

# Valuation of ecosystem services and air pollution damage in Spain

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# National Level

Ecosystem types

Identification

Ecosystem Services

Identification

Ecosystem Services

Economic Valuation

## CLRTAP

Air Pollution effects

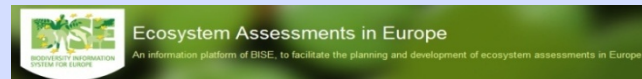
risk → damage

Critical Loads and Levels

### Sources of information

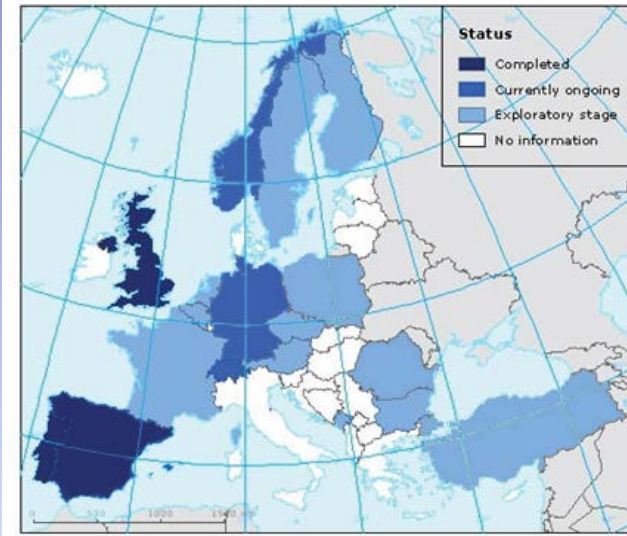


<http://biodiversity.europa.eu/ecosystem-assessments/assessments>

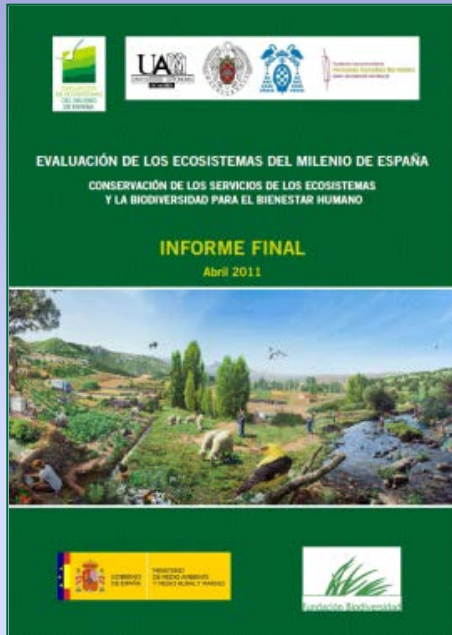


# Ecosystem Types

Status of national ecosystem assessments in EEA member countries



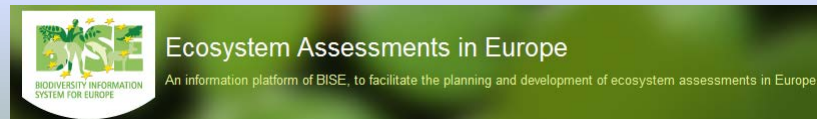
## Millenium Ecosystem Assessment (SPAIN, 2009)



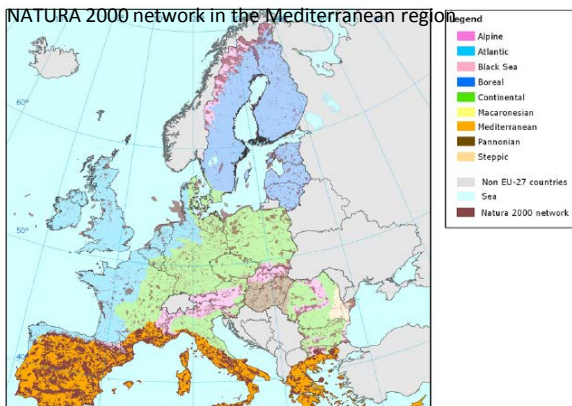
“Ecosystems and Biodiversity for human well-being “

- MEA: Identify condition and trends of the Spanish ecosystems and the services they provide (such as clean water, food, forest products, flood control, and natural resources)
- Identification of drivers of change.
- Critical factors causing changes in ecosystems and ecosystem services

<http://biodiversity.europa.eu/ecosystem-assessments/assessments>



# Ecosystem Types

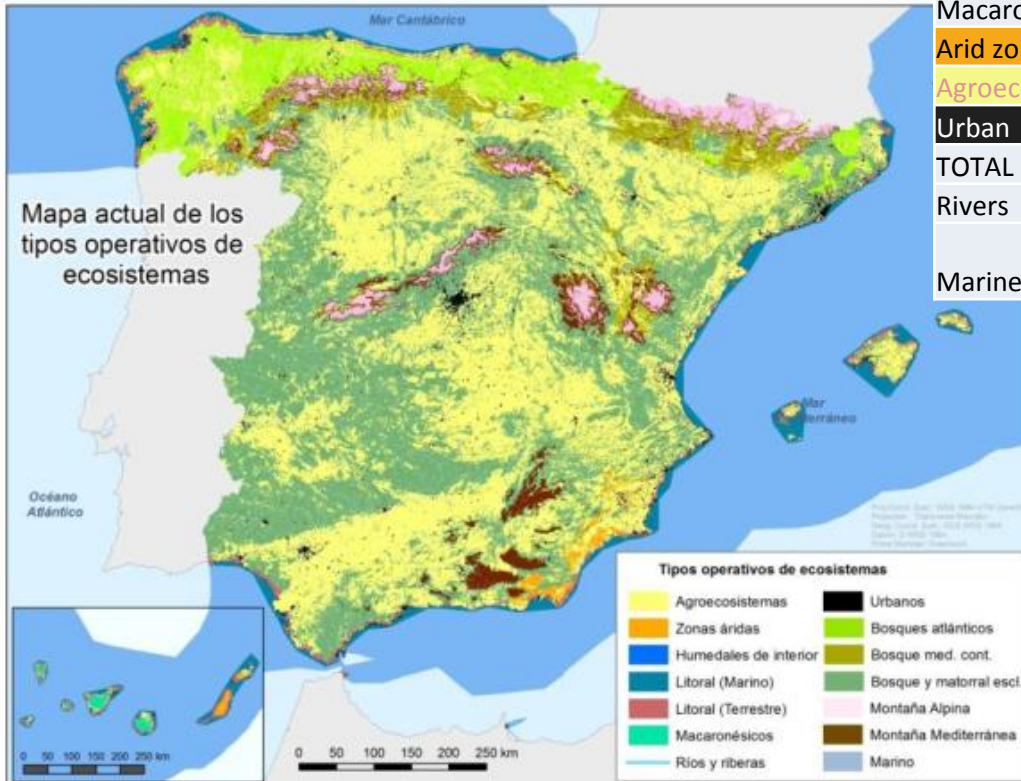


NATURA 2000 network in the Medite



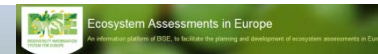
Ecosystem	Area (ha)	%
Sclerophyllous forests and shrubs	14.917.626	28%
Mediterranean forests	2.676.318	5%
Atlantic Forest	3.316.942	6%
Alpine ecos	1.480.074	3%
Mediterranean mountain ecosystem	1.942.453,20	4%
Lakes and wetlands	321.534,57	1%
Coastal ecosystems	478.103,36	1%
Macaronesic (islands)	772.512	1%
Arid zones (peninsular)	1.590.743	3%
Agroecosystems	24.631.880	46%
Urban	1.017.356	2%
TOTAL	53.145.542	100%
Rivers	711.747 km	
Marine	103.051.507	

Mapa actual de los tipos operativos de ecosistemas



Classification (terrestrial ecosystems)  
 Altitude  
 Aridity  
 Climate: Medit, Atlantic  
 Land Use: urban, agriculture

database (November 2008).



# Ecosystem Services

Millenium Ecosystem Assessment (2005)

## PROVISIONING SERVICES: THE GOODS OR PRODUCTS OBTAINED FROM ECOSYSTEMS

Food (e.g. fish, game, fruit)

Water (e.g. for drinking, irrigation, cooling)

Raw materials (e.g. fiber, timber, fuel wood, fodder, fertilizer)

Genetic resources; Medicinal resources; Ornamental resources

## REGULATING SERVICES: THE BENEFITS OBTAINED FROM AN ECOSYSTEM'S CONTROL OF NATURAL PROCESSES

Air quality regulation (e.g. capturing (fine)dust, chemicals, etc.)

Climate regulation (incl. C-sequestration, influence of vegetation on rainfall, etc.)

Moderation of extreme events (e.g. storm protection and flood prevention)

Regulation of water flows (e.g. natural drainage, irrigation and drought prevention)

Waste treatment (especially water purification)

Erosion prevention

Maintenance of soil fertility (incl. soil formation)

Pollination

Biological control (e.g. seed dispersal, pest and disease control)

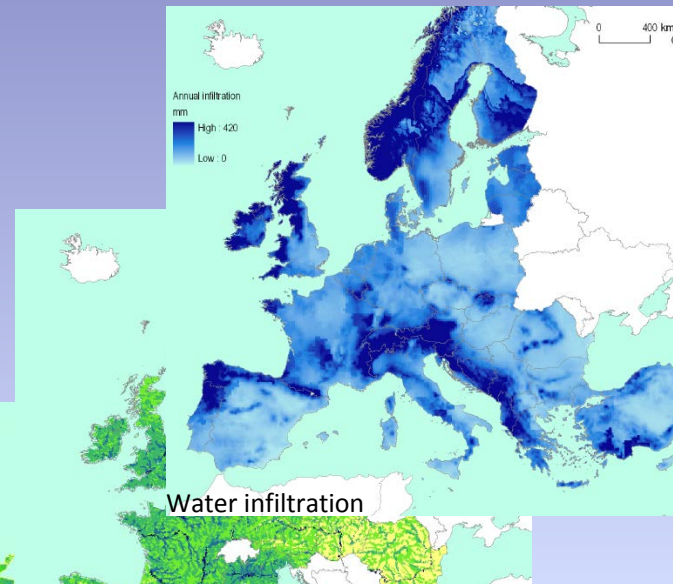
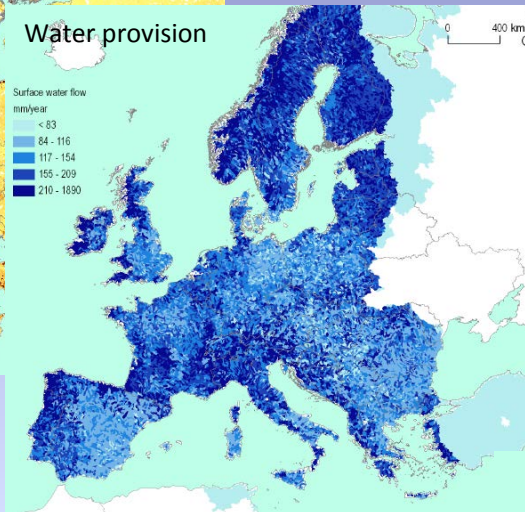
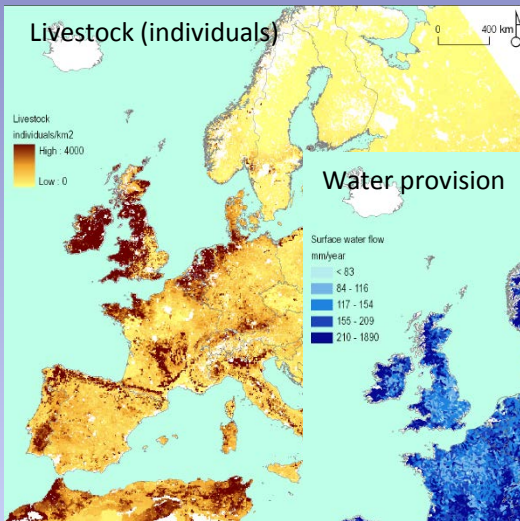
## HABITAT SERVICES: SERVICES SUPPORTING THE PROVISION OF OTHERS BY PROVIDING HABITAT

nursery habitat ; Gene pool protection

## CULTURAL SERVICES: THE NONMATERIAL BENEFITS OBTAINED FROM ECOSYSTEMS

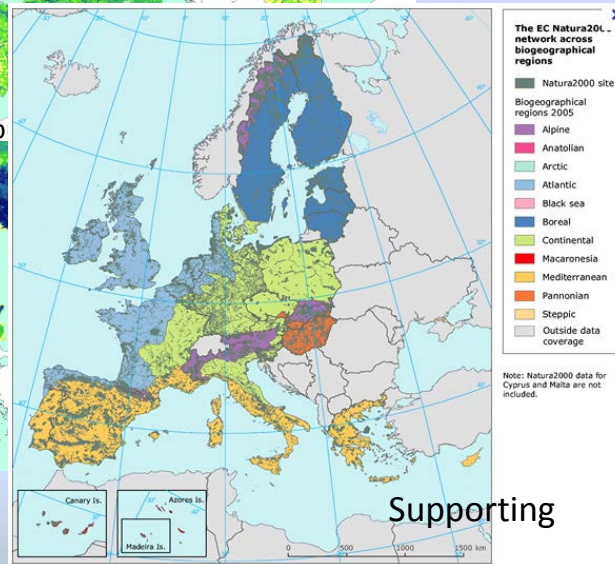
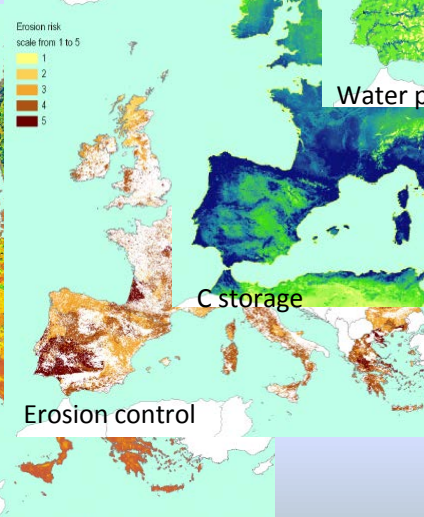
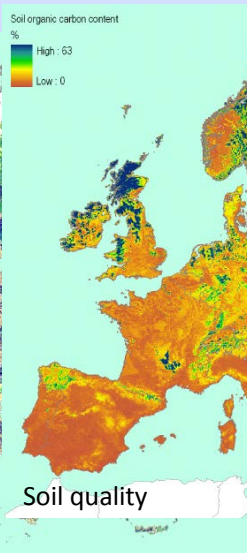
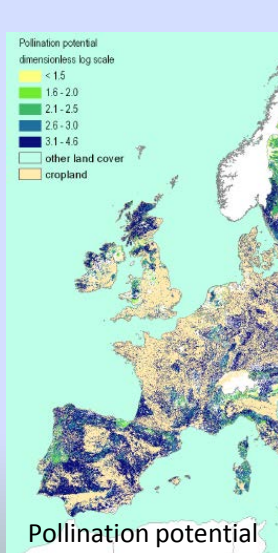
Opportunities for recreation & tourism; Inspiration for culture, art and design; Spiritual experience

# Ecosystem Services



Provisioning

Regulating

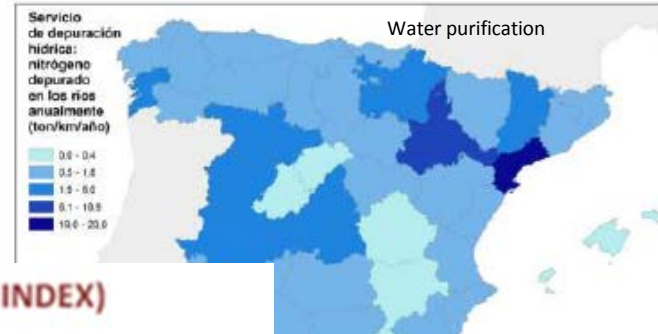


Source: JRC, EUR24750, 2011

# Valuation of Ecosystem Services



Figura 25.56. Cantidad de madera almacenada "stock" en España (m³/ha)



Water purification

## A. BIODIVERSITY (RED LIST INDEX)

## B. SERVICES



## C storage

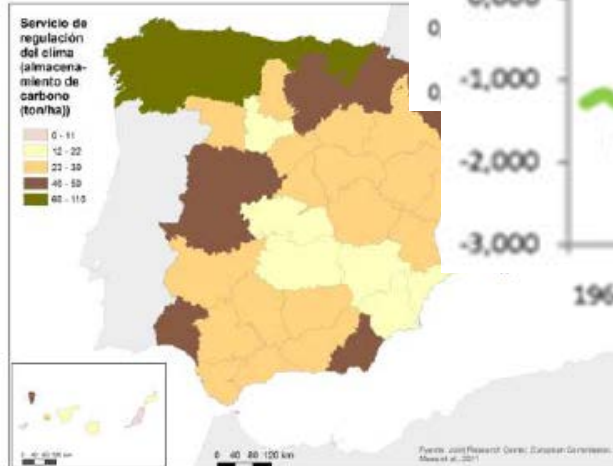


Figura 25.65. Servicio de regulación del clima (almacenamiento de carbono).

Figura 25.68. Servicio de regulación de control de la erosión, utilizando como indicador los resultados de un modelo que relaciona las áreas con vegetación natural y las zonas con alto riesgo de erosión.

# Economic Valuation of Ecosystem Services

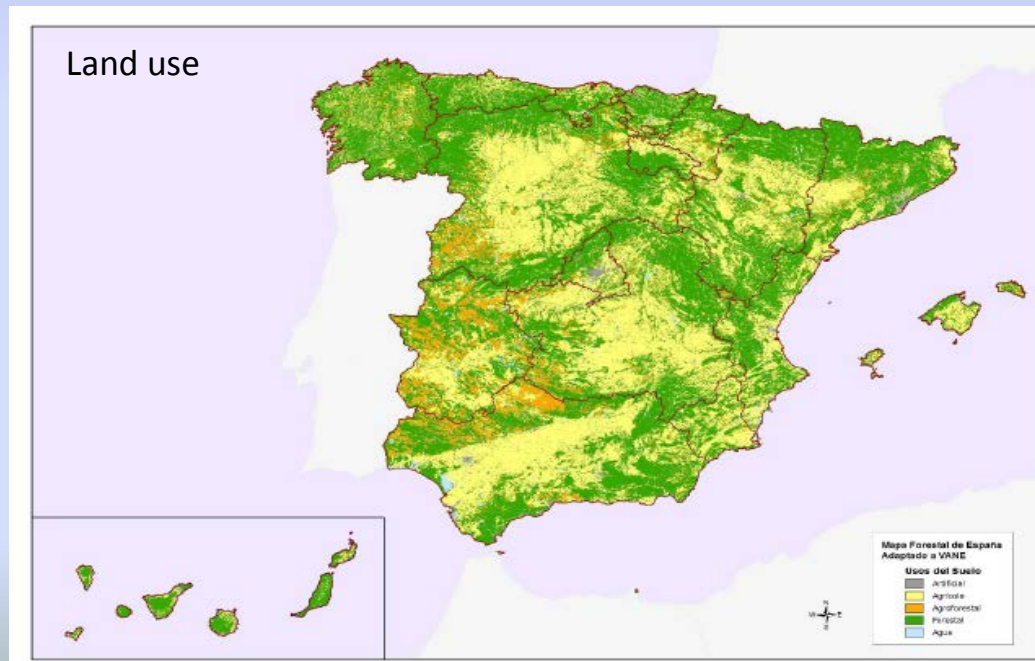
**VANE Project (2005-2008):** valuation of ecosystem services in Spain

## Eco-areas

Agrosistemas & pastures  
Forests  
Arid zones & desert  
Mountain  
Protected natural areas

## Valuation of services

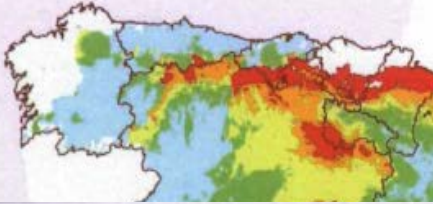
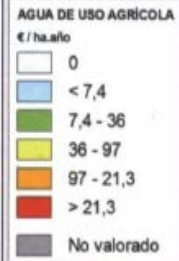
Provisioning of wood & other products  
Water provision for agriculture  
Erosion control  
Water quality  
Carbon sequestration



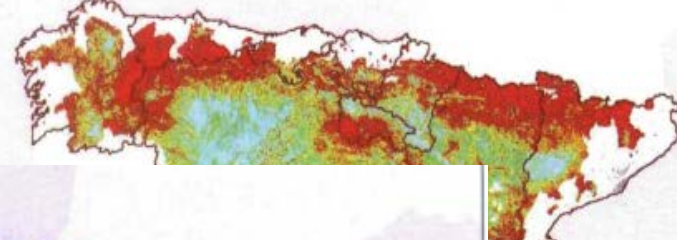


# Economic Valuation of Ecosystem Services

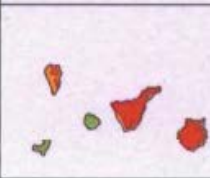
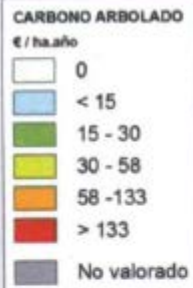
Water provision for agriculture (€ ha<sup>-1</sup> y<sup>-1</sup>)



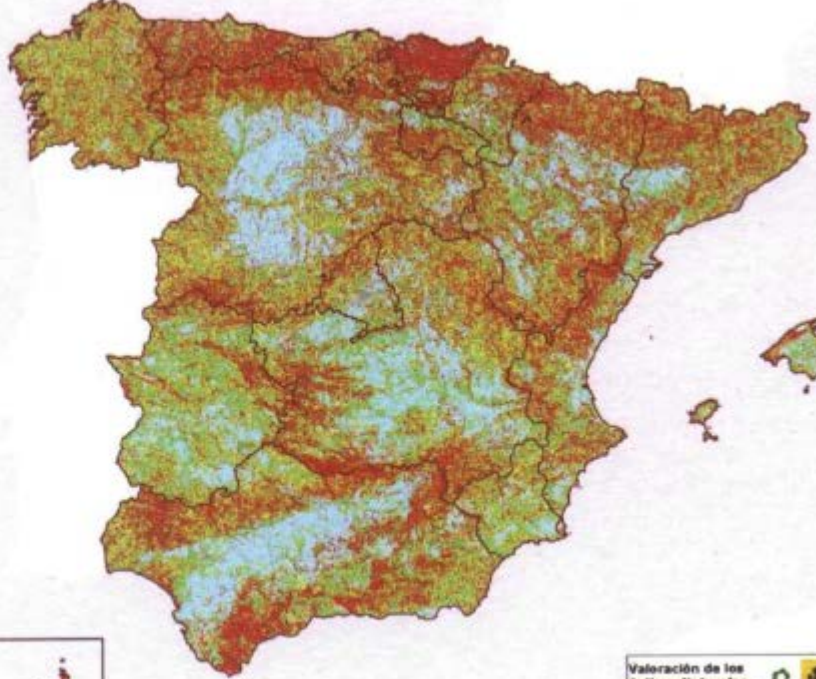
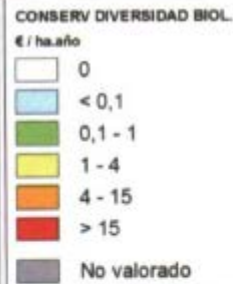
Erosion control (€ ha<sup>-1</sup> y<sup>-1</sup>)



C sequestration (€ ha<sup>-1</sup> y<sup>-1</sup>)



Biodiversity conservation (€ ha<sup>-1</sup> y<sup>-1</sup>)



Valoración de los Activos Naturales de España

Conservación de la Diversidad Biológica

# Economic Valuation of Ecosystem Services

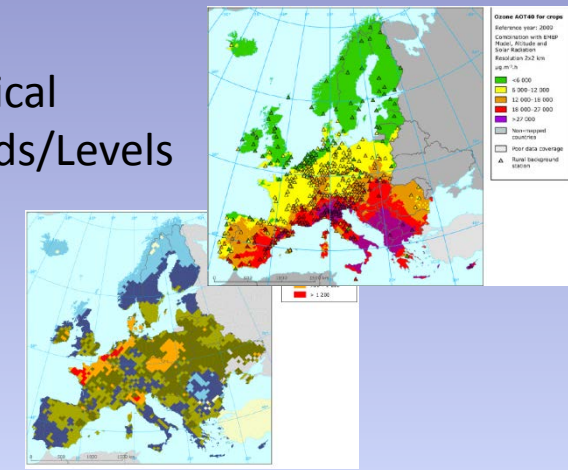
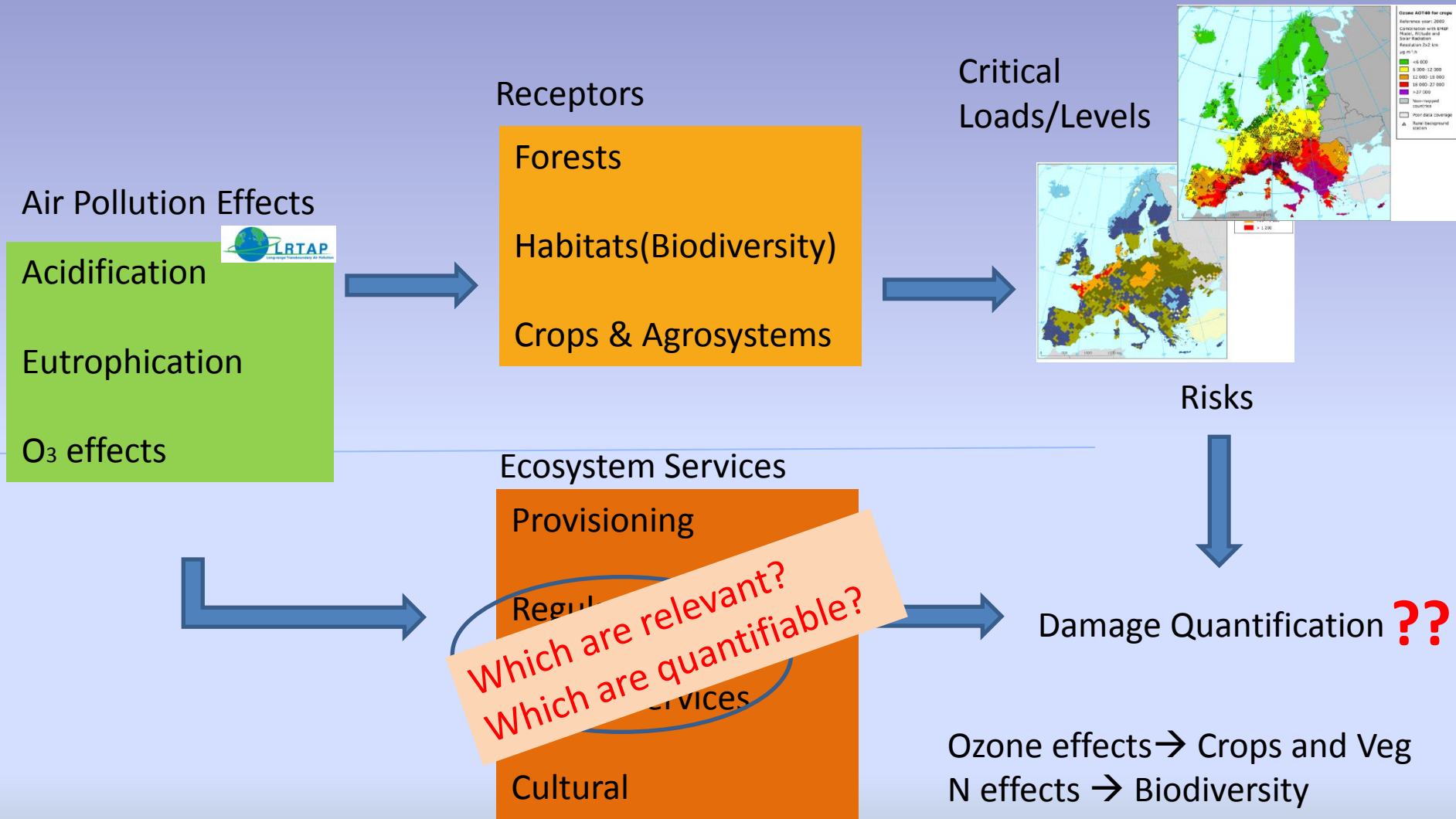
## VANE Project (2005-2008): Valuation of ecosystem services in Spain

	Agric	Forest	€/ha.y (forests)
Food and raw material	+++	+++	market
Water provision	++	++	215,37 (163,37*)
Recreation	+	++	market
Hunting& fishing	++	++	market
Erosion control	++	++	23,29 (17,21*)
C sequestration	++	++	83,29 (294,8*)
Biodiversity (conservation)	+	++	22,56 (24,30*)

\* Plantation forests

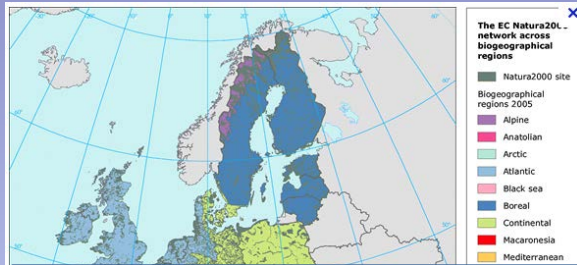
## MORA Project: Economic valuation of natural capital (replacement value)

# Valuation of Air Pollution Damage on Ecosystem Services



*Which are relevant?  
Which are quantifiable?*

# Biodiversity



## Biodiversity (Habitats)

Difficult to identify damage on terrestrial ecosystems due to air pollution

Supporting: a relevant ecosystem service  
a NonMarket ecosystem service  
difficult for economic valuation

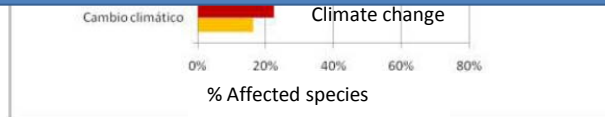


Figura 4.18. Efecto de los principales impulsores directos de cambio sobre las especies amenazadas en España. Fuente datos: UICN (2010).

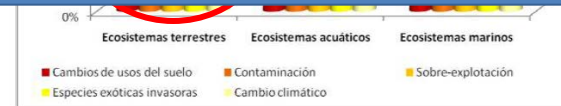
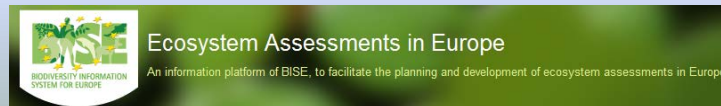


Figura 4.21. Efecto de los principales impulsores directos de cambio sobre los ecosistemas españoles. Fuente datos: UICN (2010).

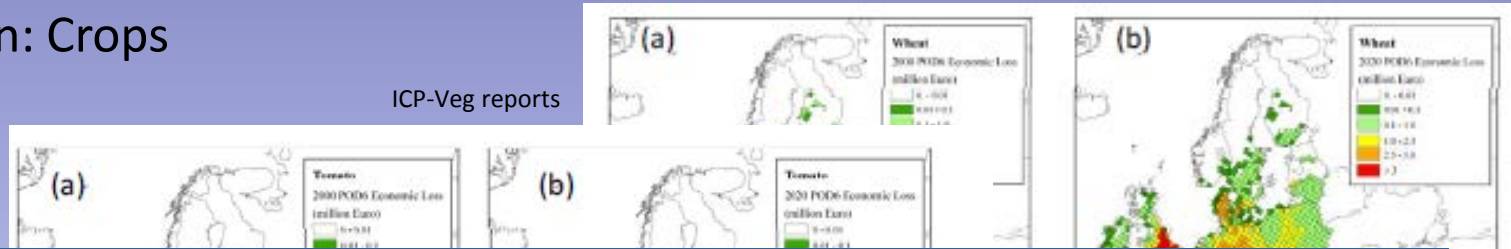
<http://biodiversity.europa.eu/ecosystem-assessments/assessments>



# Ozone Pollution

Food production: Crops

ICP-Veg reports



## O<sub>3</sub> Critical Levels

- Risk identification and potential yield losses  
Damages could be overestimated because dose-response functions are based on the most sensitive species
- No information for other ecosystem services:  
regulating and supporting services

Gr  
C s

applying the following parameterisations in DO<sub>3</sub>SE: (b) generic parameterisation (Y =

Biodiversity

Difficult to value,  
not available dose-response relationships

**Thank you for your attention!**

Zagreb, 24-25 October 2013

