



**Conference on Natural and Cultural Capital: the Future of
Europe**

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Improve the Knowledge of Natural Capital: recent advances in Italy

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Improve the knowledge of natural capital: the essential step

To 'improve the knowledge of natural capital' means first to deeply UNDERSTAND and RECOGNISE BIODIVERSITY in ALL ITS FORMS

Natural Capital

Environmental Assets:

Ecosystem Assets

- ◆ Biodiversity - the stock of plants (including trees) & animals (including fish), fungi & bacteria (e.g. for food, fuels, fibre & medicine, genetic resources for developing new crops or medicines, or as a tourism asset etc.)
- ◆ Soils for producing crops (note that the crops themselves, i.e. the commercial seeds & livestock, are better considered a produced asset in this instance)
- ◆ Surface fresh waters (e.g. for drinking water, hydropower, watering crops, washing etc.)
- ◆ The store of organic carbon (held in terrestrial plants & soils, as well as in marine organisms)
- ◆ Landscapes (in terms of aesthetic values for enjoyment, including tourism use)

Natural Resources

- ◆ The recoverable stock of fossil fuels (i.e. coal, oil & gas)
- ◆ The recoverable stock of minerals (including metals, uranium etc)
- ◆ Aggregates (including sand)
- ◆ Fossil water stores (i.e. deep underground aquifers replenished over centuries)
- ◆ Deep ocean stores of carbon
- ◆ Land (i.e. space for activity to take place)
- ◆ Ozone layer (protective value)
- ◆ Solar energy (i.e. as a source of energy, including plant growth)

in particular we must improve our knowledge of

ECOSYSTEMS in terms of
composition and state of biotic
(species, genetic resources and
communities) and
physical (non-living) components


functions

spatial arrangement



Subsequent step: from ecosystem knowledge towards stock and flow accounts

By means of ecosystem knowledge we can translate

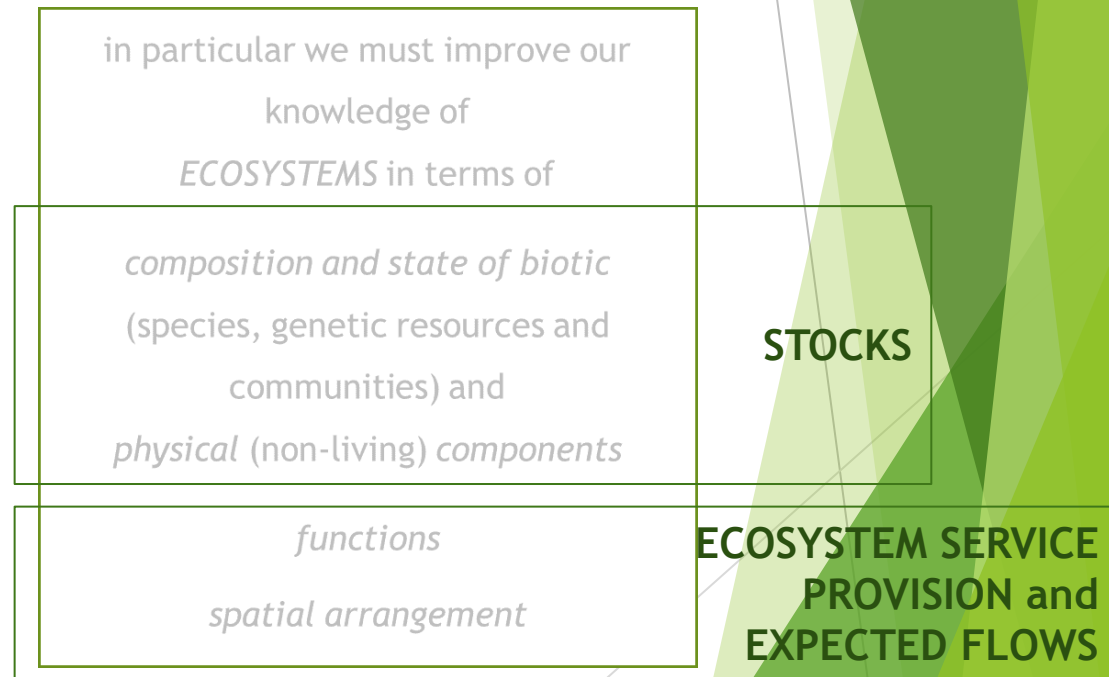
- ▶ ecosystem components into natural capital stocks and
- ▶ functions plus spatial arrangement into provision and expected flows of ecosystem services

 **Basic Accounting Model**

- Stocks = Ecosystem Assets
 - Spatial area
 - Fixed characteristics (e.g., slope, altitude)
 - Variable characteristics (e.g., land cover, biodiversity)
- Flows
 - Intra-ecosystem (within ecosystem)
 - Inter-ecosystem (between ecosystems)
 - Ecosystem services (to people)



Source: SEEA - System of Environmental Economic Accounting, 2013

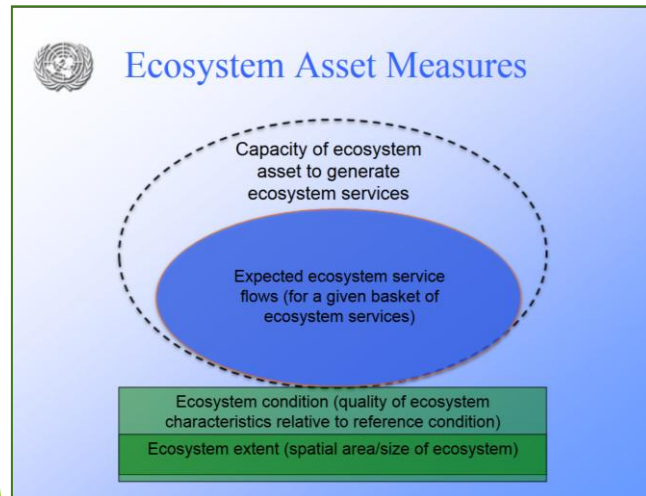


Nevertheless, in order to reach proper translations, we need to overcome constraints posed by data availability

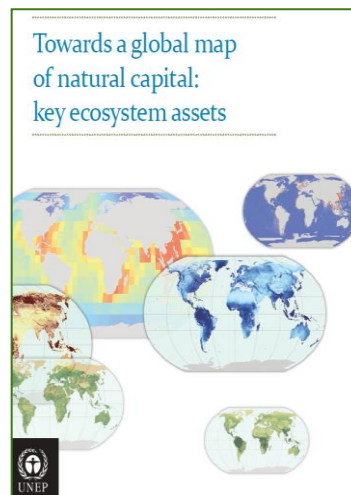
A further point for improving knowledge: the importance of mapping

Illustrate the spatial dimension of ecosystems allows:

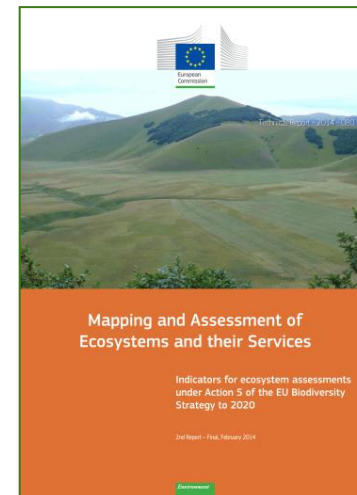
- ▶ *the assessment and monitoring of extent and geographic distribution of ecosystems*
- ▶ *the recognition of territorial contexts (e.g. in terms of landscape conservation status, weight of land use/land cover change)*
- ▶ *the valuation of provision and spatial flows of ecosystem services within different land units*



SEEA Experimental Ecosystem Accounting 2013



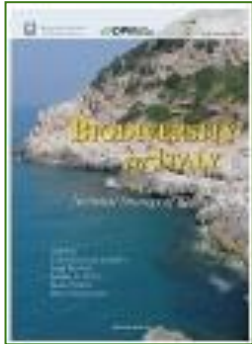
UNEP 2014



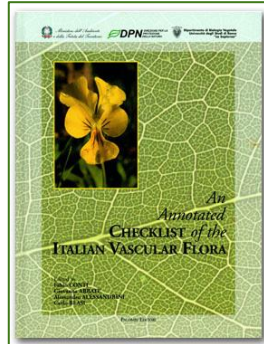
EU Biodiversity Strategy 2020

Improving knowledge: state of the art in Italy

Recent research efforts at the national level



Blasi et al. eds 2005



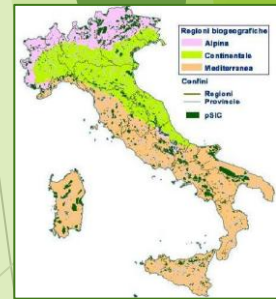
Conti et al eds. 2005

SPECIES

Vascular plants: 6 700 (60% of EU flora)

The checklist of the Italian flora was carried out by 33 Regional Advisers, 15 Taxonomic Advisers, 45 Regional and Taxonomic Contributors, and involved a nation-wide network of botanists

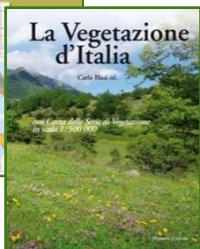
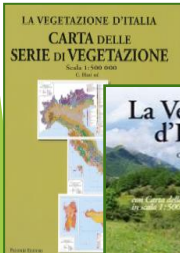
HABITATS



Biondi et al 2009

The Interpretation Manual was carried out by 49 Authors and 46 Regional and Thematic Experts

VEGETATION COMMUNITIES



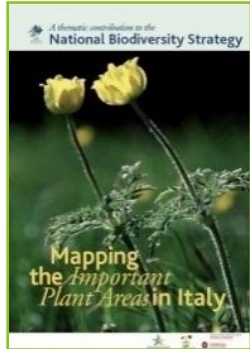
The Vegetation series map and the Regional Monographs were carried out by 8 Scientific Advisers, 68 Authors, and involved a nation-wide network of geobotanists

Blasi ed. 2010

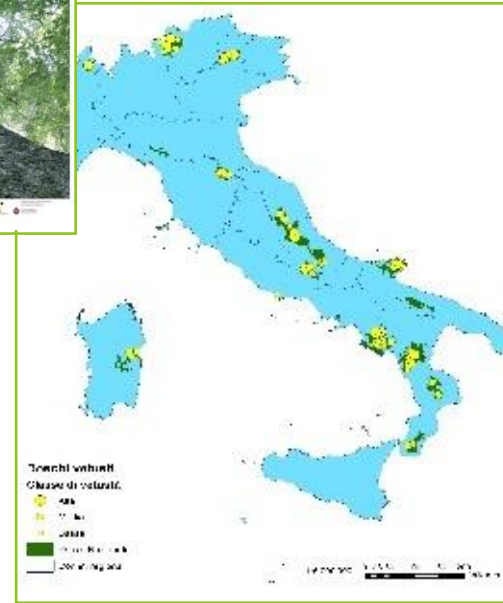
Biondi, Blasi et al. 2013/14

Improving knowledge: state of the art in Italy

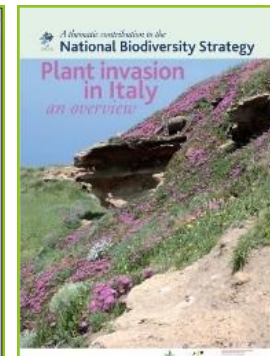
IMPORTANT PLANT AREAS



OLD-GROWTH FORESTS

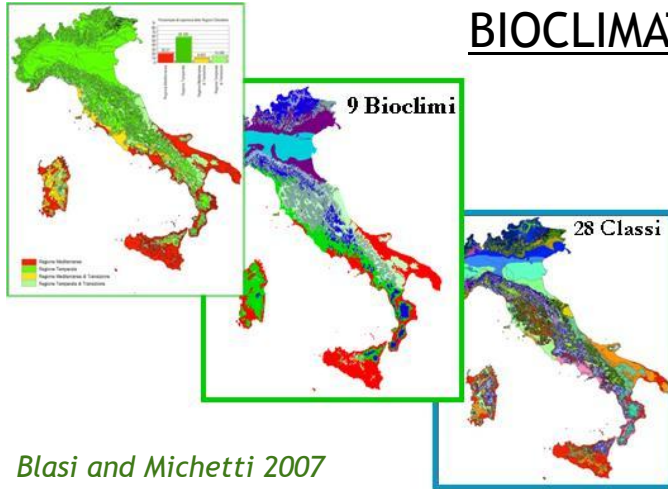


PLANT INVASION



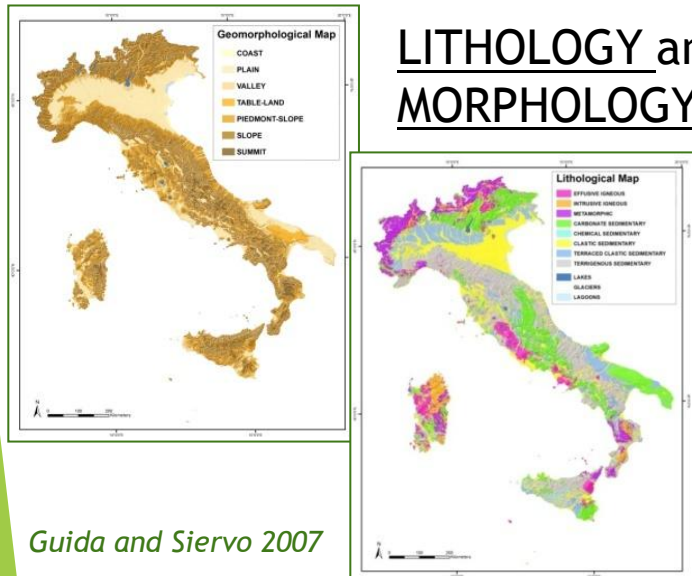
Improving knowledge: state of the art in Italy

BIOCLIMATE



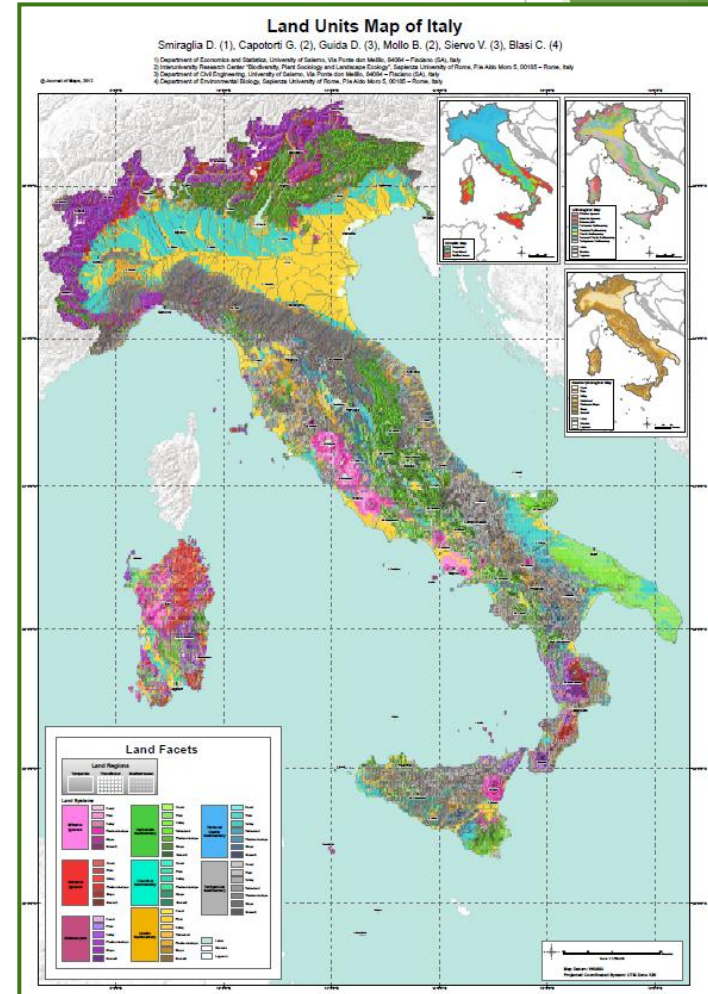
Blasi and Michetti 2007

LITHOLOGY and MORPHOLOGY



Guida and Siervo 2007

ENVIRONMENTAL LAND UNITS



Capotorti et al. 2012; Smiraglia et al. 2013

Improving knowledge: state of the art in Italy

LAND COVER

Improved detail from the integration of remotely sensed data with field inventories

CLC classes, up to the III level, as defined by the European CORINE Programme

Italian CLC IV level → forest classes are consistent with the National Inventory-INFC



Cork oak forests



Deciduous oak forests



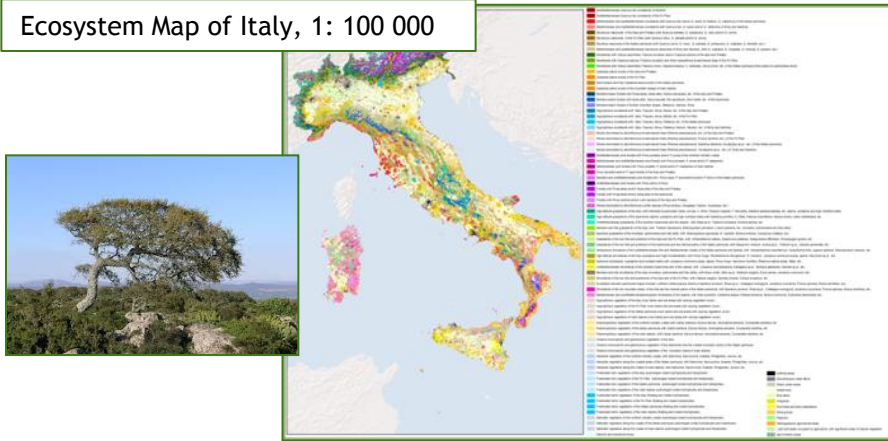
Beech forests

I Level	II Level	III Level	IV (V) Level
3 Forest and semi natural areas	31 Forests	311 Broadleaved forest	3111 Evergreen oak forests (holm and cork oaks)
			3112 Deciduous oak forests (turkey, downy, Italian, sessile, pedunculate oaks)
			3113 Mixed forests dominated by other native broadleaved (maple, ash, hombeam, flowering ash)
			3114 Chestnut forests
			3115 Beech forests
			3116 Hygrophilous forests (willows, poplars, alders)
			3117 Woods and former plantations dominated by exotic broadleaved (black locust and <i>Ailanthus altissima</i>)
			3121 Mediterranean pines and cypress forests (pine, maritime pine, Aleppo pine)
			3122 Oro-Mediterranean and mountain pine forests (black pine and larch, Scots pine, Bosnian pine)

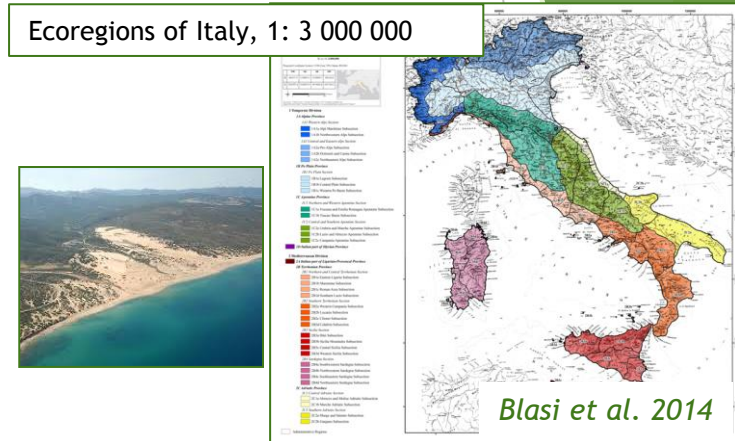
Mapping and Assessing Ecosystems and their Services in Italy (MAES-IT)

This background knowledge allowed to build the Ecosystem Map as well as the Ecoregion Map of Italy (*ecoregions represent broad regional ecosystems*)

Ecosystem Map of Italy, 1: 100 000

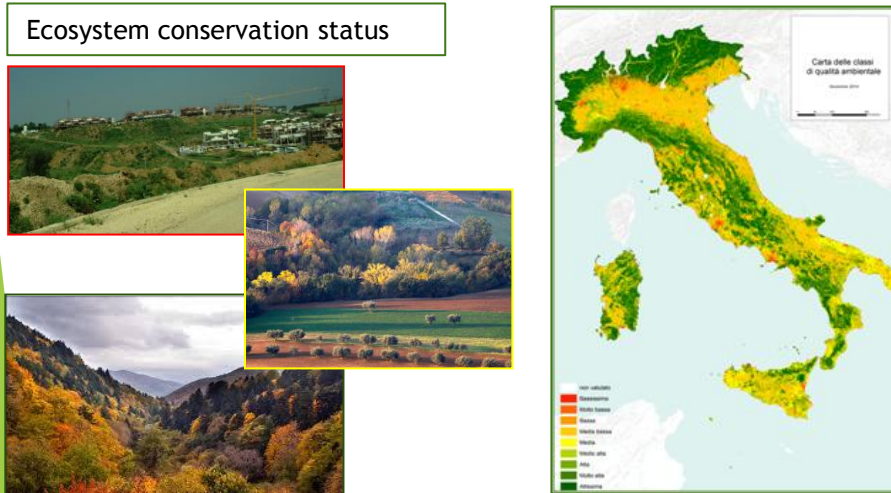


Ecoregions of Italy, 1: 3 000 000

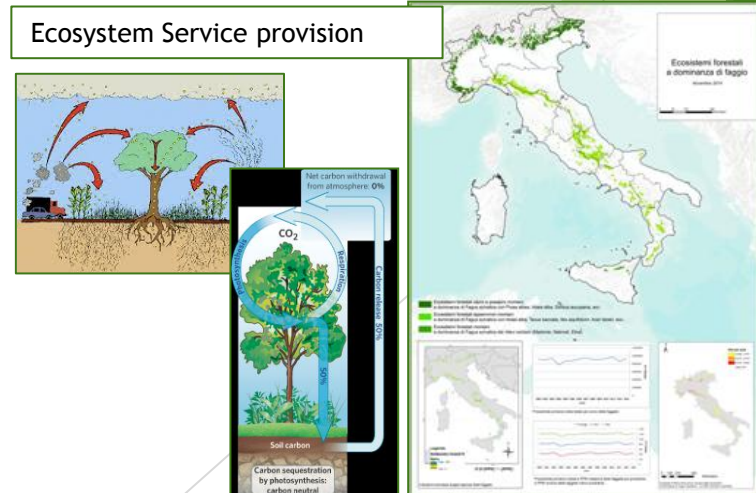


Integration between these Maps is informing a sound assessment of ecosystem status and the physical valuation of ecosystem services

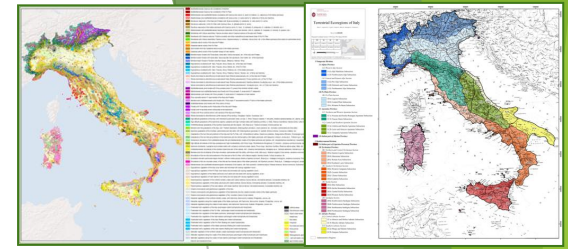
Ecosystem conservation status



Ecosystem Service provision



Natural and cultural dimension of in depth ecosystem classification and accurate mapping



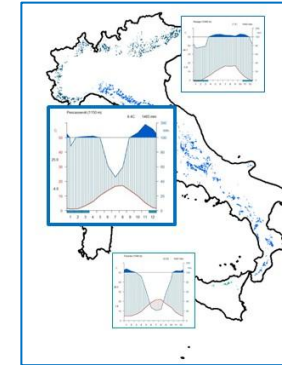
3115 Beech forests	Montane beech forests with <i>Picea abies</i> , <i>Abies alba</i> , <i>Sorbus aucuparia</i> , etc. of the Alps and Prealps
	Montane beech forests with <i>Abies alba</i>, <i>Taxus baccata</i>, <i>Ilex aquifolium</i>, <i>Acer lobelii</i> of the Apennines
	Montane beech forests of Sicilian mountain ranges (Madonie, Nebrodi, Etna)

SPECIES COMPOSITION

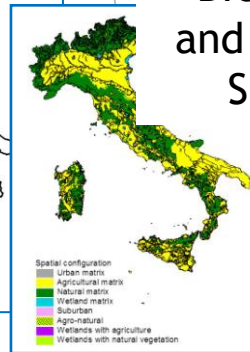
- Characteristic species of the association *Lathyro veneti-Fagetum sylvaticae* and diff subassociation *Lathyroveneti***
- Lathyrus venetus* V
 - Euphorbia amygdaloides* subsp. *amygdaloides* IV
 - Sorbus aria* subsp. *aria* II
 - Viola alba* subsp. *dehnhardtii*
 - Galanthus nivalis* subsp. *nivalis*
 - Galium odoratum*
 - Scilla bifolia*
 - Prenanthes purpurea*
 - Cardamine enneaphyllis*
 - Cardamine kitzbelleri*
- Acidophilous species**
- Luzula sylvatica* subsp. *sylvatica* IV
 - Hieracium murorum* I
 - Rosa arvensis* I
 - Luzula forsteri* I
 - Pteridium aquilinum* subsp. *aquilinum* I
 - Hieracium racemosum* I
 - Cephalanthera rubra* I
 - Carex sylvatica* subsp. *sylvatica* I
 - Quercus cerris*
 - Hypericum androsaemum*
 - Potentilla micrantha*
 - Erica arborea*
- Charact. and diff. Species of the alliance *Geranio versicoloris-Fagion sylvaticae***
- Daphne laureola* V
 - Acer opalus* subsp. *obtusatum* IV
 - Cyclamen hederifolium* subsp. *hederifolium* III
 - Ranunculus lanuginosus* I
 - Pulmonaria apennina* II
 - Ruscus hypoglossum* II
 - Anemone ranunculoides* I

BIOMASS PRODUCTION

Distretto territoriale	Totale Faggete		
	Volume (m ³)	ES (%)	Volume (m ³ ha ⁻¹)
Piemonte	20,758,731	8.5	179.7
Valle d'Aosta	202,576	64.6	175.3
Liguria	6,986,747	11.0	216.1
Emilia Romagna	21,275,150	8.6	210.9
Toscana	17,545,114	9.2	242.8
Umbria	2,644,115	20.3	174.9
Marche	2,670,319	23.2	149.7
Lazio	17,735,774	11.1	247.3
Abruzzo	28,261,832	7.1	230.9
Molise	3,923,098	19.4	264.4
Campania	16,243,190	12.4	294.3
Puglia	1,331,508	33.8	285.7
Basilicata	7,179,721	16.7	224.6
Calabria	23,636,402		
Sicilia	2,641,277		
Sardegna	0		
Italia	240,009,507		



BIOCLIMATE and LAND USE SETTING



CULTURAL VALUES



CARBON STOCK



CONSERVATION INTEREST

92: Foreste mediterranee caducifoglie
9220*: Faggeti degli Appennini con *Abies alba* e faggete con *Abies nebrodensis*
 *Apennine beech forests with *Abies alba* and beech forests with *Abies nebrodensis*

Codice CORINE Biotope
 41.171 - Alpino-Appennine acidophilous beech forests
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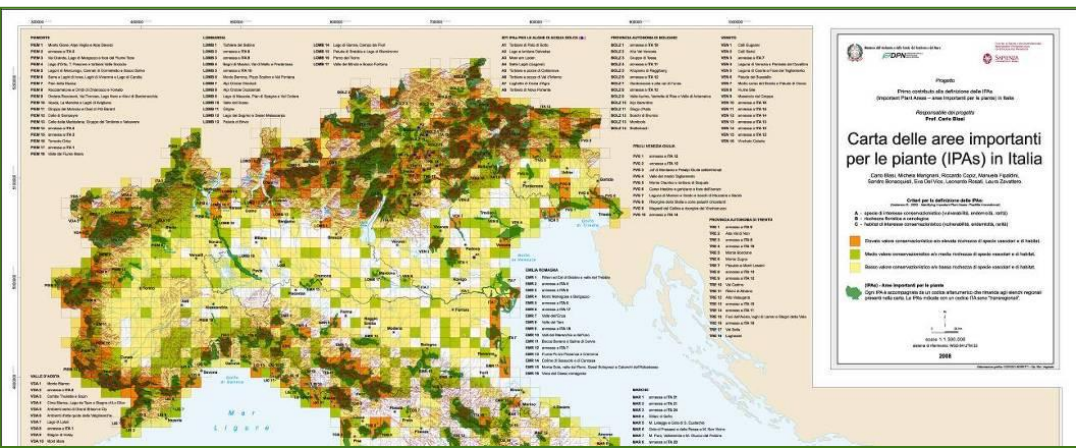
NEVERTHELESS

increasing investment on scientific research is required

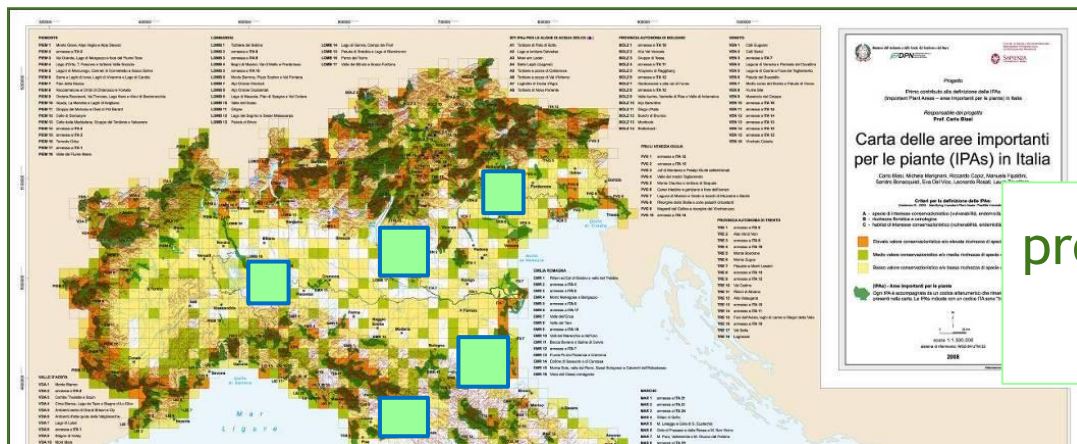
- ▶ for “capitalising” and integrating available information on the natural and cultural dimension of ecosystems



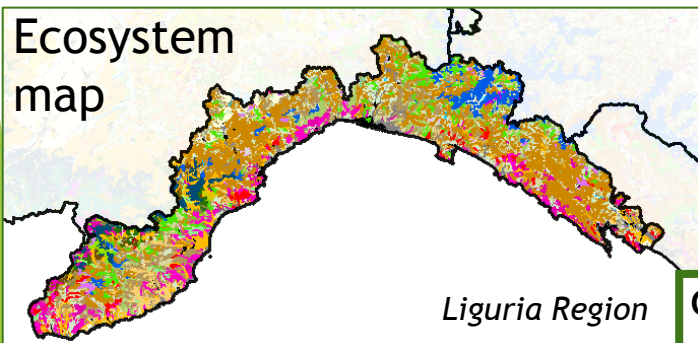
- ▶ as well as for bridging the gaps in biodiversity knowledge and reduce approximations



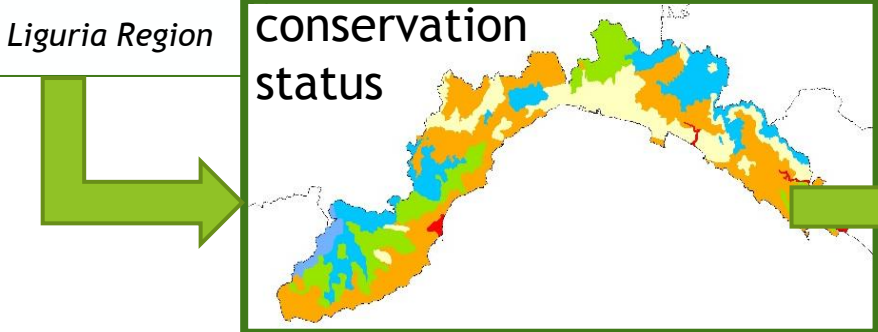
bridging the gaps in biodiversity knowledge and reduce approximations



progressively fill the white cells of our maps and databases



and found critical estimations on accurate basic data



Assessment of soil protection



Thank you for your attention!

DIPARTIMENTO
DI BIOLOGIA AMBIENTALE



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