Monitoring Trees Outside Forests in the EU

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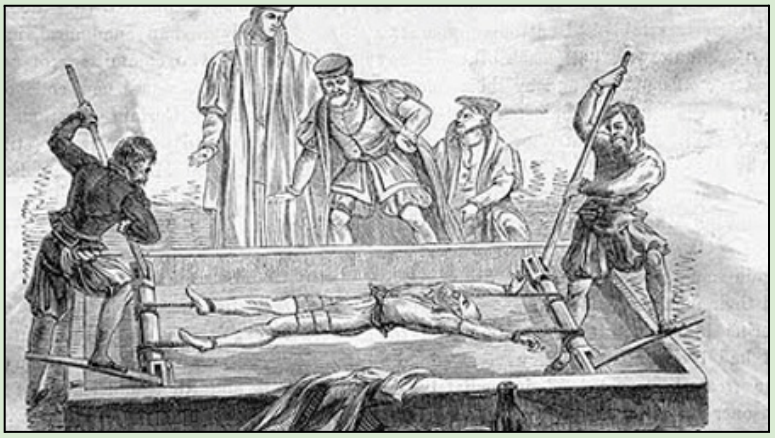
EURAF is an NGO, established in Paris on 16/11/2012, with - French Registration W343014937. and a Transparency Register ID of 913270437706-82. It aims "to promote the adoption of agroforestry practices across Europe by supporting efforts to develop awareness, education, research, policy making and investments which foster the use of trees on farms". It has a network of 31 affiliated entities in 23 countries.

Trees outside Forests (ToF) are greatly under-reported in EU and FAO statistics, and should have been included in the draft EU Forest Monitoring Regulation (FMR). ToF comprises 20-30% of tree-cover in the EU, and there is a need for consistent reporting of areas of copses, hedges, lines of trees and isolated trees in inventories of EU tree, timber and energy resources, and for integrated reporting of Greenhouse Gas emissions from the land sector as a whole (i.e. "Agriculture, Forestry and Other Land Use"). This requires clear national forest definitions and reliable rural-cadastres, to distinguish forest land from agricultural land. It does not require a unified definition of "forest" to be applied across Europe. Insistence in the draft Forest Monitoring Regulation on this single definition ignores the existing Forest Laws of most Member States, and the thresholds provided to the UNFCCC Secretariat. It also neglects the flexibility negotiated in the UNFCCC 2001 Marrakesh Accords. Forcing MS to have a single definition will hinder accurate GHG reporting by creating confusion on the boundary between forestry and agriculture. It also contradicts the existing EU *acquis* - expressed in Annex II of the LULUCF Regulation (2018/841).[1] The FMR should therefore be amended to refer to forest definition in the 2018 LULUCF Regulation.

EURAF broadly welcomes the publication of the **Forest Monitoring Regulation** (ref), although its earlier recommendation that Trees outside Forests should be included in the FMR was not acted upon. EURAF cautions against the expectation that **Land Cover** data from satellites can replace **Land Use** data from forest inventories and Cadastral Registers. Huge errors are apparent when a single criteria like crown-cover-percent is used to map "forest" area. EURAF also welcomes the ten recommendations in the review from Sten Nilsson (ref)[2]. Comments are made below on: a) lessons from the past, b) what is a "forest", c) ToF in the FAO Forest Resource Assessment, d) mapping forests in the CAP Performance Monitoring and Evaluation Framework, e) how much agroforestry is there in Europe? and f) recommendations.

1. Lessons from the past

***"One Size Fits All"**: Procrustes, in Greek legend, was a robber dwelling somewhere in Attica. His father was said to be Poseidon. Procrustes had an iron bed on which he compelled his victims to lie. If a victim was shorter than the bed, he stretched him by hammering or racking the body to fit. Alternatively, if the victim was longer than the bed, he cut off the legs to make the body fit the bed's length. **In either event the victim died.** Ultimately Procrustes was slain by his own method by the young Attic hero Theseus.*



[1] *This mistake was also made with the EU Deforestation Regulation (despite EURAF lobbying) which expects all countries in the world to use a single definition for legal purposes - despite the fact that different national definitions are embedded in REDD+ and Clean Development Regulation rules of the UNFCCC (see EURAF Policy Briefing #25).*

[2] *The monitoring system must: 1) be holistic and legally binding, 2) rely on a strong concept of sustainability, 3) be developed with a stepwise approach, 4) rely upon science-based indicators, overall objectives and legislative measures, 5) consider local conditions, 6) raise the quality of all Member States' monitoring, 7) use Earth Observations for accurate and timely monitoring, 8) produce risk assessments to help countries respond to hazards, 9) include all relevant stakeholders, 10) have a strong governance system*

2. What is a "forest".

Many studies have stressed the importance of agroforestry in future EU Carbon Farming schemes (COWI, Ecologic Institute and IEEP, 2021; European Commission, 2021). In the EU "Agroforestry" describes "land use systems where trees are grown in combination with agriculture on the same land" (Regulations 1305/2013 and 2472/2022), although each Member State now has its own detailed Definition (see EURAF Policy Briefing #22). In LULUCF terms it covers "cropland" and "grassland" containing managed trees and shrubs, and net emissions from these features should be fully recorded by Member States. Thus for GHG purposes it is important to distinguish "forest" from "agriculture", and it is obvious from Table 1 **that a single forest definition simply cannot be imposed retrospectively across Europe.**

Table 1: *- threshold values used in the definitions of "forest land" in UNFCCC reports by UU Member States (Annex 2 LULUCF Regulation 2018/841)[3]. The box shows the definition used in the quinquennial FAO-Forest Resource Assessment and proposed for all MS in the EU Forest Monitoring Regulation.*

Member State	Area (ha)	Tree crown cover (%)	Tree height (m)	Minimum width (m)
Malta	1,0	30	5	
Spain	1,0	20	3	25
Portugal	1,0	10	5	20
Hungary	0,5	30	5	10
Estonia	0,5	30	2	
Belgium	0,5	20	5	
Netherlands	0,5	20	5	30
Denmark	***0,5***	***10***	***5***	20
Finland	***0,5***	***10***	***5***	20
France	***0,5***	***10***	***5***	
Italy	***0,5***	***10***	***5***	
Luxembourg	***0,5***	***10***	***5***	
Sweden	***0,5***	***10***	***5***	10
Greece	0,3	25	2	
Slovakia	0,3	20	5	
Cyprus	0,3	10	5	
Slovenia	0,25	30	2	
Romania	0,25	10	5	20
Lithuania	0,1	30	5	10
Ireland	0,1	20	5	20
Latvia	0,1	20	5	20
United Kingdom	0,1	20	2	20
Bulgaria	0,1	10	5	
Germany	0,1	10	5	
Croatia	0,1	10	2	
Poland	0,1	10	2	10
Austria	0,05	30	2	10
Czech Republic	0,05	30	2	20

The 2018 Land Use Land Use Change and Forestry Regulation (2018/841), as amended in 2023 (2023/839), committed Member States to collectively achieve a net Greenhouse Gas (GHG) emissions target of -310Mt CO2e in 2030, and to include a roadmap to reach these agreed annual national targets by amending their National Energy and Climate Plans (NECPs), national CAP Strategic Plans and Forest Strategies. A DGCLIMA evaluation of planning by MS for these targets in their revised NECPs was published on 18.12.23, indicating:

> *The majority of the draft updated NECPs do not show sufficient ambition and action on land. Very few Member States show a concrete pathway to reach their national net removal targets, or sufficient actions to assist farmers, foresters and other stakeholders in building sustainable business models in line with these targets. The aggregation of the LULUCF projections shows that the overall net removals would still lead to a gap of around -40 to -50 Mt CO2 eq. compared to the 2030 target of -310 Mt CO2 eq. Particular concern continues to exist for Czechia, Estonia, Finland and France, where the overall declining trend of net removals until 2025 may impact the achievement of the 2030 targets, both at national and EU level. Other plans show instead the right ambition in terms of quantification of the climate mitigation impacts of various policies and measures (Lithuania), and valuable policies such as rewetting or restoration targets on peatlands (Denmark, Spain, the Netherlands and Germany).* ***Almost all Member States need to improve their monitoring, reporting and verification to ensure the robustness and policy integration enhancements of the revised legislation.*** *Finally, biodiversity, nature restoration and nature-based solutions should be better integrated in the plans, to enhance carbon sinks and resilience. The effective implementation of the EU Regulation on deforestation-free products will also contribute to counter this trend.*

-310 MtCO2e net emission is a very ambitious target and clearly cannot be delivered by forestry alone. The European Environment Agency (EEA) confirms that it is one of the 5 (from 30) Environmental Action Programme Targets for 2030 which are "very unlikely" to be achieved. EURAF noted this in its Policy Briefing #26, and showed that a combined annual planting programme of 1 million ha annually of afforestation and agroforestation would

[3] *The revised LULUCF Regulation (2023/839) introduced changes in the national definitions of "forest" in 3 countries - resulting in a recalculation of GHG emissions from land use categories in for every year back to 1990: a)* ***Spain****: minimum area remains at 1.0 ha, and tree height at 3m, but the minimum tree crown cover will decrease from 20% to 10% from 2028 onwards; b)* ***Slovenia:*** *minimum forest area will remain at 0.25ha, but tree height will increase from 2m to 5m and crown cover threshold will decrease from 30% to 10%; c)* ***Finland:*** *minimum forest area will decrease to 0.25ha, while tree crown cover will remain at 10% and tree height at 5m.*

be needed to achieve a 2040 net-zero target in the AFOLU sector, and that this is ten times greater than in current plans.

EU-DGCLIMA and the Joint Research Centre (Korosuo et al., 2021) have reviewed "Forest Reference Levels'' used in GHG Reporting from Forest Land, and Member States have compared the LULUCF metric "forest remaining forest" in annual GHG reporting consistently matches that reported from national forest inventories (European Commission, 2020). This detailed review of national forest inventory methods and results shows that **the forest definitions used in UNFCCC statistics are those which should be used to assess estimates of "deforestation", rather than the globally-averaged definition used by the FAO.** The JRC has also supported the UNFCCC Global Stocktake of nationally reported GHG emission data, with large differences becoming apparent between FAO-Forest Resource Assessment (FAO-FRA) and UNFCCC estimates of both forest areas and net-emissions (Grassi et al., 2022, 2023).

3. ToF in the FAO Forest Resource Assessment

All Member States report to the 5-yearly FAO Forest Resource Assessment (FAO, 2020). MS are broadly consistent in the way they report forest land, however they vary greatly in their use of the two FAO categories of Other Wooded Land (OWL)[4] and Other Land With Tree Cover (OLTC)[5] . Even with inconsistent data, the sum of OWL and OLTC indicates that **around 16% of EU tree cover is outside of forest land** (Table 2). Both measures only include blocks bigger than 0.5ha: inclusion of smaller areas of tree-cover **would give a much higher total estimate.**

Table 2 *- Returns by EU Member States to the FAO Forest Resource Assessment 2020, showing that* ***Trees outside Forests*** *comprise at least 16% of the tree-covered land. However this only looks at blocks bigger than 0.5 ha - the real area of ToF will be much larger*

Country	Forest Land ('000 ha)	Other Wooded Land ('000 ha)	Other Land with Tree Cover ('000ha)	%Trees outside Forest (OWL+OLTC)
2020 returns ('000 ha)				
Austria	3899.15	130.24	13.08	3.5%
Belgium	689.3	32.9	31.47	8.5%
Bulgaria	3893	24	13.2	0.9%
Croatia	1939.11	618.09	50	25.6%
Czechia	2677.09	0	200.25	7.0%
Cyprus	172.53	213.57	0	55.3%
Denmark	628.44	36.95	2.67	5.9%
Estonia	2438.4	94.44	3.6	3.9%
Finland	22409	746	9	3.3%
France	17253	843	206	5.7%
Germany	11419	0	400	3.4%
Greece	3901.8	2634.72	1000	48.2%
Hungary	2053.01	200	82.24	12.1%
Ireland	782.02	65.74	0.67	7.8%
Italy	9566.13	1865.84	2718.37	32.4%
Latvia	3410.79	107.8	182.61	7.8%
Lithuania	2201	62.1	19.5	3.6%
Luxembourg	88.7	2.7	0	3.0%
Malta	0.46	0.07	4.7	91.2%
Netherlands	369.5	0	21.55	5.5%
Poland	9483	0	0	0.0%
Portugal	3312	1543	0	31.8%
Romania	6929.05	15.57	0	0.2%
Slovakia	1925.9	20.41	0	1.0%
Slovenia	1237.83	27.42	288	20.3%
Spain	18572.17	9381.82	3902.36	41.7%
Sweden	27980	2364	0	7.8%
Total	**159231.4**	**21030.4**	**9149.3**	**15.9%**
Switzerland	1269.11	74.92	301.69	22.9%
United Kingdom	3190	20	24	1.4%

The FAO FRA-2020 data was used by Forest Europe together with Pan-European Indicators of Sustainable Management, to evaluate the financial and environmental impact of Europe's forests (2020).. However, the FAO-FRA data is voluntary and **often incomplete**. Table 3, for example, shows that data on deforestation and expansion is absent for 11 Member States. Improvement in this reporting through the FMR is welcomed.

As indicated in the draft Forest Monitoring Regulation, modern remote sensing technologies can contribute greatly to forest monitoring. Once forest areas are consistently defined, the Trees outside Forests on "grassland", "cropland", "wetland" and "settlements" can be consistently identified for GHG estimation (Brandt et al., 2020; GFOI, 2020; Malkoç et al., 2021).

[4] Land not classified as "Forest", spanning more than 0.5 hectares; with trees higher than 5 metres and a **canopy cover of 5-10 percent**, or trees able to reach these thresholds in situ; or with a combined cover of shrubs, bushes and trees above 10 percent. It does not include land that is predominantly under agricultural or urban land use.

[5] Land classified as "other land", spanning more than 0.5 hectares with a canopy cover of more than 10 percent of trees able to reach a height of 5 metres at maturity.

The overwhelming need is to ensure that the EU Forest Monitoring Regulation complies with the UNFCCC methodology used for LULUCF estimation - specifically the IPCC "2019 Refinement of the 2006 Guidelines for National GHG Inventories" (link). These documents, together with the Marrakesh Accords (link), should be referred to in the EU FMR.

4. Monitoring Forests in the CAP Performance Monitoring and Evaluation Framework (PMEF)

Several metrics relate to forestry and agroforestry in the new Performance and Monitoring Framework of the CAP (link). The most relevant of these are the following Result and Output Indicators:

- **R.17** Area supported for afforestation, agroforestry and restoration, including breakdowns
- **R.34** Share of utilised agricultural area (UAA) under supported commitments for managing landscape features, including hedgerows and trees
- **O.15** Number of hectares (forestry) covered by environmental or climate-related commitments going beyond mandatory requirements.
- **O.16** Number of hectares or number of other units (such as trees) under maintenance commitments for afforestation and agroforestry.

However, only 14 Member States have included targets for R.17 in their CAP Strategic Plans. There are 6 Member States - Ireland, Netherlands, Finland, Sweden, Luxembourg and Germany (mainly) which have removed forest related expenditure from their CAP Strategic Plans, and therefore have not given targets for any forest related indicators. These exceptions mean that forestry and agroforestry statistics will be under-reported in CAP statistics. **It is therefore important for the 6 "opt-out" countries to include R.17, R.34, O.15 and O.16 within their returns under the FMR.**

2015-20	Deforestation	Expansion	.. of which		Net Change
			Natural Exp.	Afforestation	
	000ha / yr	000ha / yr	000ha / yr	000ha / yr	000ha / yr
Austria	5.81	9.40	9.10	0.30	3.59
Belgium	1.50	1.50	1.50		
Bulgaria	0.00	12.00	11.90	0.10	12.00
Croatia	0.05	3.47	3.44	0.03	3.42
Czechia					
Denmark	0.62	1.37	0.00	1.37	0.75
Estonia	5.01	8.49	6.79	1.70	3.48
Finland					
France					
Germany	7.00	7.00	3.00	4.00	0.00
Greece					
Hungary	3.14	1.58	1.12	0.46	-1.56
Ireland	0.62	6.09	0.25	4.60	5.47
Italy					
Latvia	0.36	4.23	2.28	1.95	3.87
Lithuania	0.14	2.94	0.87	2.07	2.80
Luxembourg			0.00		
Malta					
Netherlands	2.19	3.12	0.00	3.12	0.93
Poland	0.77	13.37			12.60
Portugal					
Romania	0.02	13.63		0.48	13.61
Slovakia				0.12	
Slovenia	2.03	0.00	0.00	0.00	-2.03
Spain	3.74	7.94	3.28	4.66	4.20
Sweden	13.05	13.05	0.00	13.05	0.00
Average	**2.71**	**6.42**	**2.72**	**2.38**	**3.95**

Table 3: *Forest expansion and deforestation rates for 2015-20 from the FAO-FRA 2020 (http: fra-data.fao.org/), showing missing data for 11 MS*

5. How much Agroforestry is there in Europe?

"Trees outside Forests" encompass not only trees in agroforestry systems, but also urban trees. In aggregate, across Europe, we are talking about billions of extra trees. The EU Biodiversity Strategy made a promise to 3 billion "extra" trees across Europe, and these are being recorded in the "Map my Tree" database. This DG ENV database collects data from planting organisations on whether being planted in forest land (reforestation), agricultural land (agroforestry) or in settlements (urban forestry), but no reporting option for ToF is available on the viewer.

The EU definition of agroforestry is "*a land use system in which trees are grown in combination with agriculture on the same land*" (Reg 1305/2013), and the the European Agroforestry Federation clarifies that: "*Agroforestry practices include all forms of association of trees and crops (silvoarable systems) and/or animals (silvopastoral systems), on a parcel of agricultural land, whether in the interior of the parcel or on its edges (hedges)*". All EU Member States have now provided their own definitions of agroforestry for use in arable, permanent-grassland and permanent-crop areas (see EURAF Policy Briefing #22). Landscape Features, as defined in GAEC-8 of the Strategic Plan Regulation include "groups of trees, lines of trees, hedges and individual trees), mapping and reporting of these is to be carried out

by Member States as described in Indicator Fiche I.21 (ref) of the CAP Performance Monitoring and Evaluation Framework (see EURAF Policy Briefing #21)

According to the estimates of den Herder et al. (2017), using the LUCAS database, the total area under agroforestry in the EU 27 is about **15.4 million ha**, which is equivalent to about 3.6% of the EU territorial area and 8.8% of the utilised agricultural area. There is evidence that the intensity of grazing in silvopastoral areas in the EU has become **less intense** over the past 20 years (Rubio Delgado et al., 2023), but there is no apparent decrease in the area of permanent pasture (see EURAF Policy Briefing #29).

Several studies have quantified the extent of agroforestry:

- **Reisner et al** (2007) focused on silvoarable agroforestry, taking data on soil, climate, topography, and land cover to identify target regions where: (i) productive growth of trees (*Juglans spp, Prunus avium, Populus spp, Pinus pinea,* and *Quercus ilex*) could be expected and where (ii) silvoarable systems could potentially reduce the risk of soil erosion, nitrate leaching and increase landscape diversity.[6] They showed that silvoarable systems could grow productively on 56% of arable land in Europe (i.e 90.79 Mha),[7] with a bigger figure if more tree species are included.
- **Aertsens et al.** (2013) assumed that agroforestry was possible on half of EU arable land (90 Mha) and permanent pastures (50 Mha), and recommended including an additional 17.8 M kilometres of hedges into the EU.
- **Kay et al** (2019) estimated priority areas for agroforestry, classified by biogeographical regions, and calculated detailed environmental pressures on 100 x 100m pixels across Europe. Areas with more than 4 (pastures) or 5 (arable areas) environmental pressures were selected as "priority areas". So these are the areas in Europe with the worst environmental problems. They estimated that priority target area for new and regenerated agroforestry by 2030 would occupy 12.8 Mha[8]. The same dataset, which excludes protected areas (Natura 2000, Ramsar) and areas with existing agroforestry, has been analysed to identify areas (pixels) with only ONE environmental pressure. This produced an area of 119,890 million ha (arable 95.89 Mha, permanent grassland 24.00 Mha).
- **Den Herder et al** (2020), as a contribution to the EU Forest Strategy Impact Assessment, produced detailed tree cover density maps for agricultural land in the EU. They used the Copernicus Tree Cover Density (2015) system[9], the Corine Land Cover database (2018), and Natura 2000 databases to map areas of low-tree-cover on agricultural land across Europe and showed that 169 million ha[2] of European agricultural land[10] had 0% tree cover in 2015. An area of 171 million ha of agricultural land had less than 1% tree cover, and 190 million ha had less than 10% tree cover. They emphasised the need to focus the planting of Europe's three billion additional trees on these areas of ultra low tree crown cover.[11] These estimates have been updated using Copernicus 2018 data (EURAF Policy Briefing #26)

6. Conclusions

1. Trees outside Forests (ToF) are greatly under-reported and should have been included in the "Forest Monitoring Regulation", with recommendations based on modern methodologies using Copernicus, LUCAS, LPIS and cadastral datasets.
2. Greenhouse gas emissions reporting by Member States should estimate of the impact of trees in cropland, grassland and settlements in additional to forests - the revised LULUCF Regulation expects MS to use the best available spatially explicit reporting methods, and these best provided by Forest Inventory and agricultural Land Parcel Identification.
3. Six EU Member States (IE,NL,FI,SE,LU, DE (most Lander) fund forestry from their 'own resources', and do not provide forestry related indicators and targets in the CAP Performance, Monitoring and Evaluation Framework (PMEF). These indicators (R.17, R.34, O.15 and O.16) should nevertheless be used by these countries in the new Forest Monitoring Regulation.
4. The Forest Monitoring Regulation should refer to definitions of "forest" supplied by Member States to the UNFCCC, and the LULUCF Regulation, rather than the more rigid and less realistic global definition used by the FAO in its Forest Resource Assessment.

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[6] ***Environmental risks*** *were present on about 40% of the European arable land*

[7] ***Arable land*** *- covers 61.2% of EU27 utilised agricultural area (161.787 Mha), permanent grass 30.1% (50.137 Mha), permanent crops 7.5% (12.120 Mha)*

[8] ***The UK and Croatia*** *are excluded -. Judging from neighbouring countries, an additional Priority area of 0.1 MHa could be added for Croatia.*

[9] **Tree Cover Density** data is provided by CORINE in a range from 0-100% for the 2012 and 2015 reference years. The data is available as raster data in European projection (EPSG: 3035) with 20 and 100m resolution. For our assessment we used the data with 100m resolution as we were interested in large areas with little or no tree cover. For our assessment we first constructed a map showing tree cover density in "agricultural areas". We then examined different thresholds for "no or very low tree cover" (0%, <1%, <2%, < 5%, <10%).

[10] *EEA-39 - Including EFTA members and EU Candidate States (inc. Turkey). This map will be replaced with EU-27*

[11] See updates using Copernicus crown-cover-density data from 2018 in EURAF Policy Briefing #26)

5. The MapMyTree database, established to monitor the three billion "additional" trees established under the initiative announced in the EU Biodiversity Strategy and the Forest Strategy, should clearly differentiate trees established on forest, agricultural or settlement land.

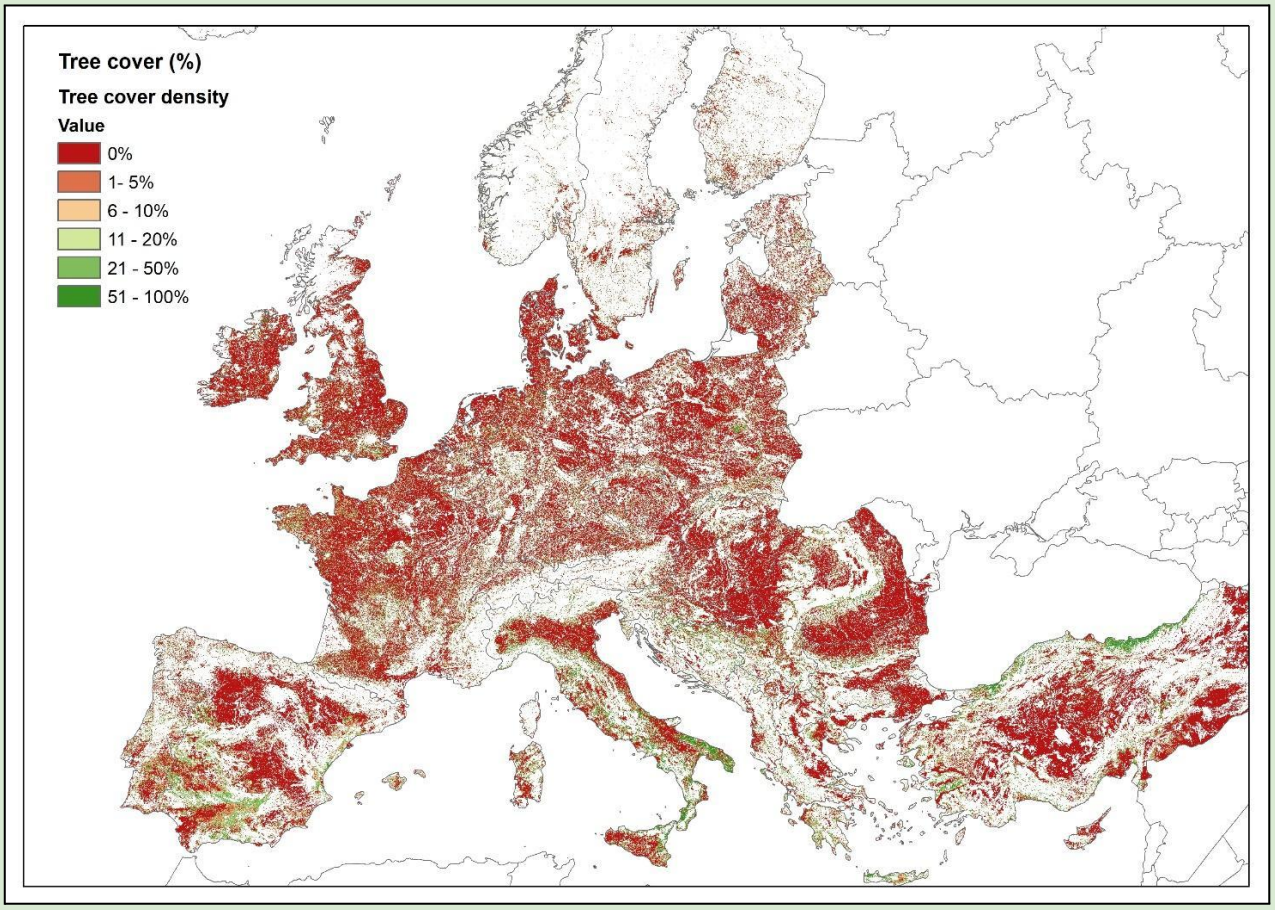

***Figure 1**. **Priority tree-planting areas:** COPERNICUS tree cover density distributions (2015) superimposed on agricultural land from CORINE (2015) showing the the **zero-tree-index** - i.e. areas where new planting should be focused - and where it will produce greatest environmental and soil-carbon benefit (den Herder et al., 2020).*

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