

EO 4 Ecosystem Accounting 2022

INCA TOOL: EO DATA GAPS CHALLENGES FOR FUTURE ECOSYSTEM ACCOUNTS - CASE STUDY ON SOIL RETENTION

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30/11/2022



INCA TOOL: SOIL RETENTION

INCA

Edit metadata Run Continue existing run

Working directory D:\workspace_plugin

Study Scope

Year 2012

Data areas

NUTS-2021 regions NUTS-0

Custom shape

Reporting areas

NUTS-2021 regions NUTS-2

Custom shape

Selected regions BE10, BE21, BE22, BE23, BE24, BE25, BE31, BE32, BE33, BE34, BE35

Deflator table D:\workspace\deflator_table.csv

Land cover map e:\LandCover_Corine_INCA-AOI\CLC2000ACC_V2018_20_INCA_100m_EPSG3035.tif

Ecosystem translation INCA default mapping for CORINE data

Where all **outputs** will be stored

1

Reporting year

2

Area covered by input data

3

Reporting area

4

Fixed inputs for ES

5

6 ES selection
7 Folder for **outputs of current model run**

8 **Biophysical inputs (RUSLE)**

9 **Monetary valuation inputs**

Inputs adjust according to the ES selected

Ecosystem Service Sol Retention

Run name sol_retention_beta3

Biophysical

C-Factor ace\sol_retention\input_model\annual_c_factor\cfactor2000_INCA.tif

K-Factor _model\ESDAC_RUSLE_data\K_new_filed_INCA_100m_EPSG3035.tif

LS-Factor SDAC_RUSLE_data\EU_LS_Mosaic_100m_INCA_100m_EPSG3035.tif

P-Factor :SDAC_RUSLE_data\EU_PFactor_V2_filed_INCA_100m_EPSG3035.tif

R-Factor nput_model\ESDAC_RUSLE_data\Rf_gp1_INCA_100m_EPSG3035.tif

Average soil formation factor 1,40

Monetary

Topsoil N content enton\input_model\LUCAS_nutrient_content\N_INCA_100m_EPSG3035.tif

N content scaling 1000,00

Topsoil P content enton\input_model\LUCAS_nutrient_content\P_INCA_100m_EPSG3035.tif

P content scaling 1000000,00

Retention rate _model\retention_rate\retention_rate_AOI-EU28-2016_100m_EPSG3035.tif

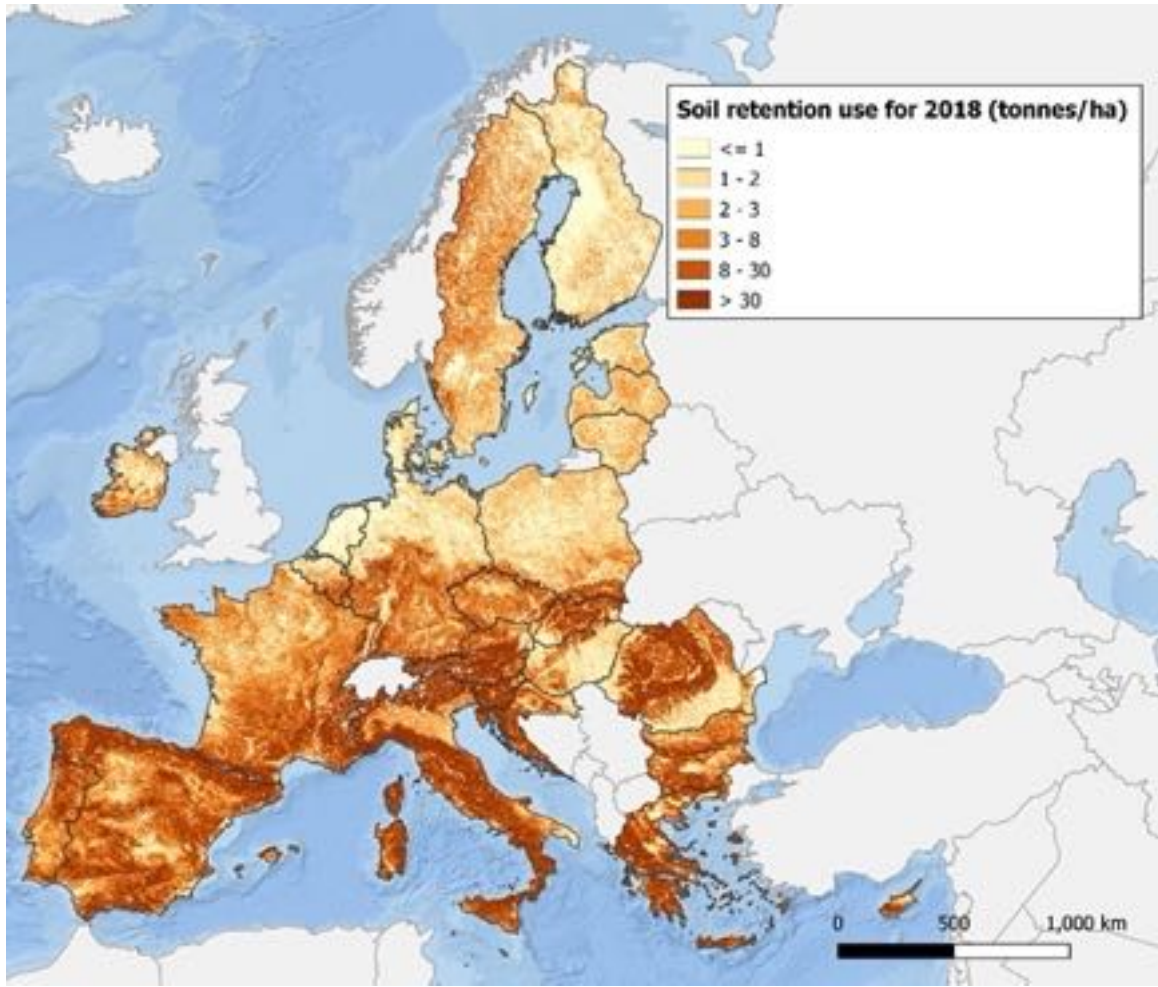
Average nutrient prices ut_model\Look_up_Tables\annual_average_nutrient_prices_20211019.csv

bulk soil price enton\input_model\Look_up_Tables\annual_bulksoil_prices_20211015.csv

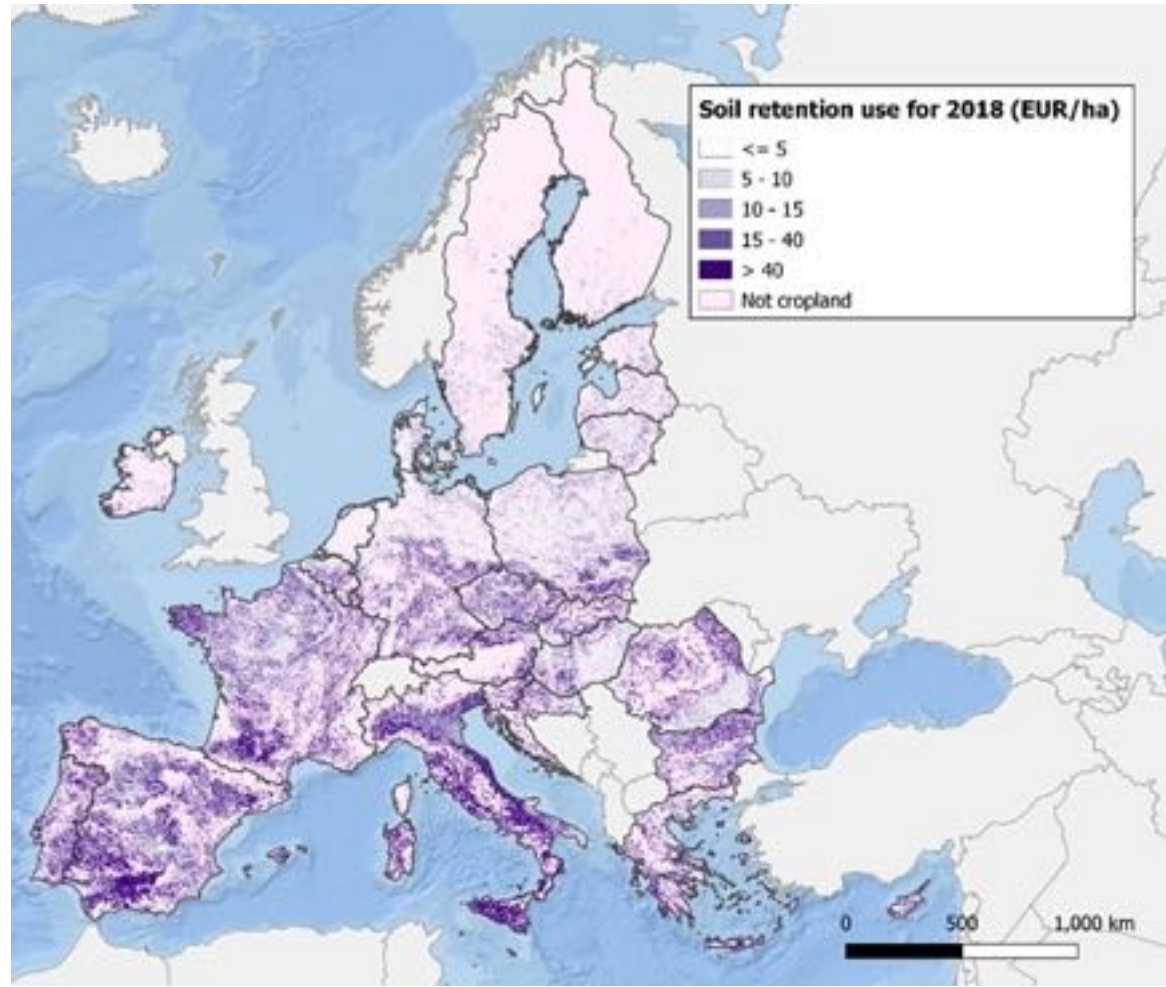
OUTPUT MAPS FROM INCA TOOL FOR SOIL RETENTION



Use in biophysical terms



Use in monetary terms



SUPPLY AND USE TABLE FOR SOIL RETENTION FOR 2018 (BIOPHYSICAL TERMS)

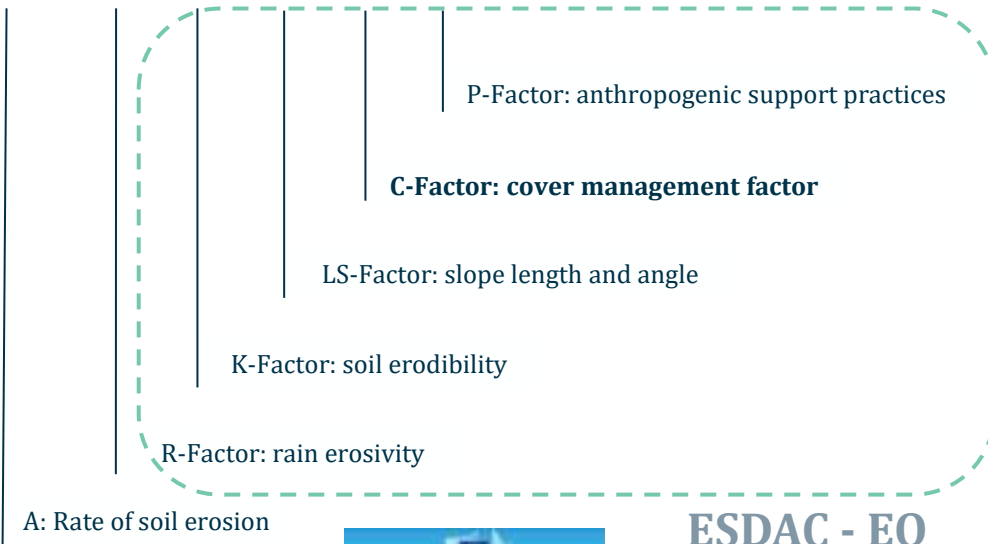
	SUPPLY 2018											Total				
	Economic Unit						Type of ecosystem unit									
	Primary sector		Secondary Sector	Tertiary sector	Households	Global Society	Urban	Cropland	Grassland	Woodland and forest	Heathland and shrub		Sparsely vegetated land	Wetlands	Rivers and lakes	Coastal / intertidal
	Agriculture	Forestry														
soil retention																
<i>1000 metric tonnes year 2018</i>																
AT	59	24,567	151,224	421,934	33,939	22,162									653,885	
BE	35	6,135	2,759	12,073	76	-									21,080	
BG	38	39,437	17,618	166,707	1,555	842									226,198	
CY	3	3,778	489	12,039	4,426	132									20,868	
CZ	69	22,945	9,597	61,654	72	9									94,346	
DE	189	52,048	61,132	228,480	2,656	351									344,857	
DK	23	3,519	105	1,364	42	0									5,053	
EE	7	1,777	456	5,408	7	0									7,655	
EL	32	76,885	58,604	273,746	143,865	8,691									561,823	
ES	295	253,485	171,261	878,506	367,371	16,879									1,687,797	
FI	18	2,694	97	43,305	2,340	65									48,519	
FR	304	162,799	228,743	701,118	73,146	31,294									1,197,404	
HR	54	23,996	22,594	179,619	8,712	2,111									237,086	
HU	35	14,166	4,262	38,696	-	2									57,162	
IE	8	4,413	21,807	11,068	6,475	2,182									45,952	
IT	366	423,922	117,678	1,433,935	122,597	67,948									2,166,446	
LT	45	5,112	1,010	7,795	4	1									13,968	
LU	8	1,167	494	3,294	-	-									4,963	
LV	16	3,386	1,472	10,896	-	1									15,771	
MT	4	223	-	3	87	2									319	
NL	27	1,148	786	656	50	-									2,666	
PL	85	39,492	7,821	74,667	323	33									122,421	
PT	60	41,548	2,476	107,043	26,021	2,245									179,393	
RO	42	74,933	86,824	434,439	7,141	300									603,680	
SE	109	7,547	7,622	185,066	44,047	5,058									249,449	
SI	23	30,311	13,045	234,019	9,950	850									288,197	
SK	12	15,542	7,843	97,875	1,480	271									123,024	
EU	1,968	1,336,974	997,819	5,625,405	856,382	161,429	-	-	-						8,979,978	

	USE 2018											Total				
	Economic Unit						Type of ecosystem unit									
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SE	7,547					109		7,622	185,066	44,047	5,058				249,449	
SI	30,311					23		13,045	234,019	9,950	850				288,197	
SK	15,542					12		7,843	97,875	1,480	271				123,024	
EU	1,336,974					1,968	-	997,819	5,625,405	856,382	161,429	-	-	-	8,979,978	

EO INPUTS FOR SOIL RETENTION & MAIN DATA GAPS CHALLENGES

RUSLE

$$A = R \cdot K \cdot LS \cdot C \cdot P$$



ESDAC - EO

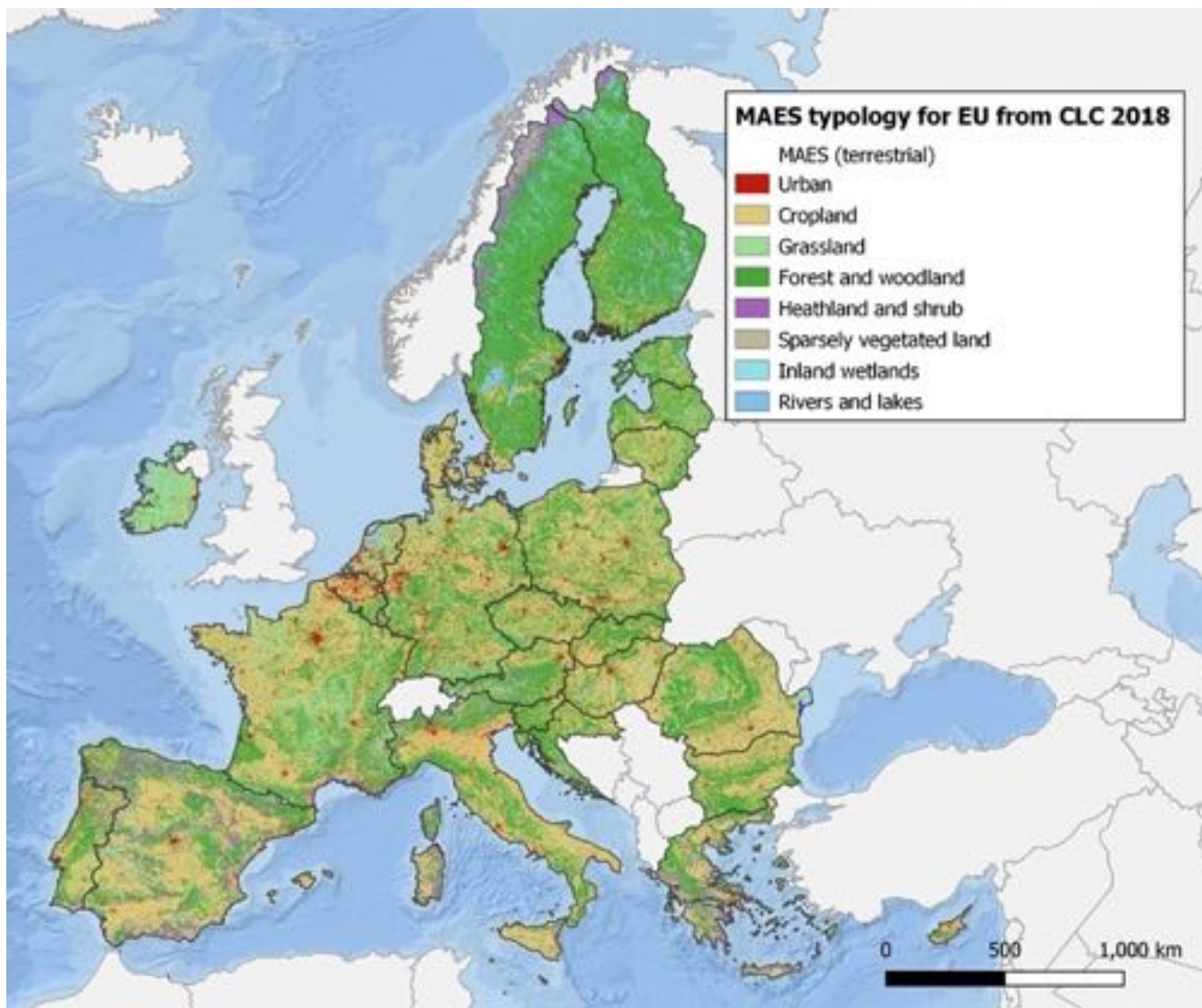
Ecosystem service: Soil Retention (on-site)

Climatic characteristics, soil characteristics and terrain (slope) characteristics are the main drivers of soil erosion, whereas higher vegetation cover and sustainable land management practices limit soil loss due to erosion *

* La Notte, A., Vallecillo Rodriguez, S., Garcia Bendito, E., Grammatikopoulou, I., Czucz, B., Ferrini, S., Grizzetti, B., Rega, C., Herrando, S., Villero, D., Zurbaran Nucci, M. and Maes, J., Ecosystem Services Accounting – Part III - Pilot accounts for habitat and species maintenance, on-site soil retention and water purification, EUR 30856 EN, Publications Office of the European Union, Luxembourg, 2021, ISBN 978-92-76-42051-4, doi:10.2760/636621, JRC126566

<https://publications.jrc.ec.europa.eu/repository/handle/JRC126566>

Land cover	
Use of data	Identification of ecosystems (extent) and parameters assignment
Component	Demand, unmet demand, potential, use (biophysical), use (monetary)
Original input	Corine Land Cover Accounting Layers
Link	https://www.eea.europa.eu/data-and-maps/data/corine-land-cover-accounting-layers
Derivation	Source Coordinate Reference Spatial resolution Temporal coverage Spatial coverage Format
Derived	EEA - Copernicus EPSG:3035 100m 2000-2018 Europe GEOTIF
Alternative EO	ESA Worldcover
Link	https://esa-worldcover.org/en
Derivation	Source Coordinate Reference Spatial resolution Temporal coverage Spatial coverage Format
Derived from Sentinel 1 & 2	ESA EPSG:4326 10m 2020-2021 Global WMS service
Notes/Methodology	Used to determine the extent of the ecosystems
Crop type	
Use of data	Input for C-Factor (dynamic over time)
Component	Demand, unmet demand, potential, use (biophysical)
Original input	[apro_cpsh1], Farm structure survey data
Link	#N/A
Derivation	Source Coordinate Reference Spatial resolution Temporal coverage Spatial coverage Format
Derived	#N/A EUROSTAT #N/A #N/A #N/A #N/A Tabular
Alternative EO	EUCROPMAP
Link	https://data.jrc.ec.europa.eu/dataset/15f86c84-eae1-4723-8e00-c1b35c8f56b9
Derivation	Source Coordinate Reference Spatial resolution Temporal coverage Spatial coverage Format
Derived from LUCAS and Sentinel-1	JRC EPSG:3035 10m 2018 European Union GEOTIF
Alternative EO	High-Resolution Layer (HRL) Vegetated Land Cover Characteristics (VLCC)
Link	https://remotesensing.vito.be/clms-consortium-starts-hr-layer-vegetated-land-cover-characteristics-project
Derivation	Source Coordinate Reference Spatial resolution Temporal coverage Spatial coverage Format
Derived from Sentinel 1 & 2	Copernicus (VITO) TBD 10m 2017-2021 (2022 & 2023 planned) European Union TBD
Notes/Methodology	The proposed alternative provide spatially explicit data on crop types that can serve for the purpose of the calculation of the C-Factor instead of tabular data



- INCA uses the **MAES** typology for ecosystems;
- **CORINE Land Cover Accounting Layers** are the main input, then a crosswalk is done between classes;
- Currently, CLC is released every 6 years while **accounting periods are more subjective and foreseen to be more frequent**;
- **Using the latest available CLC Accounting Layer is the best option to ensure consistency across the time series, that goes back to 2000**;
- For the next accounting period (2021), there is no release of a new CLC Accounting layer, making 2018 release the most viable choice;
- Transitioning to **another land cover map** would imply **loss of consistency in the time series**;
- **Recent land cover maps** have higher resolution but **lack land use information and backwards consistent time-series**.

Current status

- **Models** have already **been developed for ES at EU level;**
- **Most of them rely heavily on Earth Observation data;**
- Efforts to operationalize and streamline have been made, through the **development of a QGIS plugin (INCA Tool);**
- **Data remains the main bottleneck** for ensuring the calculation of future EA:
 - **Continuity is not always guaranteed;**
 - **Spatial and/or temporal coverage** is not sufficient;
 - **Resolution** poses limitations for some ES – too coarse;
 - **EO products release does not always align with accounting periods.**

On-going efforts

- In-depth analysis of EO inputs for EA is undergoing;
- **Compilation of a database with required inputs for ES is being developed** to highlight existing gaps that must be addressed to ensure future EA and the adoption of the INCA Tool.

Produced by

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INCA Platform:

<https://ecosystem-accounts.jrc.ec.europa.eu/>

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Thank you, questions?