EU-wide datasets & information systems for ecosystem accounting

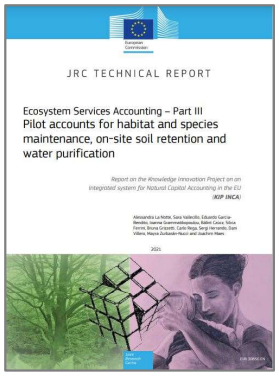
Bruno Smets

Contributions by Marcel Buchhorn, Thomas Danckaert, Maarten Van Loo, Wim Peelaerts, Steven Broekx

MAIA Final Project Conference, Brussels

Support mainstream of NCA in Europe

European Commission | eurostat



KIP-INCA PILOT

EU REGULATION

See presentation E. Petri

European Commission | JOINT RESEARCH CENTRE

Support in INCA Phase-3

vito + Ecounting IDEEA Group eftec

1. EU methodological **Guidelines**
2. INCA Account **Tool**
3. **Validation** Methods
4. Demo **policy use**

- Unified & Harmonized
- Service accounts
- Multi-user types
- Feedback loop
- National & EU
- Open source

EU or National data-sets

eea/ OpenDataPortal

Copernicus Europe's eyes on Earth

EUROPEAN STATISTICAL SYSTEM

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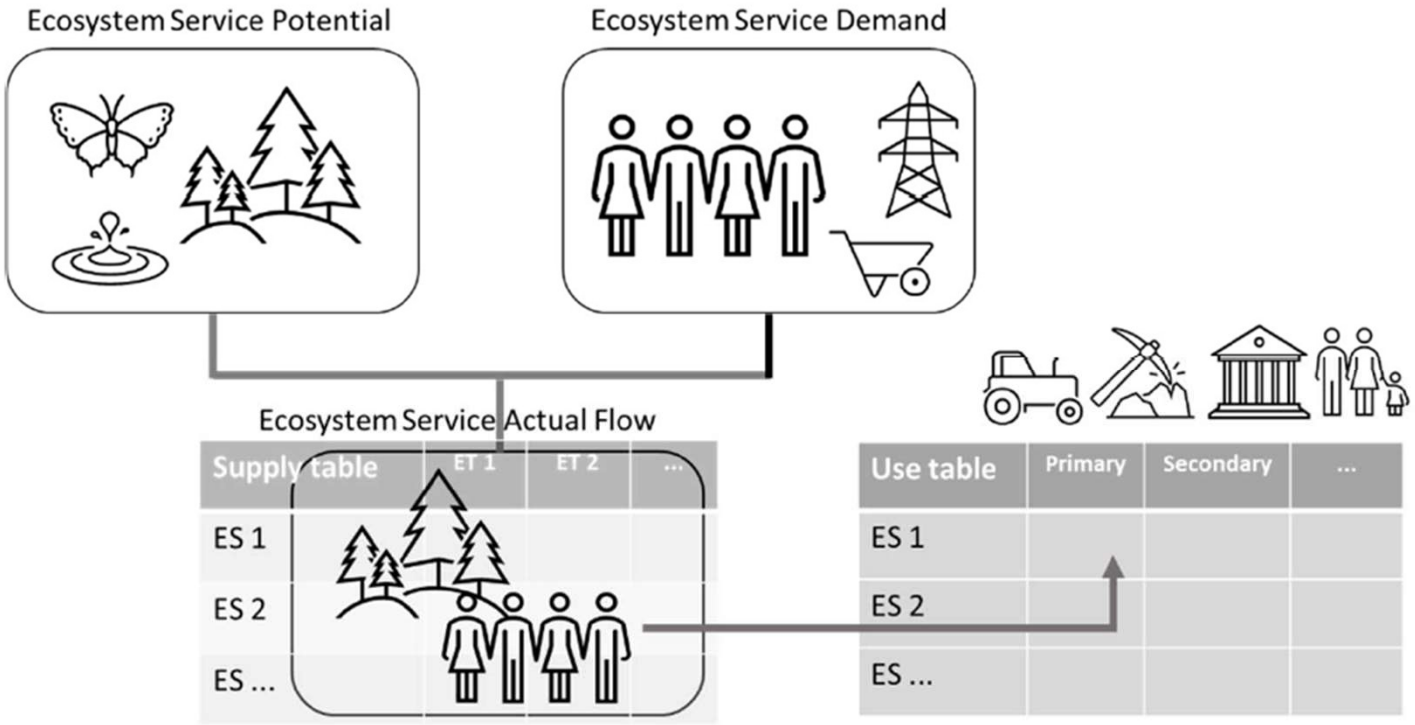
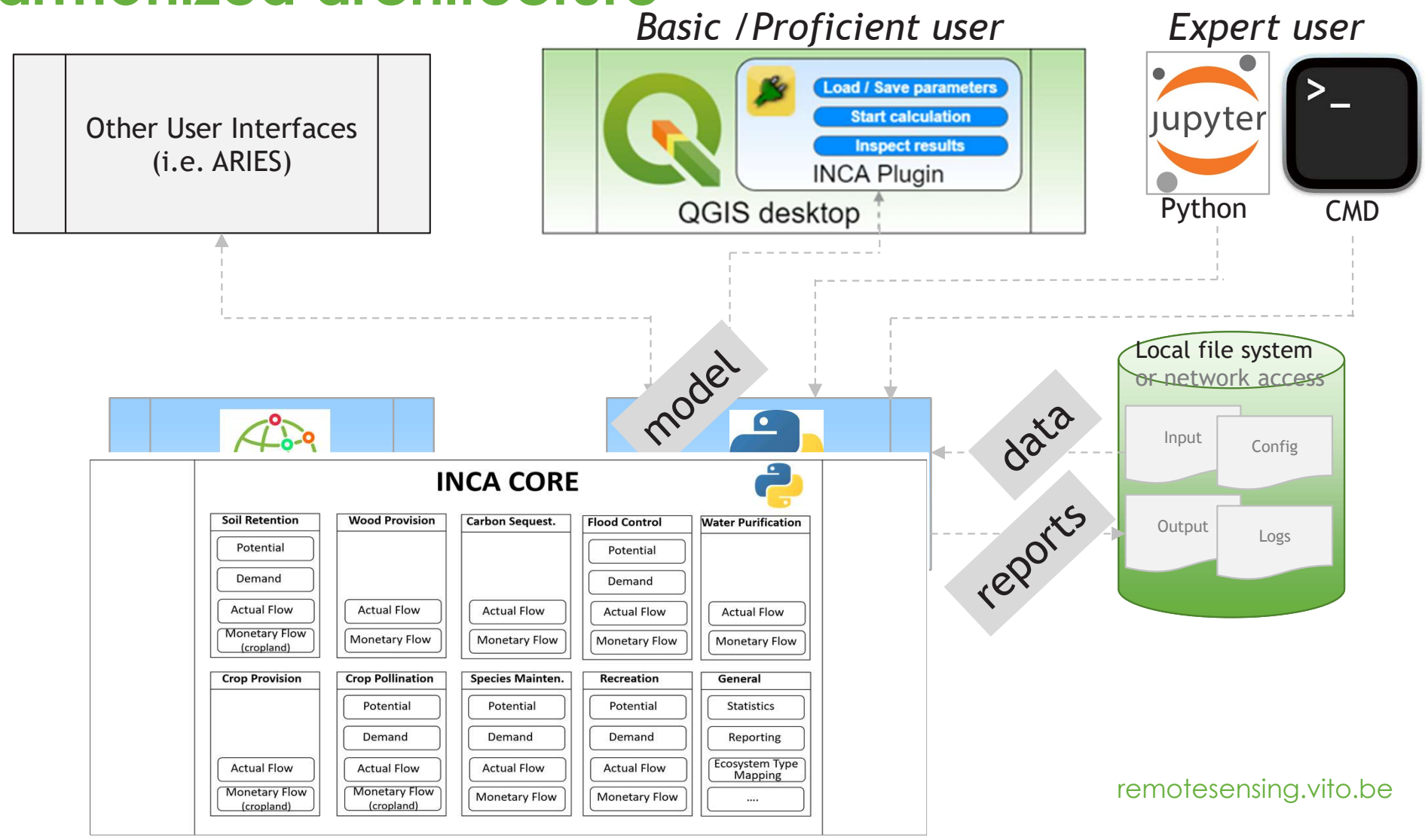
Conceptual model of the INCA tool



La Notte A., et.al 2021, Ecosystem Service Accounting - Part III - Pilot Accounts

Harmonized architecture



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Models & reports : from pilot to fair

European Commission
JOINT RESEARCH CENTRE

Findability

- DOI for algorithm model
- Rich Metadata annotation (production date, units, used inputs, etc.)

Accessibility

- Free and open source published under EUPL (early 2023)
- Installation, user and developer manuals
- Basic to proficient to expert users
- Able to run on a normal PC to upscaled on high-end machines (cloud, multi-core)

Interoperability

- Compliant to SEEA EA & EU guidelines
- Common API (INCA architecture)
- Harmonized reporting across EU (cog, csv, xlsx templates)
- Tested on Linux and Windows

Reusability

- Modular standard design, easy to add new services
- Modular design, enables integration in different platforms

Data input

- **Linkage table** (#121 rows)
  - Temporal resolution
  - INCA Component
- **Complex pre-processing**
  - Mix tabular, raster, vector
  - AOI & Spatial resolution
  - Projection
- **Configurable for MS**
  - DataArea vs. ReportingArea
  - Default EU vs. Specific MS

ECOSYSTEM SERVICE	INPUT DATA – LONG NAME	NPUT DATA – SHORT NAME	INPUT YEAR	OUTPUT COMPONENT	OUTPUT YEAR
crop pollination	Unit values at basic prices (aact_uv01)	basic_prices	2017,2018,2019	monetary evealuation	2018
crop pollination	CAPRI crop pollination dependent crops (demand) & total	CAPRI demand	2004	demand	2000
crop pollination	CAPRI crop pollination dependent crops (demand) & total	CAPRI demand	2008	demand	2006, 2012, 2018
crop pollination	CAPRI crop specific total production	CAPRI production	2004	use	2000
crop pollination	CAPRI crop specific total production	CAPRI production	2008	use	2006, 2012, 2018
crop pollination	deflator table	deflator_table	static	monetary evaluation	2000, 2006, 2012, 2018
species maintenance	habitats maes	habitats_maes.csv	static	Article 17 spatial data	2000, 2006, 2012, 2018
species maintenance	Habitats_regions_MS_2nd_assessment	Habitats_regions_MS_2nd_assessment_rav.csv	static	Article 17 spatial data	2000, 2006, 2012, 2018
species maintenance	Structure and function assessment (Article 17 spatial data)	art17_habitat_uniq_disslv.shp	static	Article 17 spatial data	2000, 2006, 2012, 2018
species maintenance	Accounting CORINE Land-cover v20	CLC2000ACC_V<YEAR>_20.tif	2000, 2006, 2012, 2020	Potential, extent fractions	2000, 2006, 2012, 2018
species maintenance	10 by 10 km grid for europe	Grid_10km.shp	static		2000, 2006, 2012, 2018
species maintenance	Hign Nature Values map in europe	HNVaoc_v20b_BaseLayer_<YEAR>.tif	2000, 2006, 2012,2018	Potential	2000, 2006, 2012, 2018
species maintenance	Mineral nitrogen in soil map europe	NMINSL_<YEAR>_10km_lookup.tif	2000, 2006, 2012,2018	Potential	2000, 2006, 2012, 2018
species maintenance	Imperviousness map europe	IMD_<YEAR>_100m_eu_03035_d03_full.tif	2000, 2006, 2012,2018	Potential	2000, 2006, 2012, 2018
species maintenance	Hotspot map	Allsp_hotspot.tif	2000, 2006, 2012,2018	Potential	2000, 2006, 2012, 2018
species maintenance	JRC species valuation data	Calculating the totals 2012.xlsx	2000, 2006, 2012,2018	potential, demand, mismatch,	2000, 2006, 2012, 2018
Recreation	Global Human Settlement Layer	GHSL	2000, 2015	demand	2000, 2006, 2012, 2018
Recreation	Eurostat population	[illegible]	2000, 2012	demand	2000, 2006, 2012, 2018
Recreation	Nature based recreation supply - euro per capita	Use tables	2000, 2012	Use	2000, 2006, 2012, 2018
Recreation	Nature based recreation use - euro per capita	Supply tables	2000, 2012	Use	2000, 2006, 2012, 2018
Recreation	Nature based recreation supply - million euro	Use tables	2000, 2012	Use	2000, 2006, 2012, 2018
Recreation	Nature based recreation use - million euro	Supply tables	2000, 2012	Use	2000, 2006, 2012, 2018
Recreation	Nature based recreation supply - visits	Use tables	2000, 2012	Use	2000, 2006, 2012, 2018
Recreation	Nature based recreation use - visits	Supply tables	2000, 2012	Use	2000, 2006, 2012, 2018
Recreation	Nature based recreation demand	Demand tables	2000, 2012	Demand	2000, 2006, 2012, 2018
Recreation	Nature based recreation unmet demand	Mismatch tables	2000, 2012	Mismatch	2000, 2006, 2012, 2018
Recreation	Nature based recreation potential	Potential tables	2000, 2012	Potential	2000, 2006, 2012, 2018
Crop Provision	CAPRI crop yield raster	Proxy	static	Use	2000, 2006, 2012, 2018
Crop Provision	Crop production in EU standard humidity [apro_cpsh1]	production	11, 2012, 2013, 2017, 2018	Use	2000, 2006, 2012, 2018
Crop Provision	Unit values at basic prices (aact_uv01]	basic_prices	1997–2017	Use	2000, 2006, 2012, 2018
Crop Provision	deflator table	deflator_table	2000, 2006, 2012, 2018	Use	2000, 2006, 2012, 2018
Crop Provision	Ecosystem contribution factor table	ecocon	static	Use	2000, 2006, 2012, 2018
Crop Provision	NUTS classification (Nomenclature of territorial units for statistics	NUTS	2021	Use	2000, 2006, 2012, 2018
Timber Provision	NUTS classification (Nomenclature of territorial units for statistics	NUTS	2021	Use	2000, 2006, 2012, 2018
Timber Provision	deflator table	deflator_table	2000, 2006, 2012, 2018	Use	2000, 2006, 2012, 2018
Timber Provision	Net annual increment of forest available for wood supply	NAI_FAWS	2000–2019	Use	2000, 2006, 2012, 2018
Timber Provision	Roundwood, fuelwood and other basic products [for_basic]	for_basic	2000–2019	Use	2000, 2006, 2012, 2018
Timber Provision	Supply and use of products within forestry [for_sup_cp]	for_sup_cp	2000–2019	Use	2000, 2006, 2012, 2018
Timber Provision	Natura 2000 areas	n2k	2000, 2006, 2012, 2018	Use	2000, 2006, 2012, 2018
Timber Provision	Dry matter production v2.0.1	DMP	2000, 2006, 2012, 2018	Use	2000, 2006, 2012, 2018
Timber Provision	Accounting CORINE Land-cover v20	CLC	2000, 2006, 2012, 2018	Use	2000, 2006, 2012, 2018
Timber Provision	Copernicus DEM	DEM	static	Use	2000, 2006, 2012, 2018
Flood Control	Copernicus DEM	DEM	static	Potential, Supply, Use	2000, 2006, 2012, 2018
Flood Control	Accounting CORINE Land-cover v20	CLC	2000, 2006, 2012, 2018	Potential, Demand,Use, Value	2000, 2006, 2012, 2018
Flood Control	Hydrological soil properties (reclassified in 4 categories)	hydro_soil	static	Potential	2000, 2006, 2012, 2018
Flood Control	Imperviousness map europe	IMD	2006	Potential	2000, 2006
			2012		2012
			2018		2018
Flood Control	OpenStreetmap main and secondary roads	osm_roads	static	Potential, Demand, Use, Value	2000, 2006, 2012, 2018
Flood Control	Riparian zones	riparian_zones	static	Potential	2000, 2006, 2012, 2018
Flood Control	Global Human Settlement Layer	ghs_pop	2000	Population use/demand/mismatch	2000, 2006
			2015		2012, 2018

AccoRD Hub

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Example tourism recreation @ DE

INCA

Edit metadata | Run | Continue existing run

Working directory: C:\Data\INCA\BETA2

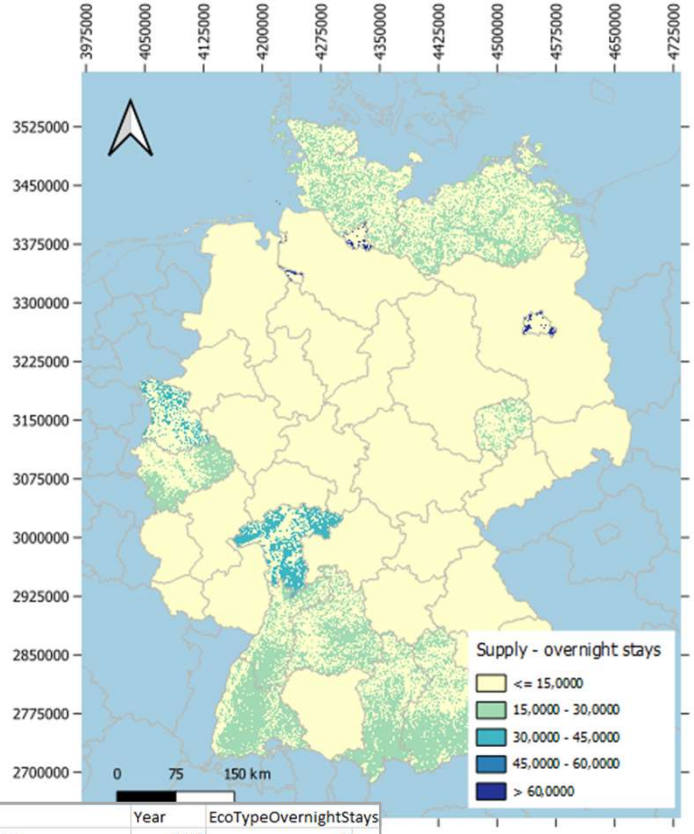
Study Scope

Year	2018
Region shapes	*2021 EU members [NUTS 2021 level 0]*
Selected regions	DE
Land cover map	INCA-AOI_100m\LandCover_Corine_INCA-AOI\CLC2018ACC_V2018_20_INCA_100m_EPSG3035.tif
Land classification	*INCA default mapping for CORINE data*

Ecosystem Service: Recreation

Run name	recreation_default2_DE
NUTS-2 regions	CA\input_model_recreation\input_model\NUTS_RG_01M_2016_3035_LEVL_2.shp
Overnight stays	C:\Data\INCA\input_model_recreation\input_model\overnight_stays_2018.csv
Eco contribution per type of Area	CA\input_model_recreation\input_model\default2\typeAreaContributionTable.csv
Eco contribution per Area	CA\input_model_recreation\input_model\default2\dataAreaContributionTable.csv
Ecosystem type weights	*INCA default ecosystem weights*
Accessibility map	ata\INCA\input_model_recreation\input_model\default2\ros_jrc_reclass_2018.tif
Accessibility weights	*Use map values as weights.*
Facilities map	ata\INCA\input_model_recreation\input_model\default2\ros_jrc_reclass_2018.tif
Facility weights	*Use map values as weights.*
Landscape attractiveness map	ata\INCA\input_model_recreation\input_model\default2\ros_jrc_reclass_2018.tif
Landscape attractiveness weights	*Use map values as weights.*

Map



Supply

	ReportAreaCode	EcosystemType	Year	EcoTypeOvernightStays
0	DE	Settlements and other artificial areas	2018	0
1	DE	Cropland	2018	0
2	DE	Grassland (pastures, semi-natural and natural grassl	2018	96845358
3	DE	Forest and woodland	2018	144820176
4	DE	Heathland and shrub	2018	1049226
5	DE	Sparsely vegetated ecosystems	2018	296595
6	DE	Inland wetlands	2018	1862373
7	DE	Rivers and canals	2018	2289975
8	DE	Lakes and reservoirs	2018	6496776
9	DE	Marine inlets and transitional waters	2018	0
10	DE	Coastal beaches, dunes and wetlands	2018	495749
11	DE	Marine ecosystems (offshore coastal shelf and oper	2018	0

Use

	ReportAre	UseSector	Year	EcoOvernightStays
0	DE	Exports	2018	51874981
1	DE	Household final consu	2018	202281245

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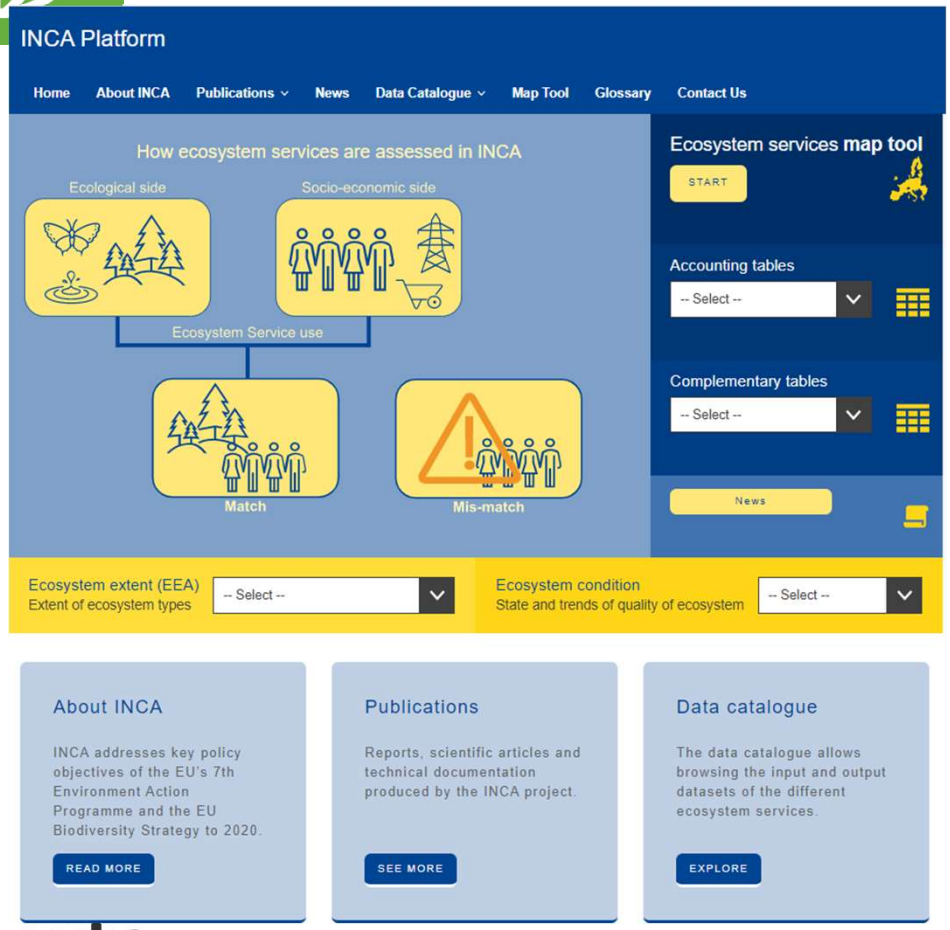
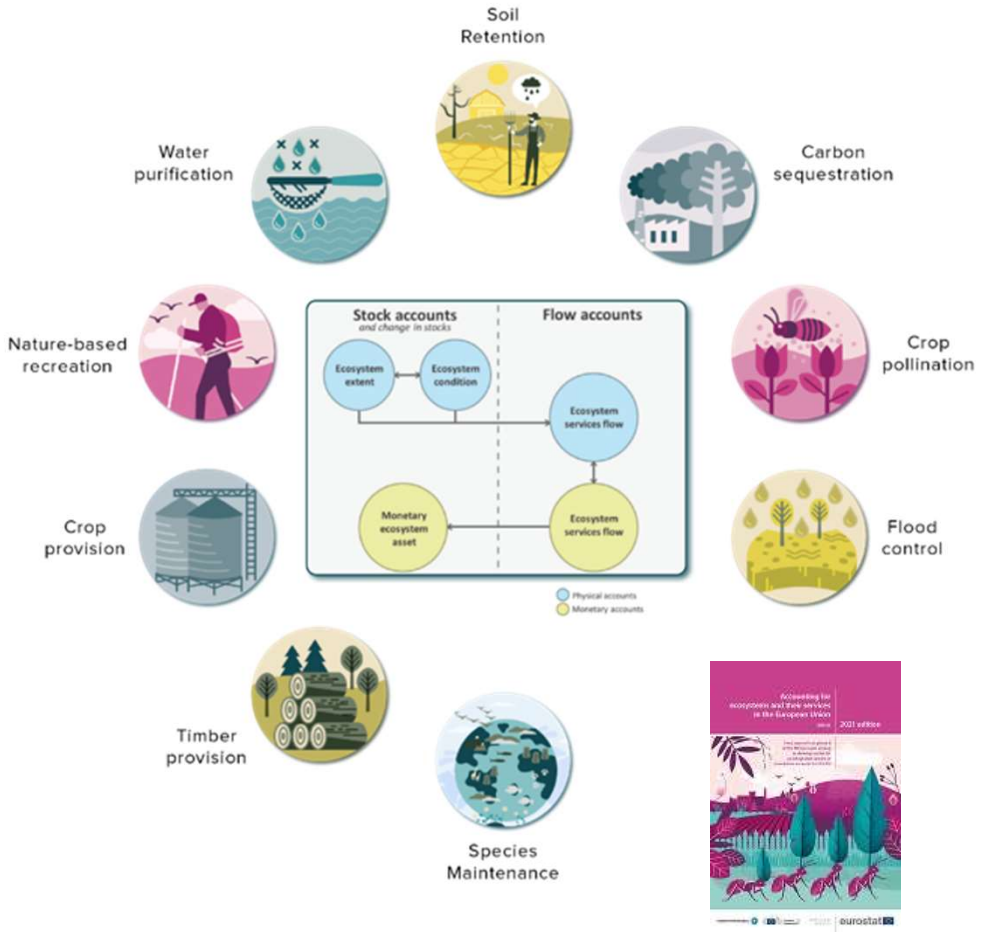
INCA Accounts series extended to 2018 using tool





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

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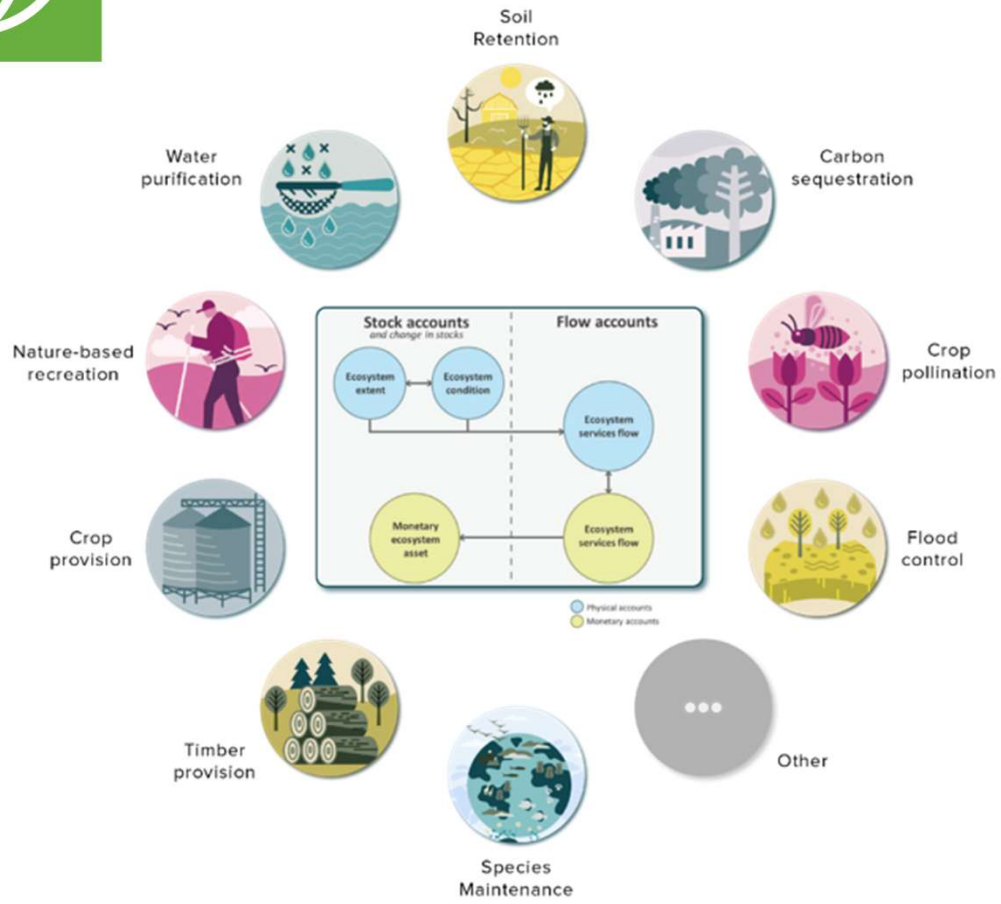
Services in INCA tool



	Service	EU-2018*	EU-2021*
Provisioning	Wood provision	A	P
	Crop provision	A	P
	Crop pollination	A	P
Regulating	Soil Retention	A	P
	Air filtration		P
	Global climate regulation	A	P
	Local climate regulation		P
	Water purification	A	
	Flood control	A	P
	Species maintenance	A	
Cultural	Nature-based	A	P
	Tourism-based		P

1.0 (end 2022)

2.0 (end 2023)

**: series from 2000*

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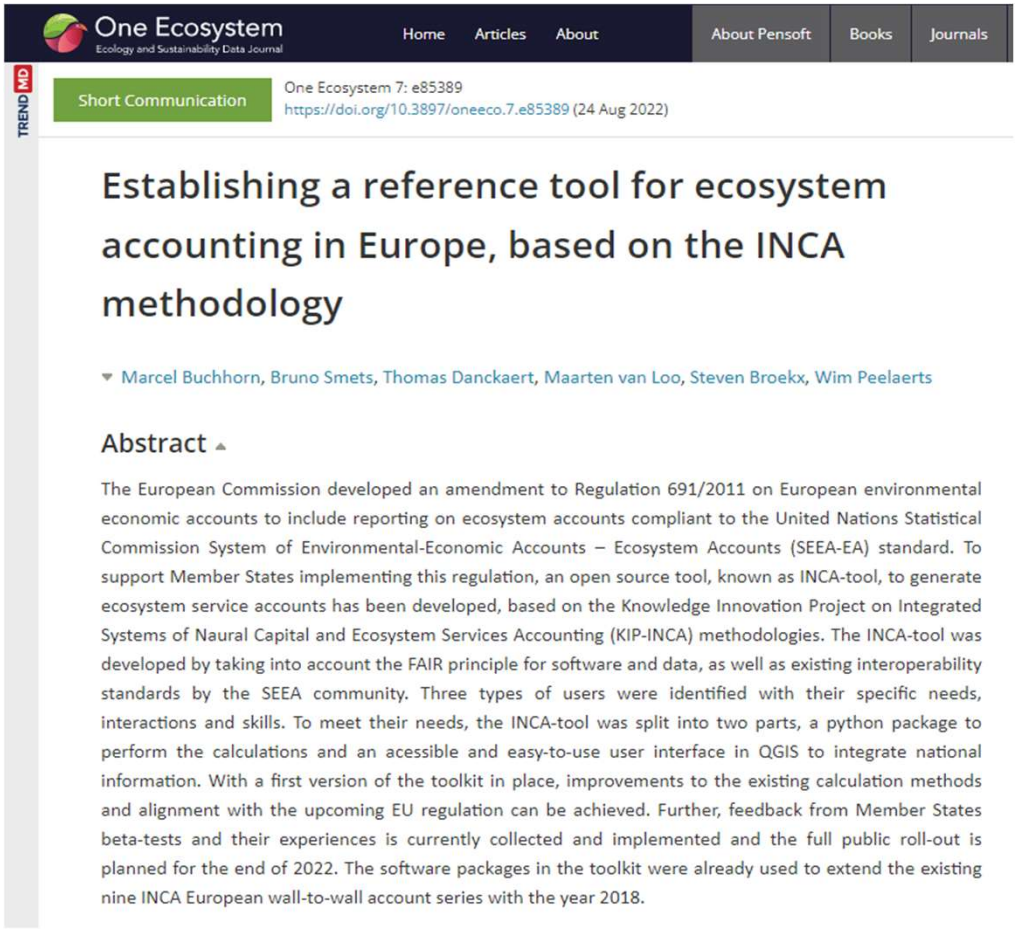
You want to know more …

https://blog.vito.be/remotesensing/accelerating-nca



https://oneecosystem.pensoft.net/article/85389/

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blog.vito.be/remotesensing

User Requirements for INCA tool

Type of User	Needs	Tool interaction	Required skills
Basic User	Only source for national accounts / Cross validation of national models	Consultation and use of final results at national level (tabular data)	Consultation and processing of tabular data (e.g. MS Excel)
Proficient User	Starting point to develop improved national accounts	Operate the tools on a national level and replace input data with national data sources	Consultation and processing of spatial data (e.g. GIS software – QGIS, ArcGIS)
Expert User	Starting point to develop national accounting procedures and perform R&D (e.g. JRC)	Operate the tools to replace formulas (open source code) and input data	Programming skills (e.g. python, …)

Example soil retention – CORE module