DANUBEparksCONNECTED Workshop ‘Corridor Land’

06.-07. April 2017, Spitz a. D., Wachau, Austria

Copernicus Land Monitoring Services:

from satellite data to ecosystem condition, ecosystem services and green infrastructure

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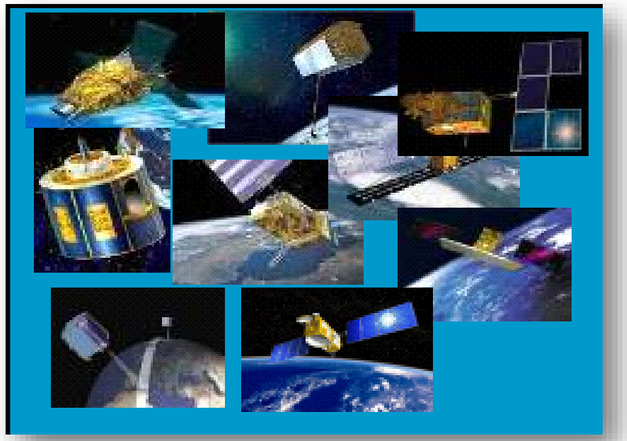
European Environment Agency

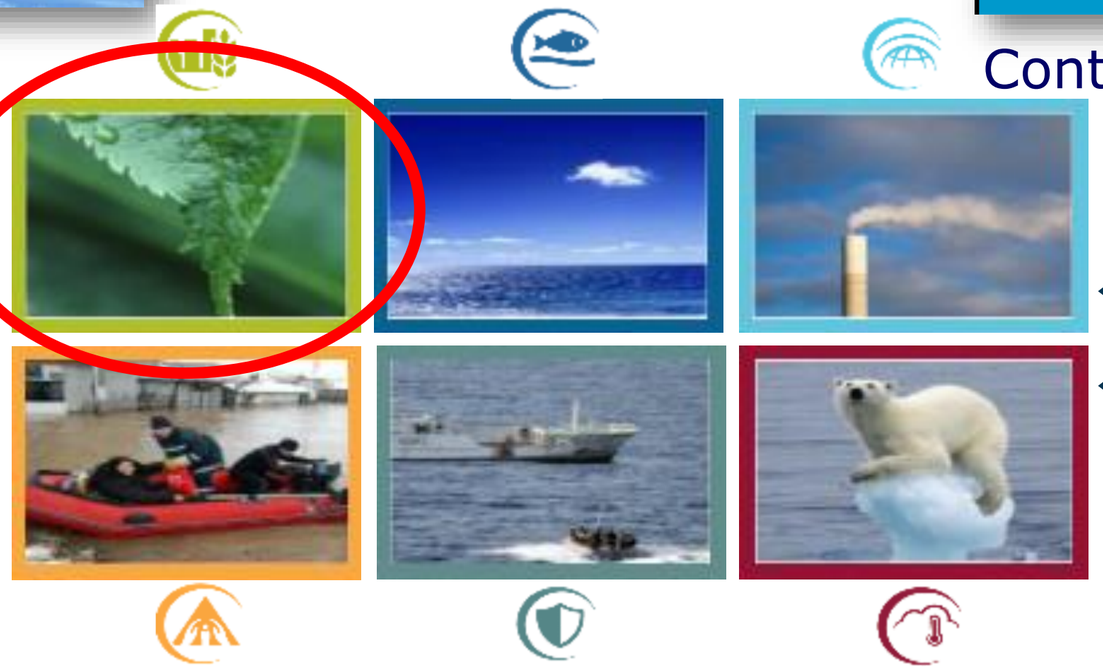
Overall programme architecture

6 services use Earth Observation data to deliver …



Sentinels

Contributing missions



in-situ

…added-value products

European Commission

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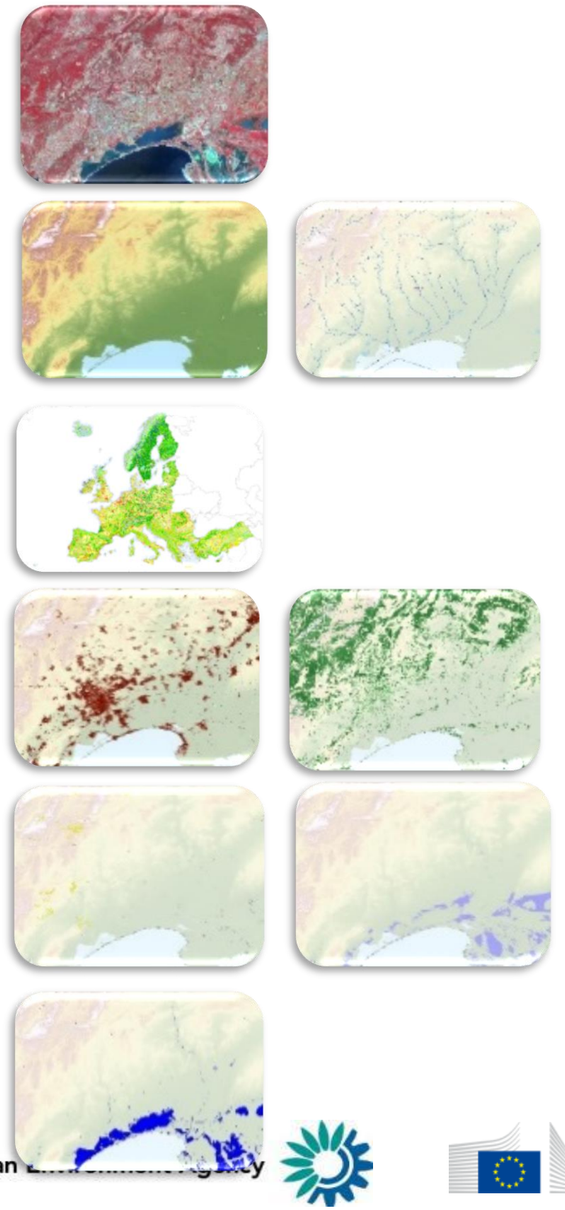
Land Monitoring

Overview Pan-European component **existing** products

- HR + VHR **image mosaics**
- **EU-DEM** and **EU-Hydro**
- **Corine** Land Cover 2012(CLC)
- Existing 5 thematic **HRL**'s **for 2012**:
  - imperviousness,
  - forests,
  - natural grasslands,
  - wet lands,
  - water bodies



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Product lines

1. Pan-European component

- Corine 1990, 2000, 2006, 2012; evt. CLC+ (0.5 ha) 2018 onwards
- High Resolution Layers (2006, 2009), 2012, 2015, 2018 (imperviousness, forest, grassland, water bodies, wetlands)

2. Local component

- Urban Atlas 2006, 2012, 2018
- Riparian Zones (LC Biodiversity) 2012, 2018
- N2000 2006, 2012
- Upcoming: small woody features (SWF), coastal zones, snow and ice

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Current update frequency for various products

Product	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
HRL Imperviousness	■			■			■			■			■		
HRL forest, water, wetland, grassland							■			■			■		
CLC	■						■						■		
Urban Atlas	■						■						■		
Riparian zones							■						■		
SoER				← ■					← ■					← ■	

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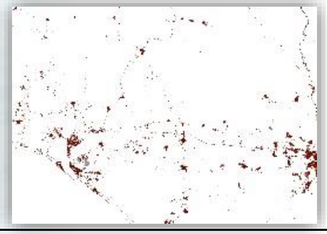
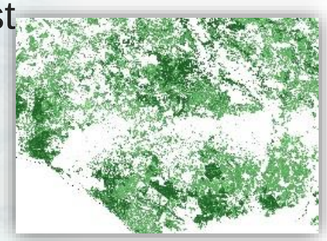
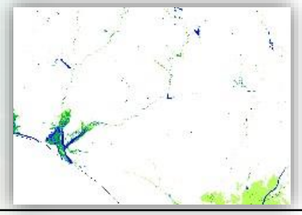
Overview Pan-European component- **in production HRL's**

Lot	Topic	Products	Comment
1	Imperviousness 	• Imperviousness density • Imperviousness density change • Imperviousness density change classified	Full re-processing of 2006-2009-2012 time series and related change products. Tbd. which products for verification
2	Forest 	• Tree Cover Density • Dominant Leaf Type • Forest type • Tree Cover density change • Leaf Type change	Continuation of the 2012 products with some minor changes and new change products
3	Grassland 	• Grassland	New baseline product, based on time-series analysis
4	Wetness and Water 	• Wetness and water	New baseline: Combined product mapping 4 classes of wetness and water presence based on multi sensor time-series analysis
5	Small Woody Features (SWF)	• Small woody features	New product based on VHR data

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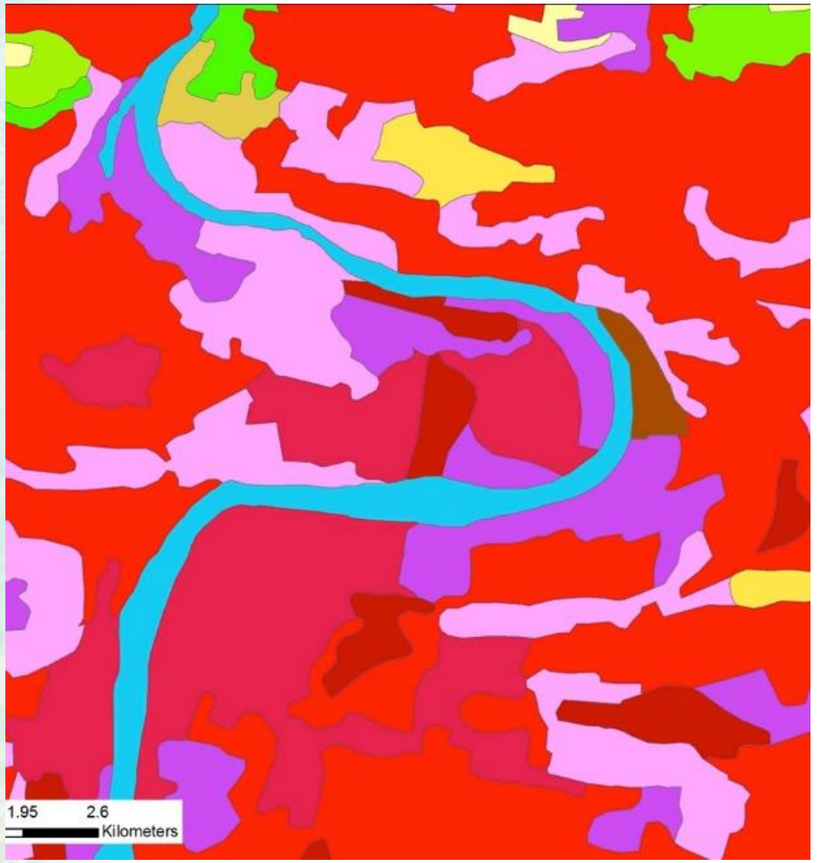
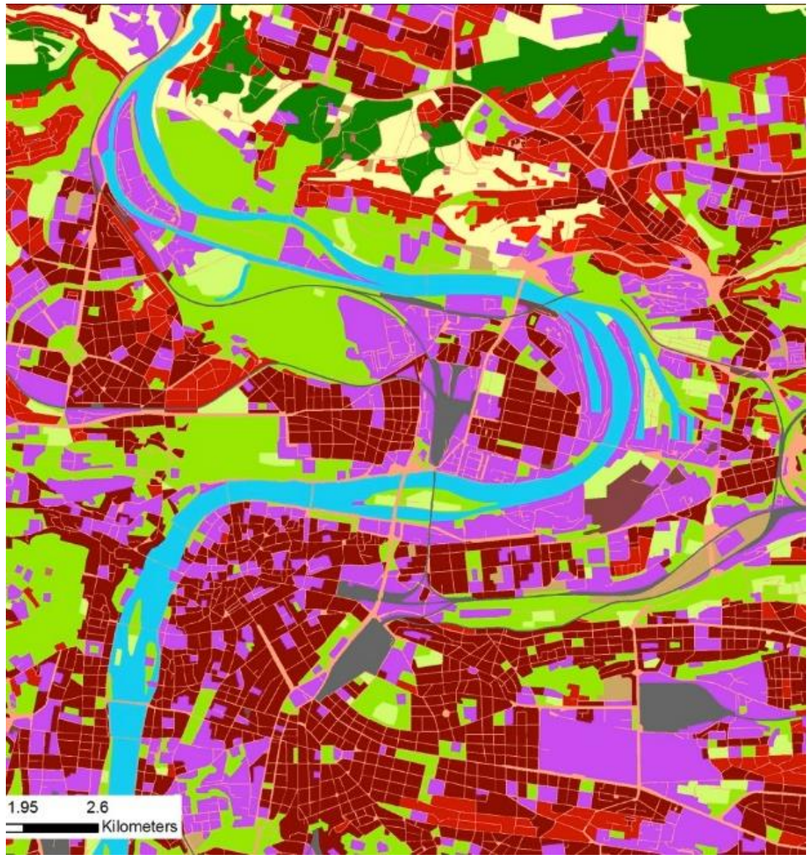
Challenge for Land recycling indicator – from CLC to Urban Atlas

Corine Land Cover



Urban Atlas



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Copernicus
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Copernicus Land Monitoring service

Land Monitoring

Copernicus Land Monitoring service Webpage:

http://land.copernicus.eu/

- **View data**
- **Download data**
- **WMS**

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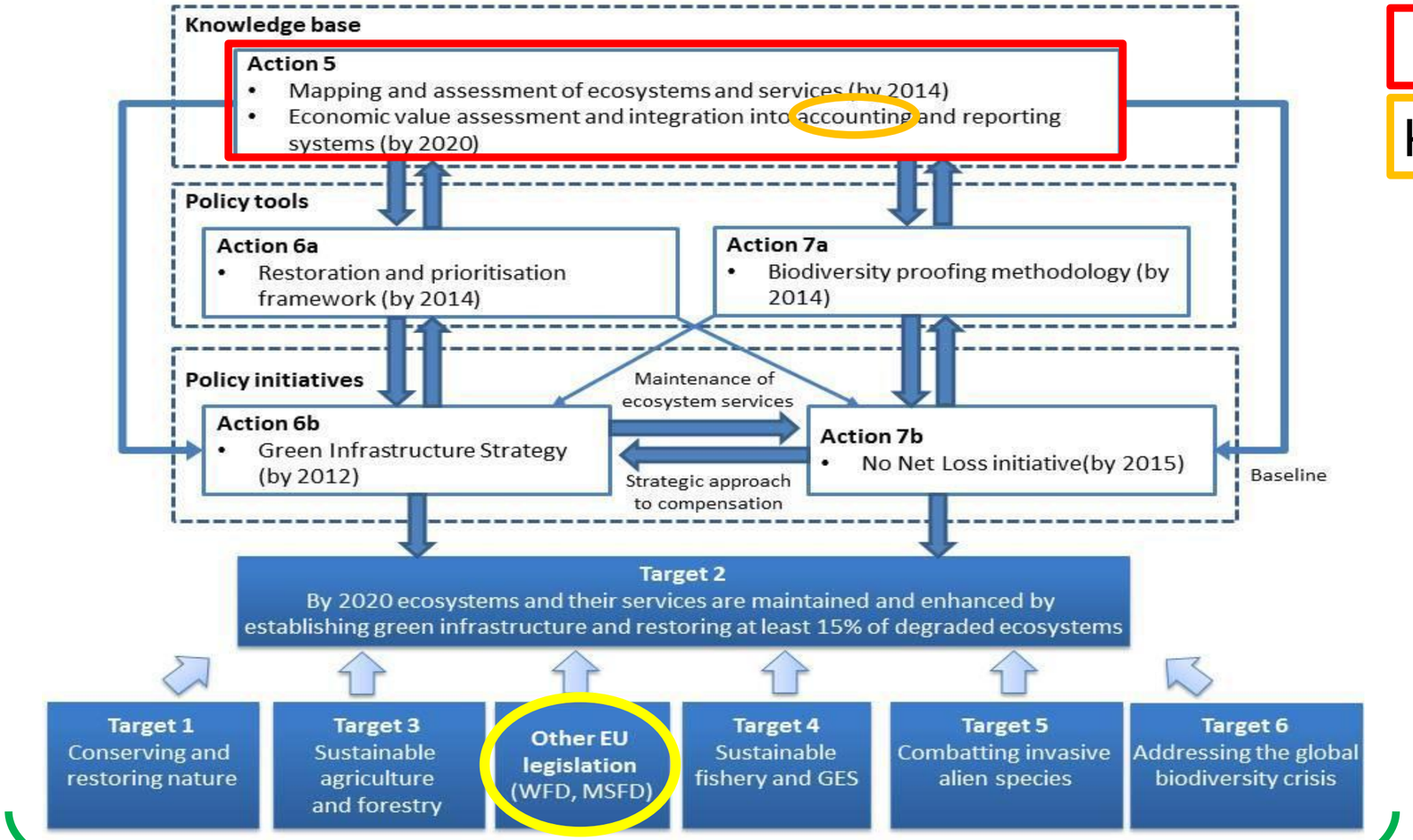
EU Biodiversity Strategy to 2020 Target 2

2020 headline target:
Halting the loss of biodiversity and the degradation of ecosystem services in the EU by 2020, and restoring them in so far as feasible, while stepping up the EU contribution to averting global biodiversity loss.

Action 5:
‘Member States, with the assistance of the Commission, to **map and assess the state of ecosystems and their services** in their national territory by 2014, assess the economic value of such services, and promote the **integration of these values into accounting and reporting systems at EU and national level** by 2020’

EU Biodiversity Strategy to 2020 – MAES – KIP-INCA



MAES

KIP-INCA

Natural Capital 7th EAP

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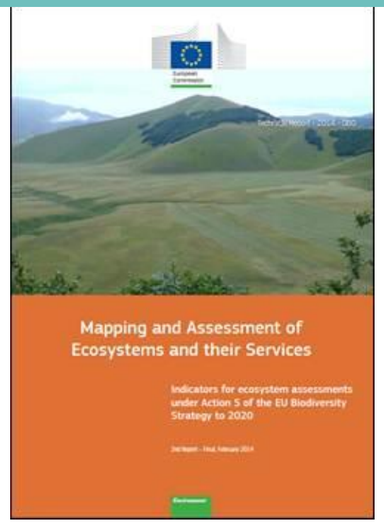
MAES Analytical Framework

Common Assessment Framework:

Building blocks for an integrated assessment



- Improving the knowledge base
  uptake of new information, interpretation, integration …
- Mapping and assessing ecosystem services
  ecosystem service modelling
- Linking ecosystem condition and ecosystem services
  sensitivity of service assessments to condition changes
- Providing input and using accounting and valuation
  ecosystem extent and condition

(1)
Map ecosystems

Urban	**Land use land cover data, e.g.**
Cropland	Corine Land Cover
Grassland	Copernicus high resolution data
Woodland and forest	Elevation data
Heathland and shrub	Seabed maps
Sparsely vegetated land	National datasets
Wetlands	
Rivers and lakes	Models for spatially delineating wetlands or natural, unmanaged systems
Marine inlets and transitional waters	
Coastal	
Shelf	
Open ocean	

(2)
Assess the condition of ecosystems

Indicators	*Data*
Conservation status of habitats and species	Art.17 assessment
Ecological status of water bodies	WFD assessment
Environmental status of seas	MSFD assessment
Ecosystem status and biodiversity	data including air pollutant concentration, habitat connectivity, land use change, soil degradation, …

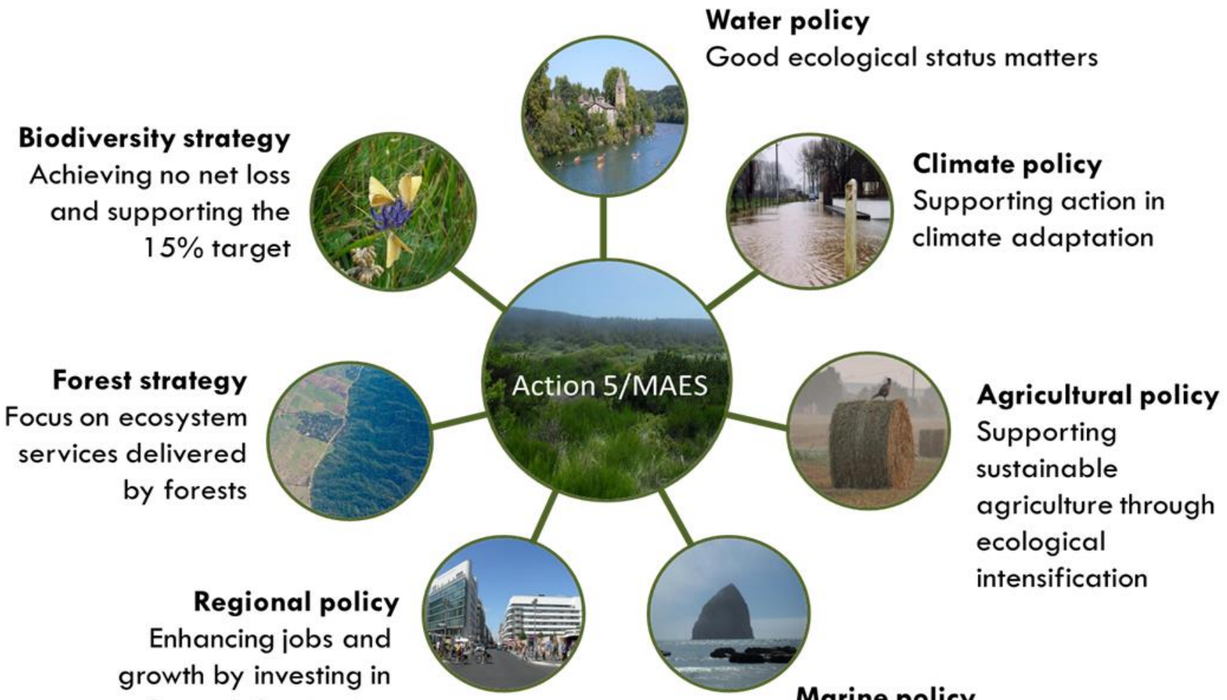
(3)
Assess te ecosystem services delivered by ecosystems

Indicators	*Data and models*
Supply indicators: Indicators of stock and flow of ecosystem functions and ecosystem services	Different sources of environmental data and models
Demand indicators: Indicators for the human demand for ecosystem services	Different socio-economic statistics

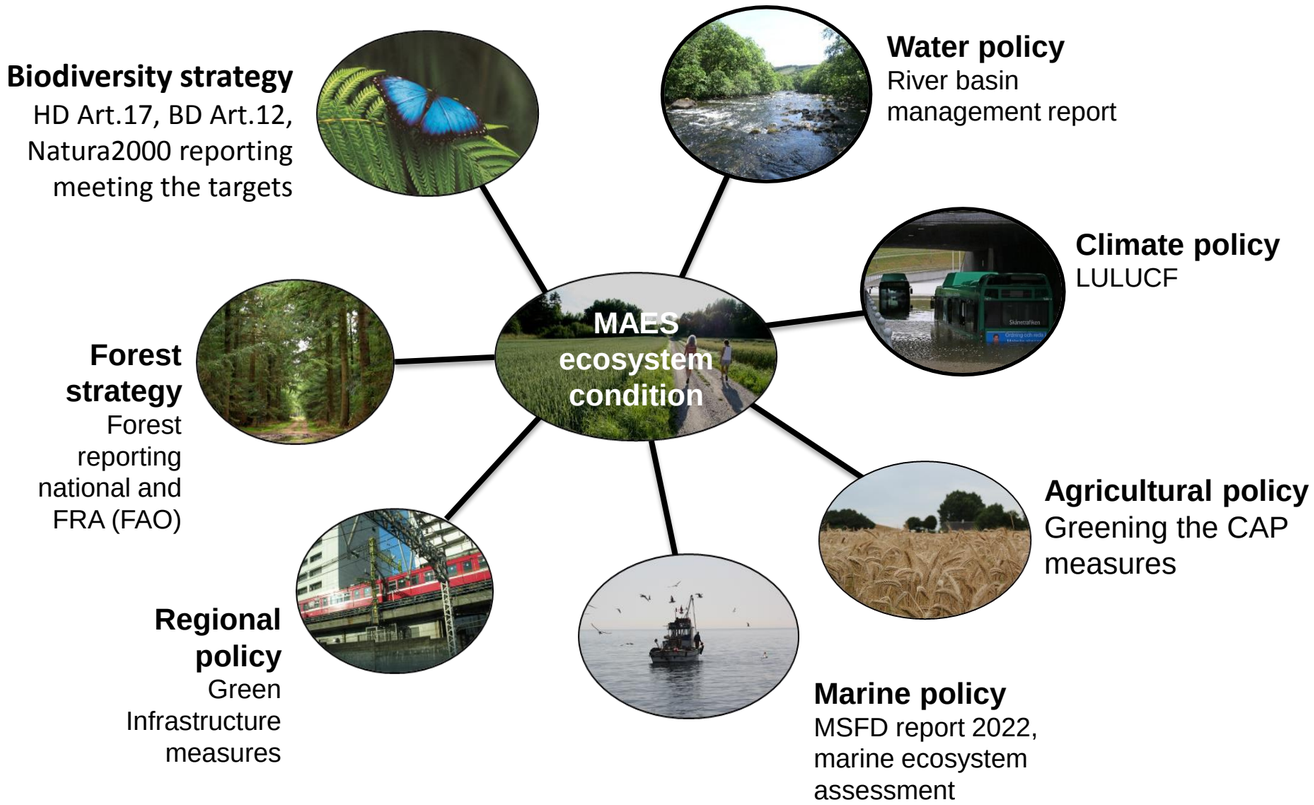
(4)
Integrated ecosystem assessment:
How does condition relate to services provision?
How do the various ecosystem types interact to provide services?

Policy Mainstreaming - Integration

DG-ENV view

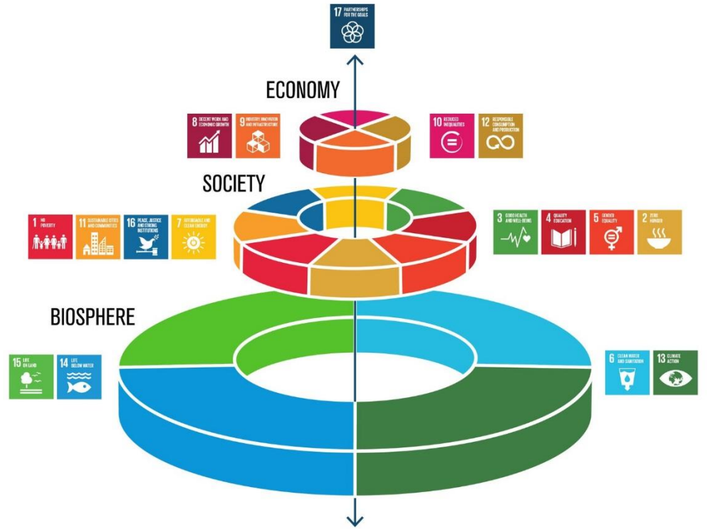


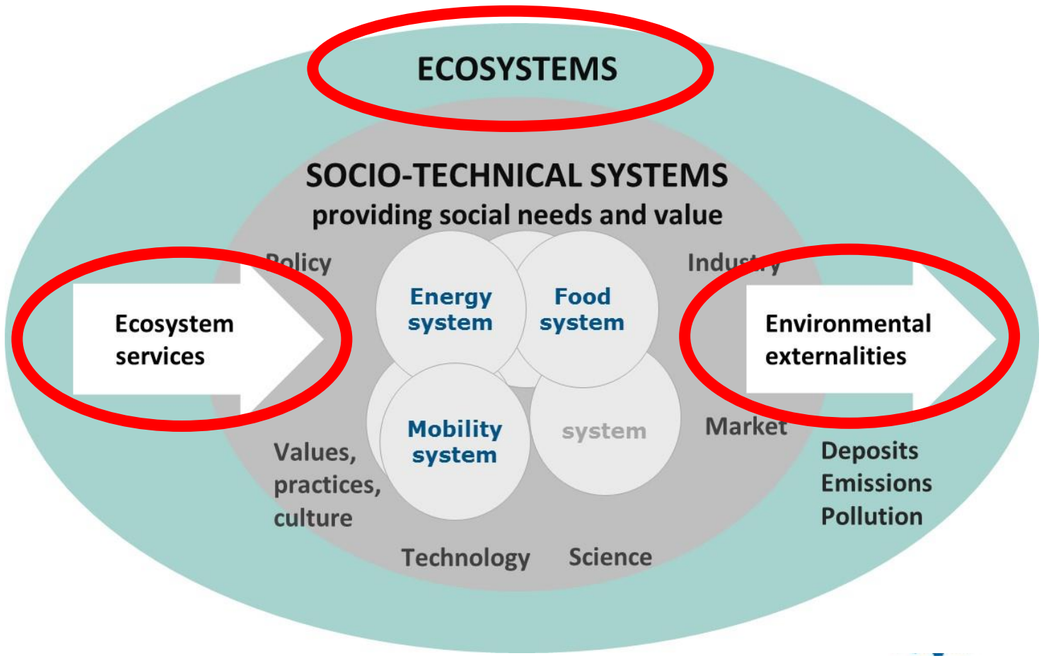
Member State perspective



MAES in broader context

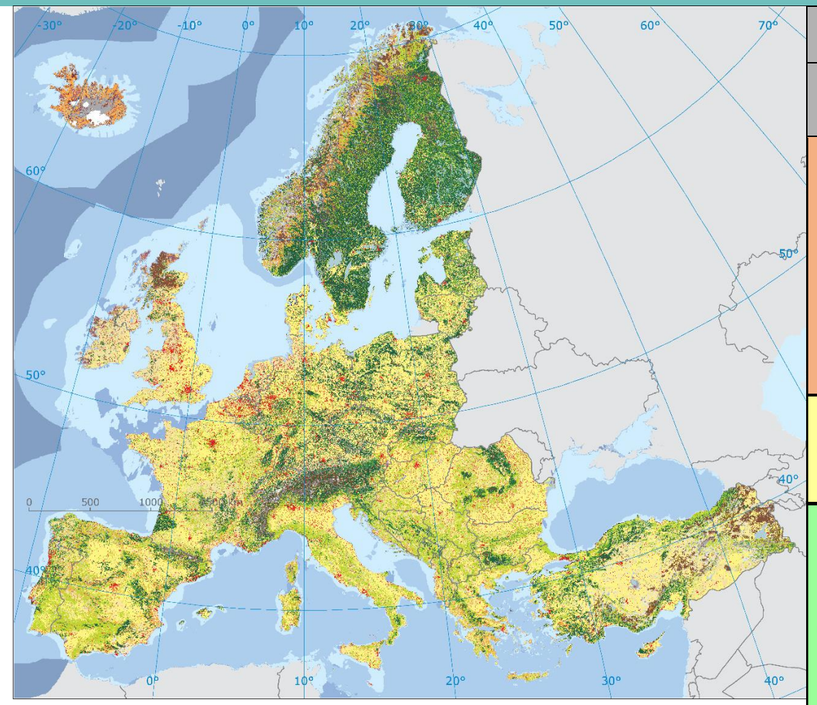
- NEC Art. 9 air pollution and biodiversity
- Climate change mitigation / adaptation
- UN Sustainable Development Goals (SDGs)
- Systemic changes and natural capital

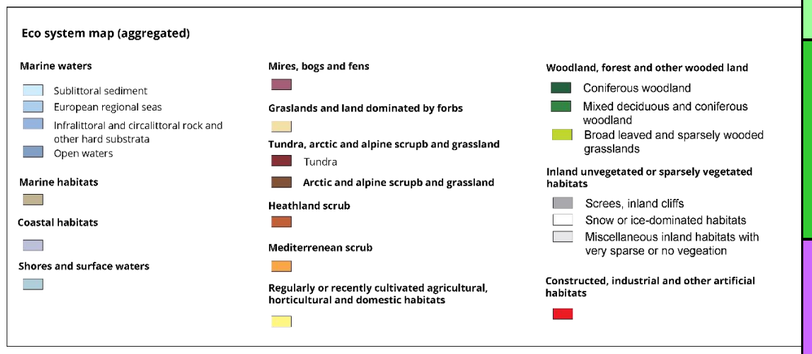




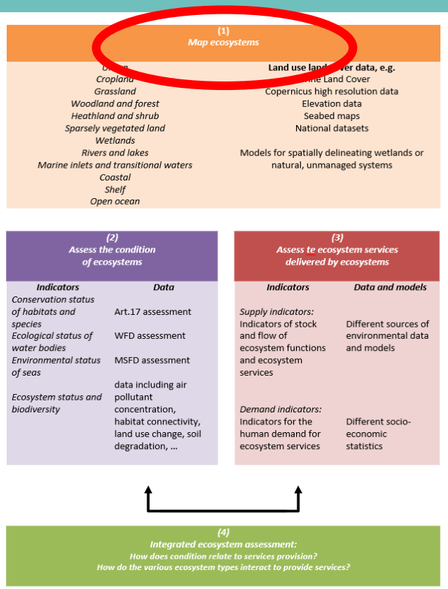
Mapping Ecosystems

EUNIS Habitat – Land cover – Reference Data





Ecosystem type	EUNIS Level 1	EUNIS Level 2	Total ecosystem coverage	
			Area (km²)	% area EUNIS level 2 per level 1
Urban	J Constructed, industrial and other **artificial** habitats	J1 Buildings of cities, towns and villages	**102151**	46.08
		J2 Low density buildings	**94150**	42.47
		J3 Extractive industrial sites	**6453**	2.91
		J4 Transport networks and other constructed hard-surface areas	**16100**	7.26
		J5 Highly artificial man-made waters and associated structures	**1828**	0.82
		J6 Waste deposits	**998**	0.45
Cropland	I Regularly or recently cultivated **agricultural**, horticultural and domestic habitats	I1 Arable land and market gardens	**1243168**	99.18
		I2 Cultivated areas of gardens and parks	**10292**	0.82
Grassland	E **Grasslands** and land dominated by forbs, mosses or lichens	E1 Dry grasslands	**9330**	1.35
		E2 Mesic grasslands	**571931**	82.48
		E3 Seasonally wet and wet grasslands	**55771**	8.04
		E4 alpine and subalpine grasslands	**21128**	3.05
		E5 Woodland fringes, clearings and tall forbs stands	**0**	0.00
		E6 Inland salt steppes	**3043**	0.44
		E7 sparsely wooded grasslands	**32195**	4.64
Woodland and forest	G Woodland, **forest** and other wooded land	G1 Broadleaved deciduous woodland	**487970**	28.29
		G2 Broadleaved evergreen woodland	**49248**	2.86
		G3 Coniferous woodland	**695907**	40.35
		G4 Mixed woodland	**291687**	16.91
		G5 Lines of trees, small woodlands, recently felled woodlands, early stage woodland, coppice	**199784**	11.58
Heathland and shrub	F **Heathland**, scrub and tundra	F1 Tundra	**0**	0.00
		F2 Arctic, alpine and subalpine scrub	**34524**	14.88
		F3 Temperate and mediteraneo-montane scrub	**52824**	22.76
		F4 Temperate shrub heathland	**691**	0.30



http://www.eea.europa.eu/data-and-maps/data/ecosystem-types-of-europe

Source: ETC/SIA 2014

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DPSIR Framework – Understanding the Causalities

Drivers

Population, economic growth, technology...

Pressures

Habitat change

Climate change

Land/sea use

Invasive species

Nutrient load and pollution

State/condition

Habitat quality

Species abundance and diversity

Water quality

etc...

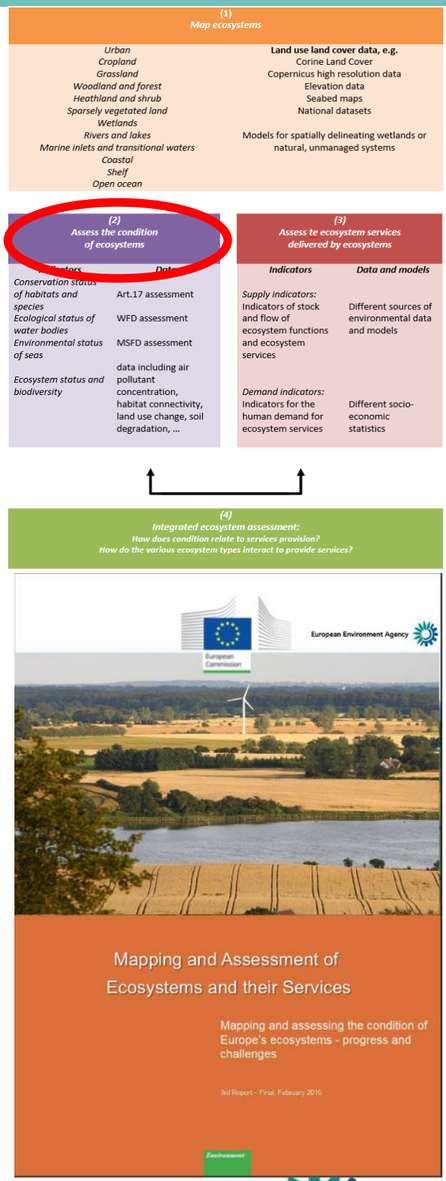
Impacts

Change in ecosystem state (habitat loss or degradation, change in species abundance...)

Response

Policy measures to reduce impacts (protection, pollution reduction, land management...)

Change of our Natural Resources



http://ec.europa.eu/environment/nature/knowledge/ecosystem_assessment/pdf/3rdMAESReport_Condition.pdf

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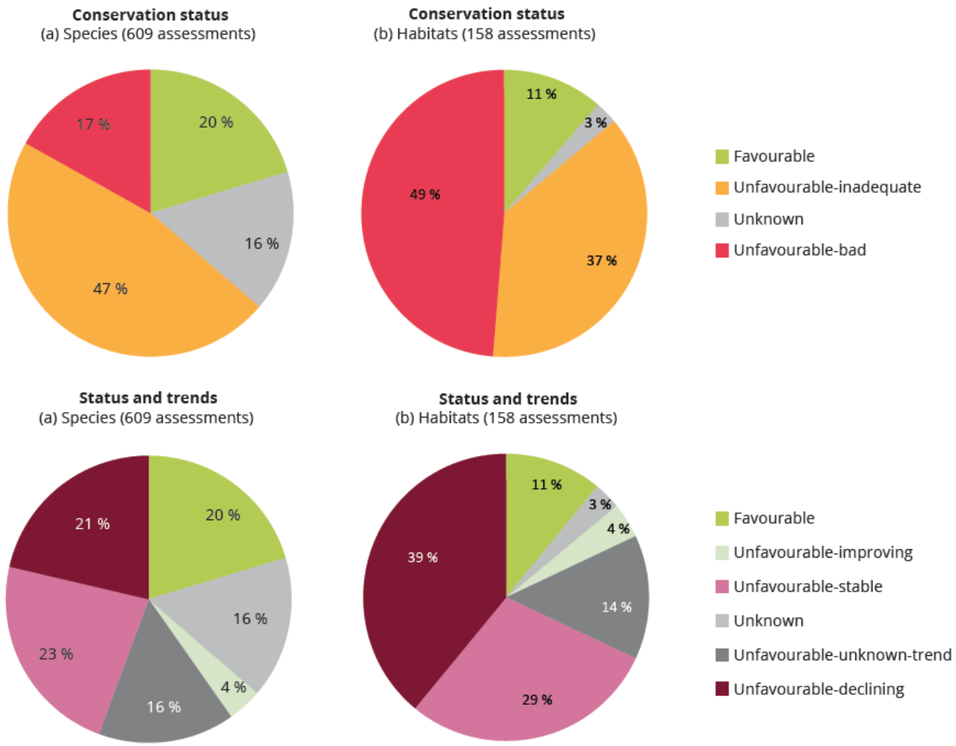
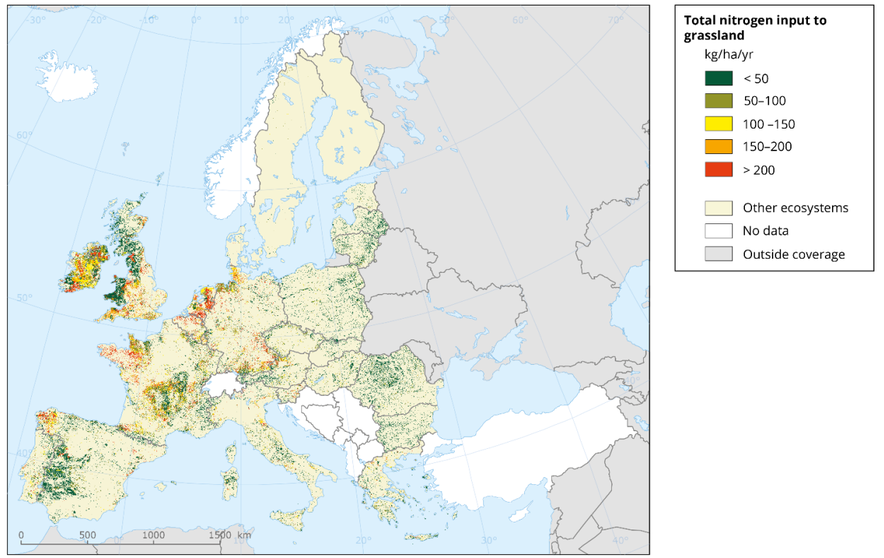
Causalities - developing story-lines e.g. grassland

Grassland ecosystems:
non-bird species and habitat conservation status and trends

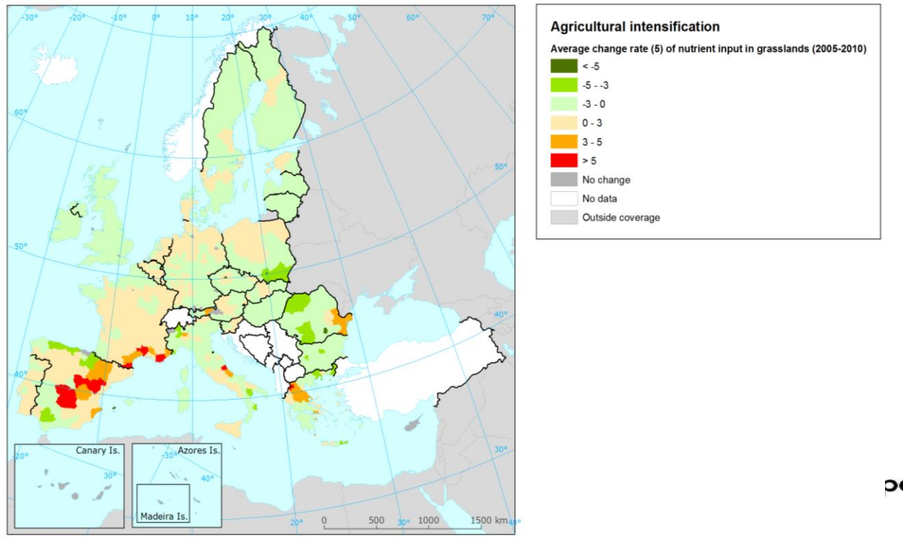


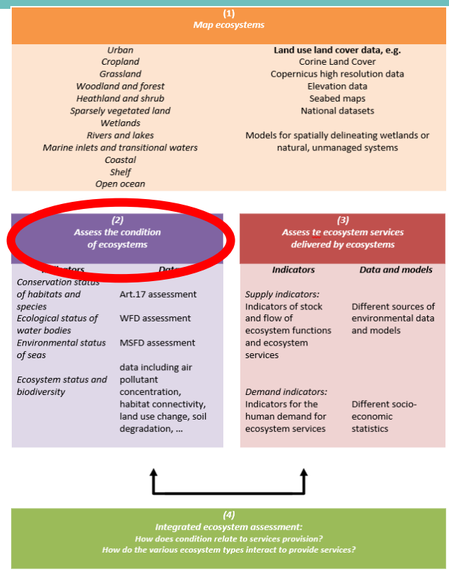
Nature report (EEA,2015)

Nitrogen input 2010



Change in nitrogen input 2005-2010





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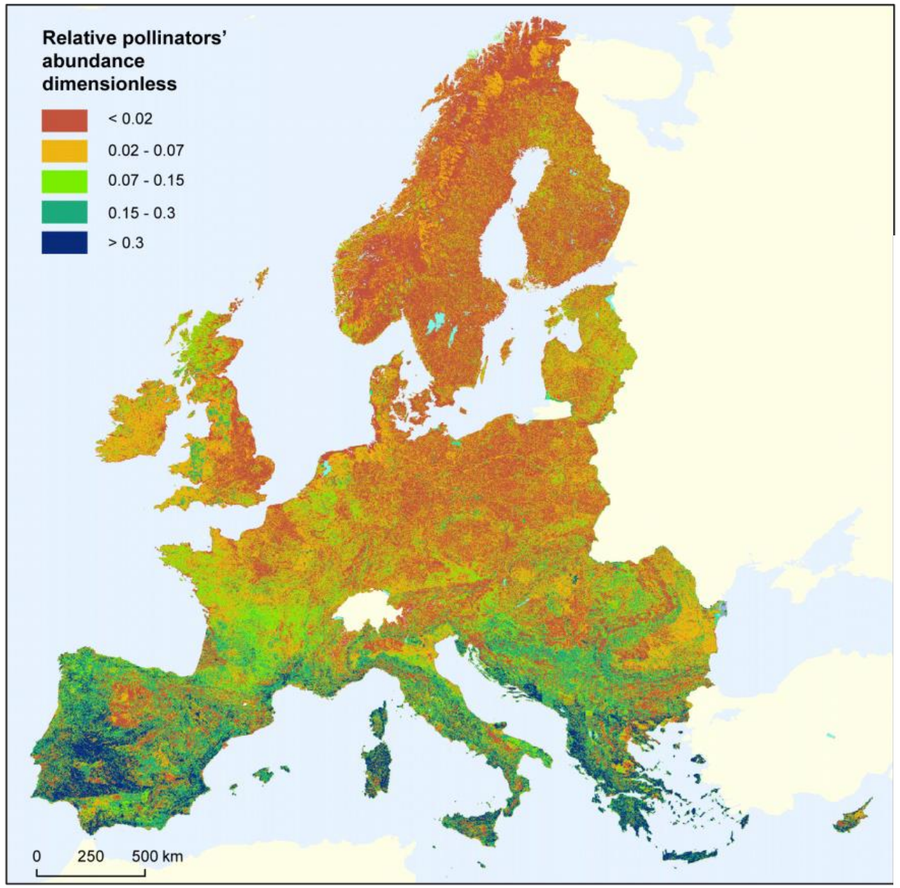
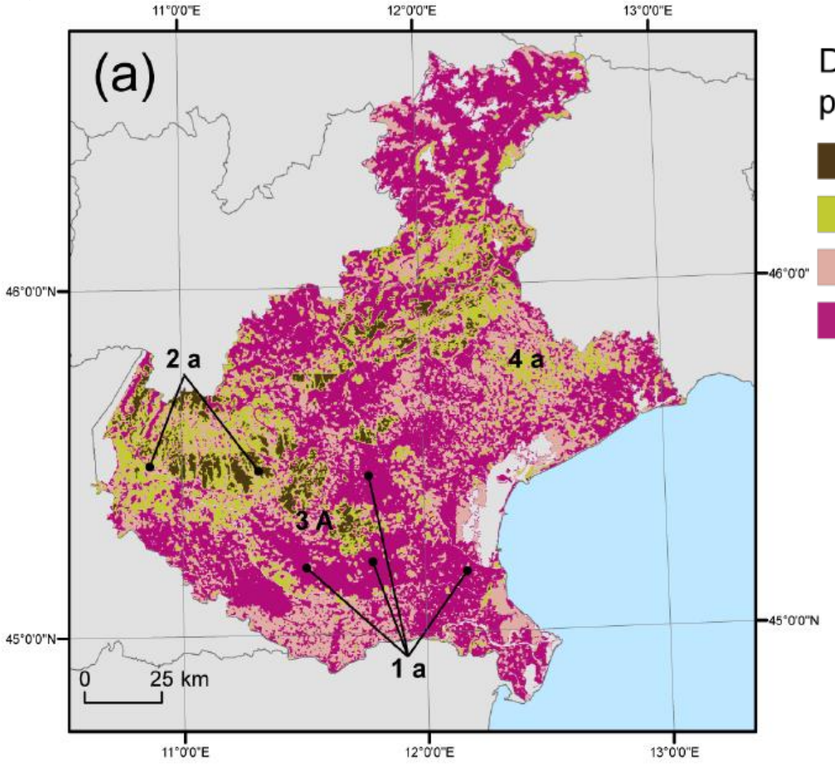
Modelling and Mapping of Ecosystem Services

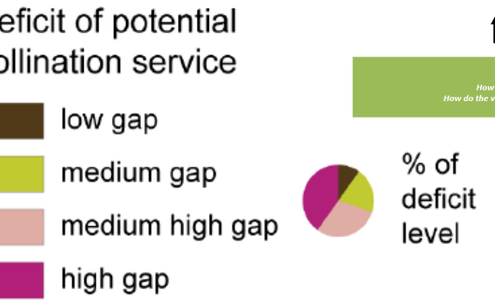
Pollination Service



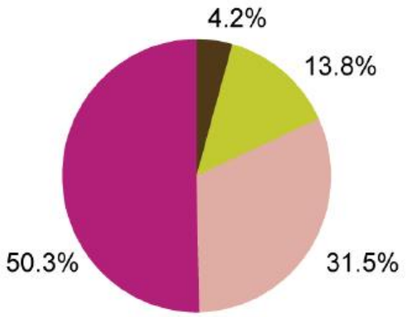
Source: J. Maes, JRC, 2014

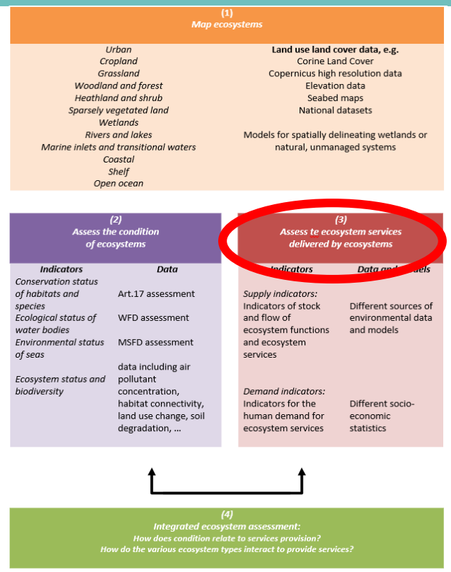
Pollination Service - spatial connectivity





% of deficit level





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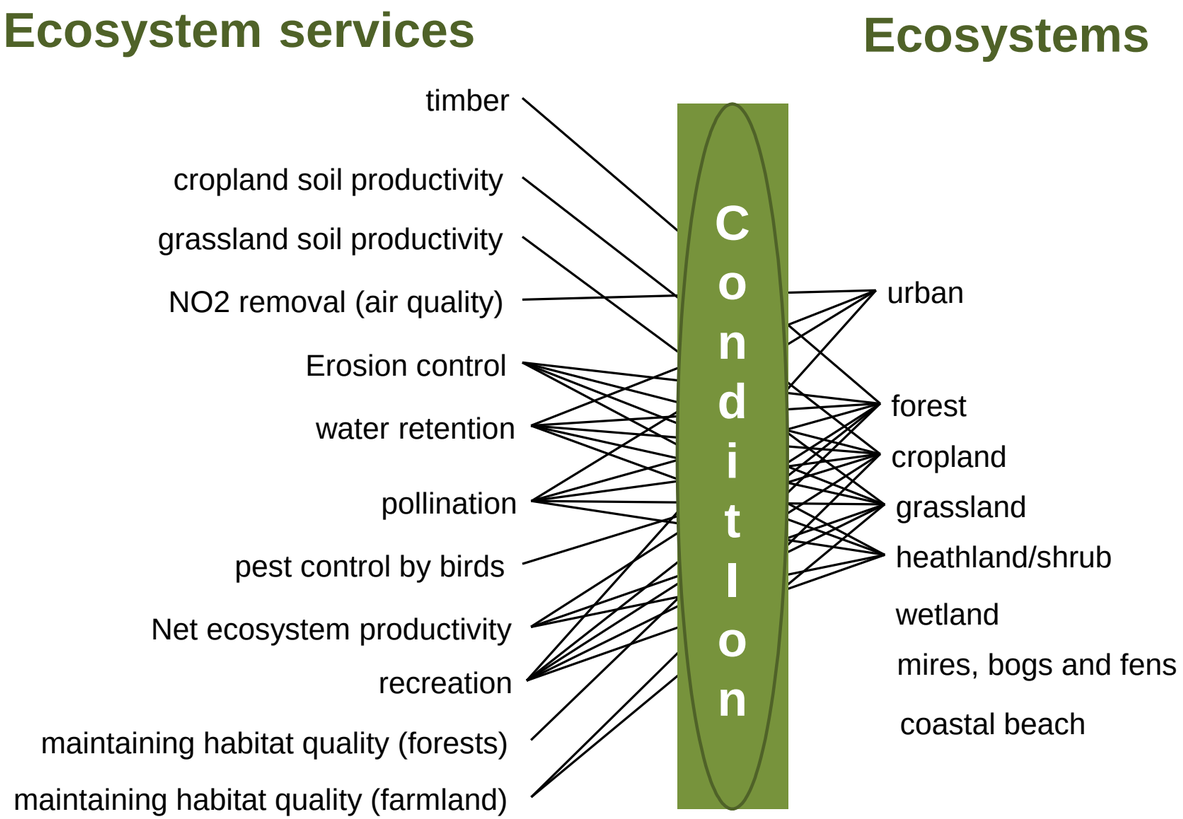
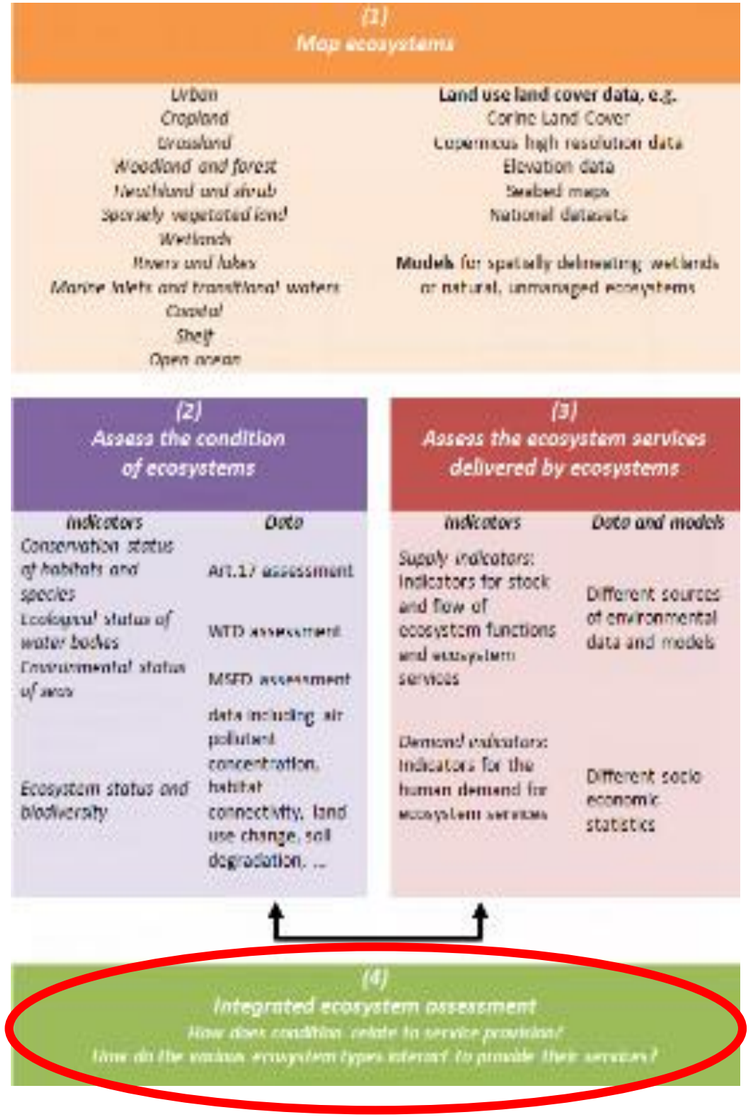
Ecosystem Multi-functionality

Illustrative Example



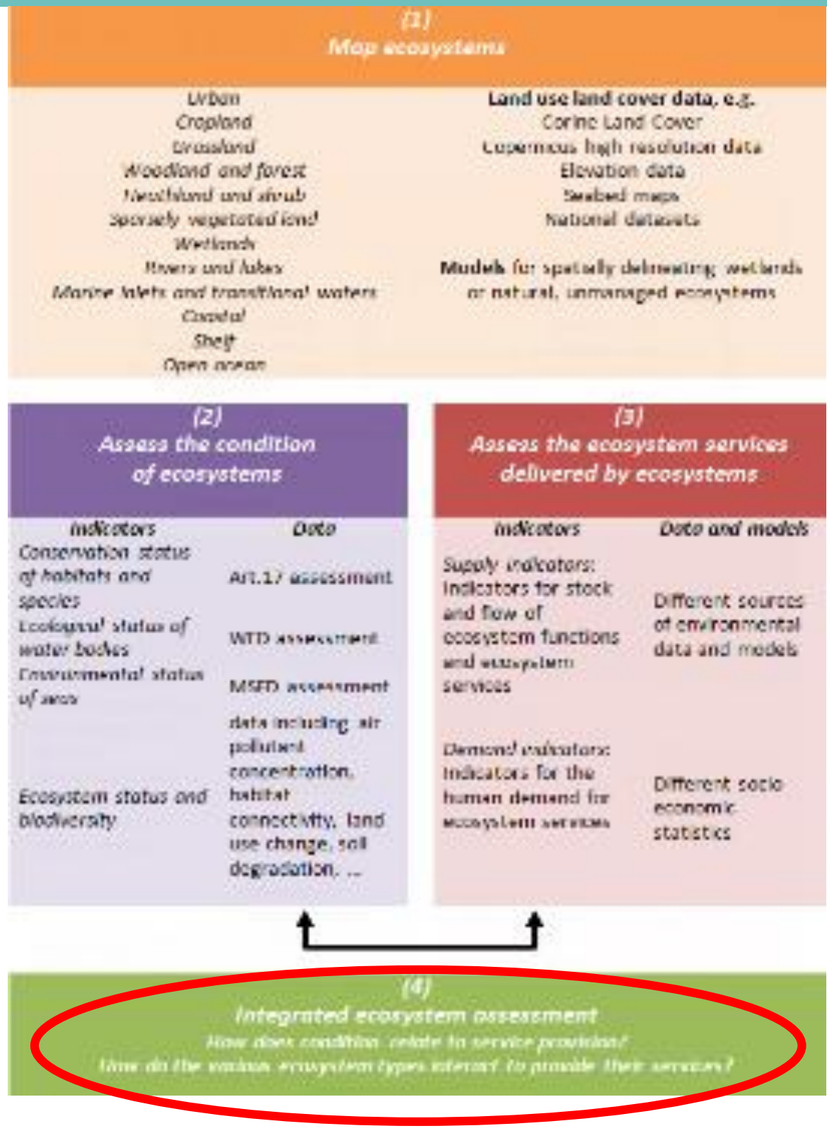


Ecosystem Condition - Ecosystem Services

Management → enhance multiple service portfolios

Condition - assessment		
Pressures	Status	Biodiversity
NEC IAS … … …	HBD WFD MSFD	Common Bird Indicator …
Ecosystems		

Ecosystem Services
Provisioning Food, timber Fish …… **Regulatory** Pollination Genetic diversity Water/flood regulation …… **Cultural** Recreation Heritage Intrinsic value (bequest) ……



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Green Infrastructure

Promoting Green Infrastructure through EU's main policy areas and legislation

GI: can be significant contribution to many of the EU's main policy objectives, especially as regards

- **Sustainable growth and jobs** / Europe 2020
- **Cohesion, regional and rural development**
- **Urban policy**
- **Climate change** mitigation and adaptation
- **Disaster risk reduction and management**
- **Agriculture/forestry, water** and the **environment**
- **Horizon 2020**

Legislation

The Water Framework Directive

The Birds & Habitats Directive

Birds/habitats

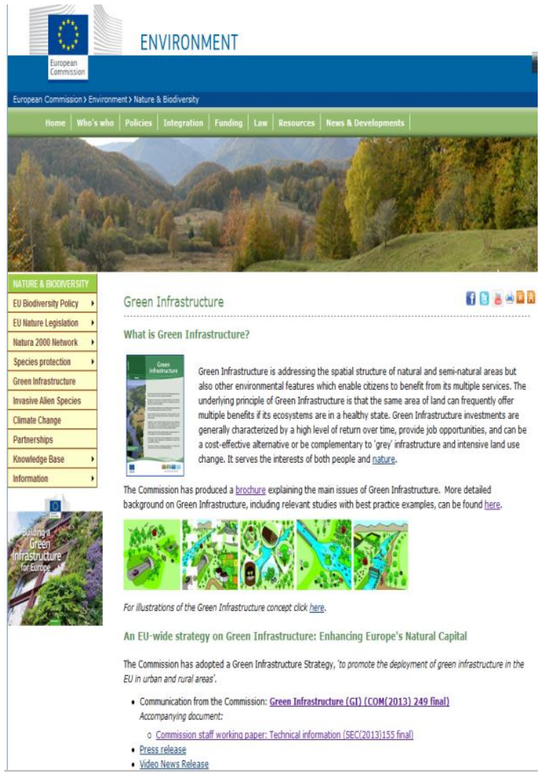
The Floods Directive

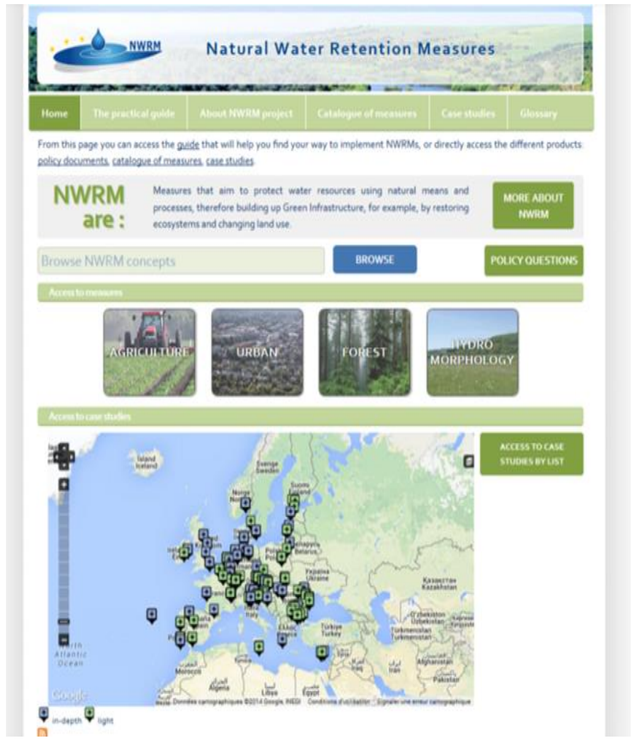
Floods

Source: DG-ENV, 2016

Green Infrastructure

More info on DG ENV, BISE, and NWRM webpages





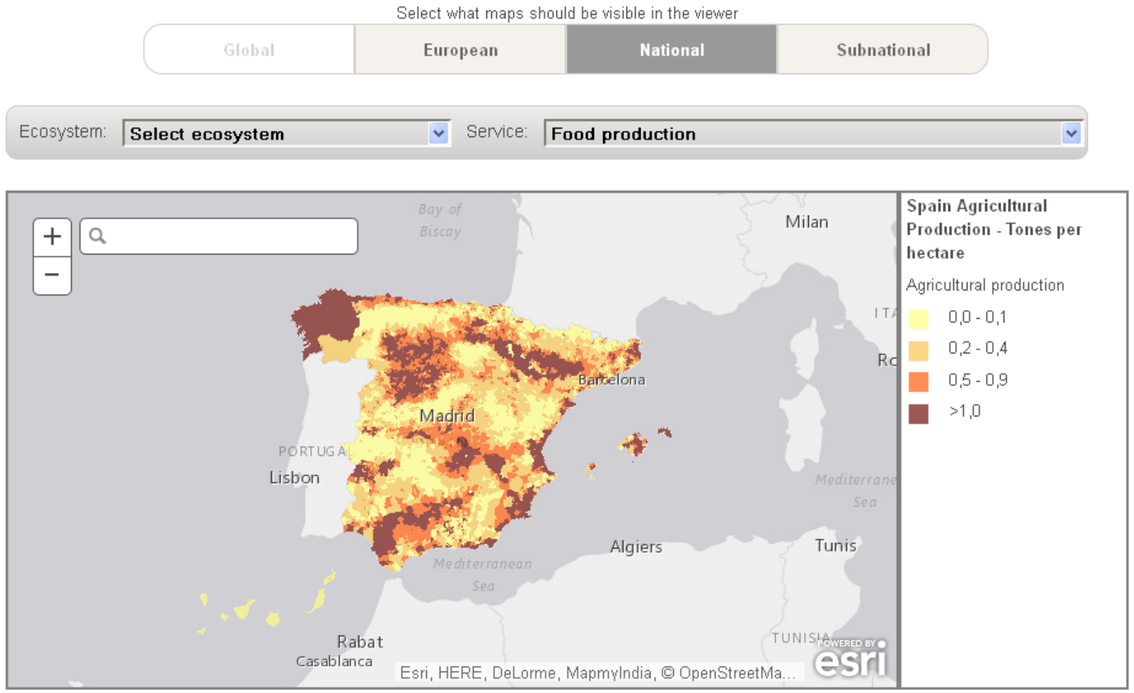
http://ec.europa.eu/environment/nature/ecosystems/index_en.htm
http://ec.europa.eu/environment/water/adaptation/ecosystemstorage.htm
http://biodiversity.europa.eu/bise-catalogue > Green Infrastructure
http://www.nwrm.eu

Source: DG-ENV, 2016

Access to Member State Information – BISE Platform

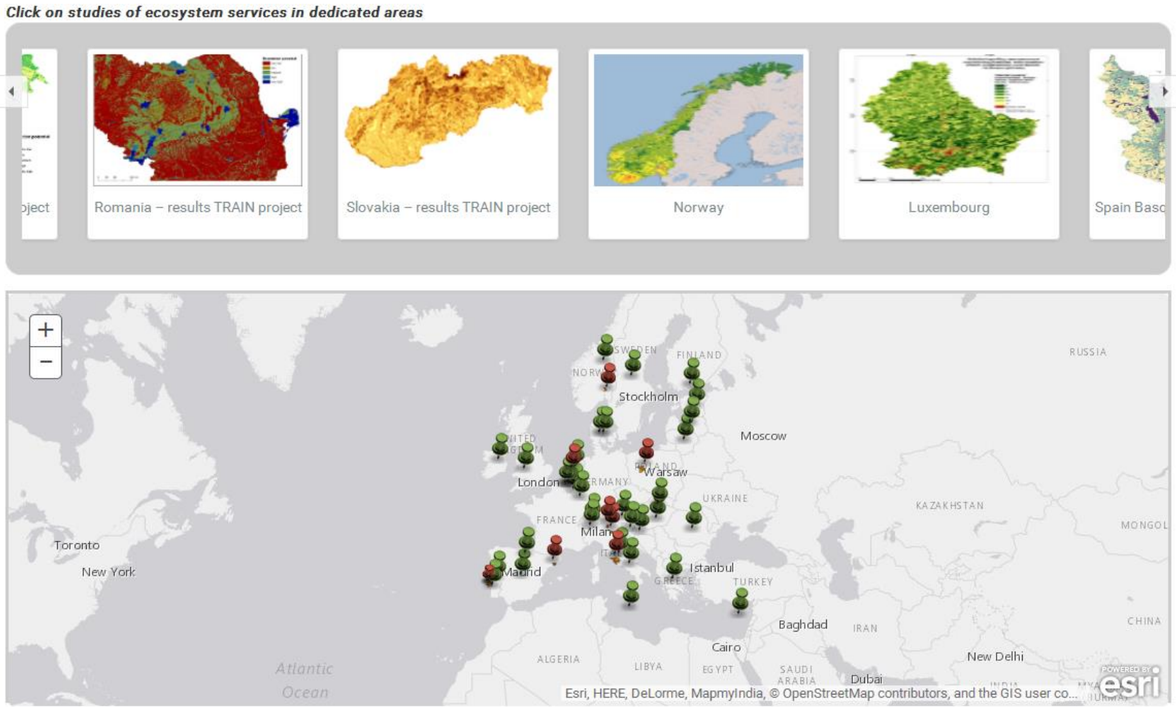
http://biodiversity.europa.eu/countries
http://esmeralda-project.eu/news/13664_esmeralda-country-fact-sheets-now-available-on-bise/
http://biodiversity.europa.eu/ecosystem-assessments

MAES digital atlas:
http://biodiversity.europa.eu/maes/maes-digital-atlas



This case study has been elaborated in the frame of the MESEU (Mapping of Ecosystems and their Services in the EU and its Member States) service contract for the European Commission

Catalogue of case studies:
http://biodiversity.europa.eu/maes/maes-catalogue-of-case-studies



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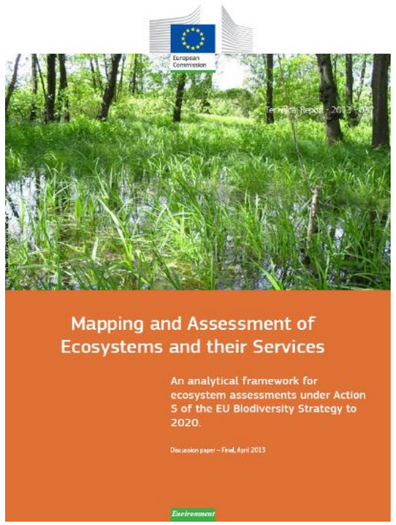
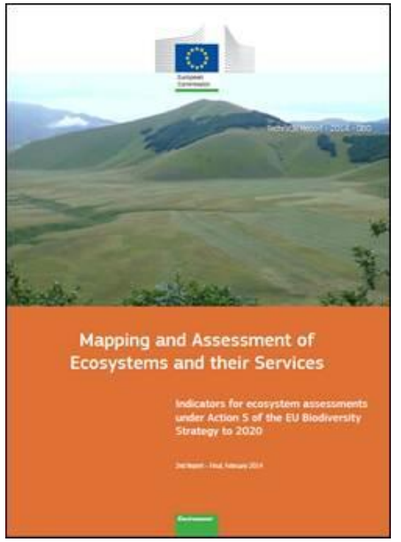
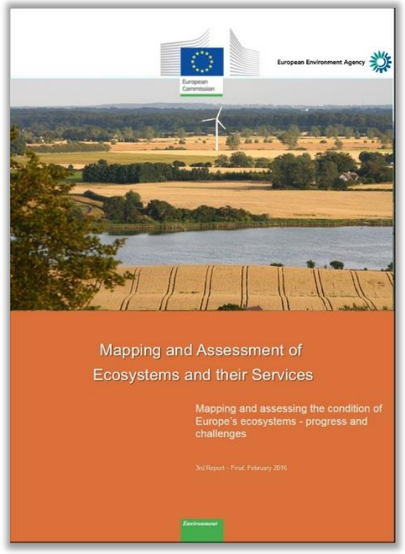
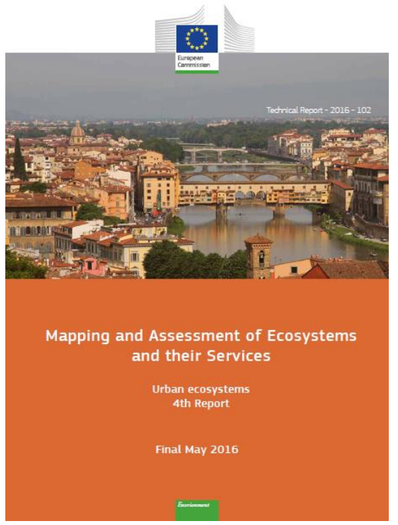
Thank you very much for your attention









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EEA: http://www.eea.europa.eu/
Ecosystem Assessment: http://biodiversity.europa.eu/maes
MAES digital atlas http://biodiversity.europa.eu/maes/maes-digital-atlas
MAES catalogue of case studies: http://biodiversity.europa.eu/maes/maes-catalogue-of-case-studies
Ecosystem Service Classification: www.cices.eu
The Ecosystem Services Partnership: http://www.es-partnership.org/esp
OPPLA platform: http://oppla.eu/
UNSD-SEEA: http://unstats.un.org/unsd/envaccounting/seea.asp

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