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Working paper
on biodiversity and ecosystem assessment reports
(Annexes)

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Working paper on biodiversity and ecosystem assessment reports - Annexes

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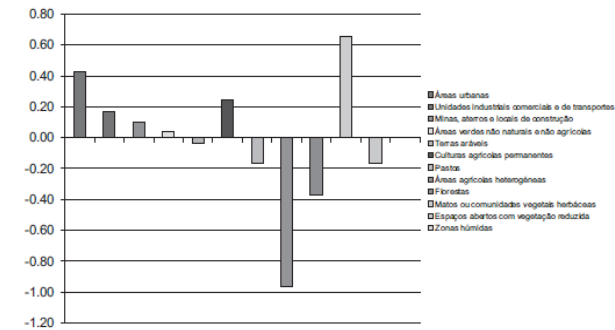
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This document was prepared by a project team from the European Topic Centre on Biological Diversity – Sophie Condé, MNHN, Amor Torre-Marín and Ben Delbaere, ECNC (July 2013)

Annex 1 – Visual representation of the analysis of ecosystems and ecosystem services across the three NEAs

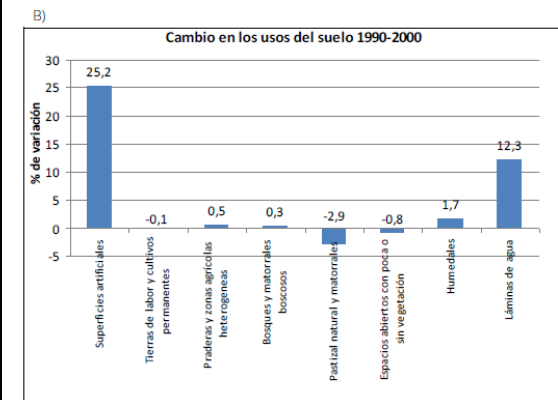
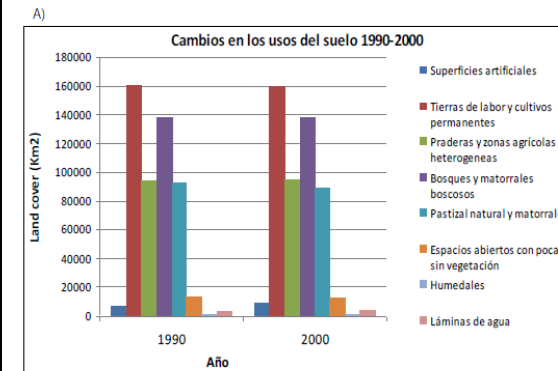
Table 1: Surface and surface change

Evolution of land cover between 1990 and 2000



Source: Corine Land Cover, 2004 in ptMA, 2012

Changes in land use obtained from Corine Land Cover, in surface (A) and in percentage of variation (B)



Source: MARM, OSE, 2006 in EME, 2012

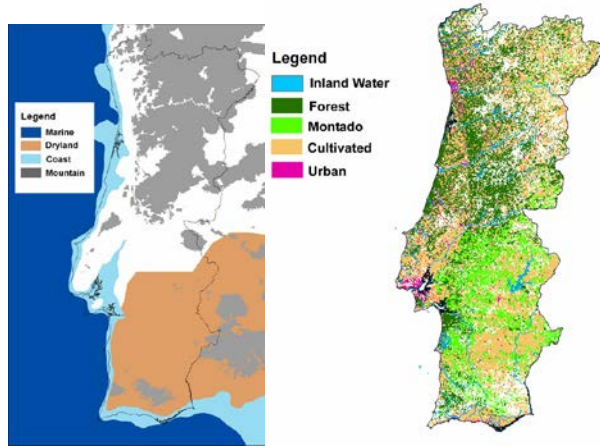
UK NEA Broad Habitats and estimated Net change between 1998 and 2007

UK NEA Broad Habitats	UK NEA component habitats	Estimate from Northern Ireland Countryside Survey	1998		2007		Net change		
			ha	% NI	ha	% NI	ha	%	
Mountains, Moorlands & Heaths	Bracken	BH09 Dense bracken	3,084	0.22	2,645	0.19	-439	-14.2	
	Dwarf Shrub Heath	BH10 Dwarf shrub heath	13,909	0.98	16,751	1.18	2,842	20.4	
	Upland Fen, Marsh & Swamp	S16 Poor fen	24,784	1.75	21,005	1.48	-3,779	-15.2	
	Bog	BH12 Bog (Above 150 m)	140,814	9.94	139,796	9.87	-1,018	-0.7	
	Montane	BH15 Montane vegetation	735	0.05	735	0.05	0	0.0	
	Inland Rock	BH16 Inland rock	7,569	0.56	5,459	0.39	-2,110	-31.6	
Mountains, Moorlands & Heaths Total			191,295	13.45	186,382	13.21	-4,913	-2.6	
Semi-natural Grasslands	Acid Grassland	BH01 Acid grassland	13,324	0.94	10,369	0.73	-2,955	-22.2	
	Neutral Grassland	BH06 Neutral grassland	269,902	18.64	231,116	16.32	-38,786	-12.4	
	Calcareous Grassland	BH07 Calcareous grassland	1,765	0.13	1,802	0.13	37	2.1	
	Purple Moor-grass & Rush Pasture	S02 Species rich wet grassland	13,396	0.95	13,186	0.93	-210	-1.6	
	565 Fen meadow	S65 Fen meadow	6,533	0.46	5,200	0.37	-1,243	-19.0	
Semi-natural Grasslands Total			298,920	21.12	261,763	18.48	-37,157	-12.4	
Enclosed Farmland	Arable & Horticulture (including orchards & short rotation coppice)	BH04 Arable and horticulture	57,213	4.04	48,917	3.46	-8,296	-14.5	
	W12 Orchard	W12 Orchard	1,623	0.12	1,365	0.08	-258	-28.2	
	Improved Grassland	BH05 Improved grassland	554,982	39.19	573,010	40.47	18,028	3.2	
	Boundary and linear features ¹	BH03a Field Boundaries (km)	226,296	n/a	225,917	n/a	-379	-0.2	
Enclosed Farmland Total¹			619,818	43.35	623,092	44.01	3,274	1.5	
Woodlands	Broadleaved, Mixed & Yew Woodland	BH01 Broadleaved, mixed and yew woodland (Not including W12 Orchard) ²	61,884	4.37	80,534	5.69	18,650	30.1	
	Coniferous Woodland	BH02 Coniferous woodland	62,135	4.39	60,617	4.28	-1,518	-2.4	
	Woodlands Total			124,019	8.76	141,151	9.97	17,132	13.8
Freshwaters - Openwaters, Wetlands & Floodplains	Standing open water (lakes, ponds & canals)	BH13 Standing open water	61,785	4.36	61,322	4.33	-463	-0.7	
	Rivers and streams	BH14 Rivers and streams	5,300	0.38	5,495	0.39	195	3.7	
	Lowland raised bog ³	BH12 Bog (Below 150 m)	23,402	1.65	21,106	1.49	-2,296	-9.8	
	S17 Reedbeds	S17 Reedbeds	2,958	0.21	2,563	0.18	-395	-13.4	
	S18 Fen	S18 Fen	2,723	0.19	2,499	0.18	-224	-8.2	
	S66 Swamp	S66 Swamp	2,280	0.16	2,524	0.18	244	10.7	
	S68 Water inundation vegetation	S68 Water inundation vegetation	260	0.02	187	0.01	-73	-28.1	
	Freshwater Total			98,798	6.98	95,706	6.76	-3,092	-3.1
	Urban	Built-up Areas & Gardens	BH17 Built up areas	56,847	4.01	74,098	5.23	17,251	30.3
		Roads, tracks and hard verges	BH03b Roads, tracks and hard verges	29,449	2.08	30,951	2.19	1,502	5.1
Urban Total			86,296	6.09	105,049	7.42	18,753	21.7	
Coastal Margins	Sea Cliffs								
	Shingle	BH18 Supralittoral rock	1,717	0.12	1,581	0.11	-136	-7.9	
	Coastal Lagoons								
	Saltmarsh	BH19 Supralittoral sediment	1,859	0.13	1,995	0.14	136	7.3	
Coastal Margins Total			3,576	0.25	3,576	0.25	0	0.0	
Marine	Intertidal Rock	BH20 Littoral rock	Not recorded	n/a	1,212	n/a	n/a	n/a	
	Intertidal Sediment	BH21 Littoral sediment	Not recorded	n/a	9,518	n/a	n/a	n/a	
	Subtidal Rock								
	Subtidal Sediment—shallow & shelf	12 NM Territorial Waters ⁴	-450,000	n/a	-450,000	n/a	0	0	
Deep-sea Habitat									

Source: Cooper & McCann, 2010 in UK NEA, 2011b

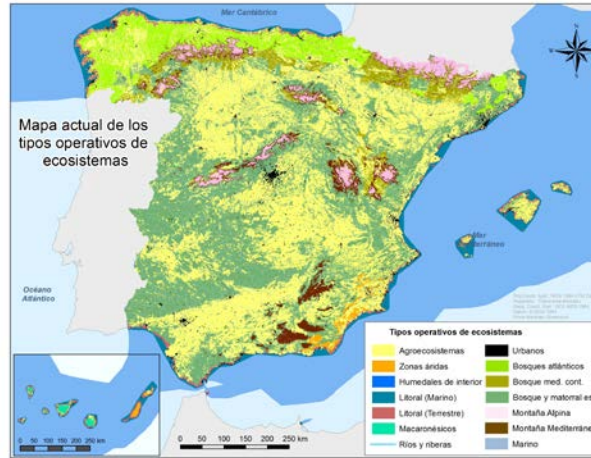
Table 2: Geographical distribution of ecosystem types

Distribution of the mainland systems analysed in the Portugal Assessment



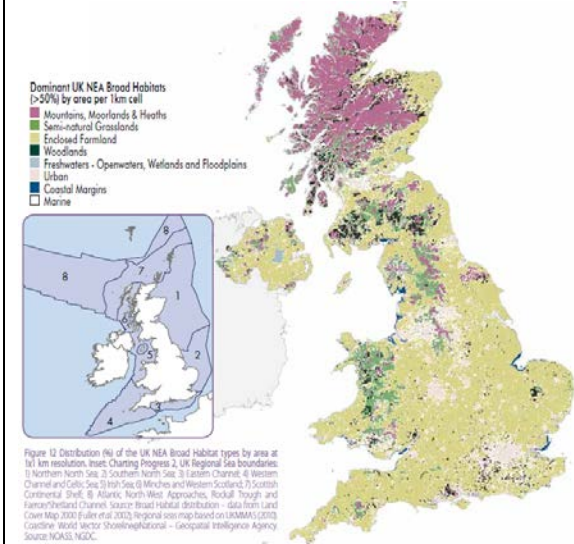
Source: Direcção erald as Florestas 2003, MA 2004 in Pereira et al., 2004

Map of current operational ecosystem types in Spain



Source: EME, 2013

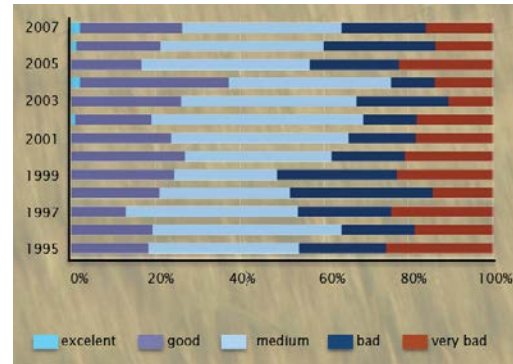
Distribution (%) of the UK NEA Broad Habitat types by area at 1x1 km resolution



Source: Land Cover Map 2000 (Fuller et al. 2002) in UK NEA, 2011a

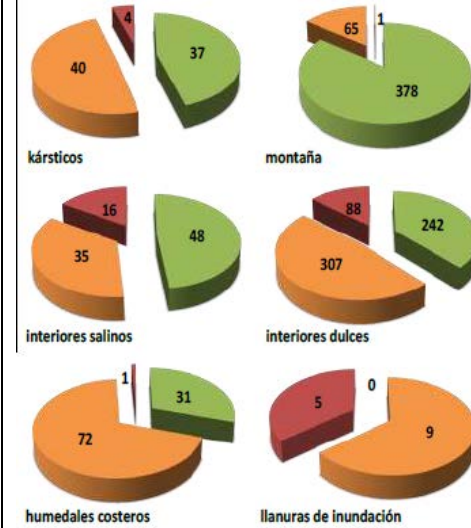
Table 3: Conservation status and trends of ecosystem types

Water quality in rivers between 1995 and 2007, according to a generic indicator based on uses



Source: ptMA, 2012

Conservation status of the main types of wetlands, expressed by the number of sites conserved (green), altered (orange) and disappeared (red) from the beginning of the XIX century until 1990



Source: EME, 2012 based on Casado et al., 1992

Ecological status of Spanish rivers according to the criteria of the Water Framework Directive



Source: MIMA, 2007 in EME, 2012

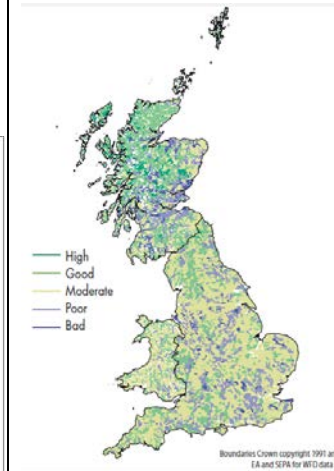
The health and biodiversity of Welsh Marine habitats

Habitat	Status	
	Celtic Sea	Irish Sea
Intertidal rock	↓	↓
Intertidal sediments	↓	↓
Subtidal rock	↔	↔
Shallow subtidal sediments	*	↔
Shelf subtidal sediments	*	↔
Deep-sea habitats	↓	habitat not present

↑	Improvement	Many problems
↓	Deterioration	Some problems
↔	Stable	Few or no problems
*	No trend information available	

Source: UKMMAS, 2010 in UK NEA, 2011b

Ecological status classes for rivers and river basins in England, Wales and Scotland as determined by the Environment Agency and Scottish Environment Protection Agency (SEPA) in 2008 for the purposes of the Water Framework Directive



Source: Environment Agency and SEPA in UK NEA, 2011b

Note: The classes reflect the most sensitive indicator element in each location relative to the prevailing risks

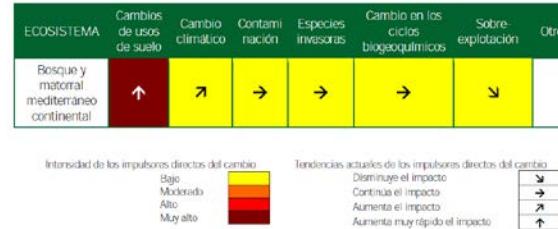
Table 4: Drivers of change of the different ecosystem types

Promotor de alteração	Ex/En	D/I	Escala espacial	Velocidade	Imp.
Alterações do uso do solo	En/Ex	D	N	Alta	1
Alterações climáticas	Ex	D	Eu/Mu	Baixa	3
Fogo	En/Ex	D	N	Média	2
Coesão social e identidade cultural	Ex	I	N, Eu/Mu	Alta	3
Políticas agrárias	En/Ex	I	N, Eu	Média	2

Source: ptMA, 2012

Note: Abbreviations: Ex – Exogenous; En – Endogenous; D – Direct; I – Indirect; N – national scale; EU – European Union scale; Imp. – Importance, from 1 (highest) to 3 (lowest)

Estimation of the trends and intensity of the direct drivers of change on Mediterranean continental forests and bush land



Source: EME, 2012

A summary of drivers of change in Semi-natural Grassland and their impacts at different periods

Driver of change	Semi-natural Grassland affected	Impact of driver on Semi-natural Grassland	Role since 1940s	Present role	Future role-‡
Agricultural grassland improvement	Priority habitats	Domination by fast-growing plants; loss of plant and animal diversity; soil processes compromised	■	□	□
Conversion to arable	Priority habitats	Cultivation and total loss of habitat	■	□	□
Conversion to forestry	All*	Cultivation, planting and total loss of habitat	■	□(‡)	□(‡) (uplands)
Other conversion: roads, building quarries, etc.	All	Habitat destruction	□	□	□
Nitrogen deposition and transfer	All	Increased soil fertility leading to domination by fast-growing plants and loss of plant diversity	■	■(‡)	□
Inadequate management	Priority habitats	Insufficient grazing leading to rank vegetation, scrub and trees	□	■	■
Overgrazing	Upland acid	Overgrazing (sheep) of moorland causing loss of heather and increase in upland grassland	■	□	□
Habitat fragmentation	Priority habitats	Remaining Semi-natural Grassland are small and isolated leading to local species losses and invasions	□	□	□
Invasion by non-native plants	All	Exclusion of desirable species; change in soil processes	□	□	□(‡)
Agri-environment schemes	Priority habitats	Conservation management of existing Semi-natural Grassland and re-creation of Semi-natural Grassland on agricultural land	□	□	□
Agri-environment schemes	Upland acid	Conversion back to heather moorland	□	□	□
Protection	Priority habitats	Designation for conservation and so protected and managed against destruction and degradation	■	■	■
Climate change	All	Species losses; colonisation by novel species; increased openness	□	□	■

* 'All' refers to all Semi-natural Grassland habitats; i.e. Priority habitats and Upland acid.
‡ Future roles to 2050 are predicated on the continuation of current environmental and land use policies.

Source: UK NEA, 2011b

Table 5: Status and trends of the ecosystem services provided by the different ecosystem types

Condition and trend for the services of each Portugal ecosystem

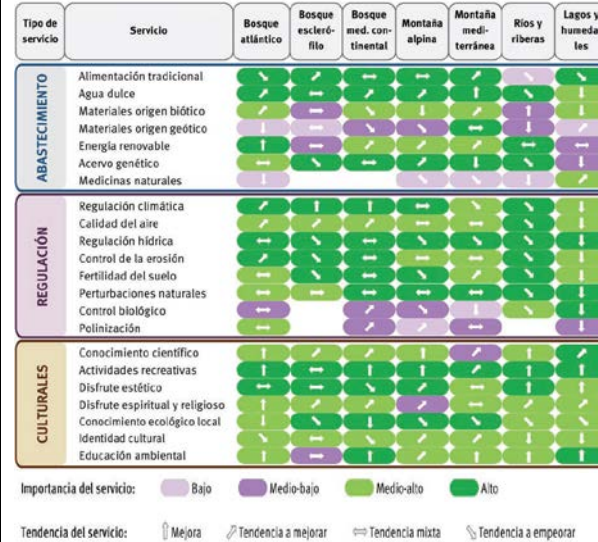
	Biodiversity	Food	Water	Fiber	Soil and Flood Protection	Climate Regulation	Recreation
Marine	↘	↗				?	↗
Coastal	↘	↗			↘		↗
Inland Water	↘	↗	↘		↘		↗
Forest	→	↗	↘	↗	→	↗	↗
Montado	→	↗	→	↗	→		↗
Cultivated	→	↗	→		↗	?	↗
Urban	↘				↘		↗

Not Assessed Bad Poor Fair Good Excellent

Source: Pereira et al., 2004

Note: The condition of the service is given by a color code. Two types of trend are shown: arrows give the trend of the condition (or “stock”); hands give the trend of the production (or “flow”) for provisioning services and recreation. In some cases services were not assessed because they do not occur or they have a marginal importance. Question marks indicate services that would have been assessed if data were available.

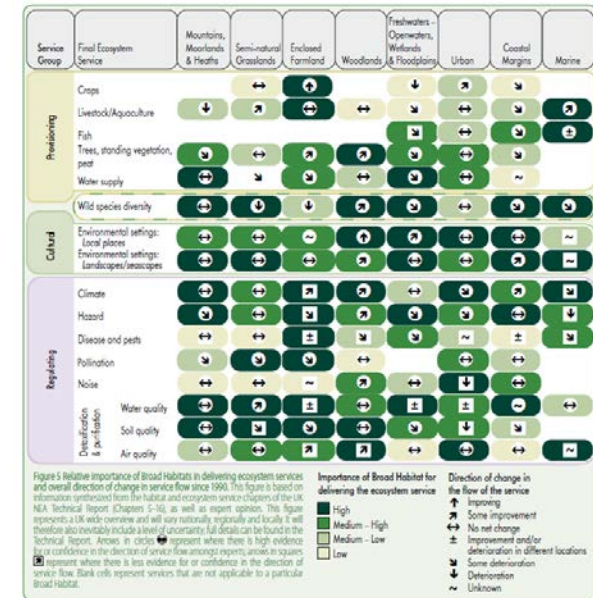
Evaluation of the relative importance and the trends since the 60s of the 22 services provided by the operational ecosystem types of Spain



Source: EME, 2011

Note: White cells mean that the service has not been evaluated or is not applicable to a certain ecosystem type.

Relative importance of Broad Habitats in delivering ecosystem services and overall direction of change in service flow since 1990



Source: UK NEA, 2011a

Table 6: Ecosystem services provided by specific ecosystem types

	Situação actual	Tendência de evolução
Produção alimentar	-	=
Sequestro de Carbono	-	=
Biodiversidade	+	↓
Provisão de água	-	↓
Protecção do solo	--	↓
Recreio	0	=

Source: ptMA, 2012

Note: Status: (+) Positive; (0) Neutral; (-) Negative; (--) Very negative. Trends: (=) Stationary; (↓) Negative

Estimated situation of the ecosystem services provided by sclerophyllous forest and bush land and associated annual grassland

Tipo	Servicio	Situación	
Abastecimiento	Alimentación	↗	
	Agua	↔	
	Tejidos, fibras y otros materiales bióticos	↔	
	Materiales origen geotico	↔	
	Energía	↔	
Regulación	Reserva genética	↘	
	Regulación climática local y regional. Almacenamiento de carbono	↑	
	Regulación del aire	↗	
	Regulación hídrica y depuración del agua	↘	
	Regulación morfo-sedimentaria.	↘	
Culturales	Regulación del suelo y nutrientes. Fertilidad del suelo	↘	
	Amortiguación de perturbaciones	↔	
	Conocimiento científico	↗	
	Actividades recreativas	Turismo clásico Turismo cultural	↔
	Paisaje - Servicio estético		↔
	Disfrute espiritual	↗	
	Conocimiento ecológico local	↘	
	Identidad cultural y sentido de pertenencia	↔	
	Educación ambiental	↔	



Source: EME, 2010

Overview of final ecosystem services provided by Enclosed Farmland

Final ecosystem service	Importance of enclosed farmland for service	Impact of enclosed farmland on service	Evidence base	Comments
Crops, plants, livestock, fish, etc. (wild and domesticated)	High	++	⊙	Strong positive score: farmland is largely managed for crop and livestock production.
Trees, standing vegetation & peat	Low	+	○	Positive score, due to small but increasing areas of biomass crops.
Climate regulation	High	--	⊙	Strong negative score, due to emissions of Greenhouse gases and depletion of carbon in soils.
Water quantity	High	+ / -	⊙	Important for catching water for ground and surface waters, though flood risk mitigation potential often compromised by management.
Hazard regulation - vegetation & other habitats	High	--	⊙	Negative impact on sediment loss to watercourses, increasing flood risk downstream.
Waste breakdown & detoxification	High	-- / +	⊙	Negative score due to diffuse (mainly) pollution leaving farmland; positive score for ability to compost green waste / AD, and sewage disposal.
Wild species diversity including microbes	High	--	⊙	Negative impacts; status of microbes unknown.
Purification	Low	--	⊙	Negative impacts on water quality as a result of diffuse pollution.
Environmental settings - meaningful places incl. green & blue space	Low	Zero	○	Individual sites have less significance than spaces in cities or mountain tops.
Environmental settings - socially valued landscapes and waterscapes	High	++	○	Farming management is largely responsible for the landscapes that many people cherish.

Source: UK NEA, 2011b

Note: the impact values range from ++ to --, depending on the magnitude and direction of influence. ⊙ denotes high agreement with much evidence; ○ indicates high agreement with limited evidence. Ecosystem services are categorised as provisioning (P), regulating (R) or cultural (C).

Table 7: Assessment and mapping of specific ecosystem services: regulating services

Inventory of the quantity of carbon sequestered in Quinta da França in 2006, 2007 and 2008

Item	Carbono sequestrado (t)					
	2006		2007		2008	
Biomassa florestal	980		1028		1656	
Solo florestal	369		409		409	
Gestão agrícola	105		708		99	
Gestão de pastagens*	344	432	507	588	578	702
Total	1798	1886	2652	2733	2742	2866

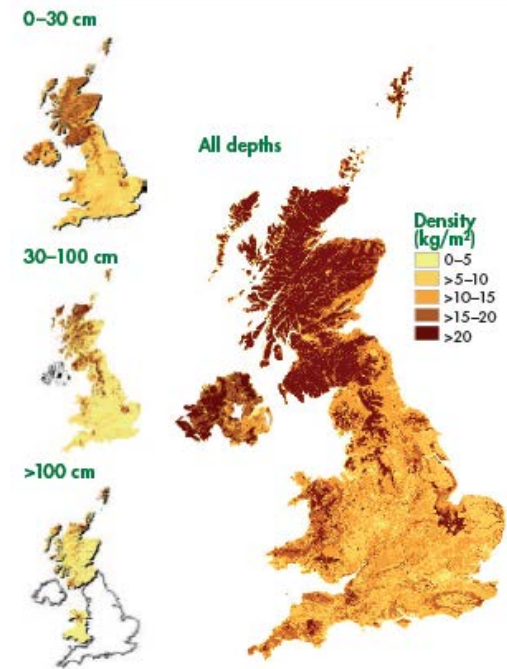
Source: Terraprima in ptMA, 2012

Map of climate regulation service (Carbon storage in ton/ha)



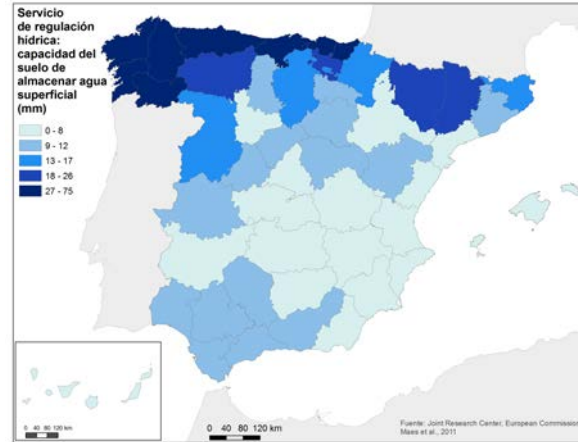
Source: EME, 2013

Density (kg/m²) of soil carbon in the UK



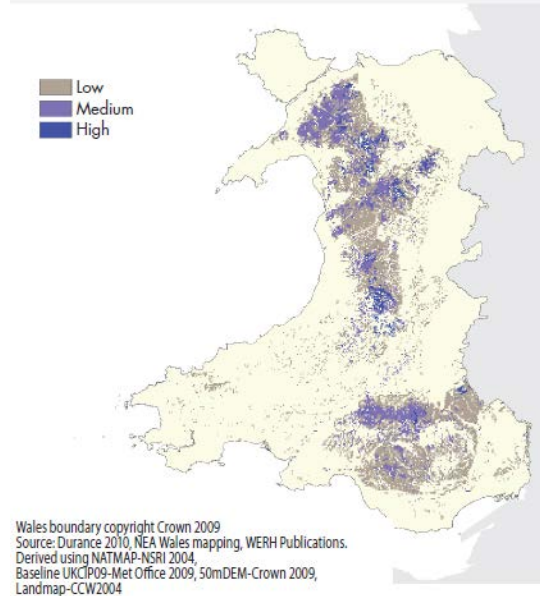
Source: Bradley et al., 2005 in UK NEA, 2011b

Regulation of water flows (soil capacity to store surface water in mm)



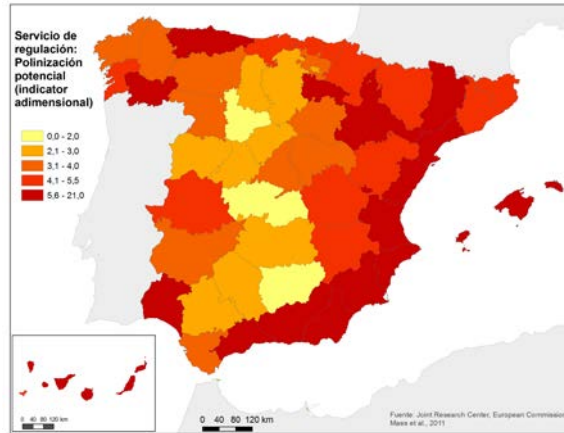
Source: EME, 2013

Potential for regulation of surface runoff by land cover in highly erodible areas of Wales



Source: Wales Environment Research Hub unpublished data in UK NEA, 2011b

Map of potential pollination (dimensionless service)



Source: EME, 2013

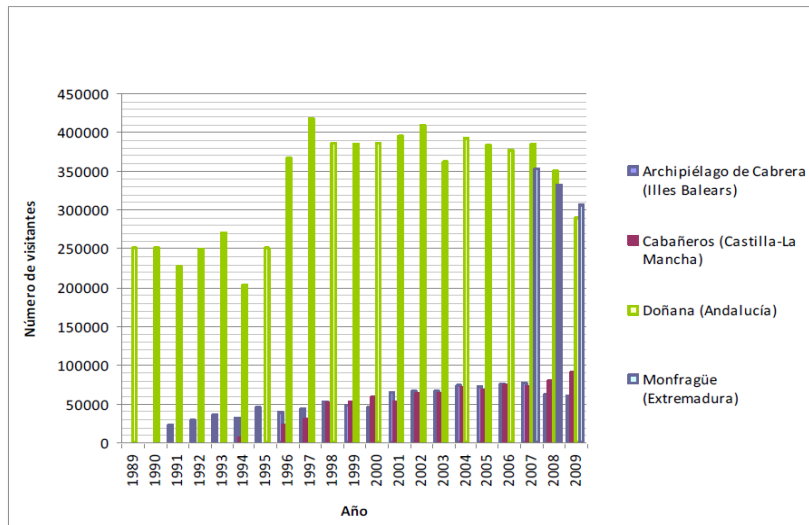
Crop dependencies on pollinators and annual value of pollination in 2007

Crop	Dependence on Pollinators (%)	Value per annum (£ millions)
Oilseed rape	25	106
Strawberries	45	72
Dessert apples	85	44
Culinary apples	85	43
Raspberries	45	39
Cucumbers	65	22
Tomatoes	25	21
Runner beans	85	16
Plums	65	6
Pears	65	5
Others	5-85	54
Total		Approx. £430 million

Source: UK NEA, 2011b

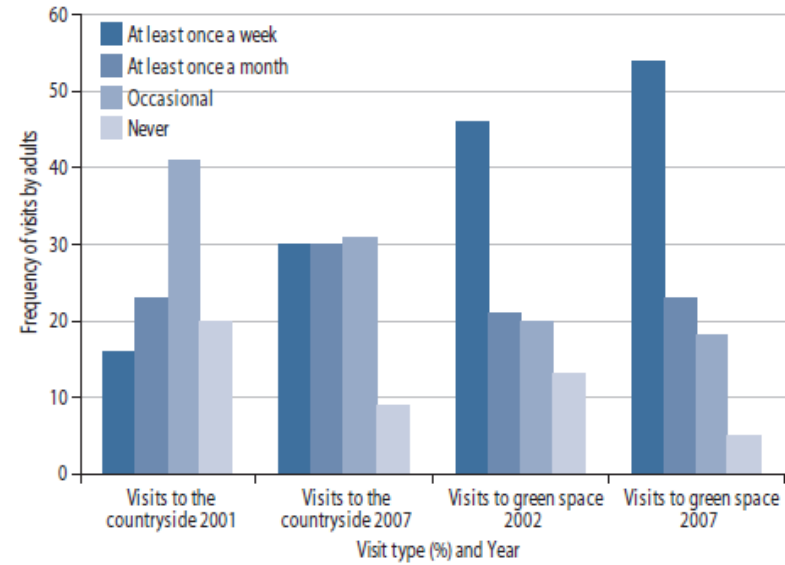
Table 8: Assessment and mapping of specific ecosystem services: cultural services

Evolution of the number of visitors to national parks which represent certain ecosystem types (in this case termophilic Mediterranean forests)



Source: MARM, 2009 in EME, 2012

Frequency of visits to the countryside and greenspaces in England



Source: FLUFP, 2010 in UK NEA, 2011b

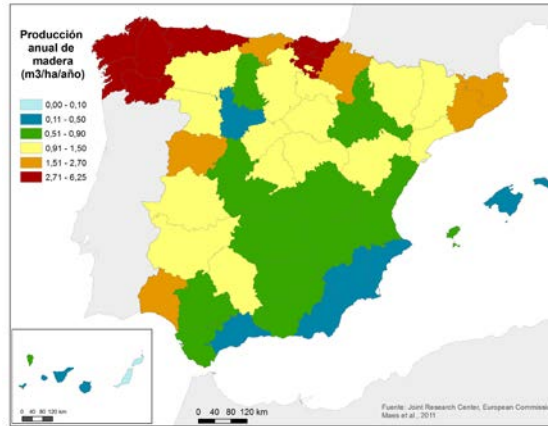
Table 9: Assessment and mapping of specific ecosystem services: provisioning services

Cork production in ton

Years	Total	Virgin cork	Reproduction cork
Average 43/51	170 666	44 222	126 444
Average 52/60	188 334	57 778	130 556
Average 61/69	221 555	78 444	143 111
Average 70/78	185 966	47 033	138 933
Average 79/87	149 422	33 700	115 722
Average 88/96	170 444	30 000	140 444
Average 97/00	165 500	30 000	135 500

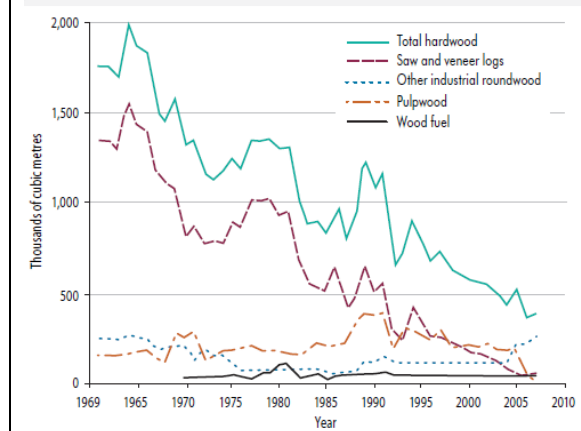
Source: Mendes, 2004 in Pereira et al., 2004

Annual timber production (m³/ha/year)



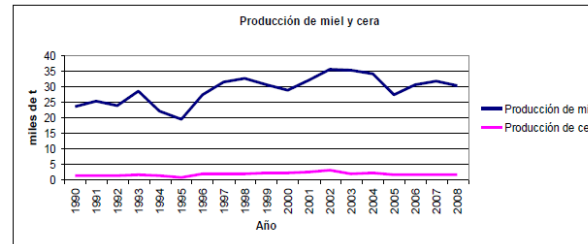
Source: EME, 2013

Production of hardwoods in the UK from 1961 to 2007



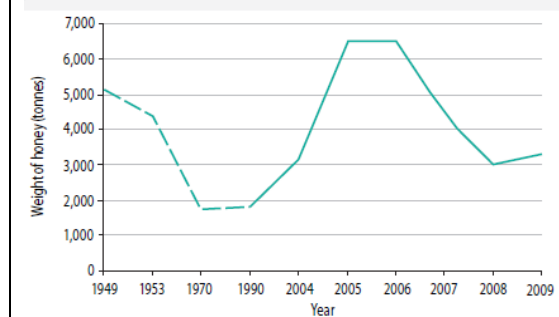
Source: Forestry Commission in UK NEA, 2011b

Evolution of the production of honey and wax



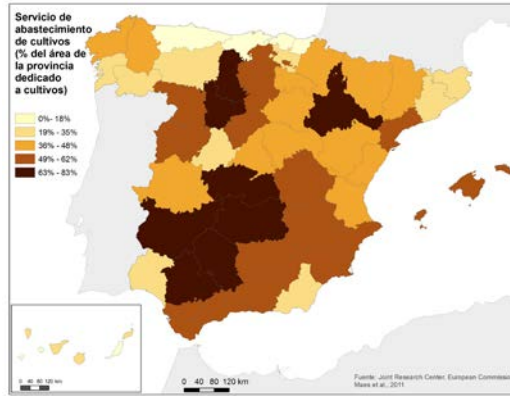
Source: COAG, 2006 in EME, 2012

Honey production in England and Wales



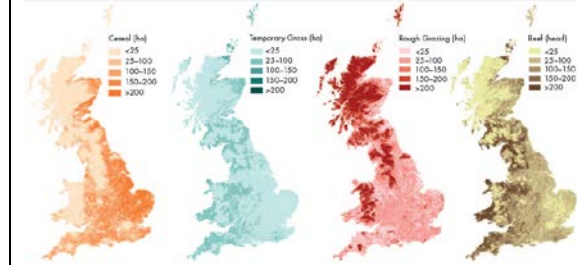
Source: UK NEA, 2011b

Provisioning service: crops (% of the area of the region dedicated to crops)



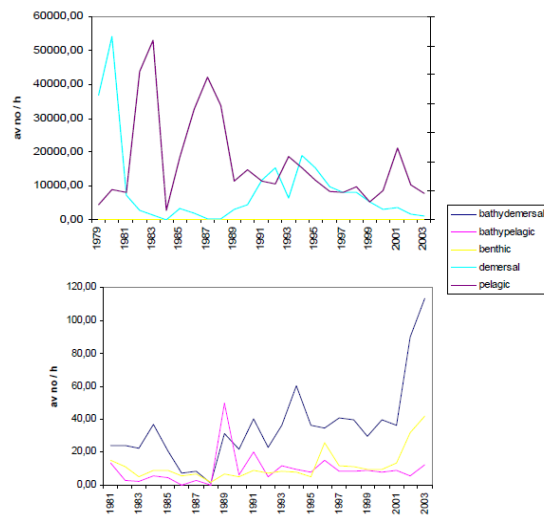
Source: EME, 2013

Cereals, temporary grassland, rough grazing and beef cows at the year 2000 baseline



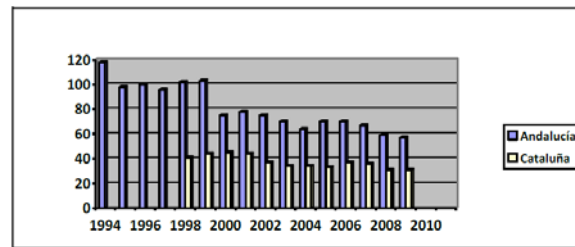
Source: UK NEA, 2011b

Fish abundance (average number per hour of fishing) according to ecological guilds in the Portuguese coast, based on regular sampling surveys performed by IPIMAR from 1981 to 2003



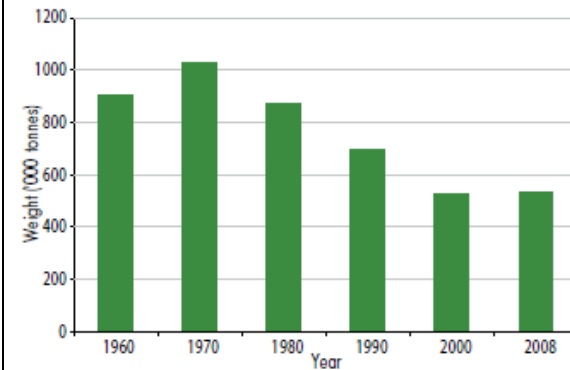
Source: Pereira et al., 2004

Evolution of fresh fish landed



Source: EME, 2012

Landings of fish and shellfish into the UK by UK and foreign vessels between 1960 and 2008



Source: MMO, 2010 in UK NEA, 2011a

Table 10: Trade-offs and synergies

Trade-offs and synergies in Mediterranean sclerophyllous ecosystem types

DECISIÓN	OBJETIVO	GANADOR/ES	ECOSERVICIO QUE DECECE	PERDEDORES
Desarrollar zonas residenciales en una provincia .	Mejora de la calidad de vida de habitantes urbanos mediante el disfrute del campo.	Empresarios constructores. Residentes. Empresarios de servicios. Comerciantes.	El paisaje rural silvestre y cultural tradicional. La biodiversidad. El disfrute espiritual colectivo. El turismo cultural.	Turistas culturales. La cultura rural. Ganaderos y silvicultores.
Mejorar el transporte por carretera.	Comunicación terrestre a través de una comarca con monte esclerófilo y dehesa. Rotura del aislamiento. Comunicación socioeconómica y cultural.	Comercio, industria, cultura. Habitantes de los núcleos urbanos de la región.	Regulación hídrica. Suministro de fertilidad natural a los valles. Conectividad física entre zonas altas y valles y conectividad biológica (mantenimiento de la biodiversidad silvestre y ganadera).	Ganaderos y agricultores de la comarca. Economía agraria. Puede no haber ningún perdedor, si los proyectos de carretera incorporan provisiones de salvaguarda de la conectividad.
Promocionar la agricultura extensiva en una comarca.	Aumento del abastecimiento alimentario.	Sociedad en general. Los agricultores en particular. La cultura agrícola.	Regulación climática local. Almacenamiento de carbono. Regulación morfosedimentaria.	Ninguno, si el desarrollo agrícola tiene lugar de forma "sensata".
Desarrollar el turismo clásico.	Mejora del nivel de vida de la comarca.	Determinadas tramas (monetaristas) empresariales y laborales del turismo.	El paisaje rural silvestre y cultural tradicional. La biodiversidad. La regulación hídrica y depuración natural del agua.	Turistas culturales. La cultura rural. Ganaderos y silvicultores.
Desarrollar el turismo cultural y de la naturaleza.	Mejora del nivel de vida de la comarca protegiendo la capacidad de genera servicios de sus ecosistemas.	Determinadas tramas (socioculturales) empresariales y laborales del turismo. Turistas culturales. La cultura rural. Ganaderos y silvicultores.	Ninguno (si el desarrollo tiene lugar de forma "sensata").	Ninguno (si el desarrollo tiene lugar de forma "sensata").
Declarar una reserva biológica integral.	Protección de las diversidad biológica.	La comunidad científica. La sociedad en general según el conocimiento aportado.	Ninguno.	La cultura rural. Ganaderos y silvicultores. Turistas culturales (dependiendo de la idea de protección aplicada).

Source: EME, 2012

Trade-offs and synergies for final ecosystem services in Sand Dunes

		P		P		R	P	R	R	P	R	C	C	
		Crops, plants, livestock, fish, etc. (wild and domesticated)		Trees, standing vegetation & peat		Climate regulation	Water quantity	Hazard regulation -vegetation & other habitats	Waste breakdown & detoxification	Wild species diversity including microbes	Purification	Environmental Settings: Meaningful places inc. green & blue space	Environmental Settings: Socially valued landscapes and waterscapes	
		Livestock related	Wild food	Forestry	Sand extraction	Military/pipelines							Golf courses	Other amenity activities
P	Crops, plants, livestock, fish, etc. (wild and domesticated)	Livestock related	=	-*	-	=	-	=	=	++	-†	-‡	-	-‡
		Wild food		±	-	=	=	=	=	++	=	+	=	+
P	Trees, standing vegetation & peat	Forestry			-	±†	+	-	+	-	=	+	-	+
		Sand extraction				-	-	-	-	±§	=	-	-	-
		Military; pipelines						-	=	++	-†	-	-	-
R	Climate regulation						=	++		-	-	+	-	
P	Water quantity							=		+	=	±	=	
R	Hazard regulation -vegetation & other habitats									-	=	±	++	±
R	Waste breakdown & detoxification													
P	Wild species diversity including microbes										=	+	±	+
R	Purification											=	-†	=
C	Environmental Settings: places (inc. green & blue space)												-**	++
C	Environmental Settings: landscapes and waterscapes	Golf courses												-**
		Other amenity activities												

Source: UK NEA, 2011b

Note: = No effect, - Minor negative or net negative if mixed, -- Strong negative, + Minor positive or net positive if mixed, ++ Strong positive, +/- Balanced positive/negative. Scores should not be summed due to potential double-counting across services. P=Provisioning service, R=Regulating service, C=Cultural service. Waste breakdown not relevant to dunes

Table 11: Response options and management practices

Comparison of the ecosystem service values of different lowland peatland management practices using active non-impacted peatland systems as a baseline

		Afforestation	Abandonment	Peat cutting (fuel)	Peat cutting (horticulture)	Agricultural improvement	Cultivation
	Vegetation produced	Coniferous forestry	Scrub/Woodland	Wet/Dry Heath	Bare	Improved grassland, Grazing marsh	Cropland
	Peatland type most affected	Shallow peat, Raised bog	Raised bog, Fens	Raised bog	Raised bog	Shallow peat, Raised bog, Fen	Raised bog, Fens
	Peat condition	Degraded/Archaic	Degraded	Degraded	Bare	Archaic	Archaic
Provisioning	Crops, livestock & fisheries	↓	↓	≈	≈	↑	↑
	Fuel or horticultural peat	≈	≈	↑	↑	≈	≈
	Timber or building material	↑	↑	≈	≈	≈	≈
	Genetic resources	↓	↑/↓	↓	↓	↓	↓
	Drinking water supply	↓	≈	≈	≈	≈	≈
Regulating	Carbon storage	↓/≈	↓	↓	↓	↓	↓
	Preventing GHG emissions	↑/↓	↓	↓/≈	↓	↓	↓
	Flood prevention	↓/↑	↑	↓/≈	↓	↓	↓
	Disease prevention	≈	≈	≈	↑?	↑	↑
	Detoxification and purification	↓	≈	≈	↓	↓	↓
	Pollination	↓	↑	↓	↓	↓	↓
Cultural	Religion and spirituality	↑	↑	≈	≈	↑?	↑?
	Cultural heritage	↑	↓	↑	↑	↑	↑
	Aesthetics	↓	↓/↑	↑	↓	↓/↑	↓?
	Social Cohesion	≈	↓	↑	↑?	≈/↑	≈/↓
	Tourism and recreation	↑	↓	↑	↓	≈	≈
	Education	↑	↑	↑	↓	↑	↑
Supporting	Soil formation	↓	↓	↓	↓	↓	↓
	Nutrient cycling	≈	↑	↑	↑	↑	↑
	Biodiversity	↓	↑	↓	↓	↓	↓

Source: JNCC, 2011 in UK NEA, 2011b

Note: The table indicates how different management practices, when applied to an active lowland peatland, affect delivery of these services*. ↓ shows a decrease in ecosystem service function; ↑ shows an increase in ecosystem service function; ≈ shows no change in ecosystem function. * An increase or decrease of any given ecosystem service function does not necessarily equate to an improvement or deterioration of the system overall

Table 12: Links with human well-being

State or degree of vulnerability of ecosystem services in relation to the relative importance of the service for human well-being and their conservation trends in relation to the presence of impacts generated by one or more direct drivers of change

Servicios de los ecosistemas	Tendencia	Importancia	Estado*	Indicador	Impulsores directos						
					Cambios de uso suelo	Cambio climático	Contaminación	Ciclo biogeoquímico	Sobre-explotación	Esp. exóticas invasoras	
ABASTECIMIENTO	Alimentos	Agricultura	↗	♦♦	Producción de cereales, frutales y olivos	✓	✓		✓	✓	✓
		Ganadería	↗	♦♦	Producción de carne		✓		✓	✓	✓
		Apicultura	↔	♦	Producción de <i>Apis mellifera</i>		✓				✓
		Acuicultura	↗	♦♦	Producción total acuícola					✓	
	Agua dulce	↔	♦	Captación de agua para uso humano	✓	✓	✓	✓	✓		
	Mat. bióticos	Madera	↗	♦	Producción de madera	✓			✓	✓	✓
		Papel	↔	♦	Producción pasta papel	✓			✓	✓	✓
	Material geótico	↔	♦	Producción de cemento	✓				✓		
	Energía renovable	↔	♦	Potencia hidroeléctrica instalada		✓			✓		
	Acervo genético	↘	♦♦	Basado en evaluación de ecosistemas	✓					✓	
Med. naturales	↘	♦	Basado en evaluación de ecosistemas		✓			✓			
REGULACIÓN	Climática local y regional	↘	♦♦	Ratio entre emisiones y secuestro de CO ₂	✓	✓	✓	✓	✓		
	Aire	↔	♦	Emisiones de gases contaminantes	✓	✓	✓	✓	✓		
	Hídrica	↘	♦♦	Almacenamiento de agua en el suelo, nieve, recarga de acuíferos y capacidad autodepuradora	✓	✓	✓	✓	✓	✓	
	Control de la erosión	↘	♦♦	Basado en evaluación de ecosistemas	✓	✓					
	Fertilidad del suelo	↘	♦♦	Necesidad de utilización de fertilizantes nitrogenados	✓		✓	✓	✓	✓	
	Perturbaciones naturales	↘	♦♦	Incendios forestales	✓	✓		✓	✓	✓	
	Control biológico	↘	♦♦	Capacidad de regulación de especies exóticas	✓	✓	✓	✓		✓	
	Polinización	↔	♦	Basado en evaluación de ecosistemas	✓	✓	✓			✓	
CULTURALES	Conocimiento Científico	↗	♦♦	Número de publicaciones españolas sobre ecosistemas	✓	✓	✓				
	Actividades Recreativas	↗	♦♦	Número de alojamientos turísticos, visitantes y pernoctaciones	✓	✓	✓				
	Disfrute estético	↔	♦	Basado en evaluación de ecosistemas	✓	✓					
	Educación ambiental	↗	♦♦	Equipamientos destinados a educación ambiental		✓	✓		✓	✓	
	Conocimiento ecológico local	↘	♦♦	Aprovechamiento tradicional del corcho y ovejas en trashumancia	✓				✓	✓	
	Disfrute espiritual	↗	♦♦	Basado en evaluación de ecosistemas	✓		✓				
	Identidad cultural y sentido pertenencia	↘	♦	Basado en evaluación de ecosistemas	✓					✓	

SERVICIOS DE LOS ECOSISTEMAS			IMPULSORES DE CAMBIO	
Tendencia	Importancia	Estado		
↗	Alta	♦♦	No vulnerable	✓ Impulsores directos de cambio que afectan al suministro de servicios de los ecosistemas La relación de los impulsores directos de cambio con los servicios de los ecosistemas se ha medido principalmente con correlaciones de Pearson basado en los indicadores establecidos, así como por criterio de expertos.
	Medio-alta	♦	Poco vulnerable	
↔	Medio-baja	♦	Vulnerable	
↘	Baja	♦♦	Muy vulnerable	

*El estado de los servicios de los ecosistemas es la resultante del análisis de la tendencia y su importancia

Source: EME, 2011

Table 13: Evaluation methods and sources of data

Services, indicators, sources of information and measurement units used to evaluate the services delivered by the different ecosystem types (in this case Alpine mountains)

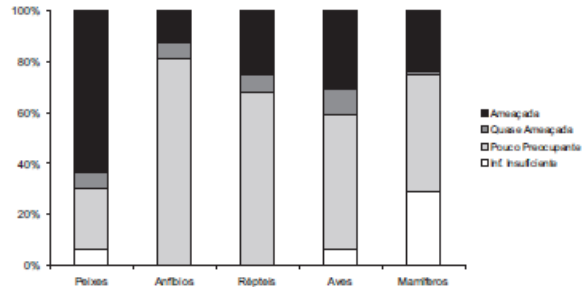
Tipo	Subtipo	Categoría	Indicador	Fuente	Unid.
Abastecimiento	Alimentación	Agricultura	Producción agrícola	Anuarios CCAA	t/ha
			Productividad Agraria	Anuarios CCAA	t/ha
			Estructura de la producción agrícola	Anuarios CCAA	%
			Huella Ecológica del sector agrícola	Anuarios CCAA	ha/cap
			Producción Agricultura Ecológica	Anuarios CCAA	t/ha
			Empleo ligado al sector agrícola	Anuarios CCAA	% total población activa
			VAB ligado al sector agrícola	Anuarios CCAA	€/ano
	Agua dulce	Anuarios CCAA, Confederaciones Hidrográficas	m ³		
	Materias primas de origen vegetal		Superficie y producción	Anuarios CCAA	ha y t
	Materias primas de origen mineral		Materiales de construcción y energía	Anuarios CCAA	t
Energías renovables		Biomasa forestal	Anuarios CCAA	%	
Acervo genético		Diversidad natural y doméstica	Anuarios CCAA	nº	
Medicinas naturales y principios activos		Plantas medicinales	Anuarios CCAA	nº	
Regulación	Regulación climática	Global	Captura de CO ₂ en bosques y matorrales	Mapa Forestal de España, CCAA	t
		Regional y Local	Cambios de uso y temperaturas y precipitaciones	Anuarios CCAA	%
	Regulación hídrica		Cambios de usos del suelo	Anuarios CCAA	%
	Regulación morfosedimentaria		Cobertura de vegetación	Mapa Forestal de España, CCAA	%
	Formación y fertilidad del suelo		Fertilidad y cambios de usos	Anuarios CCAA	%
	Regulación de las perturbaciones naturales		Regulación de perturbaciones climáticas	Anuarios CCAA	nº
	Control biológico		Cambios de uso y gestión del paisaje	Anuarios CCAA	%
Polinización		Especies polinizadoras	Informes diversos	nº	
Culturales	Conocimiento científico		Universidades e investigación	Universidades y OPIs	%
	Conocimiento ecológico local		Iniciativas educativas y de producción	Diversas fuentes	nº
	Identidad cultural y sentido de pertenencia		Lenguas locales, folklore, monumentos históricos	Diversas fuentes	nº
	Disfrute espiritual y religioso		Rutas culturales	Diversas fuentes	nº
	Paisaje disfrute estético		Paisaje, geología, flora y fauna	Diversas fuentes	%
	Actividades recreativas y Ecoturismo		ENP y turismo Deportes de nieve	Anuarios CCAA	€
Educación Ambiental		Programas de educación ambiental	Anuarios CCAA	nº	

Source: EME, 2012

Annex 2 – Visual representation of the biodiversity information provided in the three NEAs

Table 1: State and trends of biodiversity

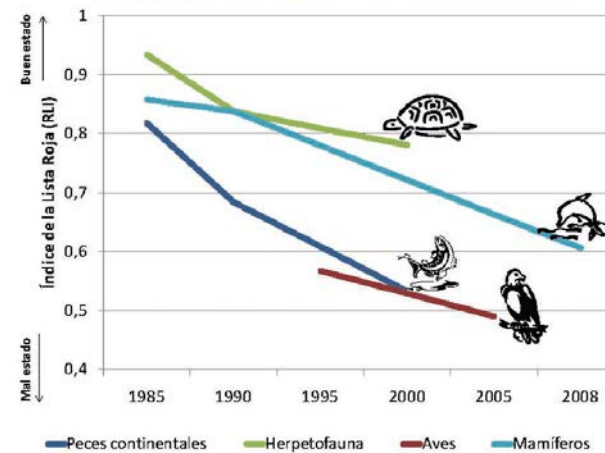
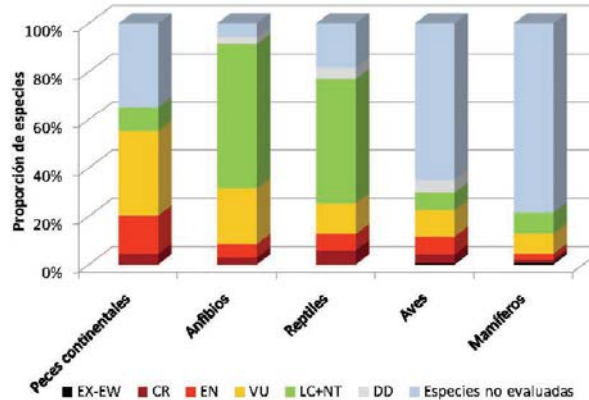
Threat status of species classified in the Red Book of Vertebrates of Portugal



Source: Cabral et al., 2005 in ptMA, 2012

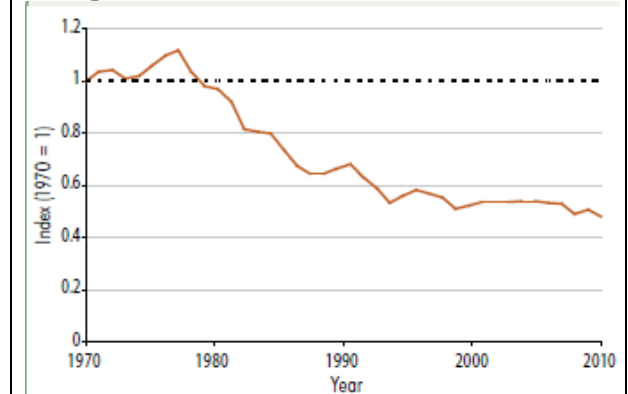
Note: Fish (n=33), reptiles (n=28), birds (n=246) and mammals (n=72)

Proportion of threatened vertebrates according to the Red Book of Vertebrates (top) and evolution of the conservation status of the same species according to the Red List Index (down)



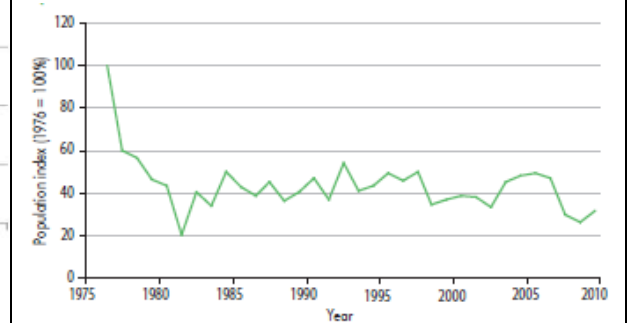
Source: EME, 2011

The UK Farmland Bird Index, 1970 to 2009, calculated on data from 19 individual farmland bird species



Source: RSPB, BTO, JNCC, Defra, 2010 in UK NEA, 2011a

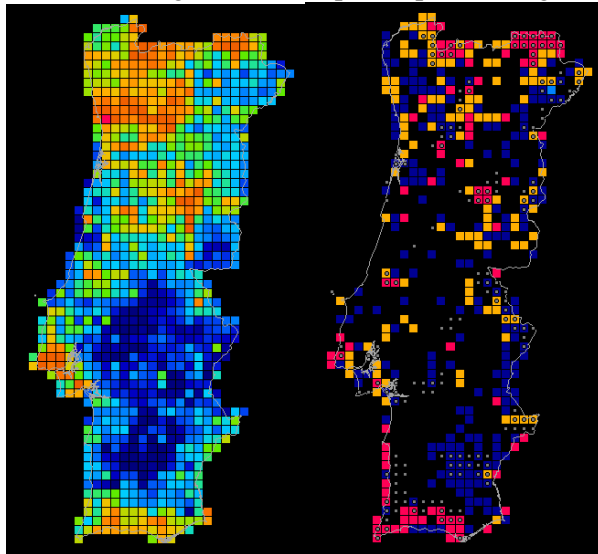
Composite population trend from 1976 to 2009 for 25 species of butterfly which are specialists of semi-natural habitats



Source: Several in UK NEA, 2011b

Table 2: State and trends of biodiversity: species richness

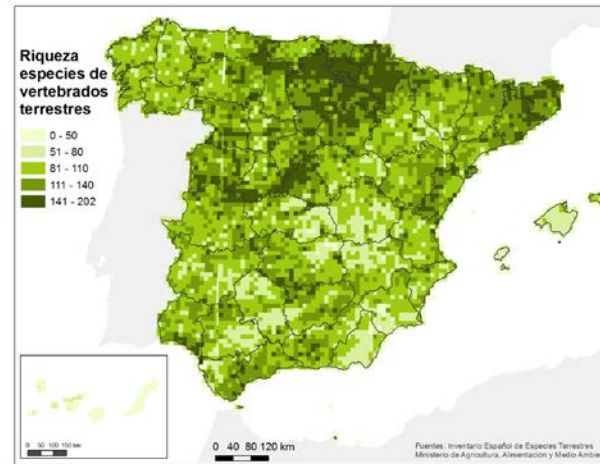
Spatial distribution of biodiversity in Portugal:
Species richness of selected groups
(gymnosperms, pteridophytes, amphibians,
reptiles, mammals and butterflies) (left);
irreplaceability of each UTM cell, measured as the
number of range restricted species per cell (right)



Source: Pereira et al., 2004

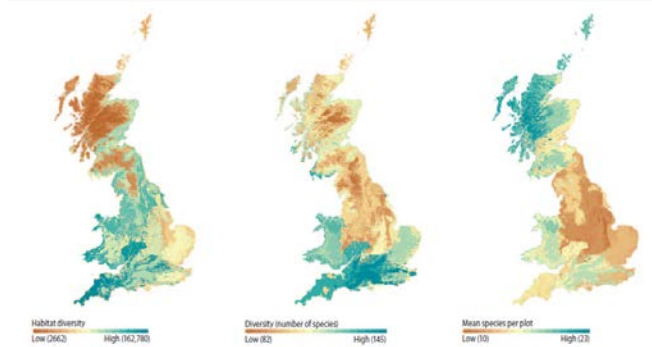
Note: Warm colours correspond to high species richness and cool colours to low species richness. Decreasing levels of irreplaceability: red, yellow, blue, black. Dots denote cells protected in the Natura 2000 network

Map of species richness of terrestrial vertebrates



Source: EME, 2013

Terrestrial habitat complexity/diversity; total species richness per 1 km² and mean species richness per plot, for 1 km² sample plots from the Countryside Survey

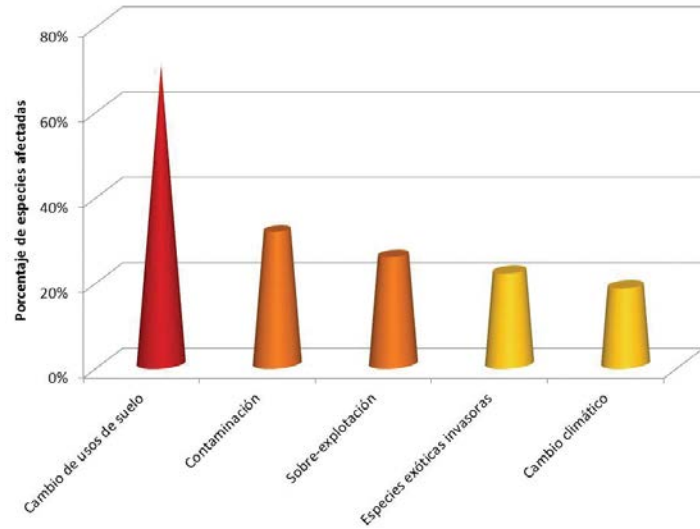


Source: Smart et al., 2010 in UK NEA, 2011b

Annex 3 – Visual representation of the drivers of change across the three NEAs

Table 1: Drivers of biodiversity change

Effects of direct drivers of biodiversity change: percentage of species affected



Source: EME, 2011

Drivers of biodiversity change in the UK

Biodiversity Group		Drivers of biodiversity change					
		Trend information	Land use change	Climate change	Invasive species	Exploitation (direct and indirect)	Pollutants
Microorganisms	Marine	Patchy	○	○			○
	Terrestrial	Poor	●	○			○
Fungi	Non-lichenised	Poor	●	●	●		●
	Lichens	Moderate	●	○	○		●
Lower plants	Phytoplankton	Good		●	○		○
	Macroalgae	Patchy	○	●	●		●
	Bryophytes	Moderate	●	○	○	○	●
Higher plants	Seagrasses	Patchy	●	●	○	○	●
	Land plants	Good	○	●	○	○	○
Invertebrates	Marine	Patchy	○	○	●	○	○
	Terrestrial	Moderate	●	○			○
Fish	Marine	Moderate		○		○	○
	Freshwater	Good	●	○	○	○	○
Amphibians		Moderate	●	●	○		○
Reptiles		Patchy	●	○			○
Birds		Good	○	○		○	○
Mammals		Moderate	●	○	○	○	○

High importance	Amount of evidence (theory, observations, models) →	Medium importance	Amount of evidence (theory, observations, models) →	Low importance	Amount of evidence (theory, observations, models) →
Level of agreement ↑	● ● ●	Level of agreement ↑	○ ○ ○	Level of agreement ↑	○ ○ ○
	○ ○ ○		○ ○ ○		○ ○ ○
	○ ○ ○		○ ○ ○		○ ○ ○

Source: UK NEA, 2011b

Note: Importance is colour-coded: high (maroon), medium (beige), low (green), unimportant on the basis of available evidence (blank). The size of the circle in each cell indicates the level of uncertainty. The impact of exploitation includes both the impact of the exploitation itself, but also the indirect consequences of exploitation through physical or ecological changes to the ecosystem

Table 2: Drivers of ecosystem change

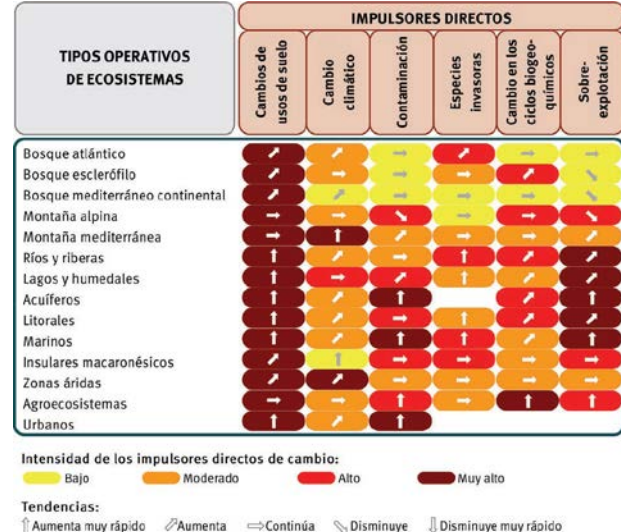
Most important drivers of ecosystem change in Portugal

Driver	Ex/En	D/I	Spatial Scale	Speed	Imp.
Fire regime	Ex/En	D	N	Fast	1
Land tenure and farm structure	En	I	N	Slow	2
Land use changes	En	D	N	Medium	1
Tourism	Ex/En	I	N	Medium	2
Exotic species	En	D	N	Medium	3
Economic growth	Ex/En	I	N	Medium	1
Population distribution and migration	Ex/En	I	N	Medium	2
Environmental legislation and attitudes	Ex/En	I	N/EU	Medium-Slow	2
EU Common Agricultural Policy and global markets	Ex	I	EU	Medium	1

Source: Pereira et al., 2004

Note: Abbreviations: Ex – Exogenous; En – Endogenous; D – Direct; I – Indirect; N – national scale; EU – European Union scale; Imp. – Importance, from 1 (highest) to 3 (lowest)

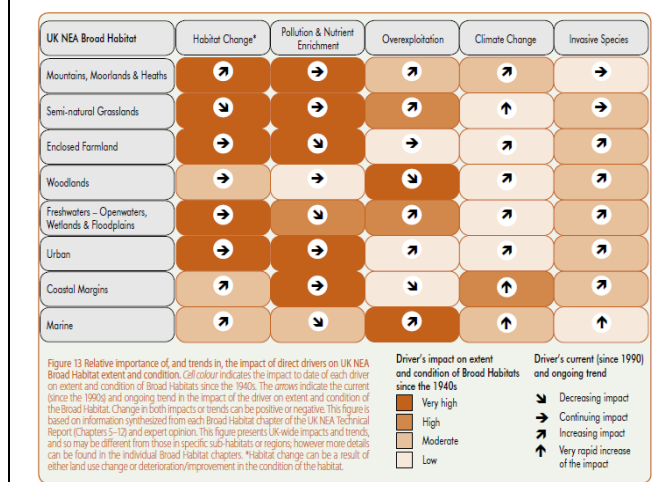
Relative intensity and trends of the impact of the 6 direct drivers of change evaluated in the different operational ecosystem types considered in the EME



Source: EME, 2011

Note: The colour indicates the intensity of the current impact of each driver on the flux of services of each ecosystem and the arrows indicate the trend in the impact of the driver. Blank cells mean that the driver is not applicable to that specific ecosystem type

Relative importance of, and trends in, the impact of direct drivers on UK NEA Broad Habitat extent and condition



Source: UK NEA, 2011a

Table 3: Drivers of ecosystem services change

Relative importance of, and trends in, the impact of direct drivers on UK ecosystem services

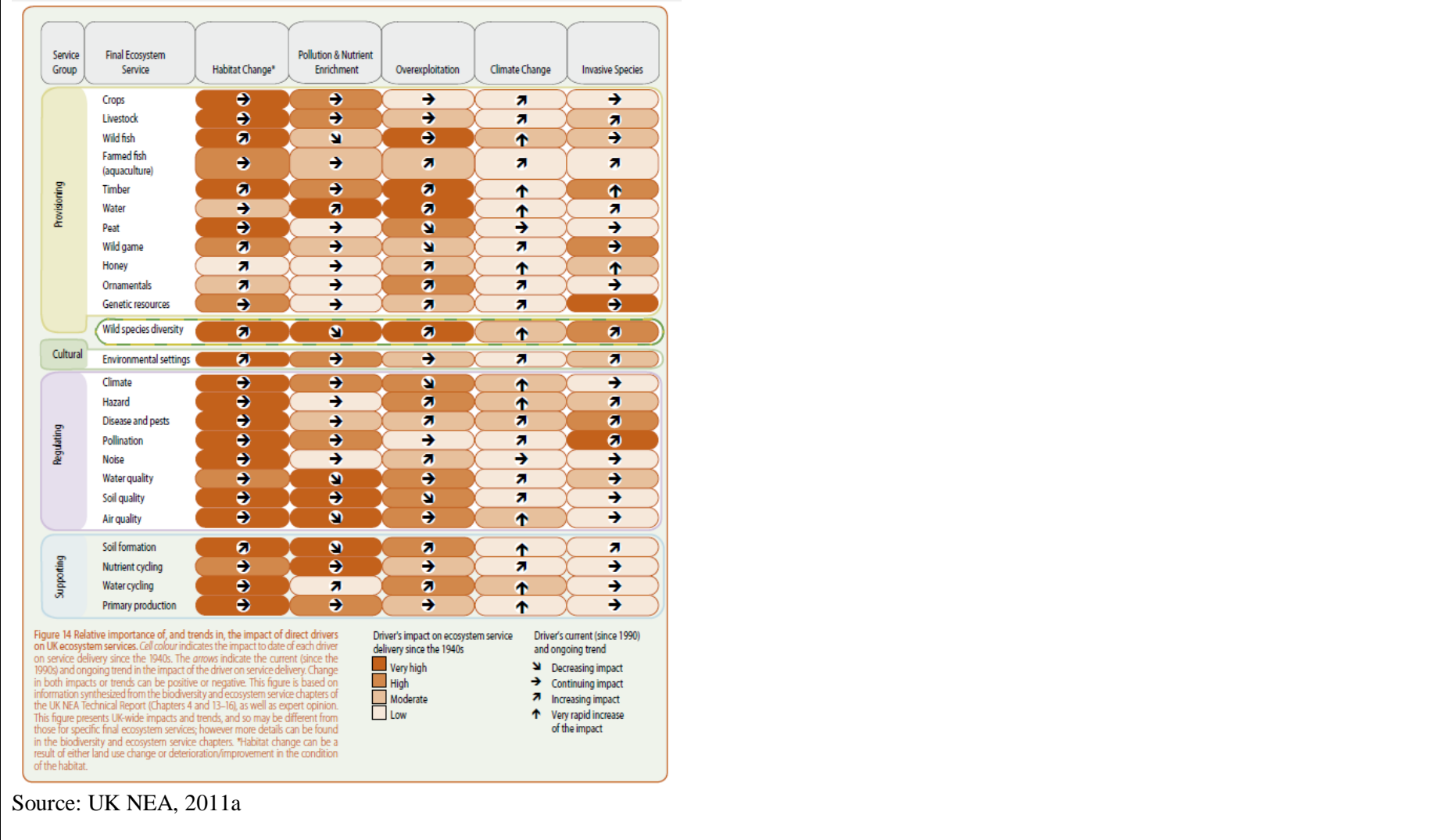
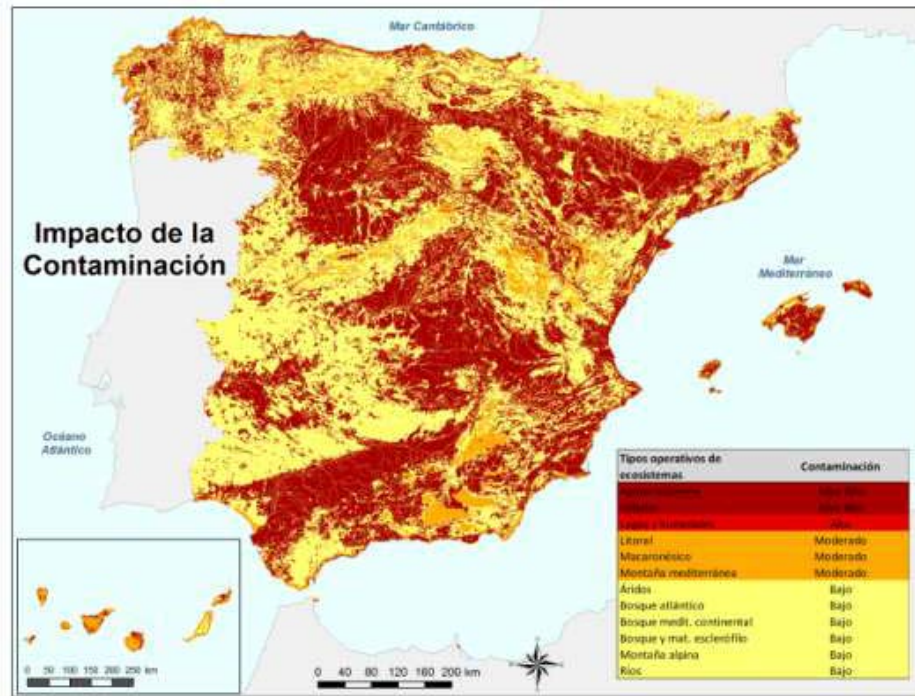


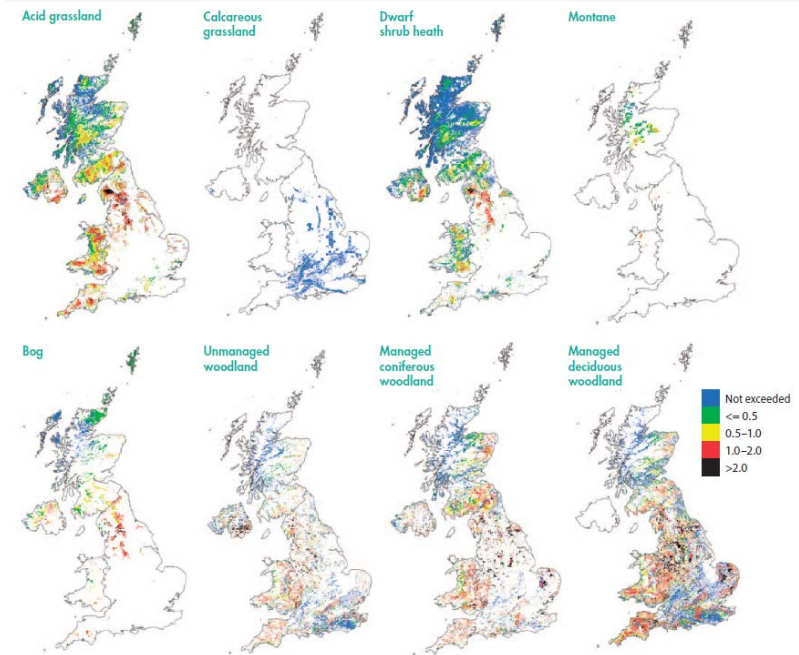
Table 4: Specific drivers of change

Impact of pollution on each of the ecosystem types evaluated by the EME



Source: EME, 2012

Exceedance of the critical loads of acidity for UK broad habitats by acid deposition for 2006–2008. The critical loads of acidity are determined by the buffering capacity of the dominant soil type in each 1x1 km square and habitat-specific parameters



Source: Several in UK NEA, 2011b