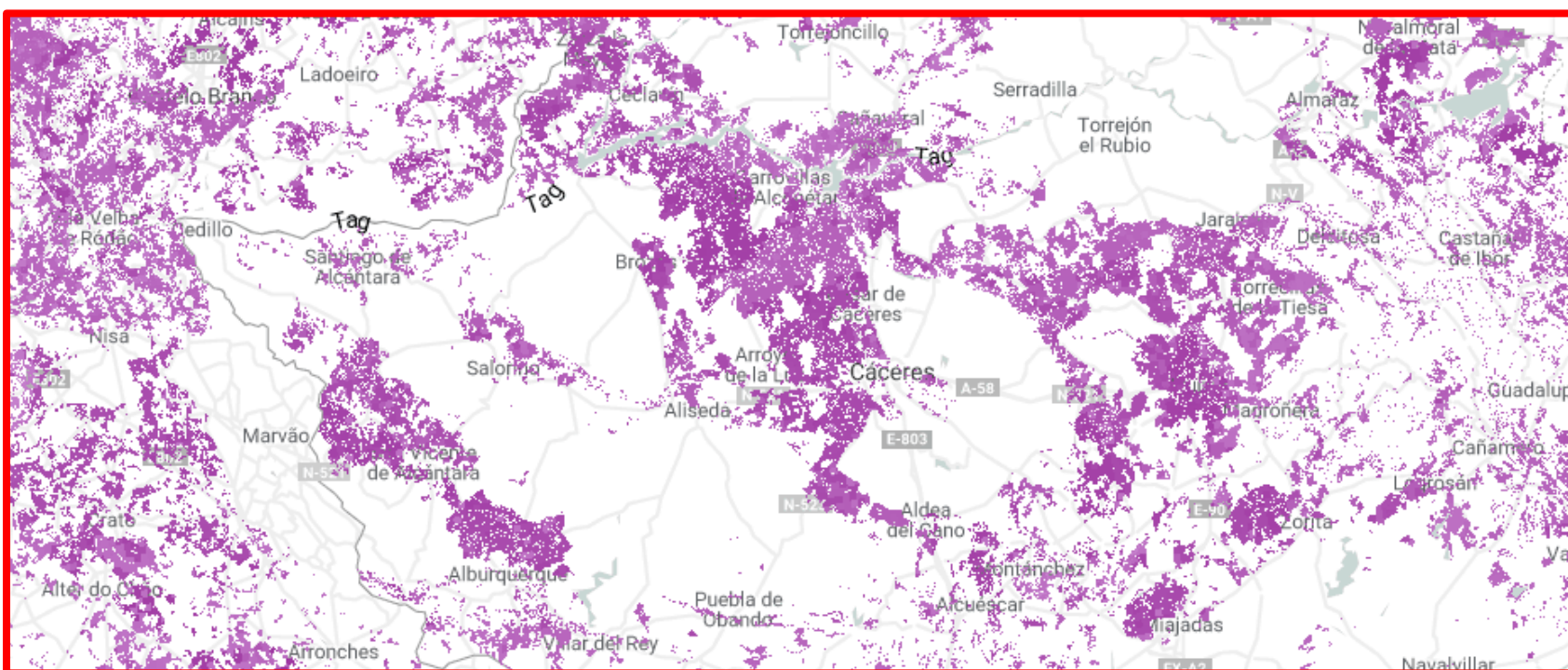




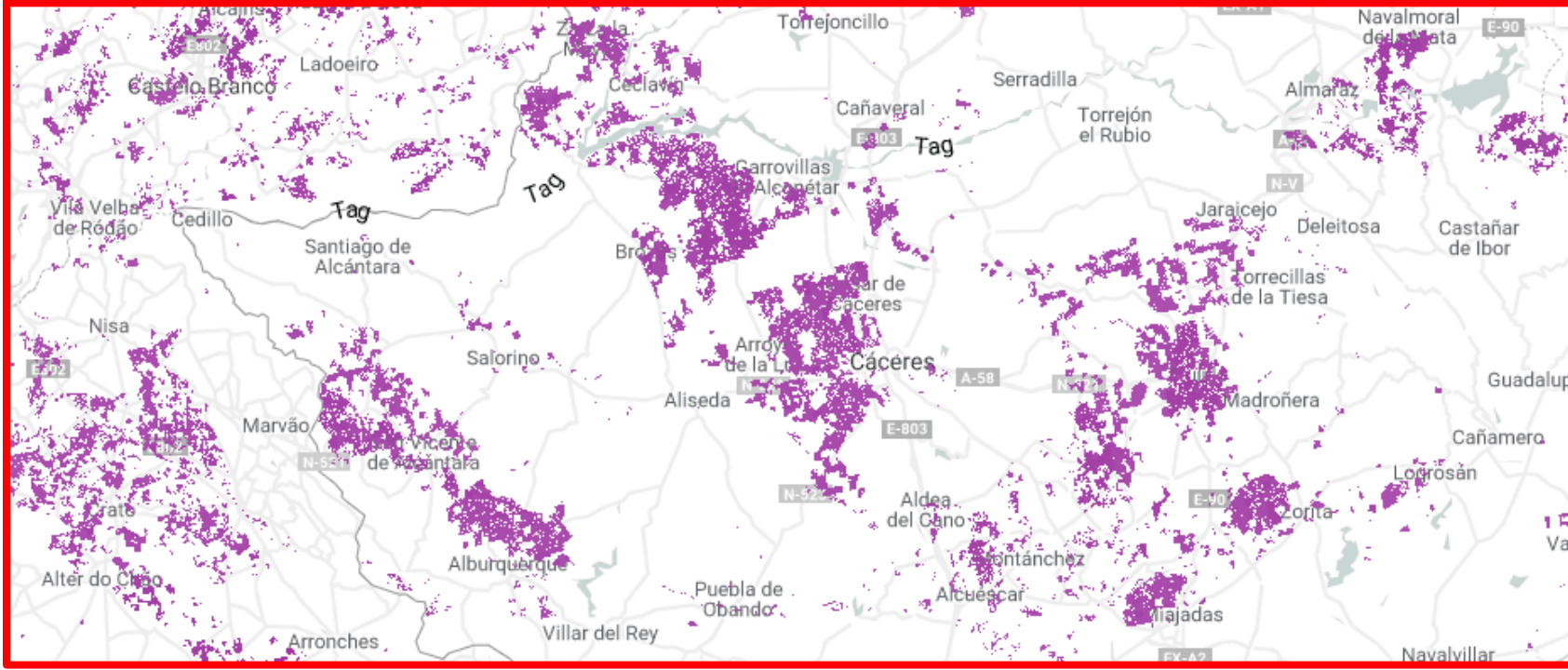




0-100

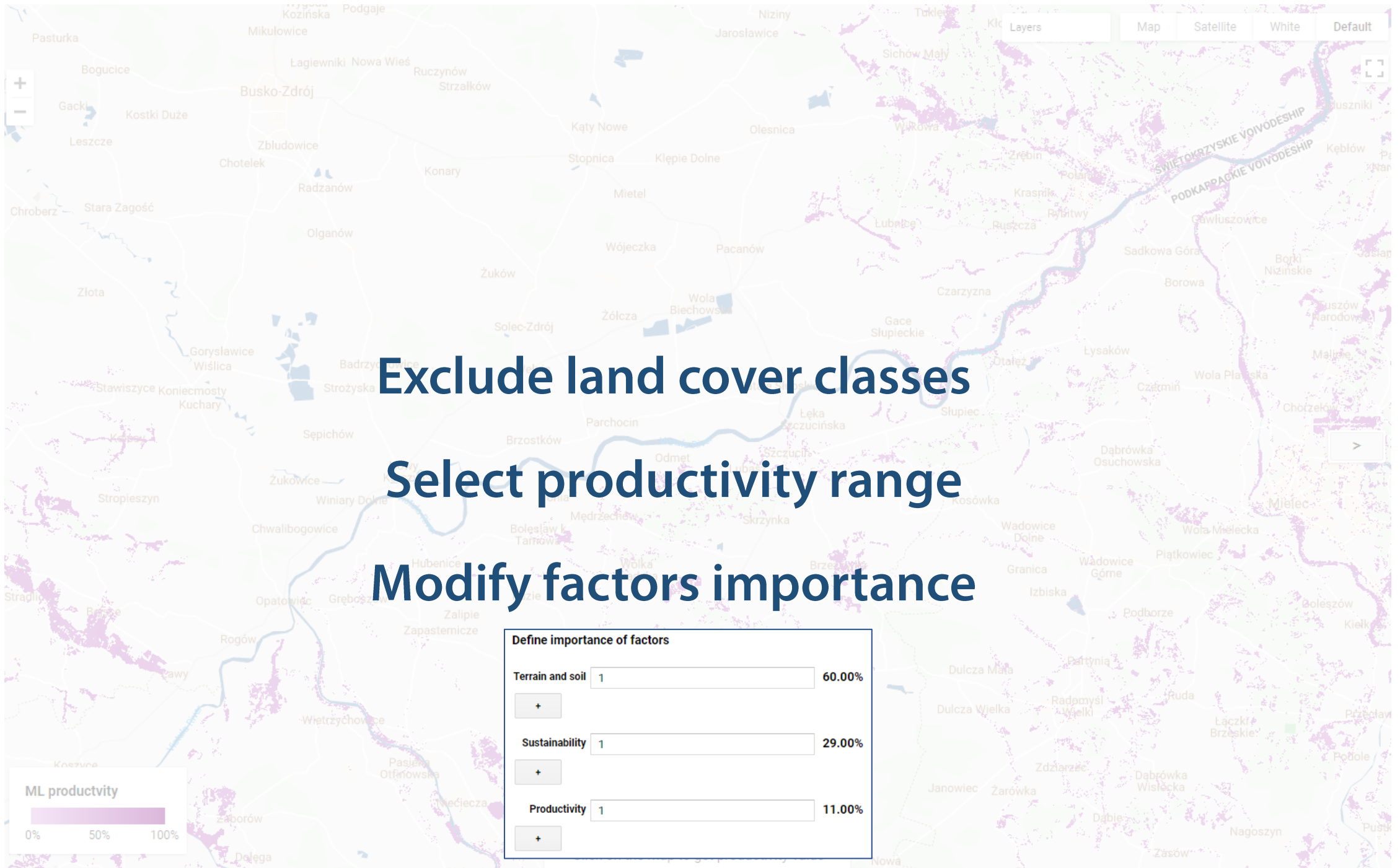


0-100



50-100

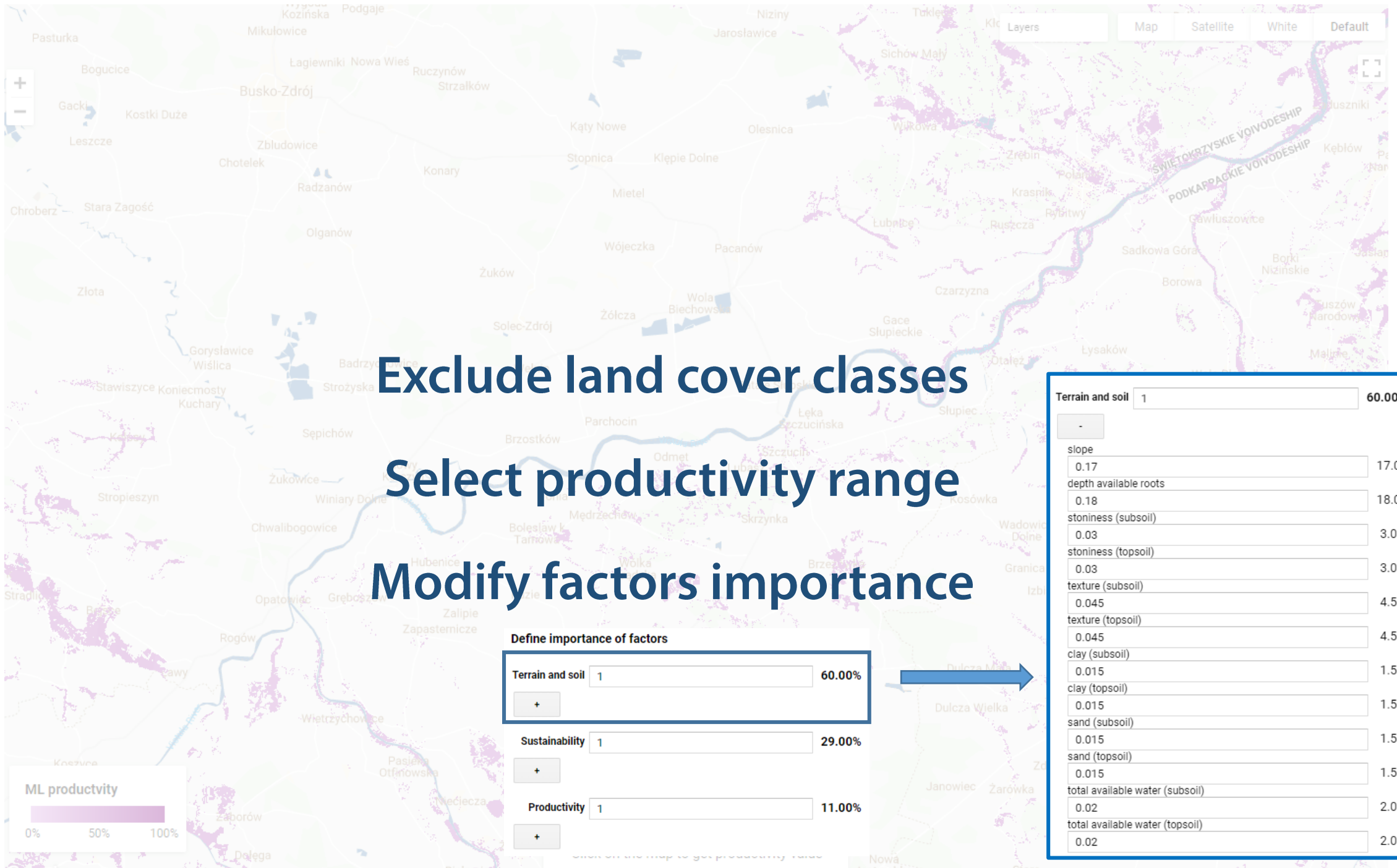




Exclude land cover classes

Select productivity range

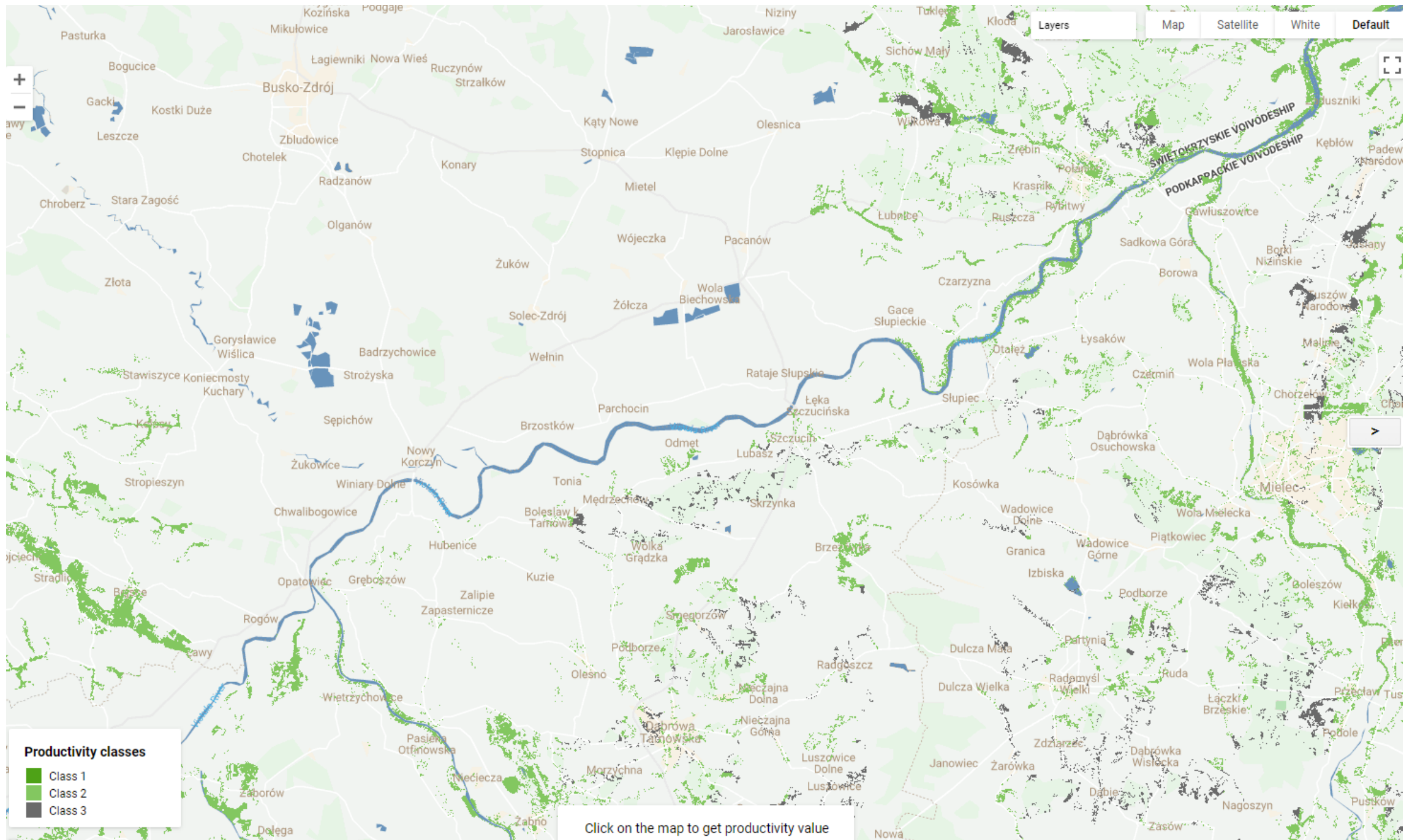
Modify factors importance



Exclude land cover classes

Select productivity range

Modify factors importance







Classification of Marginal Lands into 3 classes in 4 different ways

Equal magnitude
25th and 75th percentile
33rd and 66th percentile
Custom classes

Productivity classes

- Class 1
- Class 2
- Class 3

Click on the map to get productivity value

Decision Support System for marginal lands management - General description



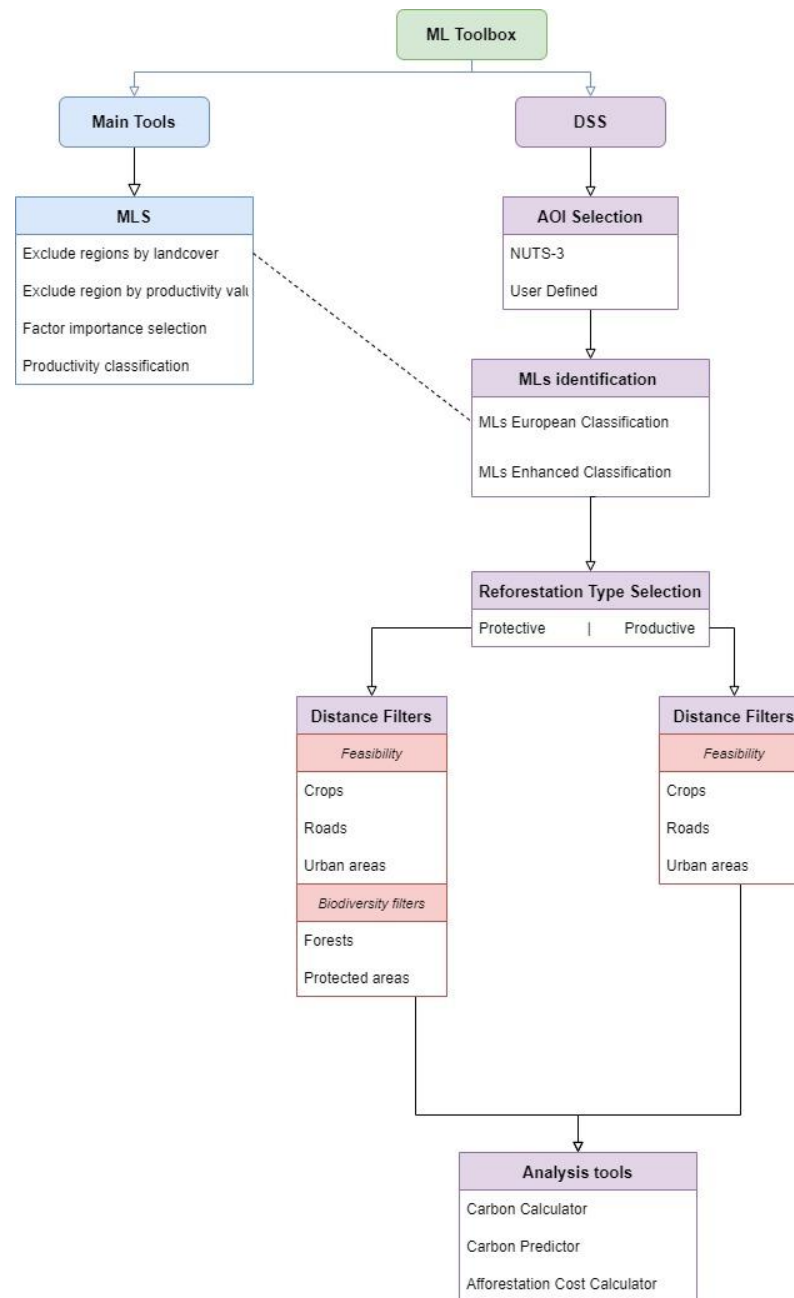
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Fernando Bezares Sanfelip, CESEFOR

MAIL toolbox: structure

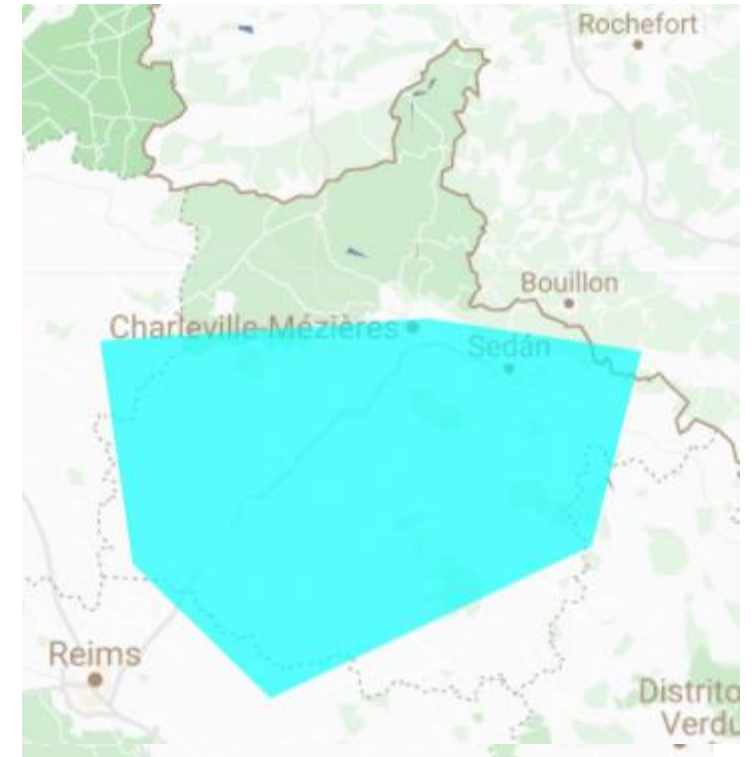
- **MAIL toolbox**
 - **Main tools**
 - Exclude regions by land cover
 - Exclude regions by productivity values
 - Factor importance selection
 - Productivity Classification
 - **DSS:**
 - Area Selection
 - Identification of MLs
 - Distance Filters
 - Analysis tools





DSS: toolbox

- Define the area of interest:
 - NUTS 3: using GAUL level 2
 - User defined polygon



DSS: toolbox

- Define the area of interest:
 - NUTS 3: using GAUL level 2
 - User defined polygon

MLs Afforestation Decision Support System

1. Select your area of interest

1.1. Select a NUT 3 region.

Albania

All regions

1.2. Or draw a custom area.

Select Area Remove Area(s)

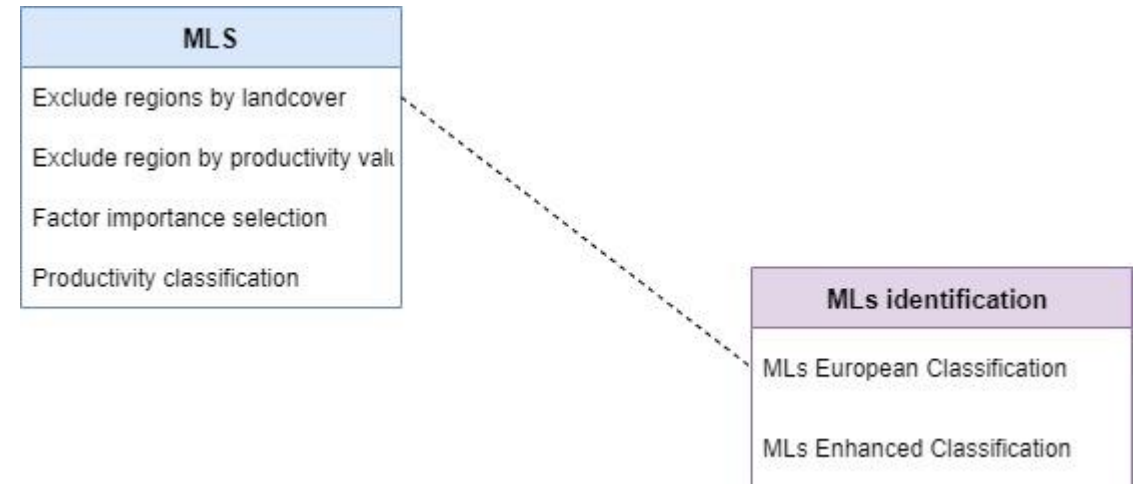
DSS: Identification of MLs

- **MLs European Classification**
- **MLs Enhanced Classification**

2. ML Identification Method

Choose a Marginal Land identification method.
The MLs European Classification uses a general MLs definition for Europe.
The Enhanced Classification improves the identification at local scale.

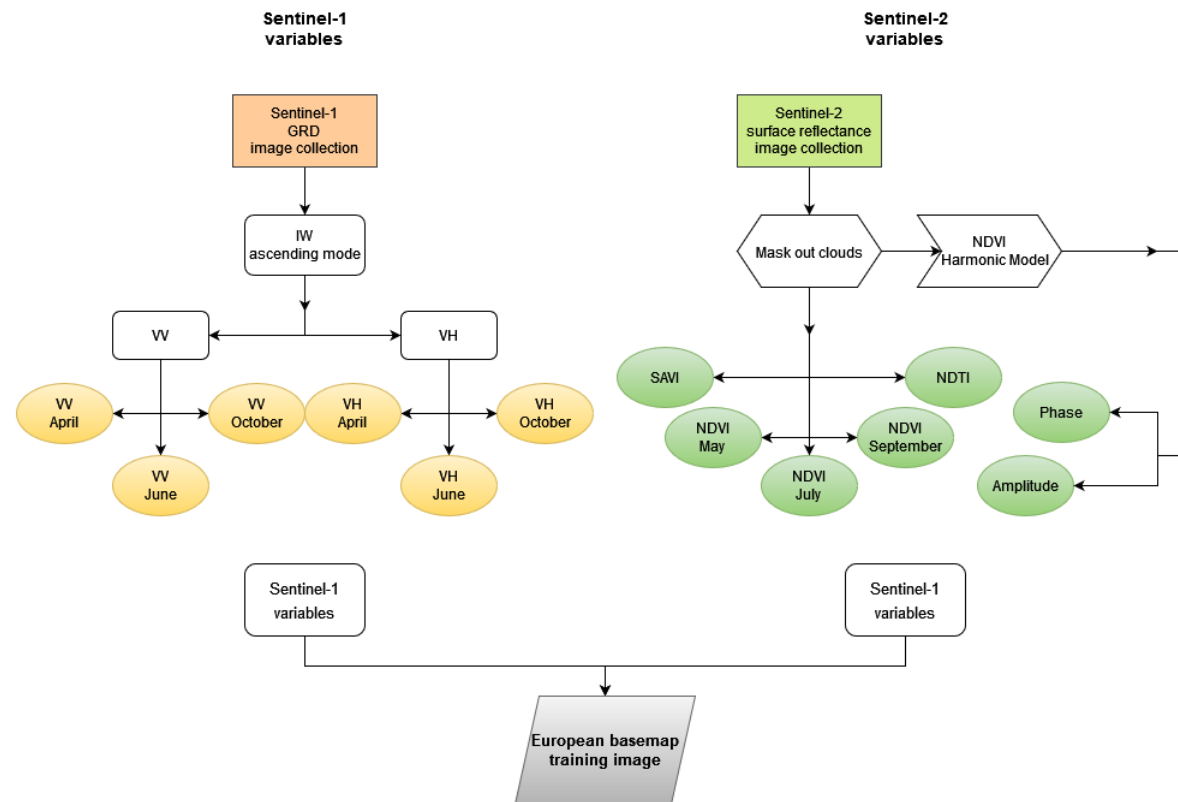
Select MLs Identification Method ⇅



European Basemap Training Layer

European Basemap Training Layer

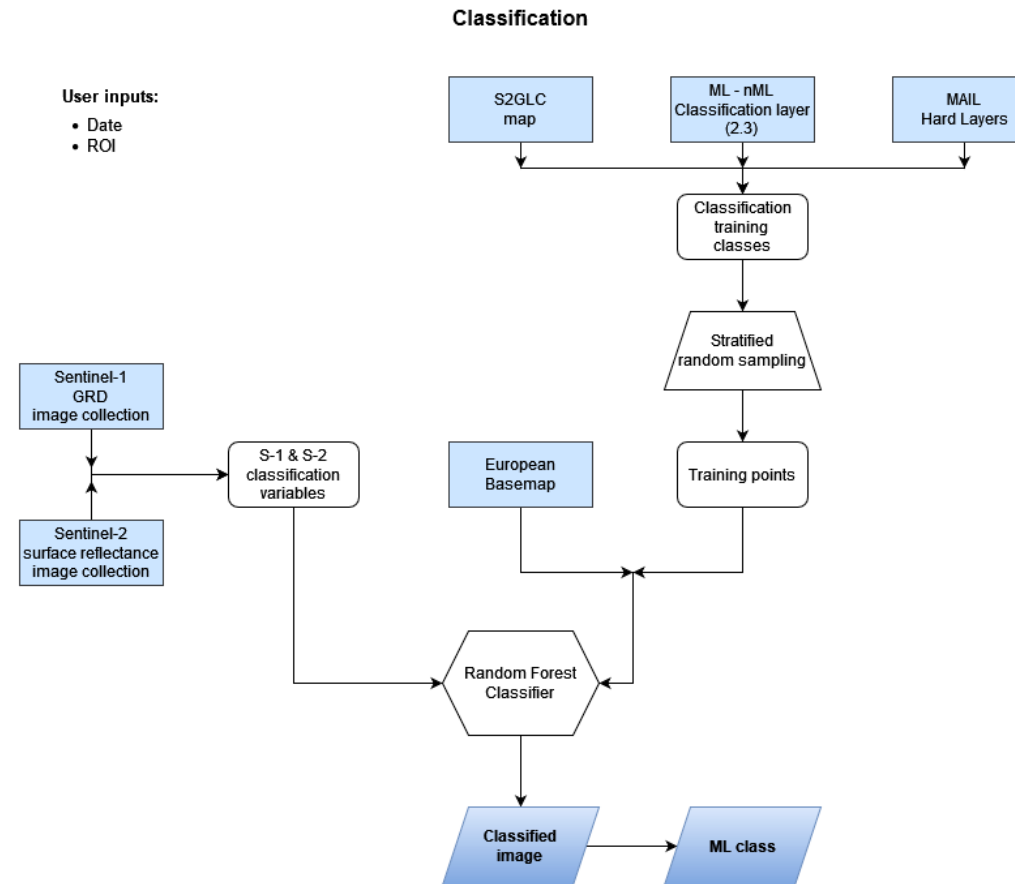
Dates: 4/2017 - 4/2019



Authors: Michał Krupiński and Georgios Spanos

Marginal Lands Conference, 13 December 2021

Classification

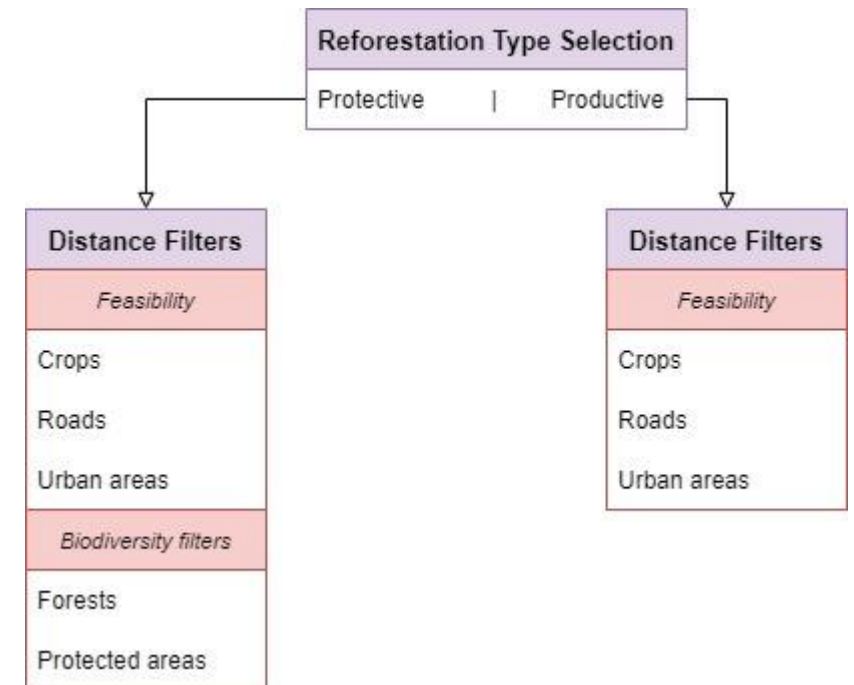


Authors: Michał Krupiński and Georgios Spanos

Marginal Lands Conference, 13 December 2021

Distance Filters

- Two reforestation scenarios
 - Protective :
 - Distance filters applied:
 - Feasibility:
 - Crops
 - Roads
 - Urban Areas
 - Biodiversity:
 - Forests
 - Protected Areas
 - Productive:
 - Distance filters applied:
 - Feasibility:
 - Crops
 - Roads
 - Urban Areas



Distance Filters

3. Type of Reforestation

Select your reforestation objective and obtain the most suitable areas. Define the maximum distance to (closer than) or from (further than) a given area. By default it is set to distance to. Max distance 5000 m

productive

Crops ☐ further than

Built-up ☐ further than

Roads ☐ further than

Apply

3. Type of Reforestation

Select your reforestation objective and obtain the most suitable areas. Define the maximum distance to (closer than) or from (further than) a given area. By default it is set to distance to. Max distance 5000 m

protective

Forest ☐ further than

Protected Areas ☐ further than

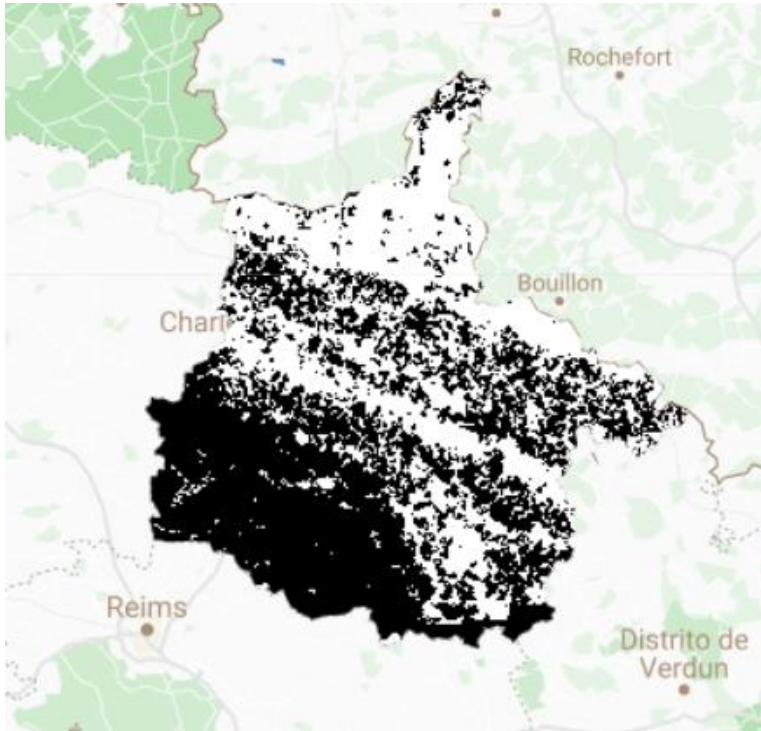
Crops ☐ further than

Built-up ☐ further than

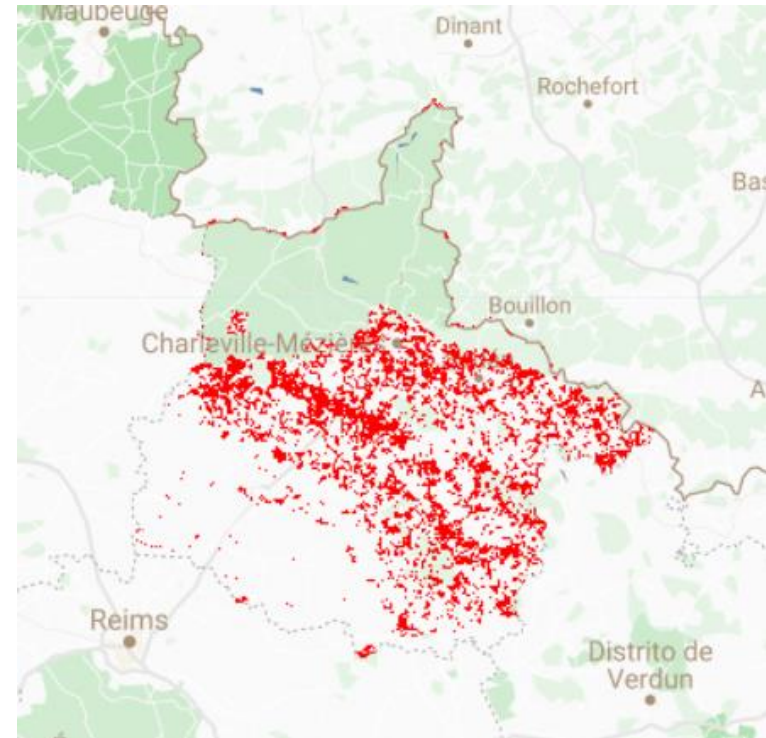
Roads ☐ further than

Apply

Distance Filters



Distance Mask



Masked MLs Enhanced Classification

Analysis Tools

- **Analysis Tools**
 - **Carbon Calculator:**
 - Calculates carbon for a given DBH for a selection of species using biomass equations. (Forrester et al. 2017)
 - **Carbon Predictor:**
 - Predicts DBH (Schelhaas et al. 2018)
 - Applies Carbon calculator biomass equations
 - **Afforestation Cost Calculator:**
 - Retrieves the cost of planting one tree based on: slope, distance from cities, soil texture and labour cost.

Analysis tools
Carbon Calculator
Carbon Predictor
Afforestation Cost Calculator

Access ?

Access ?



Free

Open

Google Earth account required

Access ?



Free

Open

Google Earth account required

(but it's free too)

More information ...

More information ...

Dedicated section with tutorials within MaiL MOOC

More information ...

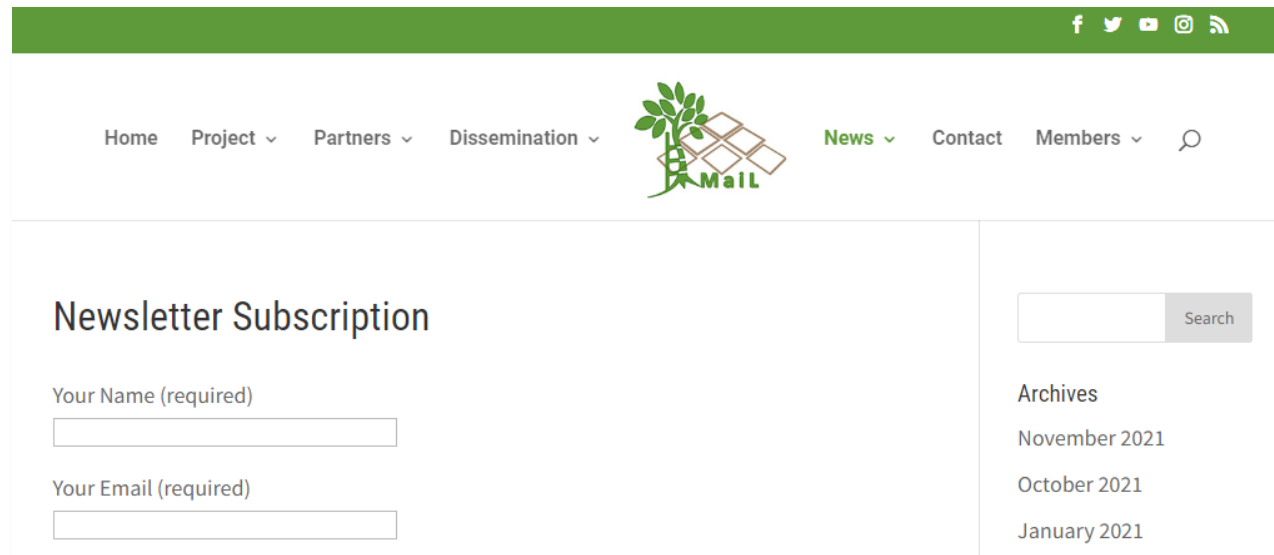
Dedicated section with tutorials within MaiL MOOC

News published on <http://marginallands.eu/>

More information ...

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The screenshot shows the Mail MOOC website interface. At the top is a green header bar with social media icons for Facebook, Twitter, YouTube, Instagram, and RSS. Below this is a navigation menu with links: Home, Project (with a dropdown arrow), Partners (with a dropdown arrow), Dissemination (with a dropdown arrow), News (with a dropdown arrow), Contact, and Members (with a dropdown arrow). A magnifying glass icon for search is also present. The Mail MOOC logo, featuring a stylized tree and the text 'Mail', is centered in the navigation bar. The main content area is divided into two columns. The left column contains a 'Newsletter Subscription' section with two input fields: 'Your Name (required)' and 'Your Email (required)'. The right column contains a search bar with a 'Search' button and an 'Archives' section listing 'November 2021', 'October 2021', and 'January 2021'.

References

- **Analysis Tools**

- Forrester, D. I., Tachauer, I. H. H., Annighoefer, P., Barbeito, I., Pretzsch, H., Ruiz-Peinado, R., ... & Sileshi, G. W. (2017). Generalized biomass and leaf area allometric equations for European tree species incorporating stand structure, tree age and climate. *Forest Ecology and Management*, 396, 160-175.
- Schelhaas, MJ., Hengeveld, G.M., Heidema, N. *et al.* Species-specific, pan-European diameter increment models based on data of 2.3 million trees. *For. Ecosyst.* **5**, 21 (2018).
<https://doi.org/10.1186/s40663-018-0133-3>



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