

# Ecosystem typification and mapping at the national level The case of Italy

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Italian inter-institutional Working Group on Ecosystem  
Accounting

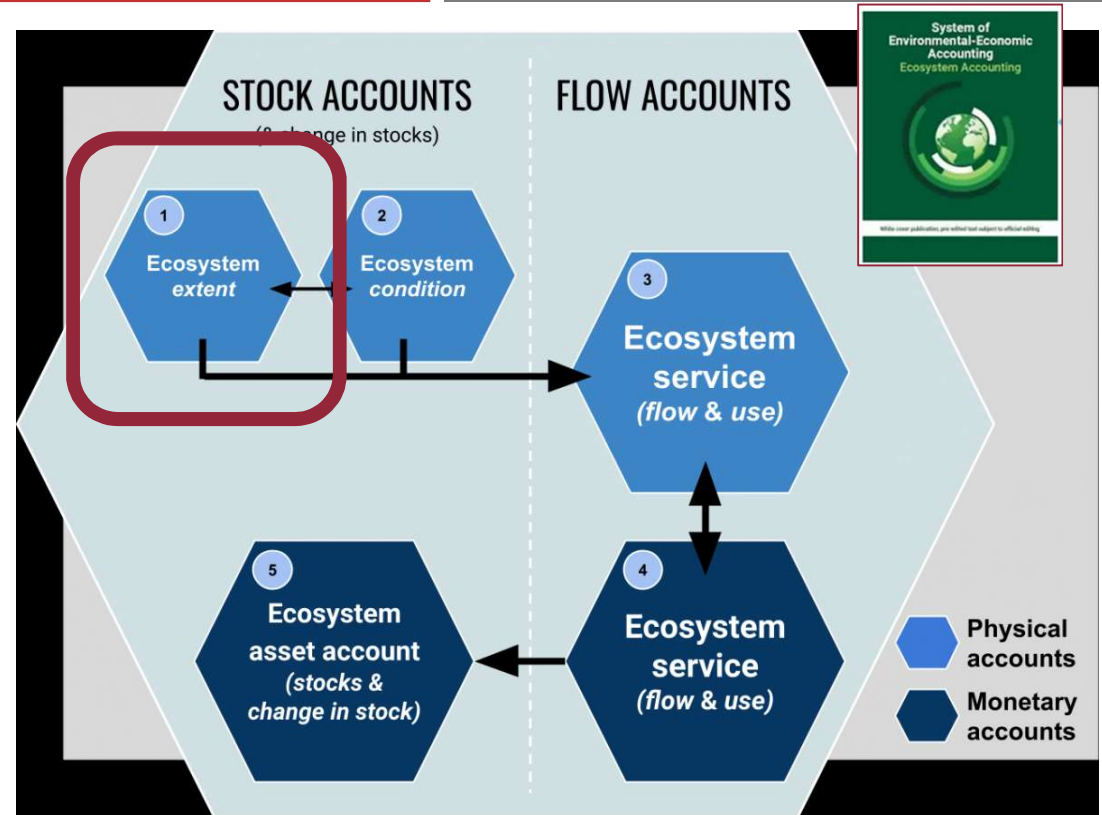


# ESTABLISHED EA RATIONALE

**'Ecosystem'** means a dynamic complex of plant, animal and micro-organism communities and their non-living environment interacting as a functional unit



Article 2 of the Convention on Biological Diversity



**DEFINITION and MAPPING of ECOSYSTEM TYPES represent the FUNDAMENTAL STARTING POINT of the entire accounting process**  
*[for ANY ACCOUNTING AREA and at ANY SCALE]*

# ESTABLISHED *EA* RATIONALE



Table 1. EU ecosystem typology, level 1

Category	Name of ecosystem type
1	Settlements and other artificial areas
2	Cropland
3	Grassland (pastures, semi-natural and natural grasslands)
4	Forest and woodland
5	Heathland and shrub
6	Sparsely vegetated ecosystems
7	Inland wetlands
8	Rivers and canals
9	Lakes and reservoirs
10	Marine inlets and transitional waters
11	Coastal beaches, dunes and wetlands
12	Marine ecosystems (coastal waters, shelf and open ocean)

**main STRUCTURAL DIFFERENCES between ECOSYSTEM TYPES are of BASIC IMPORTANCE**

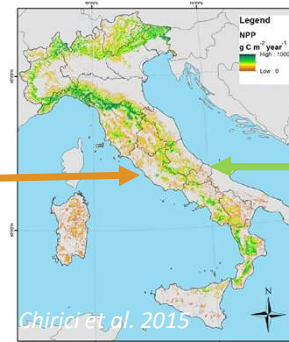
*[ 1<sup>ST</sup> LEVEL OF EU ECOSYSTEM TYPOLOGY - MANDATORY FOR EA ]*

# ADDITIONAL REMARKS

Mediterranean subcoastal broadleaved evergreen forests with *Quercus ilex*



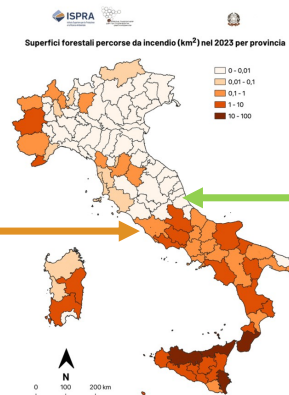
Net Primary Production



Temperate mountain deciduous forests with *Fagus sylvatica*



Forest fire risk



**COMPOSITIONAL and FUNCTIONAL DIVERSITY also matters for ECOSYSTEM CONDITION ↔ ECOSYSTEM SERVICES CAPACITY**

# ADDITIONAL REMARKS

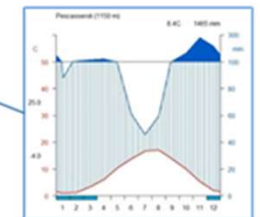
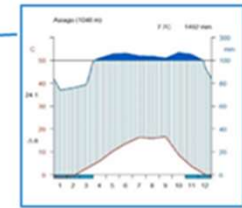
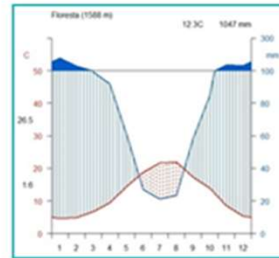
Temperate mountain deciduous forests with *Fagus sylvatica*



*Fagus sylvatica* woodland of the Alps and pre-Alps with *Picea abies*, *Abies alba*, *Sorbus aucuparia*

*Fagus sylvatica* woodland of the Apennines with *Abies alba*, *Taxus baccata*, *Ilex aquifolium*, *Acer cappadocicum* subsp. *lobelii*

Mediterranean mountain *Fagus sylvatica* woodland with *Abies alba*, *Acer pseudo-platanus*, *Ilex aquifolium*, *Quercus congesta*, *Q. dalechampii* and *Q. petraea* subsp. *austrothyrrica*

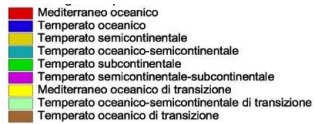


even within a same  
physiognomic type

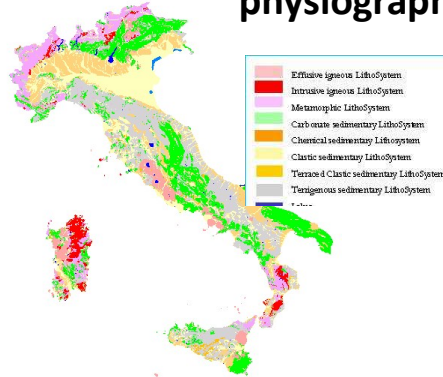
COMPOSITIONAL and FUNCTIONAL DIVERSITY also matters for  
ECOSYSTEM CONDITION ↔ ECOSYSTEM SERVICES CAPACITY

# ADDITIONAL REMARKS

bioclimate



physiography



biogeography



vegetation potential



## ECOREGIONAL ARRANGEMENT



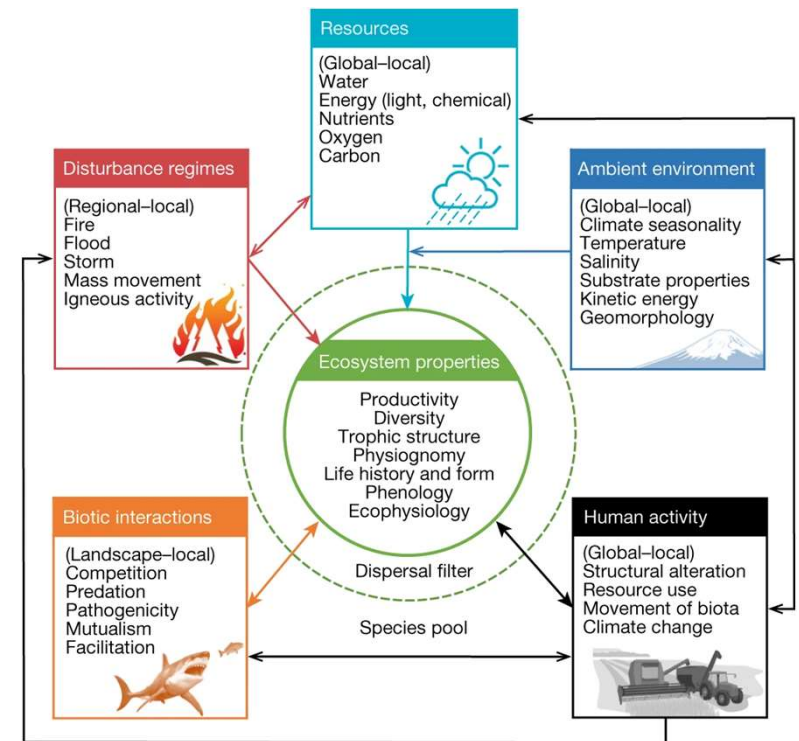
a quite detailed ecosystem typification is especially needed in heterogeneous countries

# ADOPTED APPROACH

towards actual **ECOSYSTEM** accounting

CLCplus Backbone thematic raster classes	
Class code and colour	Class Name
1	Sealed
2	Woody needle leaved trees
3	Woody broadleaved deciduous trees
4	Woody broadleaved evergreen trees
5	Low-growing woody plants
6	Permanent herbaceous
7	Periodically herbaceous
8	Lichens and mosses
9	Non- and sparsely vegetated
10	Water
11	Snow and ice

move beyond  
**LAND COVER -  
LAND USE  
monitoring**



with suitable inputs for **structure / composition /  
functions** assessment and monitoring

# Architecture of the Italian inter-institutional Working Group on Ecosystem Accounts

INTERDISCIPLINARY TEAM

National Institute of Statistics (ISTAT)

Italian Institute for Environmental Protection and Research (ISPRA)

Interuniversity Center for Biodiversity, Ecosystem Services, and Sustainability (CIRBISES)

Ministry of Agriculture, Food Sovereignty, and Forestry (MASAF)

Agency for Agricultural Subsidies (AGEA)

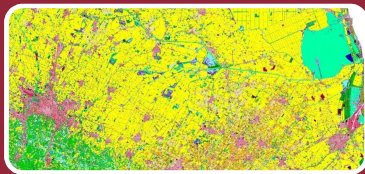
Council for Agricultural Research and Analysis of Agricultural Economics (CREA)

Institute for Terrestrial Ecosystem Research (CNR/IRET)

Italian League for Bird Protection LIPU

Academies (Ferrara, Pisa, Turin Polyt, Hannover Leibniz, Marche Polyt. Universities)

Steering and General Coordination Committee



**WP1. ECOSYSTEM EXTENT, TRANSITIONS and CONDITION**



**WP2. ECOSYSTEM SERVICES**

integrated ecological and economic perspectives

# Architecture of the Italian inter-institutional Working Group on Ecosystem Accounts

## typological WPs



**WP3**  
Settlements  
and other  
artificial areas  
+  
thematic  
account on  
urban  
ecosystems



**WP4**  
Cropland and  
grassland



**WP5**  
Forest and  
woodland;  
heathland and  
shrub;  
sparsely  
vegetated  
ecosystems

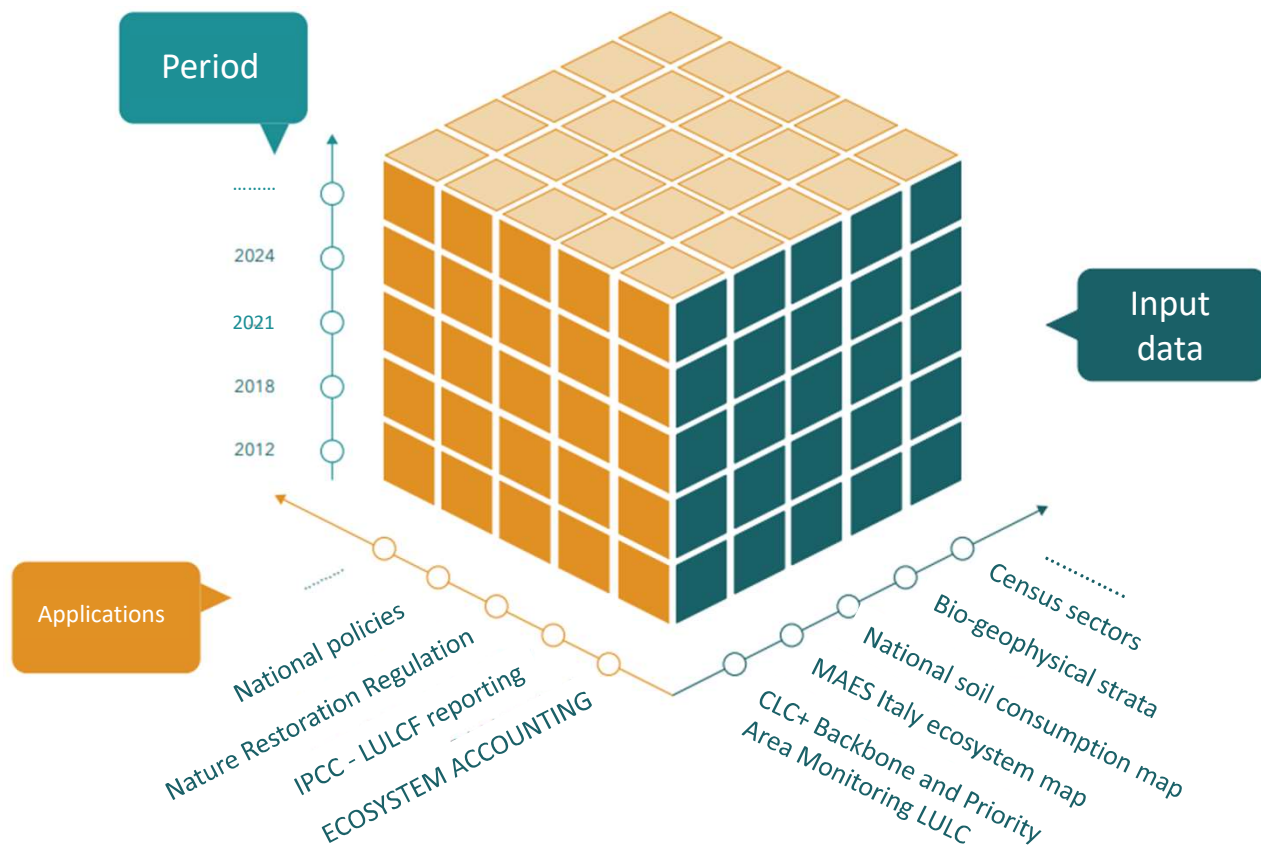


**WP6**  
Inland  
wetlands,  
rivers and lakes



**WP7**  
Marine inlets  
and transitional  
waters;  
coastal  
beaches, dunes  
and wetlands;  
marine  
ecosystems

# ECOSYSTEM TYPIFICATION and MAPPING MODEL



Modeling and Coordination by ISPRA

## DATA storage and management model



GEOMETRIC and THEMATIC comparison  
and harmonisation of datasets from  
different sources

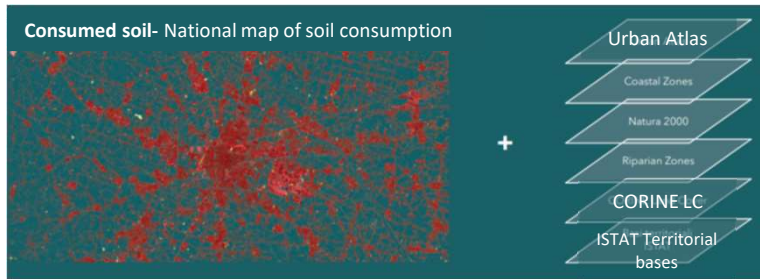


## ECOSYSTEM MAP OF ITALY

- ❖ consistent output (**MECE**- Mutually Exclusive & Collectively Exhaustive criteria)
- ❖ proper **detail**
- ❖ **hierarchical** arrangement of types
- ❖ easily **crosswalked** with EU and IUCN GET classification systems

# MODEL STRENGTHS and WEAKNESSES

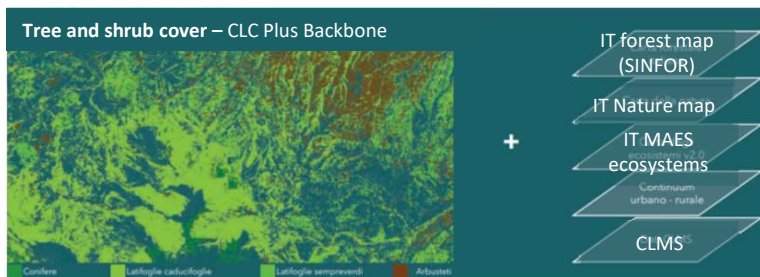
TAILORED INTEGRATION of **LAND COVER/LAND USE INPUT DATA** at the **HIGHEST GEOMETRIC RESOLUTION AVAILABLE**



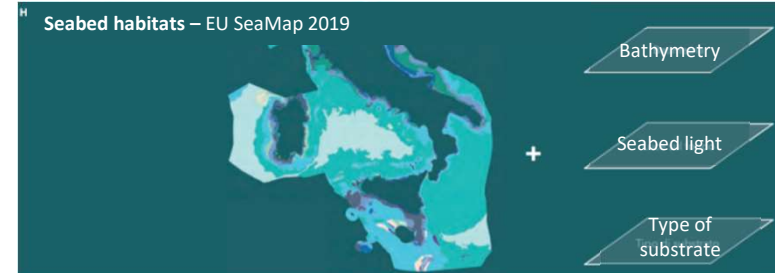
Artificial areas



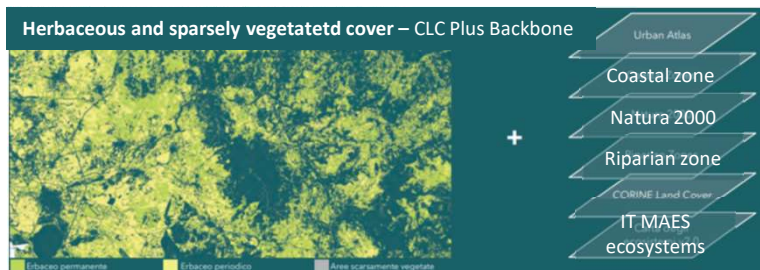
Water bodies,  
ice, and  
perennial  
snow



Tree and shrub  
cover



Marine  
waters



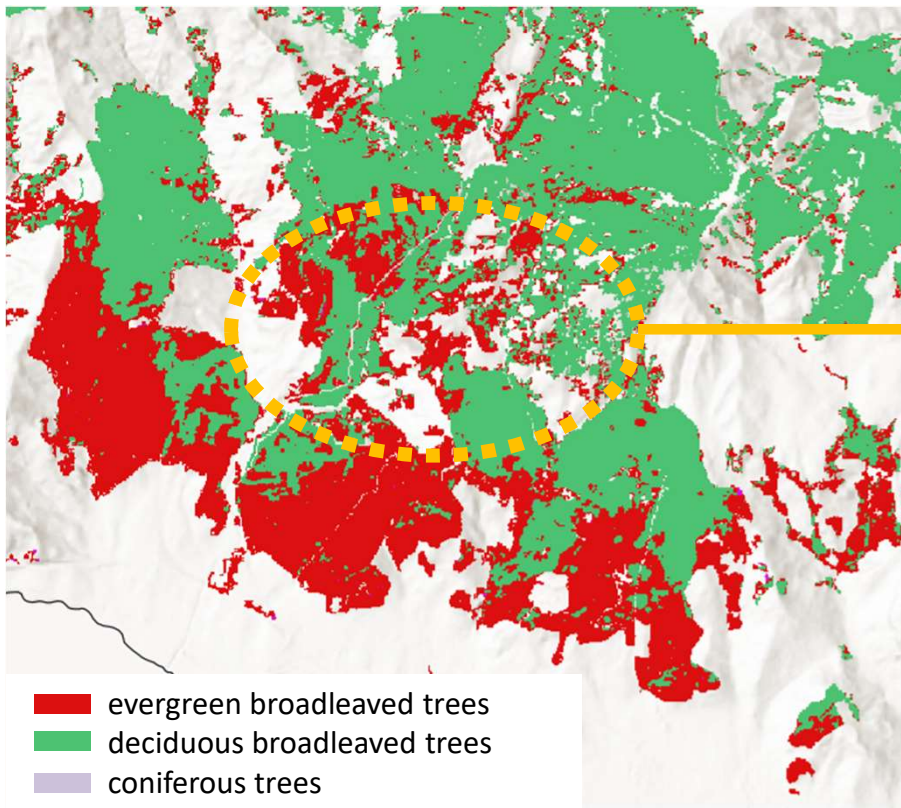
Herbaceous  
and sparsely  
vegetated cover

- ❖ enabled high frequency monitoring according to the EU SEDA-EA Regulation
- ❖ harmonised cross-scale representation (e.g. for thematic urban ecosystem accounts)

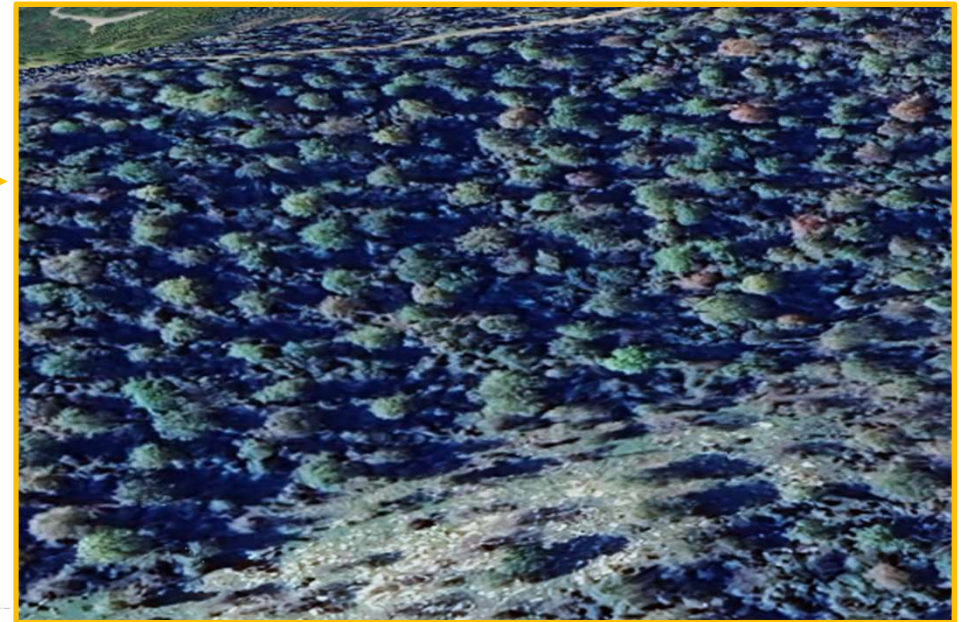
# MODEL STRENGTHS and WEAKNESSES

CHALLENGING GENERALISATION from some LAND COVER/LAND USE mosaics to composite ECOSYSTEMS ASSETS

Copernicus Land Monitoring System Leaf type



Mixed thermophilous oak woods with *Quercus ilex*, *Quercus cerris*, *Arbutus unedo* and *Erica arborea*



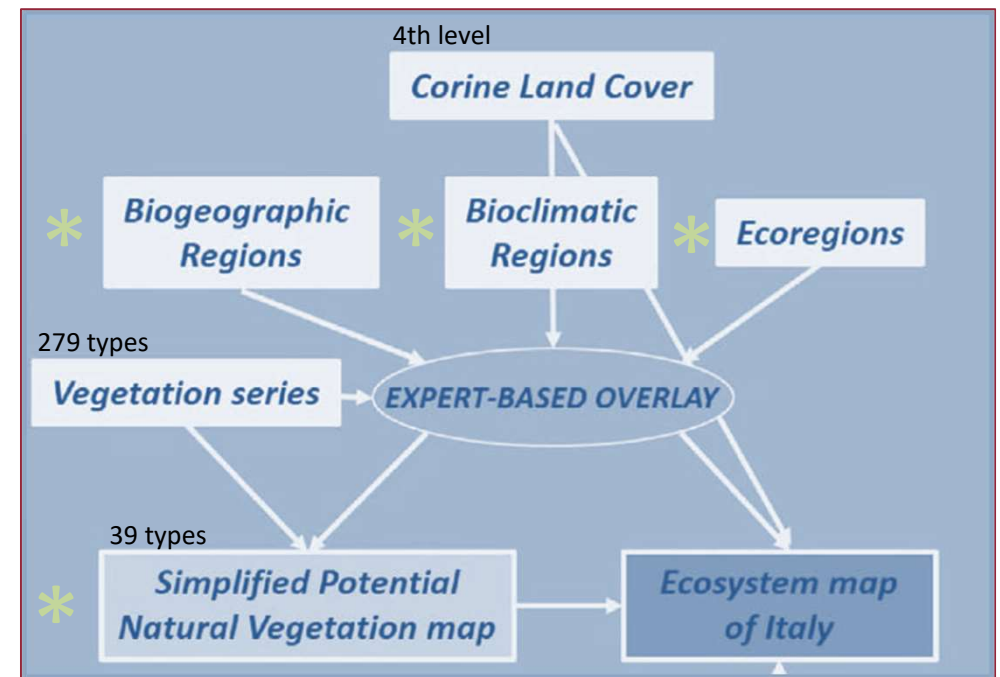
# MODEL STRENGTHS and WEAKNESSES

## AVAILABLE ECOSYSTEM TYPIFICATION at HIGH THEMATIC DETAIL



### 85 (semi-) natural ecosystem types \*

- 44 forest ecosystems
- 8 shrub ecosystems
- 8 grassland ecosystems
- 3 psammophilous ecosystems
- 3 rocky ecosystems
- 1 glacier ecosystem
- 4 hygrophilous ecosystems
- 4 lentic freshwater ecosystems
- 4 lotic freshwater ecosystems
- 3 salt marsh ecosystems



- ❖ **consistent** with EU environmental policies (MAES process)
- ❖ provides a **synthesis of vegetation heterogeneity** suitable for the accounting
- ❖ supported previous national assessments of **natural capital state** (2017-2024)
- ❖ informed the compilation of the **National Red List of Ecosystems**

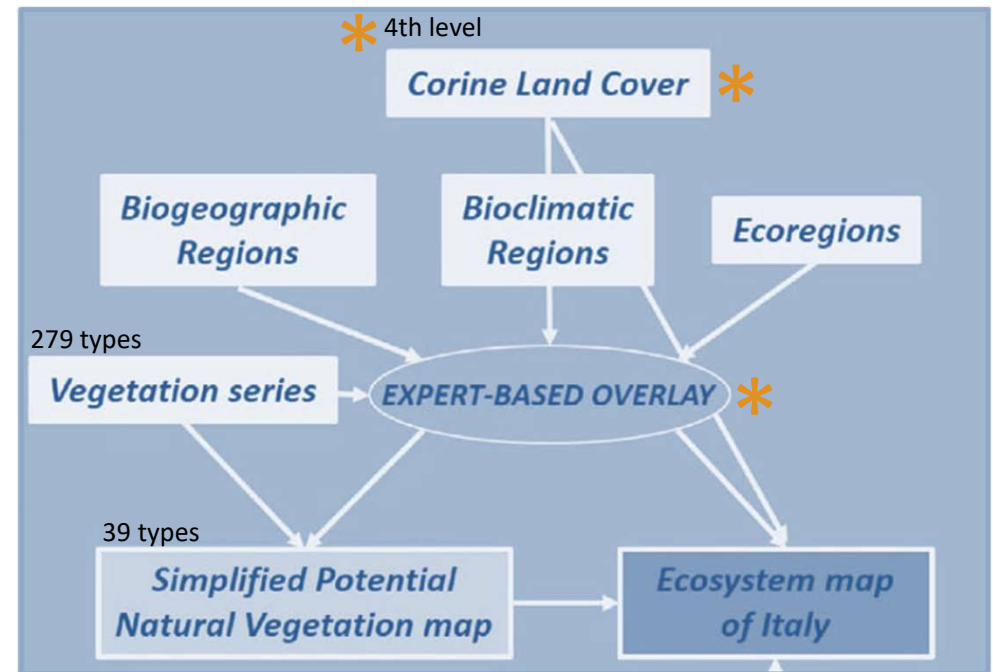
# MODEL STRENGTHS and WEAKNESSES

## operational limitations



### 85 (semi-) natural ecosystem types

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- ❖ based on national CLC at the **4th level** of detail (no longer updated)
- ❖ **MMU** not aligned with national accounting choices (e.g. 10 vs 0.5 ha for forest ecosystems)
- ❖ **high demanding replication** due to decision-making process largely based on expert judgement

# PRELIMINARY RESULTS

## Prototype Ecosystem map of Italy – 3rd ET level (2021)

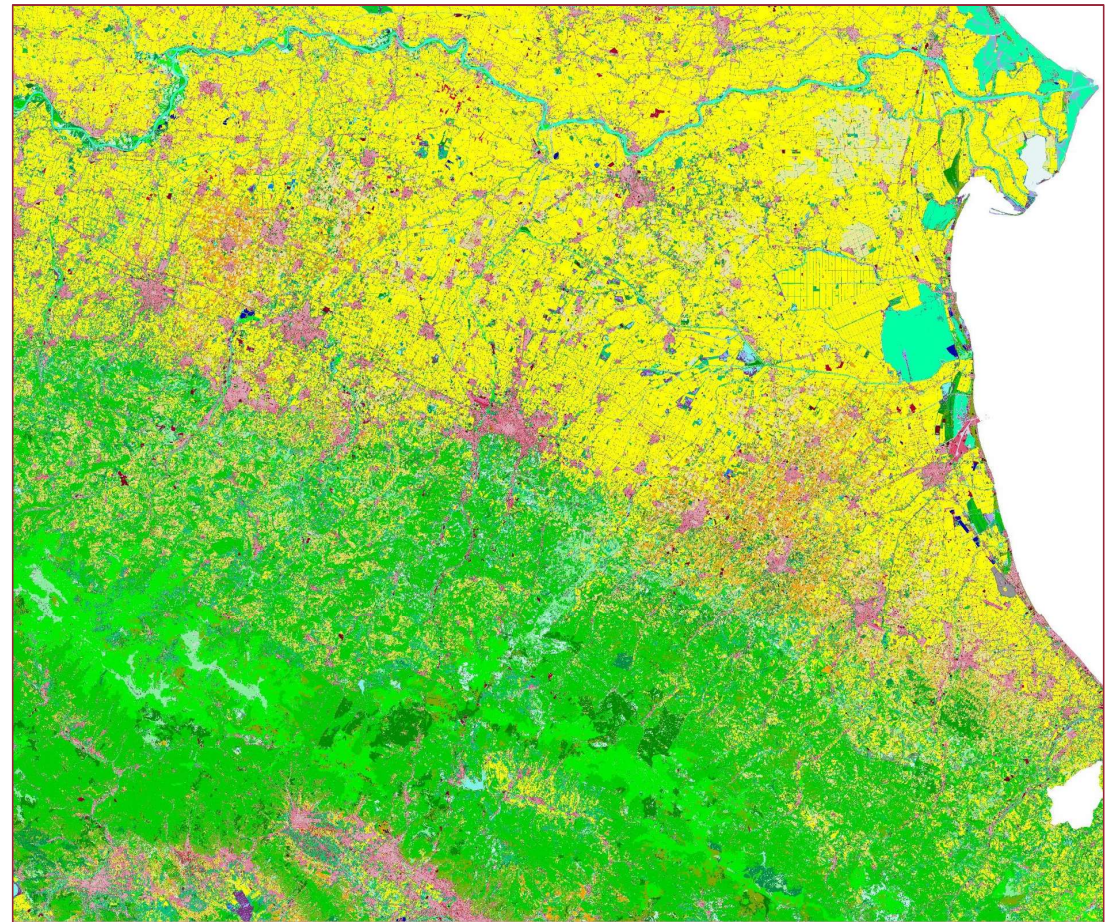
Format: **raster**

Spatial resolution: **10 meters**

Coverage: **entire national territory**

Replicability: **CLMS countries**

Update frequency: **biennial**



# ONGOING IMPROVEMENTS / FOREST ECOSYSTEM TYPES

## EU FOREST TYPOLOGY

4. Forest and woodlands	4.1 Broadleaved deciduous forest	4.1.1 Riparian forest and woodland
		4.1.2 Broadleaved swamp forest on non-acid and acid peat
		<b>4.1.3 Fagus dominated forest</b>
		4.1.4 Temperate, Submediterranean and Mediterranean thermophilous deciduous forest
		<b>4.1.5 Acidophilous [Quercus]-dominated forests</b>
		4.1.6 Temperate and boreal and Southern European Betula and Populus tremula forest on mineral soils
		4.1.7 Other broadleaved deciduous forest, excluding highly modified plantations
		4.1.8 Highly modified broadleaved deciduous forests, in particular plantations including stands of non-native trees species that have long been established in European ecosystems stands
	4.2 Coniferous forests	4.2.1 Boreal and temperate fir and spruce forest
		4.2.2 Mediterranean mountain fir and spruce forest
		<b>4.2.3 Temperate subalpine Larix, Pinus cembra and Pinus uncinata forest</b>
		4.2.4 Pine forest (excluding mires, non-thermophilous)
		4.2.5 Mediterranean thermophilous lowland pine forest
		4.2.6 Spruce, pine and larch mire forests
		4.2.7 Taiga forests
		4.2.8 Other coniferous forests, excluding plantations
		4.2.9 Highly modified coniferous forests, in particular plantations
	4.3 Broadleaved evergreen forests	4.3.1 Mediterranean evergreen Quercus forest
		4.3.2 Mainland laurophyllous forest
		4.3.3 Macaronesian laurophyllous forest
		<b>4.3.4 Olea europaea-Ceratonia siliqua forest</b>
		4.3.5 Palm groves
		4.3.6 Other broadleaved evergreen forests
	4.4 Mixed forests	4.3.7 Highly modified broadleaved evergreen forests, including stands of non-native trees species that have long been established in European forest mixes.
		4.4.1 Mixed forests dominated by coniferous species
		4.4.2 Mixed forests dominated by broadleaved species
	4.5 Transitional forest and woodland shrub	4.4.3 Other mixed forests including stands of non-native trees species that have long been established in European forest mixes.
		4.5.1 Transitional woodland/forest land
	4.6 Plantations	4.6.1 Monoculture or mixed plantations

## Second SEEA-EA Ecosystem map of Italy – (2024)

**Limits** of the physiognomic information first retrieved from the **National Forest Map** (weak consistency in accuracy across regions; many discrepancies with the IT MAES map; undefined updating periods)



New classification from the 2nd level type **by ecoregions** (complexes of forest types by bioclimatic, orographic and biogeographic sectors)



Physiognomic and ecological/functional distinction into national 3rd level typologies **by phenological profiles** (under development)

2024

# ONGOING IMPROVEMENTS / settlements-urban ecosystems

## EU TYPOLOGY

1. Settlements and other artificial areas	1.1 Continuous settlement area	1.1.1 Continuous residential area
		1.1.2 Continuous commercial and industrial area
	1.2 Discontinuous settlement area	1.2.1 Discontinuous residential area
		1.2.2 Discontinuous commercial and industrial area
	1.3 Infrastructure	1.3.1 Road and rail networks and associated land
		1.3.2 Port areas
		1.3.3 Airports
		1.3.4 Other infrastructure
		1.3.5 Mineral extraction sites (excluding peat extraction sites, see 7.3.1)
		1.3.6 Dump areas
		1.3.7 Construction sites
	1.4 Urban greenspace	1.4.1 Parks (including Zoos and botanical gardens)
		1.4.2 Sports and recreation sites
		1.4.3 Other urban green
	1.5 Other artificial areas	1.5.1 Permanent Greenhouses
		1.5.2 Cemeteries
		1.5.3 Archaeological sites
		1.5.4 Urban blue

## 2021 mapping rules:

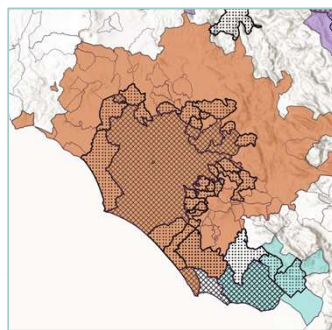
- geometric priority to the national soil consumption (SC) map
- thematic improvement with CLC, CLMS and SC information on residential/not residential areas and infrastructures
- distinction between continuous and discontinuous urban fabric



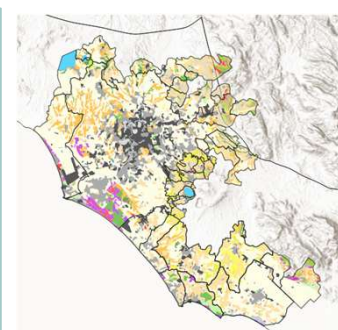
**Thematic check and update** according to census sectors' information (territorial bases, ISTAT)



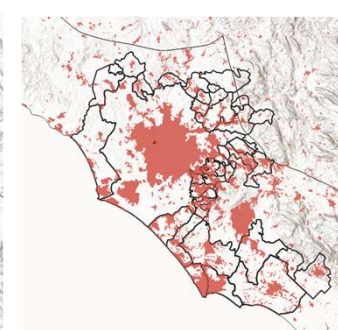
**Definition of urban ecosystems** and respective **types** for thematic account and condition assessment (under development)



urban ecosystem types at the FUA level



Ecosystems in SEEA-EA relevant LAUs

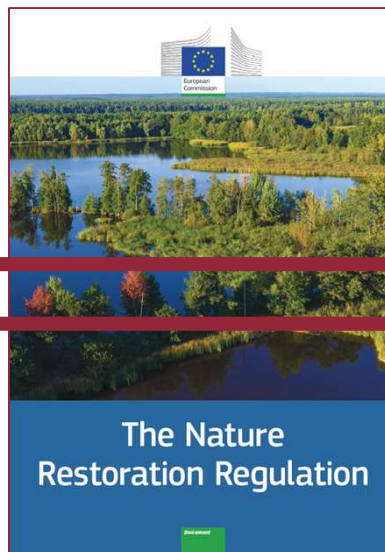
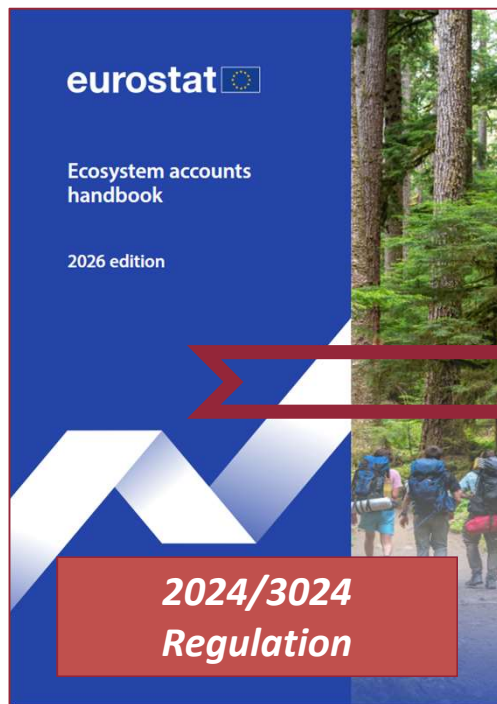


Urban 'inhabited areas'

# ALIGNMENT WITH OTHER NATURE-RELATED POLICIES

composite  
inter-institutional WG

allows a consistent national level implementation



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*thank you for the attention*



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**CIRBISES**

Biodiversità  
Servizi Ecosistemici  
Sostenibilità



**Istat**