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MAES Forest Pilot on ecosystem condition

José I. Barredo

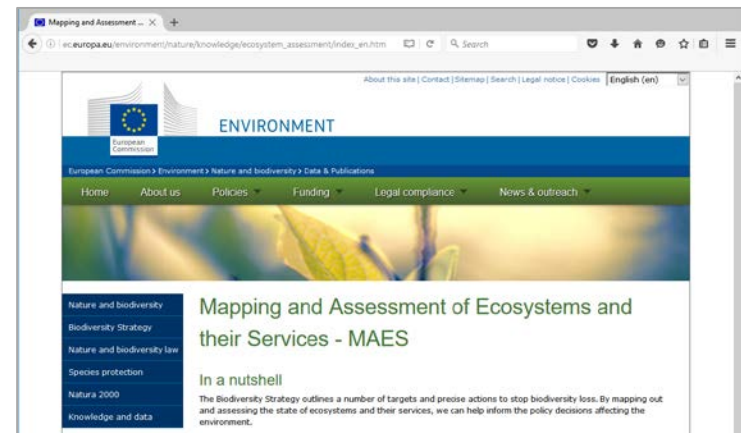
European Commission – Joint Research Centre
Bioeconomy Unit (D1)



Civil Dialogue Group on Forestry and Cork
Brussels, 8th June 2017

What is MAES?

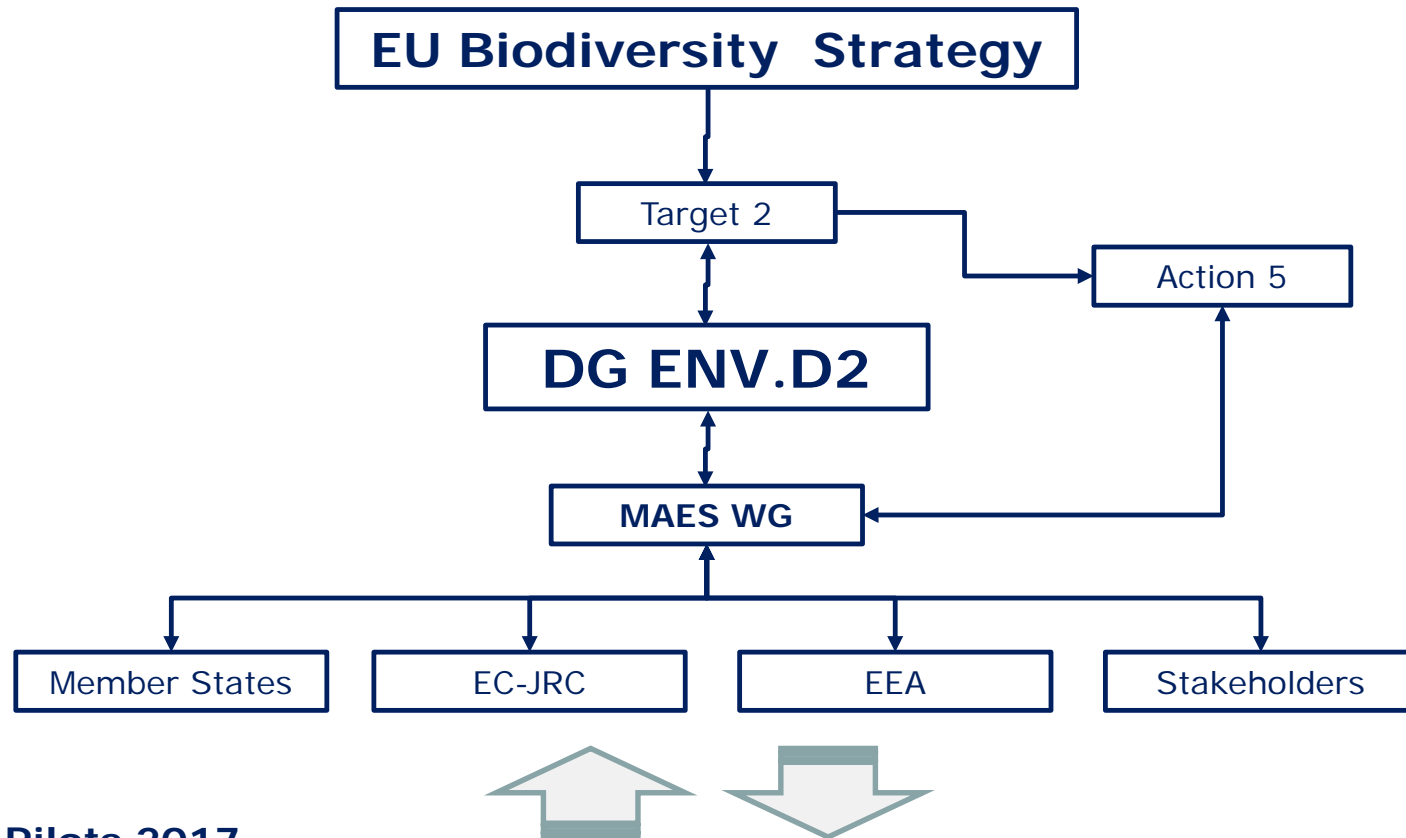
- Initiative supporting the implementation of the EU Biodiversity Strategy
- The Strategy outlines a number of targets and actions to stop biodiversity loss
- Mapping and assessment of the state of ecosystems and their services can help inform the policy decisions affecting the environment
- **MAES working group**
- Was set-up for providing support to MS in reaching Target 2 of the Biodiversity Strategy



Target 2 of the Biodiversity Strategy

- Target 2: By 2020, ecosystems and their services are maintained and enhanced by establishing green infrastructure and restoring at least 15% of degraded ecosystems
- Action 5: Improve knowledge of ecosystems and their services in the EU:
 - MS, with the assistance of the Commission, will 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

MAES Working group



MAES Pilots 2017



Current activities of the MAES Pilots

- **Analytical framework** for mapping and assessment of ecosystem condition
- Describe the **link** between ecosystem condition and ecosystem services
- Appropriate **indicators** on condition
- List European **datasets** available to quantify the indicators
- Clear proposals for the Member States
- Validate and discuss with Member States (workshop)
- 5th MAES report by end of 2017

MAES Forest Pilot on condition

Participants:

DG-Environment (D1 and D2)

Joint Research Centre (D1)

European Environment Agency (EEA)

European Topic Centre on Biological Diversity (ETC-BD)

European Topic Centre on Urban, Land and Soil Ecosystems (ETC-ULS)

Member States and Stakeholders (workshop, 27-28 June 2017)

Aim of the Pilot:

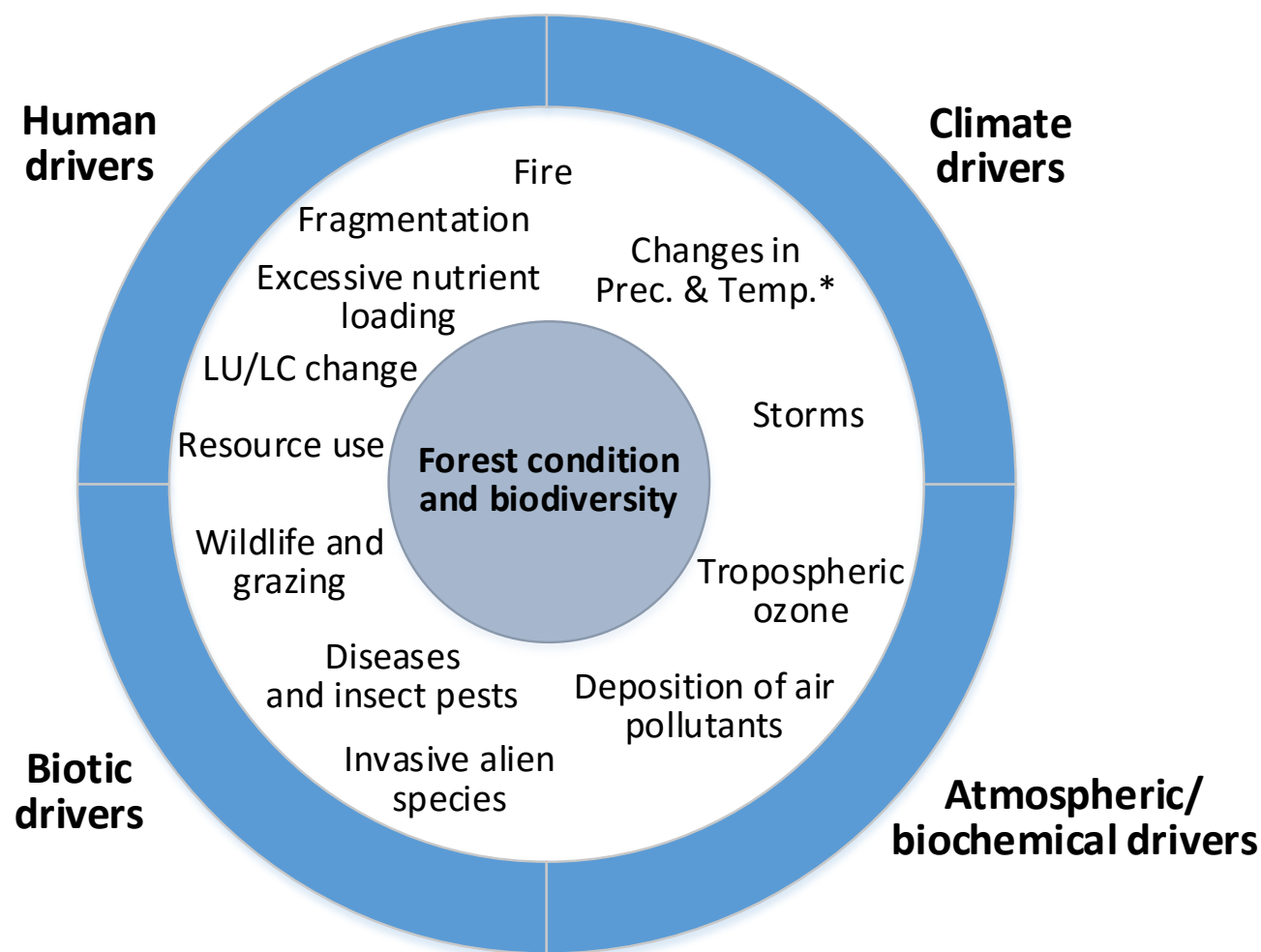
To elaborate an assessment framework (conceptual and analytical) on forest ecosystem condition in Europe.

The framework will contribute to the overarching goal of the Pilot, which is to identify an array of forest condition indicators and corresponding datasets.

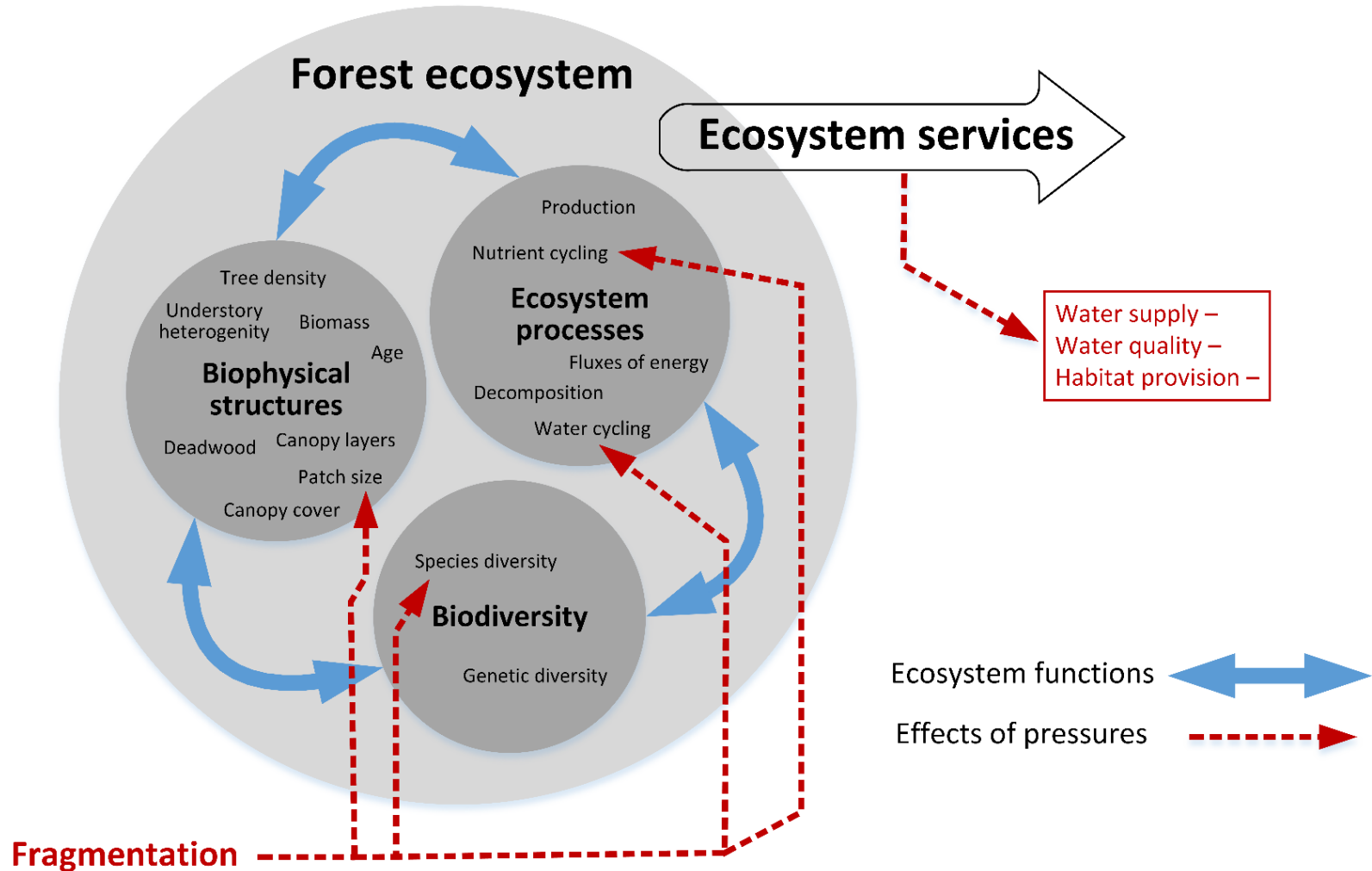
Rationale

- Despite the amount of available information on forest ecosystems from ground surveys and remote sensing, assessing forest condition remains challenging
- Although indicators of forest condition are available, these are in some cases either limited in time, spatial scale or are relative to few dimensions of forest ecosystems
- In addition, there is lack of consensus regarding a definition of forest condition or health that can be operationalised with available indicators

Drivers and pressures of forest ecosystems (draft)



Effects of pressures on ecosystem services



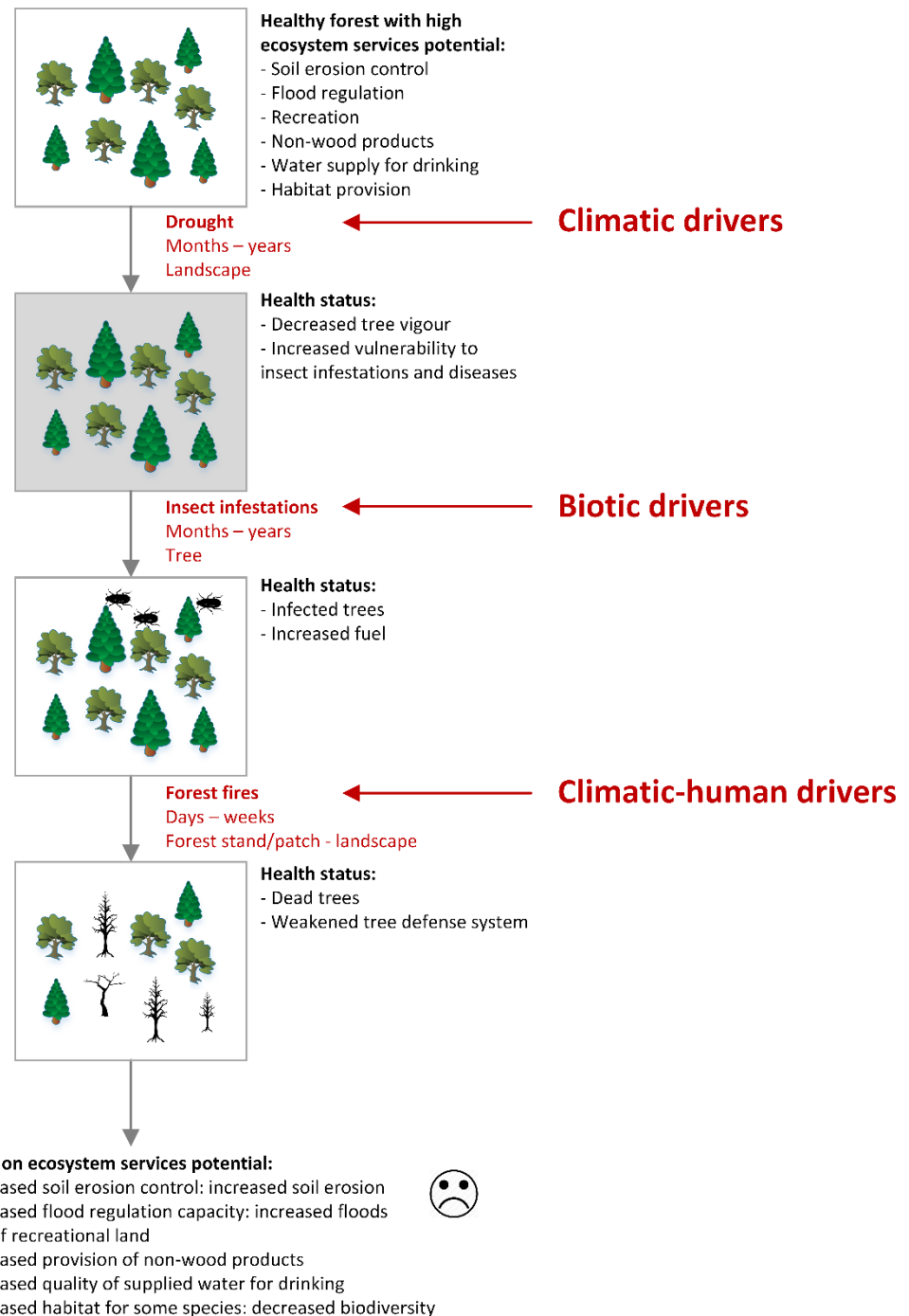
Ecosystem functions are the myriad of subsets of interactions between biophysical structures, biodiversity and ecosystem processes that underpin the capacity of an ecosystem to provide ecosystem services (MAES, 2013)

Example representation of pressures affecting the potential of forest ecosystem services

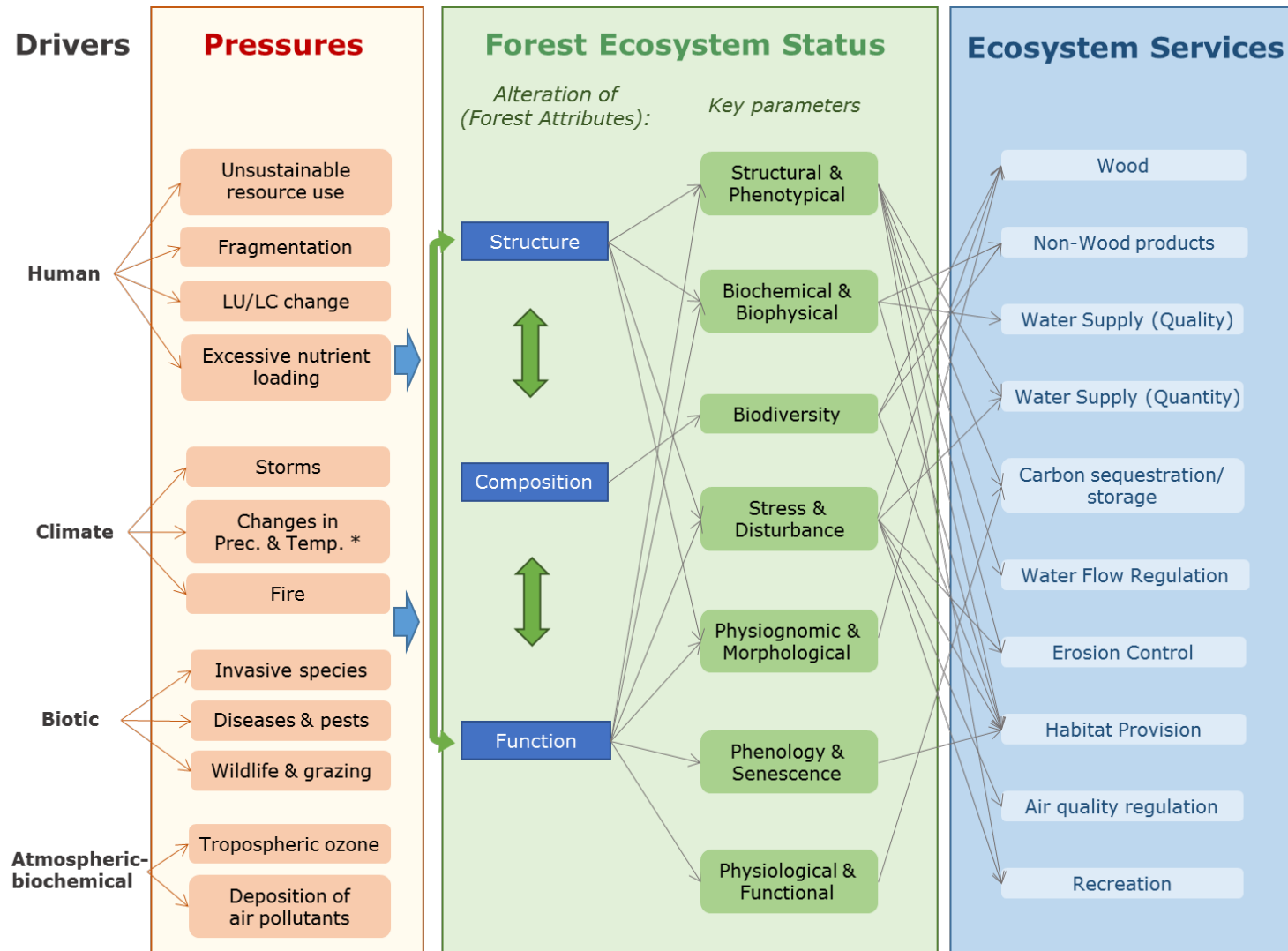
Pressures:

Temporal and spatial scale of occurrence

In the diagram, pressures are described to occur sequentially, one after another, however, often they occur simultaneously in time or in time and space



Analytical framework for forest condition (draft)



Expected impact of pressures on forest ecosystem services (draft)

Ecosystem services	Pests and diseases	Invasive alien species	Storms	Climate change (including drought)	Fires	Air pollution	Fragmentation	LU/LC change	Unsustainable resource use	Excessive nutrient loading
Wood	●	●	●	●	●					
Non-wood products									●	
Water supply (quality)					●	●	●	●	●	●
Water supply (quantity)				●	●		●	●		
Carbon sequestration/storage					●			●	●	
Water flow regulation					●			●		
Erosion control			●		●				●	
Habitat provision		●	●	●	●	●	●	●	●	
Air quality regulation					●					
Recreation			●		●			●	●	

Figure 5. Examples of expected effects of pressures on forest ecosystem services. The information in the figure is not exhaustive, however it is useful for describing the most important qualitative effects (black circles). The figure can be complemented by the users with information at local level from specific case studies.

Indicators of forest ecosystem condition (on-going)

	B	C	D	E	F	G	H	I
		PRESSURE INDICATORS						
	Key parameters	Indicator	Spatial Scale			Datasets		
			Forest Stand	Landscape	Ecological Zones			
4	Storms	Forest damage	X	X	X	1) Extreme Wind Storms Catalogue (http://www.europeanwindstorms.org), 2) European Storms Catalogue (http://www		
6	Changes in Precipitation & Temperature (including drought)	Climate Data	X	X	X	1) Climate datasets e.g. WorldClim, Chelsa, E-Obs, ERA, etc		
9	Fires	Number of fires Burnt area	X	X	X	1) Forest fires (EFFIS)		
12	Unsustainable resource use	Forest overuse	X	X	X	1) Forest statistics: NAI, harvest (NFI)		
14	Fragmentation	Connectivity Patchiness	X	X	X	1) SEBI013: fragmentation and connectivity (forest, natural/semi-natural areas) (FISE)		
17	LU/LC change	Forest cover changes Deforestation	X	X	X	1) Corine Land Cover (Copernicus), 2) Global forest change dataset (Hansen et al., 2013)		
19	Excessive Nutrient Loading	Total nitrogen in soil	X	X				

	B	C	D	E	F	G	H	I
		STATE INDICATORS						
	Key parameters	Indicator	Spatial Scale			Datasets		
			Stand	Landscape	Ecological Zones			
41	Stress & Disturbance	Naturalness	X	X	X	Species and Habitat conservation status (Art.17 database) (EEA)		
42		Conservation status			X			
43		Soil moisture (water stress)	X	X	X			
44		Resource limitations	X					
45		Habitat quality	X	X				
46		Defoliation	X	X				
47		Descoloration	X	X				
48		Drought and heat induced tree mortality-drought-stress	X	X	X			
49	Biochemical & Biophysical	Pigment content (chlorophyll a b Carotene Xanthophyll)	X	X	X	Soil condition (LUCAS) Soil condition (LUCAS)		
50		Nitrogen	X	X	X			
51		Phosphorus content	X	X				
52		Lignin	X	X				
53		Cellulose	X	X				
54		Phenole	X	X				
55		Plant water content	X	X				
56		Wax Starch Sugar	X					
57		Carbon content	X	X				

	B	C	D	E	F	G	H	I
		FOREST BIODIVERSITY INDICATORS						
	Key parameters	Indicator	Spatial Scale			Datasets		
			Stand	Landscape	Ecological Zones			
101	Biodiversity	Plant functional types		X	X	Relative area of protected forest (Natura 2000; CDDA; IUCN World database of protected areas)		
102		Protected forest area		X	X			
103		Species diversity (Alpha, beta, gamma)	X	X	X			
104		Species abundance	X	X	X	SEBI 01 Abundance and distribution of selected species (woodland bird) (EEA)		
105		Phylogenetic	X	X	X			
106		Forest tree species	X	X	X	1) Species richness (of different taxa) (country specific), 2) Tree species richness (FISE), 3) Mauri et al. 2017		
107		Forest types		X	X			
108		Serai diversity	X	X	X	1) Potential datasource: Distribution and suitability maps of revised EUNIS forest habitat types (EEA) http://		
109		Genetic variability	X	X				
110		Threatened species	X	X		Data from IUCN		
111		Deadwood	X	X	X			
112		Understorey vegetation	X	X		1) SEBI 18 Deadwood (EEA) available at national level (Forest Europe) or European scale (SEBI018); 2) NFI de		
113		Common forest bird species			X			
114		Rove beetles	X	X		SEBI 01 Abundance and distribution of selected species (woodland bird) (EEA) (index available at MS level)		
115		Ground beetles	X	X				
116		Overall vascular plant	X	X	X			
117		Overall bryophyte	X	X	X			
118		Moss	X	X	X			
119		Liverwort	X	X	X			
120		Overall lichen	X	X	X			
121		Overall fungal	X	X	X			
122								

June 27 & 28, 2017, Brussels

TUE, JUN 27 AT 9:00 AM,
Brussels, Belgium

MAES Workshop: Assessing and Mapping Ecosystem Condition

by By the European Commission with the support of IUCN, UNEP-WCMC and IEEP

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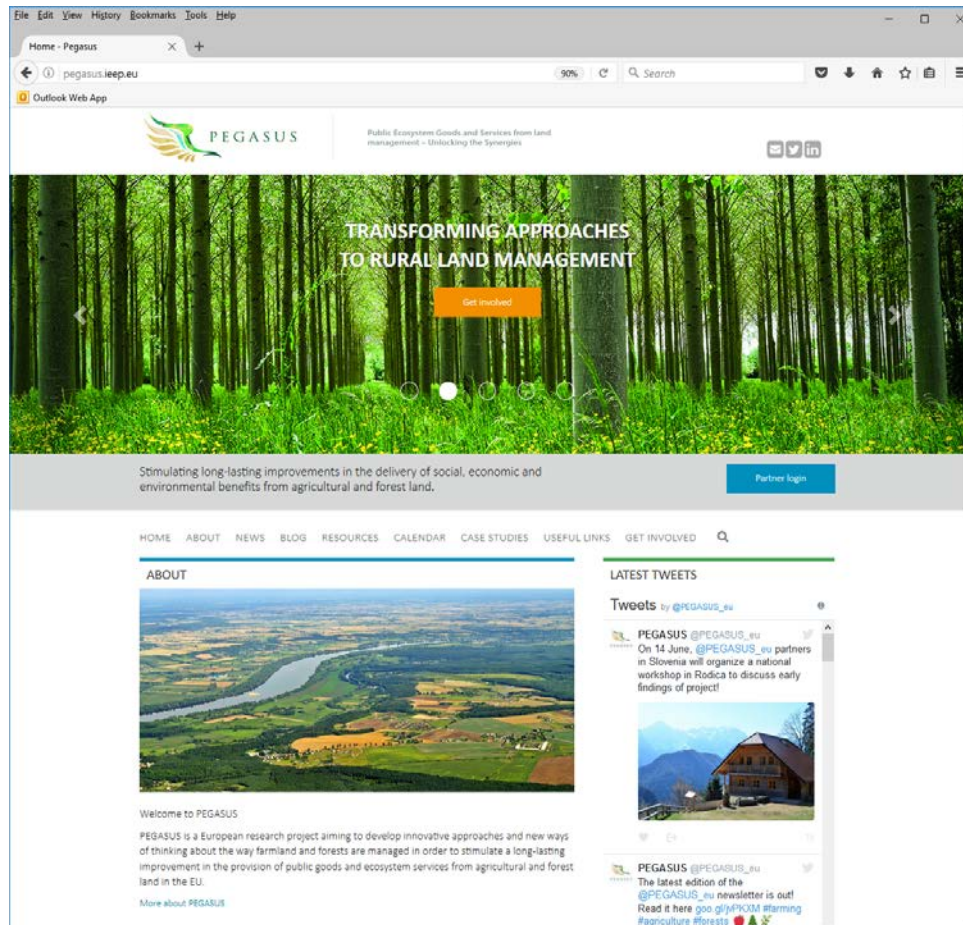
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Contact organizer: Anne Teller [anne.teller@ec.europa.eu]

Pegasus: Public Ecosystem Goods and Services from land management – Unlocking the synergies



<http://pegasus.ieep.eu/>

Horizon 2020 RTD project

14 partner organisations
2015-2018

Coordinator IEEP:
Kaley Hart
WP-2 coordinator Alterra:
Marta Pérez-Soba

WP-2: Mapping and
assessment of current and
potential PG/ESS provision in
relation to the diversity of EU
farming and forestry systems
in the EU

Task 2.3: patterns and trends of PG/ESS in relation to land management systems (JRC)

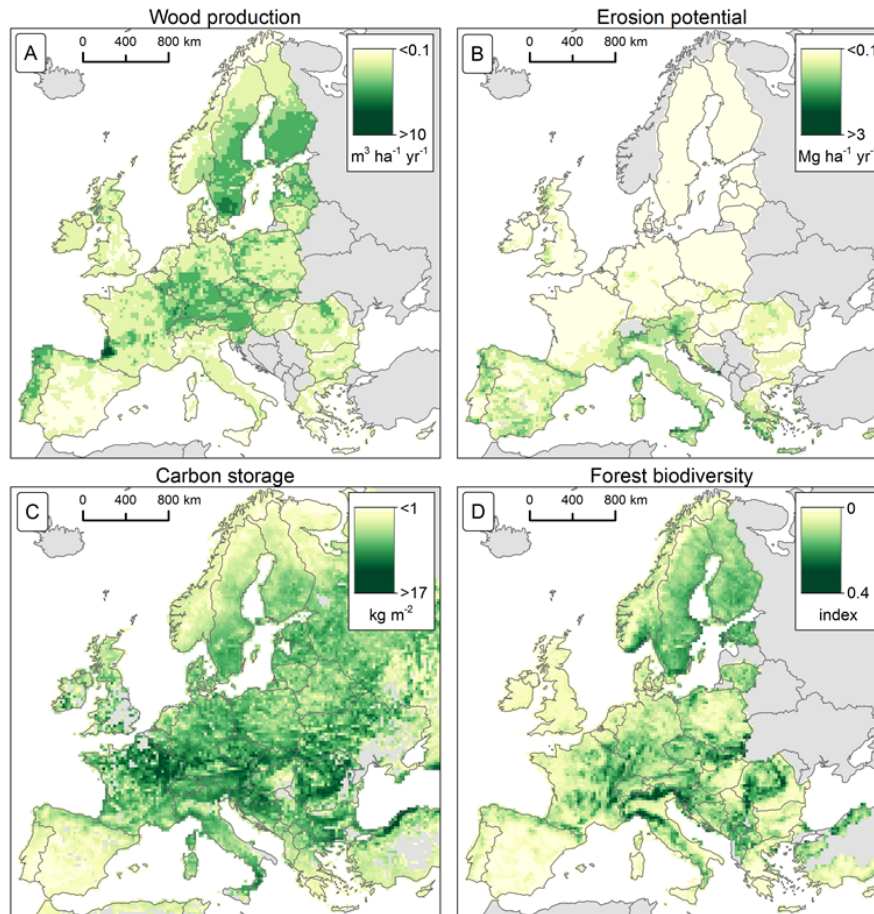


Figure 1. Proxies of forest ecosystem services. A) Wood production (source: Verkerk et al. 2015), B) Erosion potential (source: Borrelli et al. 2016), C) Carbon storage (source: Thurner et al. 2014), D) Forest biodiversity (tree species diversity) (source: de Rigo 2016). Note that the original maps, all at 1 km^2 grid size, were up-scaled (mean) to 25 km^2 grid size for better readability in this figure.

Task 2.3: Assessing forest ecosystem services per forest use intensity categories (JRC)

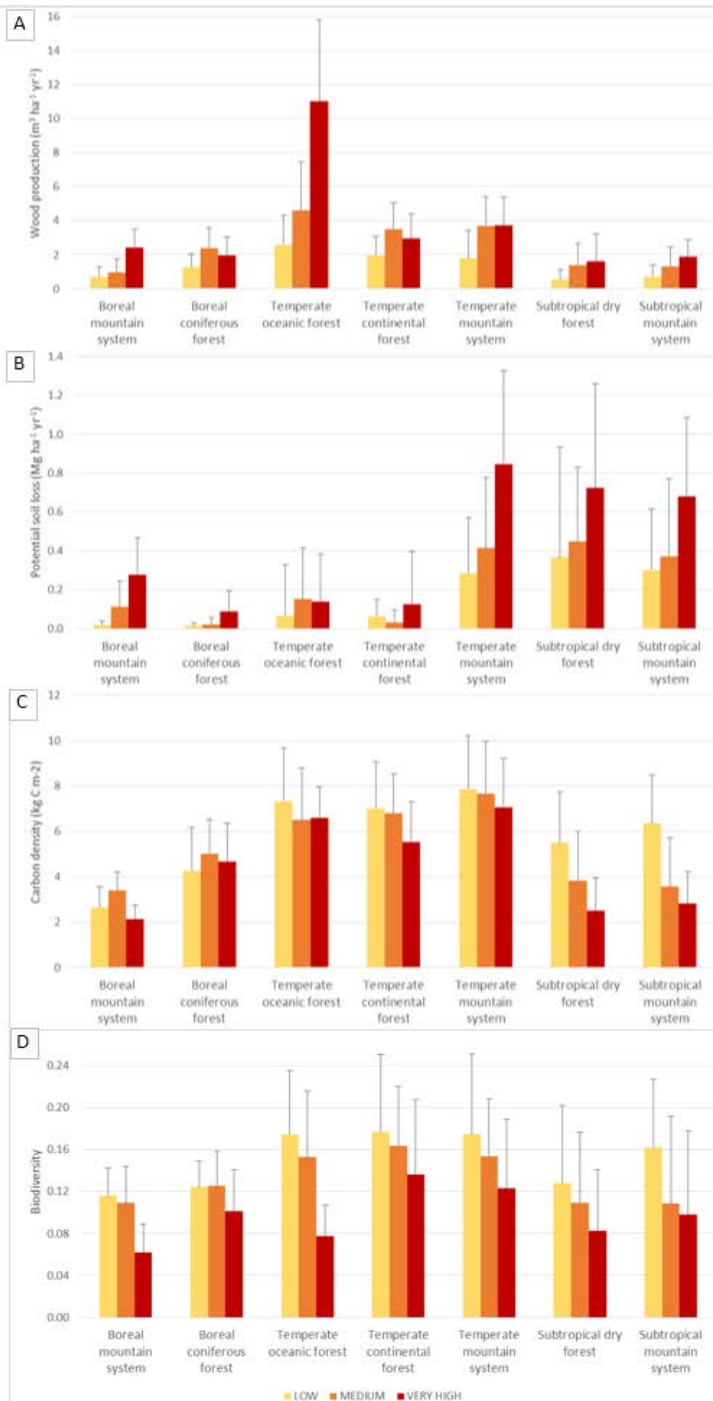
Average amount of ecosystem services per forest use intensity category on forest ecological zones. Error bars represent SD

A) Wood production

B) Erosion potential

C) Carbon stock

D) Forest biodiversity (tree species diversity)



Task 2.3: Forest Management intensity (Alterra)

Input data

Soil type (ISRIC)

Elevation (Copernicus)

Climate zone (Metzger et al)

IUCN protection status (IUCN-WPDA)

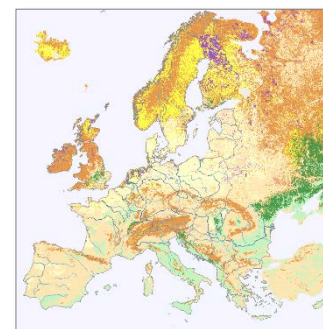
Tree species (JRC)

Size of fellings (clearcuts) (Hansen)

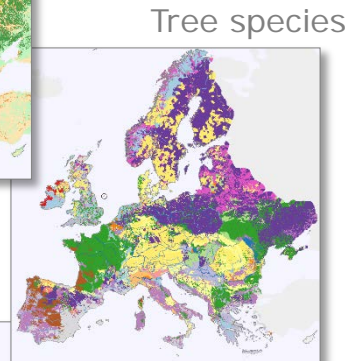
Ruggedness (based on Copernicus elevation)

Accessibility / population pressure (FAO –EU FP6)

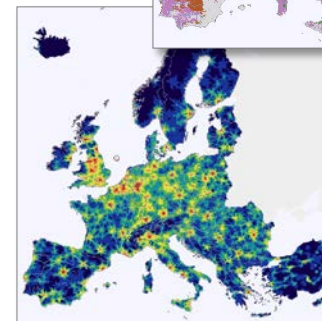
Percentage of forestry on the annual GDP (FAO-forestry statistics)



Soil type



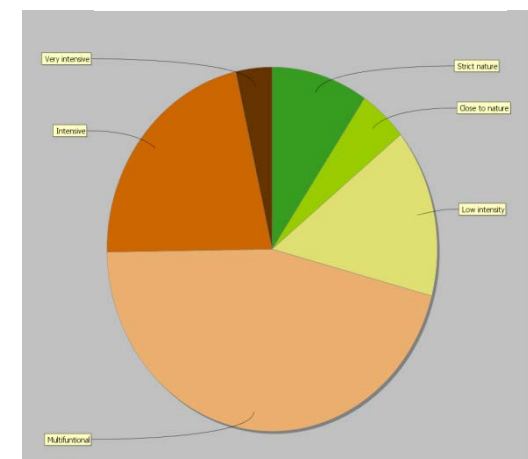
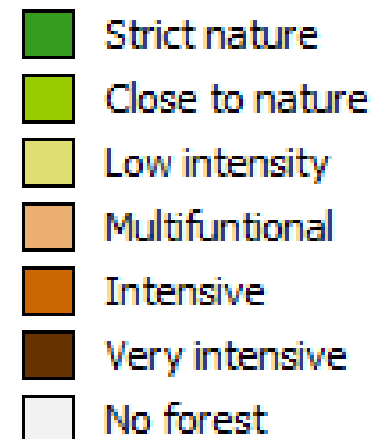
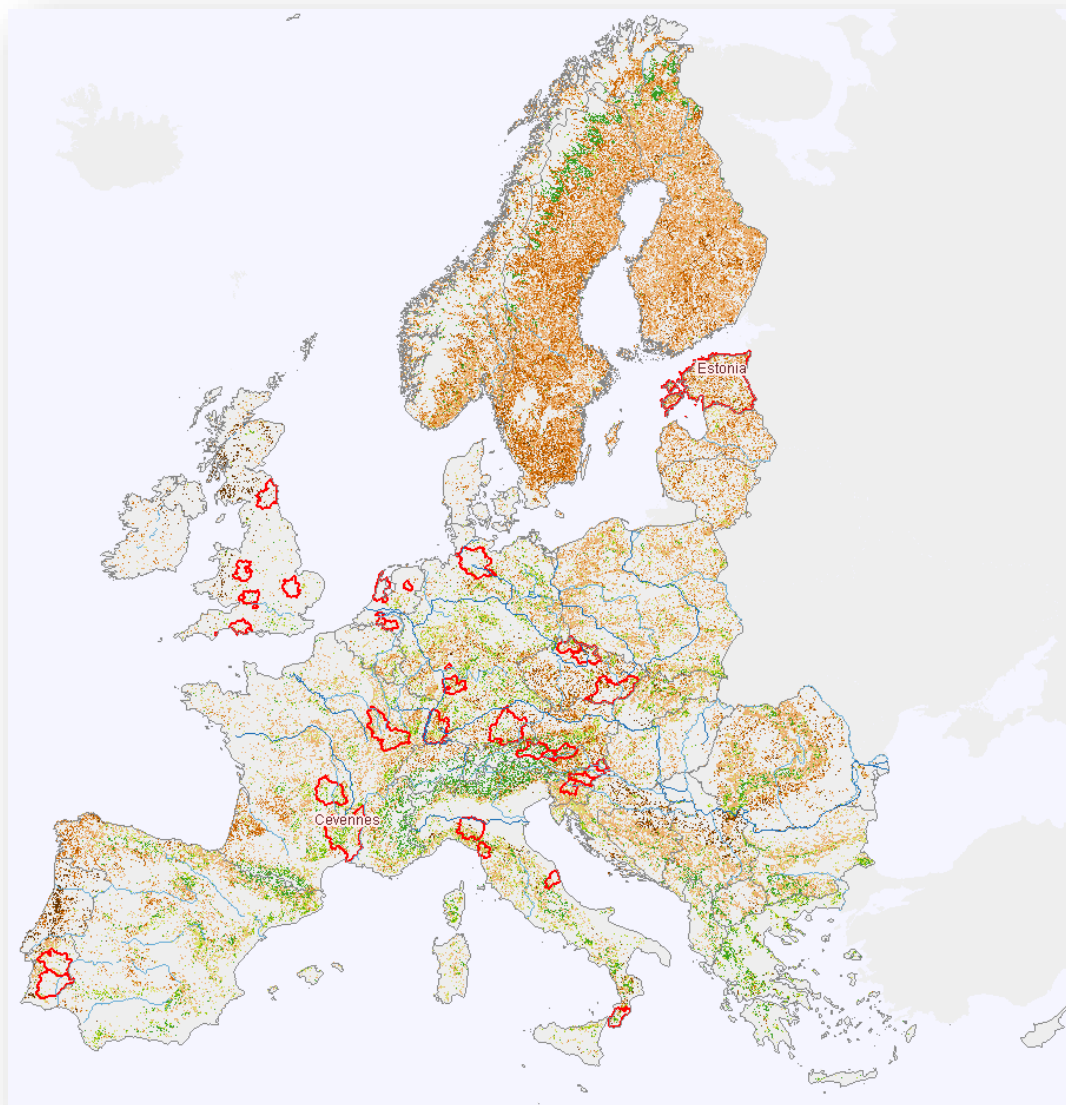
Tree species




Accessibility


Task 2.3: PEGASUS forestry management intensity patterns (Alterra)

PEGASUS case studies in red





Public Ecosystem Goods and Services from land management – Unlocking the Synergies



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Summary report on findings from the in-depth case studies – Steps 3-4 case study results - PEGASUS Deliverable 4.4

This discussion paper presents the emerging findings and insights gained from the 12 PEGASUS in-depth case studies ("Steps 3-4") and their reports (Deliverable 4.3).




In-depth case study reports - Steps 3 and 4 - PEGASUS Deliverable 4.3

This report compiles the reports of the 12 in-depth case studies in ten different EU countries. In the "Steps 3 and 4" of the case study work, the PEGASUS teams carried out more in-depth analyses of the range of factors associated with the delivery of environmental and social benefits by agriculture and forestry, in different contexts across the EU.




Innovative approaches for the provision of environmental and social benefits from agriculture and forestry – Steps 1-2 case study results - PEGASUS Deliverable 4.2

This discussion paper presents the main results and insights gained from the 34 PEGASUS broad and shallow case studies ("Steps 1-2"). It also presents our final selection of in-depth case studies as well as the main analytical questions to be explored in the subsequent steps ("Steps 3 and 4").



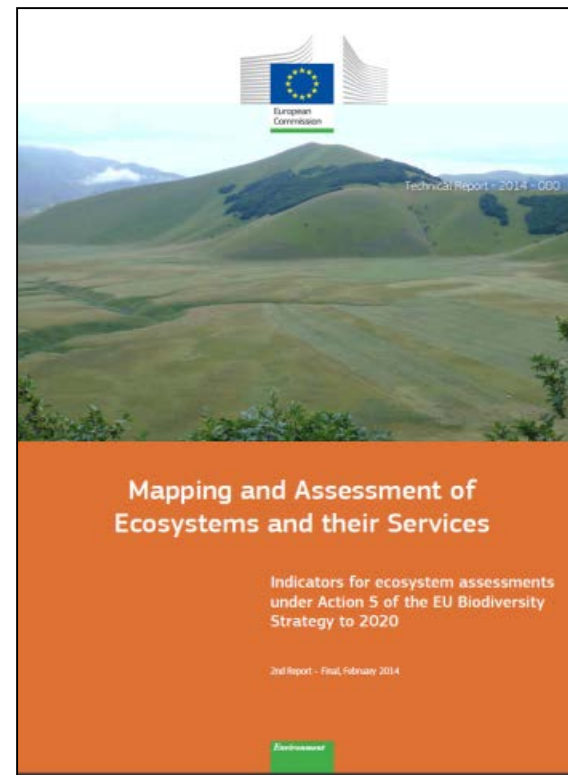
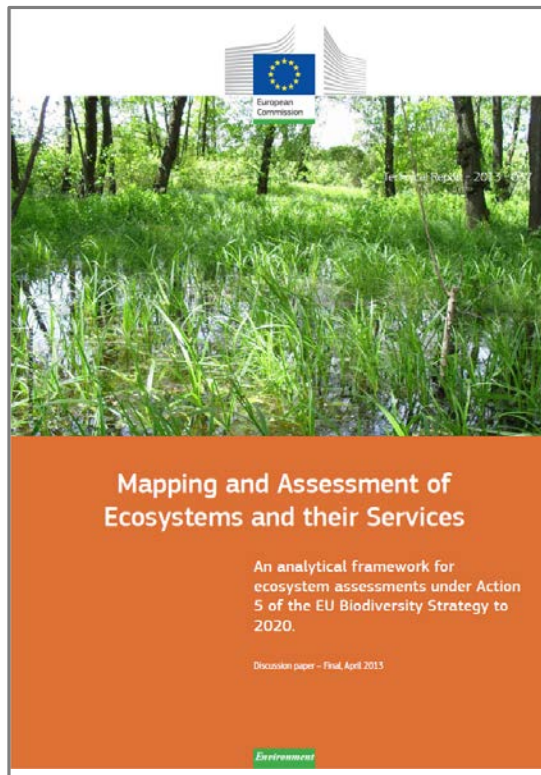
Case study reports - Steps 1 and 2 - PEGASUS Deliverable 4.1

This report compiles the reports of 34 case studies in ten different EU countries. In "Steps 1 and 2" of the case study work, the PEGASUS teams carried out analyses of issues and successful initiatives associated with the delivery of environmental and social benefits by agriculture and forestry across a wide range of broad and shallow case studies.



Thank you

MAES 1st and 2nd report



http://ec.europa.eu/environment/nature/knowledge/ecosystem_assessment/index_en.htm

A framework for forest ecosystem services

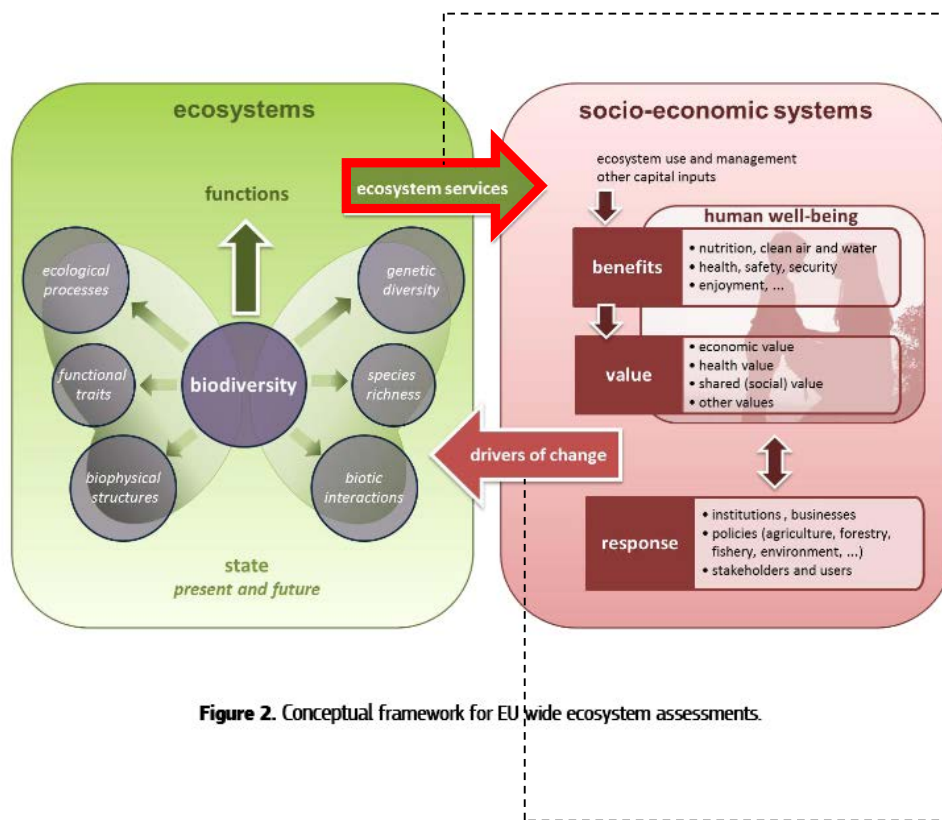


Figure 2. Conceptual framework for EU wide ecosystem assessments.

Forest ecosystem services are the benefits that people obtain from forest ecosystems. They are the direct and indirect contribution of forest to human wellbeing.

Driver of change is any natural or human-induced factor (including forest management) that directly or indirectly causes a change in a forest ecosystem.

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Mapping and Assessment ... X +

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Mapping and Assessment of Ecosystems and their Services - MAES

In a nutshell

The Biodiversity Strategy outlines a number of targets and precise actions to stop biodiversity loss. By mapping out and assessing the state of ecosystems and their services, we can help inform the policy decisions affecting the environment.

In practice

The [Biodiversity Strategy](#) called on Member States to map and assess the state of ecosystems and their services in their national territory by 2014, with the assistance of the European Commission. They must also 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 (see [Target 2](#), Action 5).

This specific action aims to provide a knowledge base on ecosystems and their services in Europe. It underpins the achievement of all 6 targets of the strategy and is also relevant to a number of other EU sectoral policies such as agriculture, maritime affairs and fisheries, and cohesion.

A coherent analytical framework has been developed (see [first technical report](#) , 2013) to be applied by the EU and its Member States in order to ensure consistent approaches. It contributes to the ongoing discussion on the conceptual framework for sub-global assessments of ecosystems and ecosystem services under the Intergovernmental Platform on Biodiversity and Ecosystem services (IPBES). A [second technical report](#)  (2014) proposes indicators that can be used at European and Member State's level to map and assess biodiversity, ecosystem condition and ecosystem services.

The [third technical report](#)  (2016) is taking stock on Mapping and assessing the condition of Europe's ecosystems: Progress and challenges. The [fourth technical report](#)  (2016) is on mapping and assessment of urban ecosystems and their services.

All Member States are actively involved in mapping and assessing the state of ecosystems and their services in their national territory. At EU level also, a lot of MAES-related activities are supported by the European Environment Agency and the Joint Research Centre.

http://ec.europa.eu/environment/nature/knowledge/ecosystem_assessment/index_en.htm