# D4.4 e.s.

# Report of pilot case study 4: Change detection and mapping in forest MLs executive summary

*MAIL*: Identifying Marginal Lands in Europe and strengthening their contribution potentialities in a CO2 sequestration strategy

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[1] **R** = Report, **P** = Prototype, **D** = Demonstrator, **O** = Other

[2] **PU** = Public, **PP** = Restricted to other programme participants (including the Commission Services), **RE** = Restricted to a group specified by the consortium (including the Commission Services), **CO** = Confidential, only for members of the consortium (including the Commission Services).

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## ABBREVIATIONS

| Term | Explanation |
|------|-------------|
| AVHRR | Advanced Very High Resolution Radiometer |
| CFMASK | C Function of Mask |
| ETM+ | Enhanced Thematic Mapper |
| GEE | Google Earth Engine |
| IDL | Interactive Data Language |
| LandTrendr | Landsat-based Detection of Trends in Disturbance and Recovery |
| LT | LandTrendr |
| ML | Marginal Land |
| MODIS | Moderate-Resolution Imaging Spectrometer |
| NBR | Normalized Burn Ratio |
| NDVI | Normalized Difference Vegetation Index |
| NIR | Near-Infrared |
| OLI | Operational Land Imager |
| SWIR | Short Wavelength Infrared |
| TM | Thematic Mapper |
| UI | User Interface |
| USGS | United States Geological Survey |
| YoD | Year of Detection |

# Contents

## EXECUTIVE SUMMARY

Being able to detect changes related with the Earth's surface characteristics is a fundamental step in understanding the way the interaction between human and natural events affects the environment around us. The *MAIL* Map Portal includes a series of tools that range from ways to identify potential marginal lands, to estimating biomass volume and calculating the carbon sequestration. However, in order to be able to fully support the user who will be interested in implementing an afforestation or reforestation project, according to the definitions of *MAIL*, a tool that will support the user in the monitoring phase of the project should be included as well.

The scope of Task 4.4 is to develop a tool that will be able to aid the user in the monitoring (and not only) phase of the project, and to present a pilot case study to validate the functionality of the tool. Since the *MAIL* Map portal is developed on Google Earth Engine platform, the tool to be implemented should also be designed to work on GEE. The LandTrendr is a web application developed on GEE, designed to identify changes in a time series of satellite images and to generate trajectory-based spectral time series data with little inter-annual signal noise. LT offers a few change detection UI applications, from which the Change Mapper was utilized for this Task. The various settings of Change Mapper that can be parametrised depending on the study's scope were described on Chapter 3 **Error! Reference source not found.**.

In the pilot case study phase, three different scenarios were explored, representing three different forest succession stages-conditions. These scenarios were the Deforestation, Stable Forest, and Afforestation/Reforestation. The suggested respective settings for the fine-tuning of the tool according to the authors in order to deliver reliable results depending on the scenario to be investigated were discussed in Chapter 4 **Error! Reference source not found.**. Finally, the proposed tool was applied on some pilot areas and some exemplified outcomes were delivered in Chapter 5 **Error! Reference source not found.**.

Finally, it is concluded that the Change Mapper application of LT-GEE is a good fit for the scope of this task and it can accompany the rest of the tools on the *MAIL* Map Portal.