



# Land use planning in Galicia

## Session 4A - Introduction to the causes of land abandonment and instruments to address it

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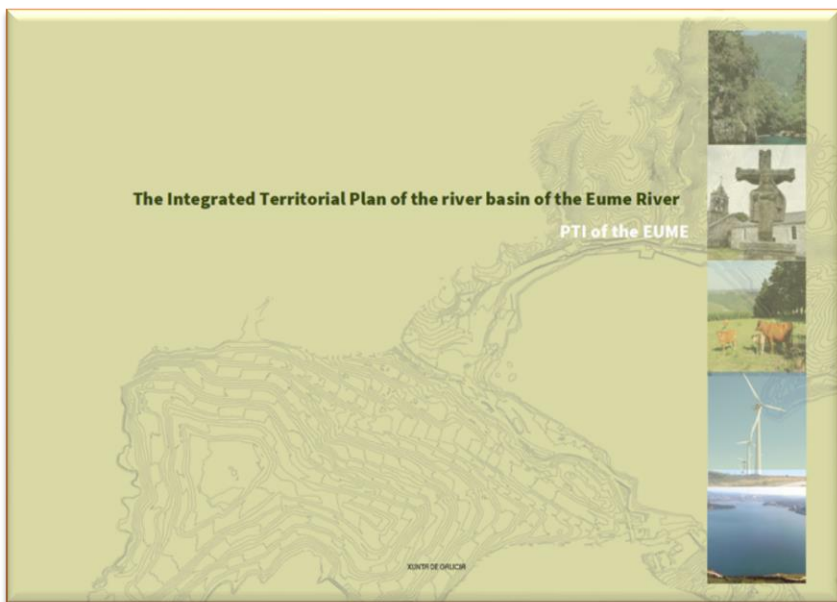
Ministry of Environment, Territory and Housing

Xunta de Galicia

**Two projects:** (In process).

The Integrated Territorial Plan of the river basin of the Eume River (PTI of the Eume).

Green Infrastructure Strategy of Galicia.



# The Integrated Territorial Plan of the river basin of the Eume (PTI of the Eume):

It is an instrument of Law of land planning in Galicia.

Application and development of  
the management Guidelines for the territory of Galicia. (2011).  
Determination 10.

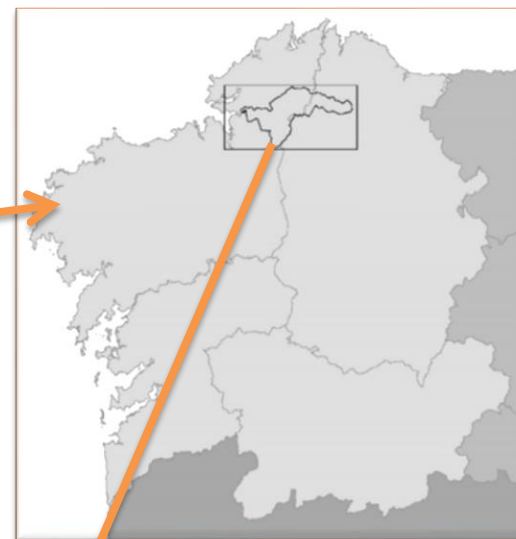
The main aim was:  
an efficient development of the territory  
protect the environment  
promote economic activity ,  
promoting a territorial balance  
and a sustainable planning of land use.

<b>BOE</b> LEGISLACIÓN CONSOLIDADA	
Ley 10/1996, de 23 de noviembre, de ordenación del territorio de Galicia.	
Comunidad Autónoma de Galicia «BOE» núm. 235, de 9 de diciembre de 1996 «BOE» núm. 11, de 12 de enero de 1998 Referencia: BOE-A-1996-768	
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[https://cmatv.xunta.gal/seccion-organizacion/c/CMAOT\\_Instituto\\_Estudios\\_Territorio?content=/Portal-Web/Contidos/Seccions/Direccion\\_Xeral\\_Sostibilidade\\_Paisaxe/Directrices\\_Ordenacion\\_Territorio/seccion.html](https://cmatv.xunta.gal/seccion-organizacion/c/CMAOT_Instituto_Estudios_Territorio?content=/Portal-Web/Contidos/Seccions/Direccion_Xeral_Sostibilidade_Paisaxe/Directrices_Ordenacion_Territorio/seccion.html)









## Why?

it was needed a cartographic approach to soil fitness from an agroforestry point of view.

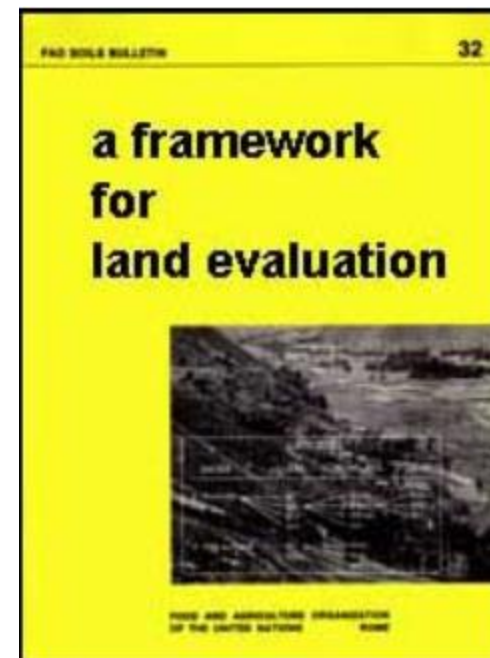
For planning the Land uses of the territory

## How?

The methodology of the territorial model of agroforestry aptitude (based in FAO. 1976. A Framework for Land Evaluation).

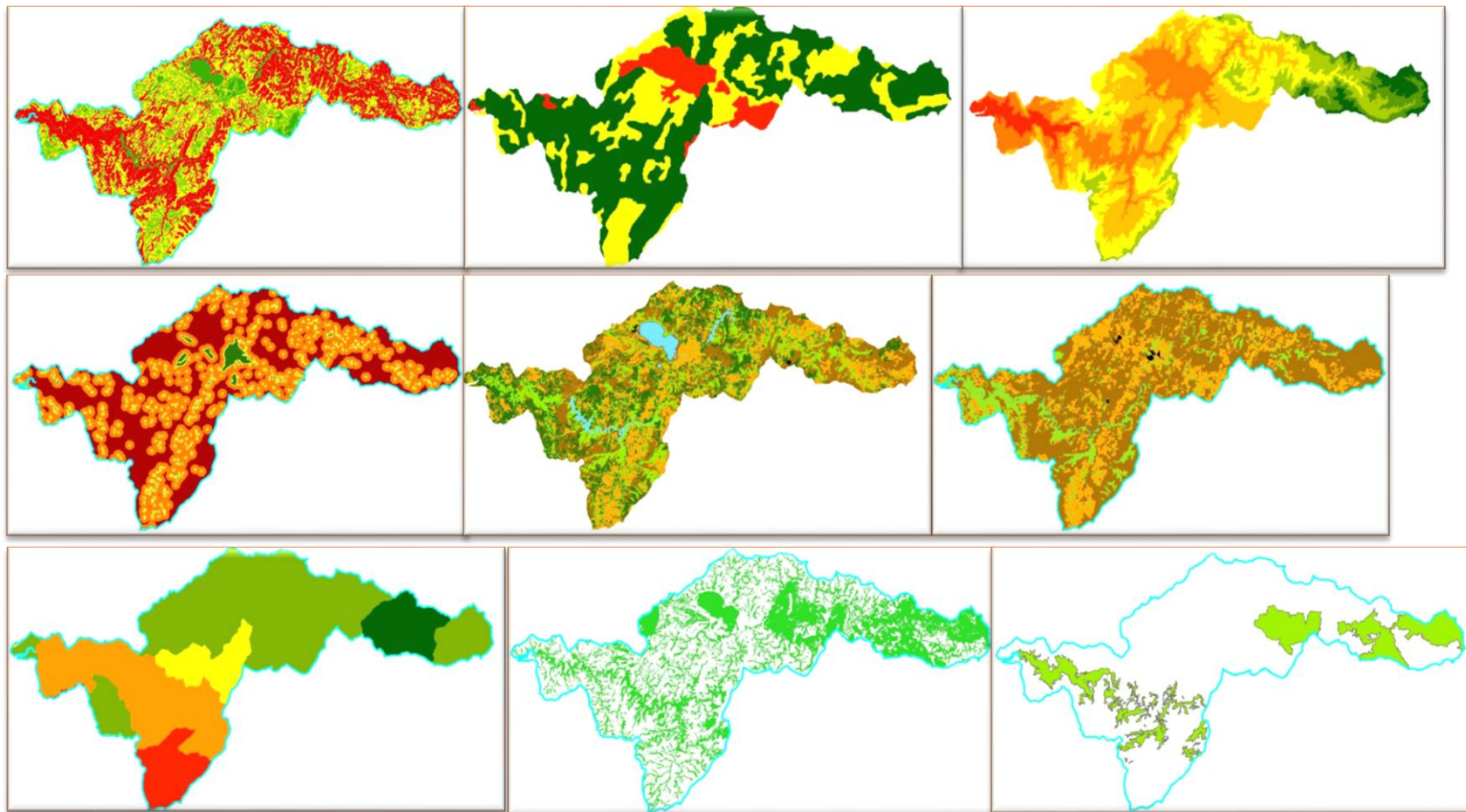
- The Soil fitness factors.
- The classes or categories of land uses.
- Evaluation of the land use classes according to the factors.
- The weight quantification of soil fitness factors for each use class.
- The aptitude map for the 7 land classes.

<http://www.fao.org/3/x5310e/x5310e00.htm>





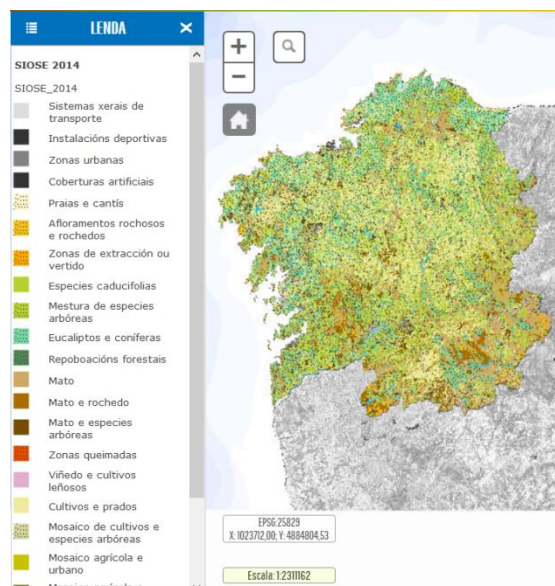
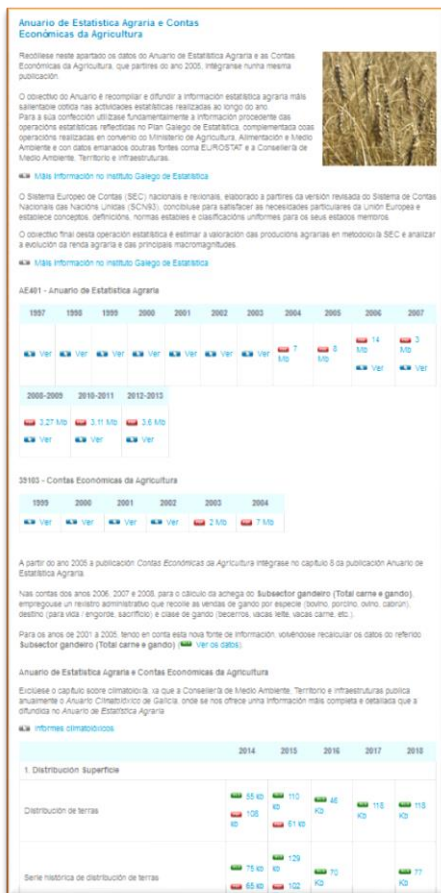
- **The Soil fitness factors** 12 Bibliographic review and available information: (1) Slope, alterability, depth, orientation and altitude (2) proximity to settlement, current land use, historical land use (3) areas with: areas of special hydrological relevance, risk of erosion, high natural value, risk of contamination (nitrites).



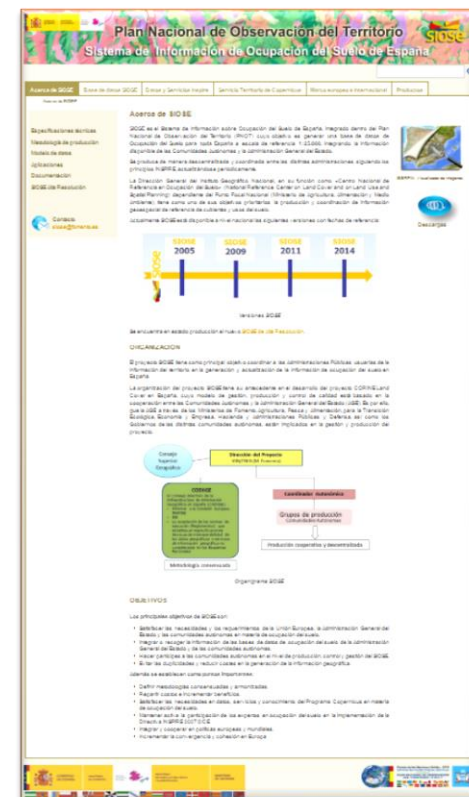
- **The classes or categories of land uses:** 7 categories: important, relevant, sustainable and information on the factors that condition it. (yearbook of agricultural statistics and SIOSE): Orchards crops, forage crops and grasslands, meadows and pasture, forestry timber producer (3) and protective forest.

[https://mediorural.xunta.gal/institucional/estadisticas/medio\\_rural/anuario\\_de\\_estadistica\\_agraria/](https://mediorural.xunta.gal/institucional/estadisticas/medio_rural/anuario_de_estadistica_agraria/)

<http://mapas.xunta.gal/visores/ocupaciondosolo/>



<https://www.siose.es/>



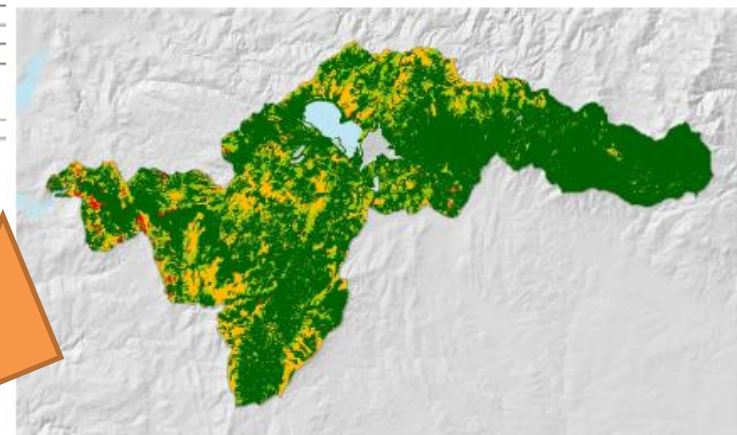


- **Evaluation of the land use classes according to the factors.** a series of evaluation criteria.
- **The weight quantification of soil fitness factors for each use class:** Scoring system based on bibliographic review and expert knowledge. The result was a scorecard from which a raster map was made

Tabela 4. Floresta produtor: *Pinus radiata* e *eucalyptus globulus*, entre outras, com função madeireira fundamentalmente.

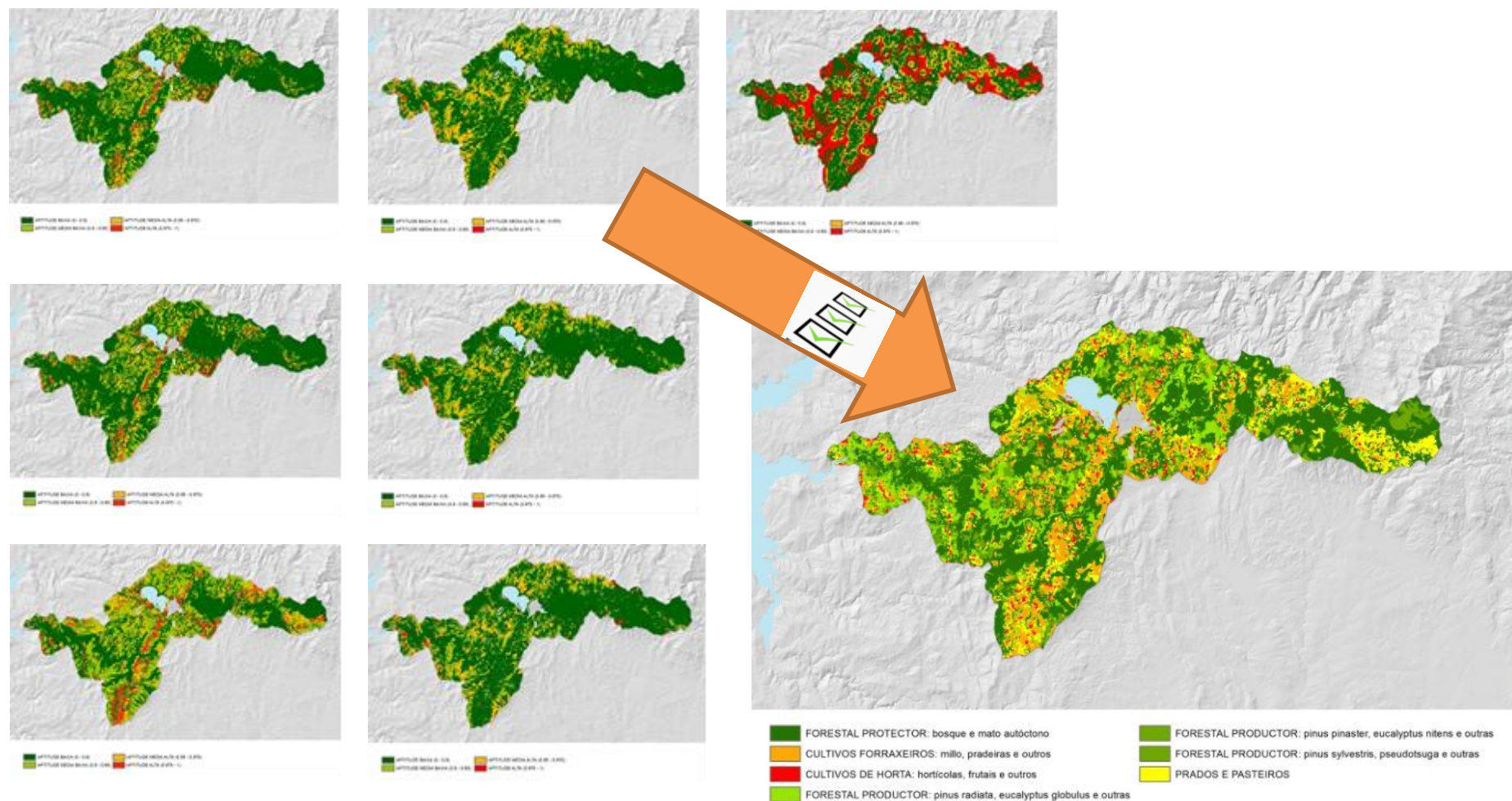
FORESTAL PRODUTOR: <i>pinus radiata</i> e <i>eucalyptus globulus</i> , entre outras USO: MADEIREIRO	CLASSE DE APTITUDE	A1: APTO SEM LIMITAÇÃO	A2: APTO COM LIMITAÇÕES DÉBILIS	A3: APTO MODERADAMENTE	N1: NON APTO ACTUALMENTE	N2: NON APTO PERMANENTEMENTE
	GRAD DE LIMITAÇÃO	níngún	débil	moderado	severo	moi severo
	PONTUAÇÃO de LIMITAÇÃO	0	1	3	9	27
Productividade do solo	Pendente	menor de 35 %	maior de 35 %			
	Atenuabilidade do solo	argilas-rochas básicas-ultrabásicas e sedimentos	rochas graníticas-louças e rochas similares-cuarcitas			
	Profundidade do solo	maior, media, menor				
	Altitude	menor de 700 m				maior de 700 m
Medio ambiente	Orientación	superfícies planas e as orientacións Sur, Suroeste, Suroeste, Norte, Noroeste, Noroeste, Este e Oeste				
	Zonas de especial relevancia hidrológica	fora			dentro	
	Zonas con risco de erosión	moi baixo, baixo, medio	alto, moi alto			
	Zonas de alto valor natural	non				
Actividade ou cobertura do solo	Zonas con risco de contaminación	moi alto, alto, medio, baixo, moi baixo				
	Proximidade a asentamentos de poboación	maior de 500 m		500 - 100 m		
	Uso actual do solo	arborado repoboación		mato		
	Uso histórico do solo	arborado		mato		

x7



Mapa 4. Mapa de aptitude para a clase forestal produtor (*pinus radiata* e *eucalyptus globulus*, entre outras)

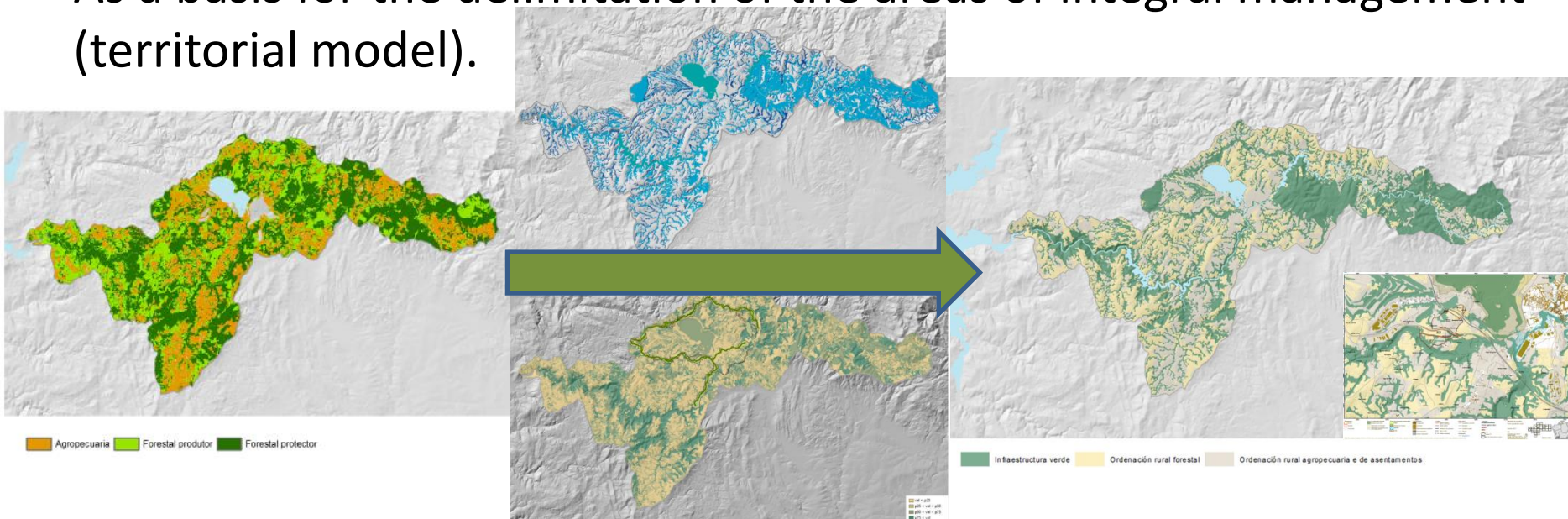
- **The aptitude map for the 7 land classes:** Continuous standardized maps of the fitness of the seven classes. Final map elaboration by algorithm (*simulated annealing*) with the maps of limitations and conditions of surfaces desired for the future.



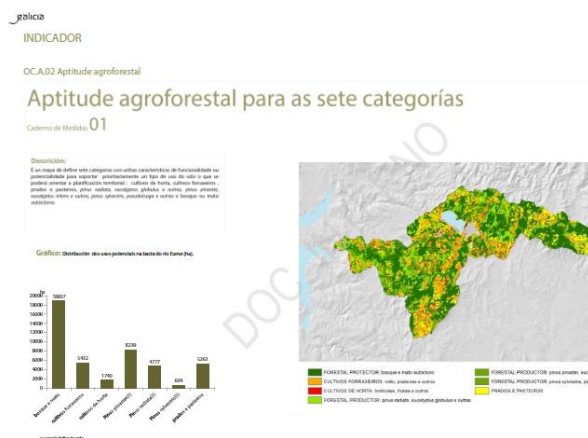


## Used for?

- As a basis for the delimitation of the areas of integral management (territorial model).



- Define indicator of land use efficiency.





# GREEN INFRASTRUCTURE STRATEGY OF GALICIA

## European Union

### EU Strategy on Green Infrastructure

**Communication from the Commission:**  
Green Infrastructure: Enhancing Europe's  
Natural Capital, of 6 may 2013

Cohesion and Structural funds  
LIFE, PAC

## Spain

Law 42/2007, of 13 December, on  
Natural Heritage and Biodiversity  
(2015)

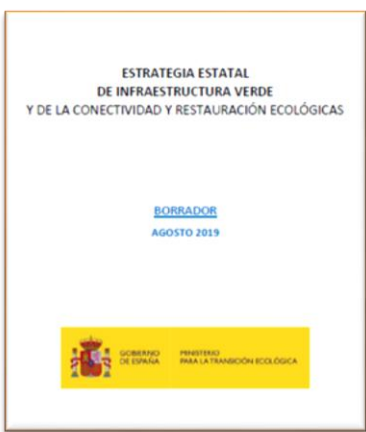
**National Strategy on green  
infrastructure, and ecological  
connectivity and restoration**

## Galicia

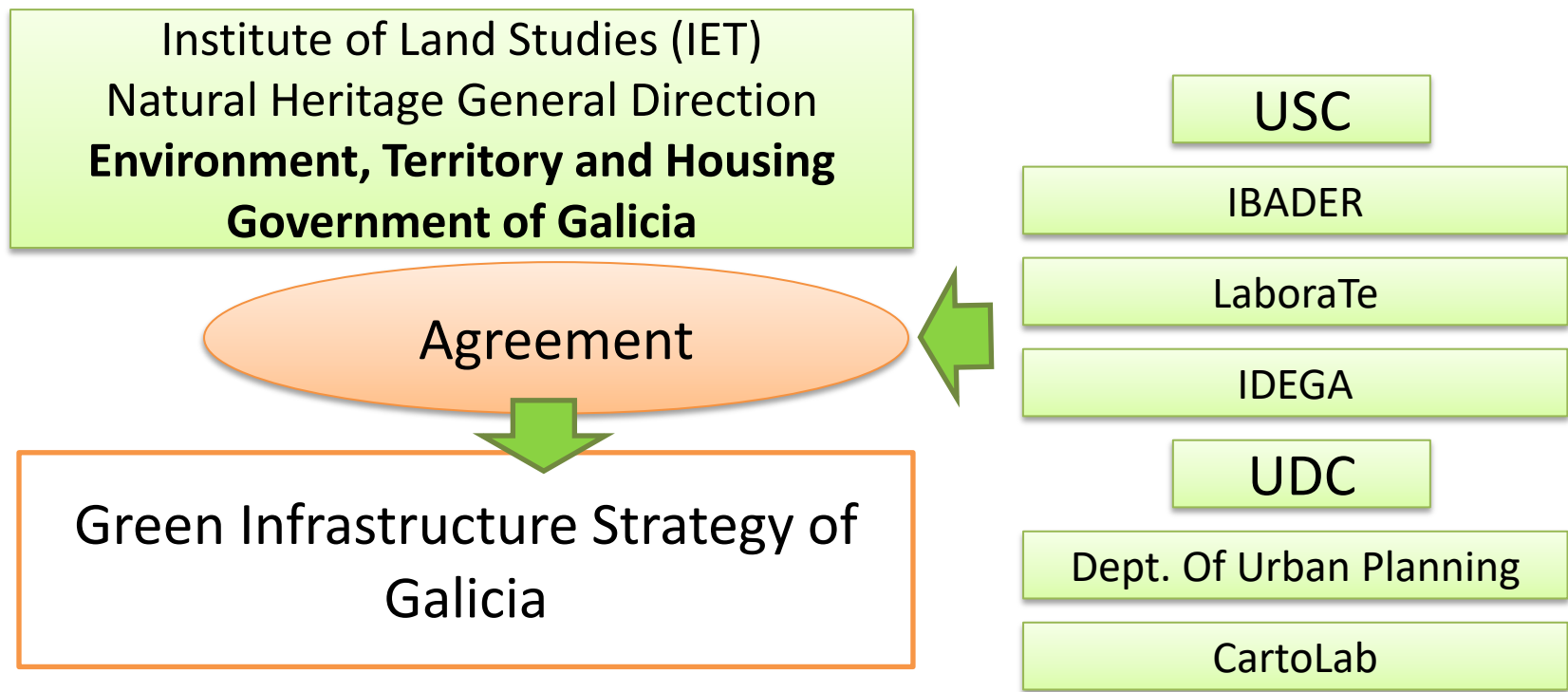
Law 5/2019 on Natural Heritage and Biodiversity of Galicia

**Galicia strategy on green infrastructure and ecological connectivity and restoration**





## Green Infrastructure Strategy of Galicia



## Green Infrastructure Strategy of Galicia: tasks

### PT 6:

- Public participation

IET

#### PT 0:

- Coordination

IET

#### PT 1:

- Natural values mapping

IBADER

#### PT 2:

- Ecosystems services mapping

IBADER, LaboraTe, DPAUC, Cartolab

#### PT 3:

- Definition of green infrastructure elements

IBADER, LaboraTe, DPAUC, Cartolab

#### PT 4:

- Analysis and identification of business models

IDEGA

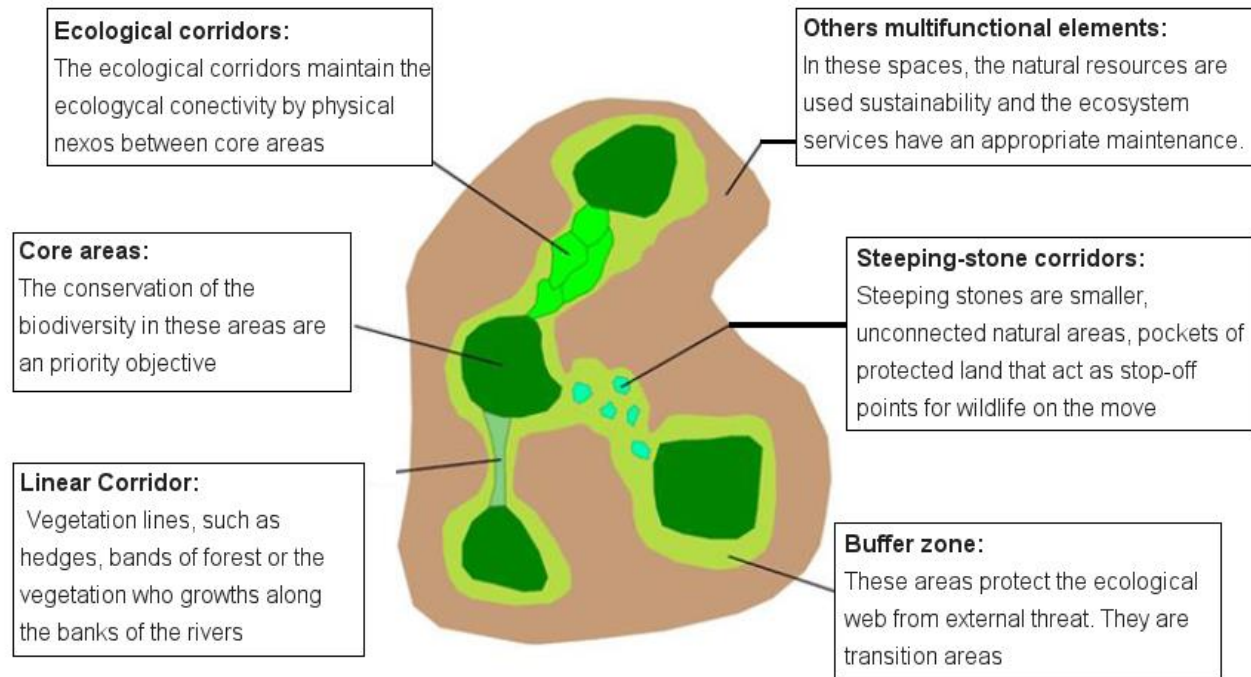
#### PT 5:

- Definition of guidelines and strategies

IBADER, LaboraTe, DPAUC, Cartolab

Green Infrastructure Strategy of Galicia(draft version)

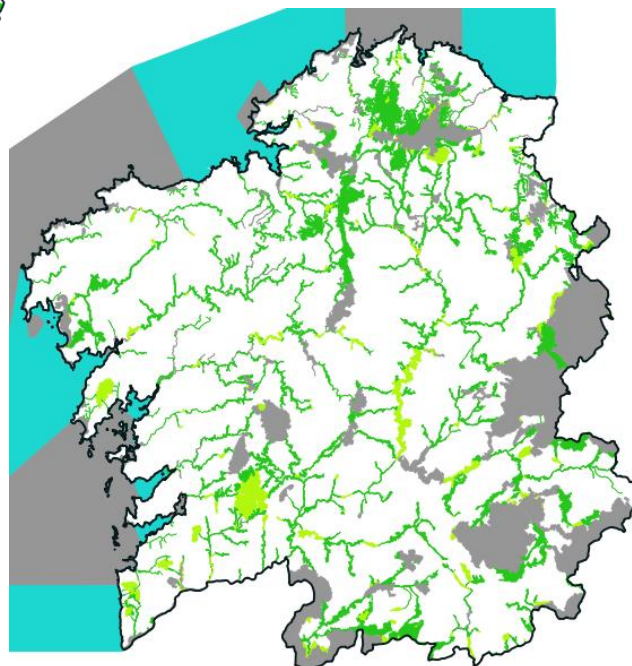
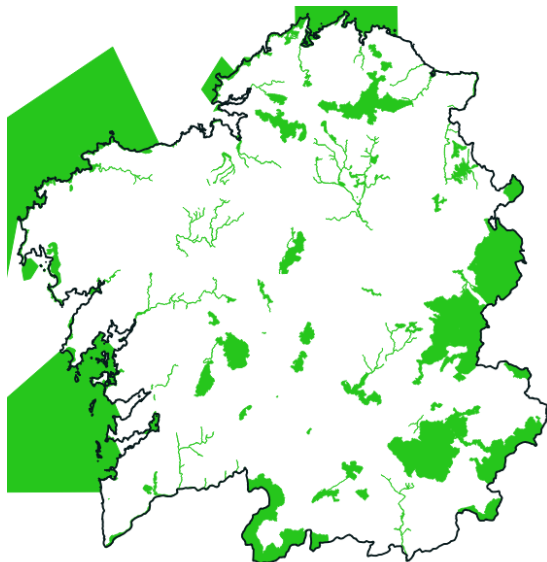




Gwent Wildlife Trust (<http://www.gwentwildlife.org>)

Green Infrastructure Strategy of Galicia(draft version)  
(GI elements: core, corridors, buffer and multifunctional areas)

# Identification of high nature value areas and criteria for corridors (IBADER)



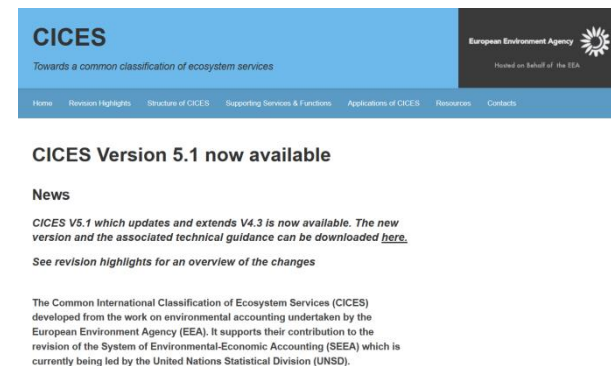
- *Natura 2000 sites* -> core areas of GI
- *Corridors:*
  - Follow up to level 3 river courses.
  - Follow areas with high nature values.
  - Follow areas with high landscape value



# Ecosystem Services to map:

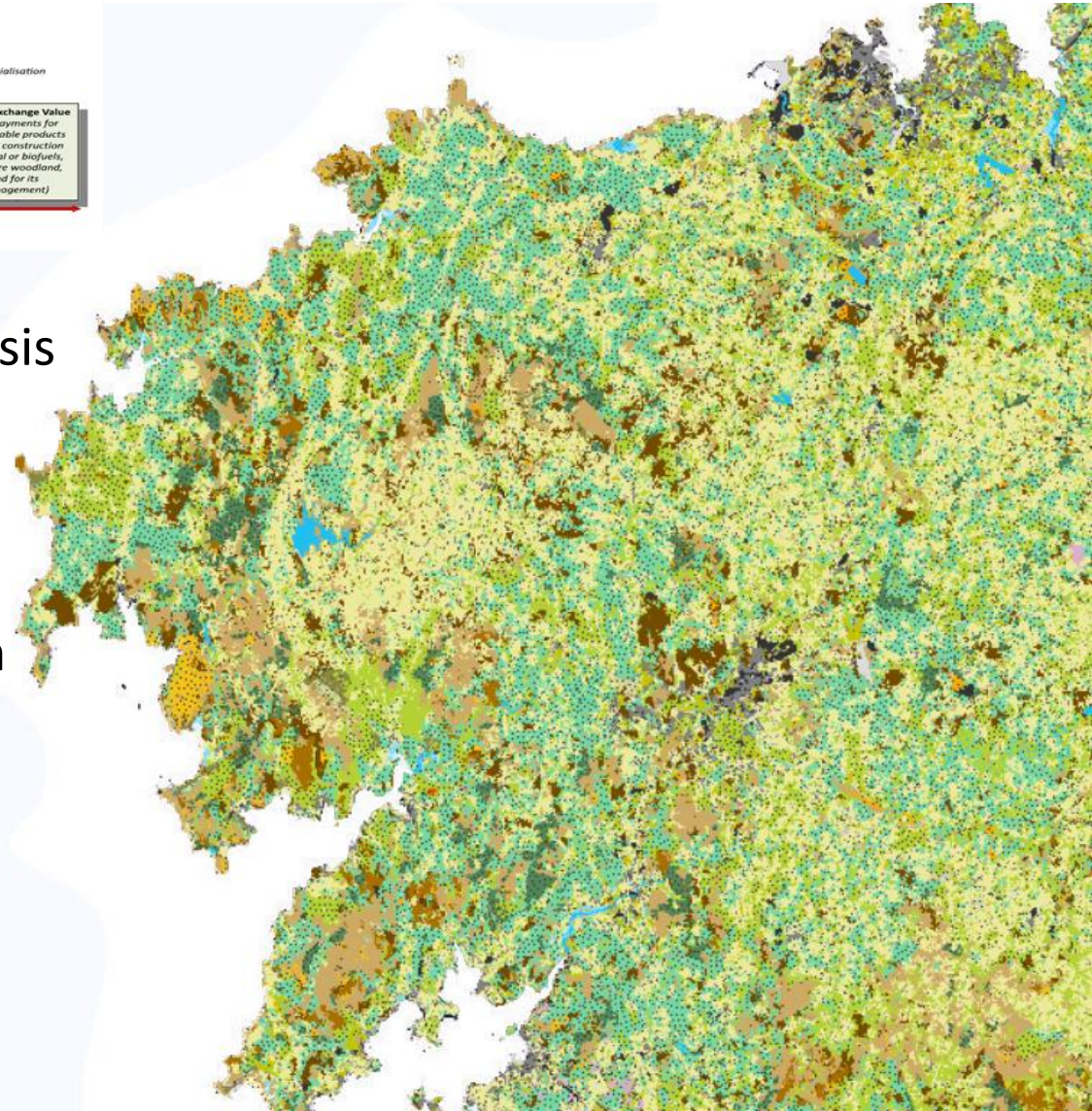
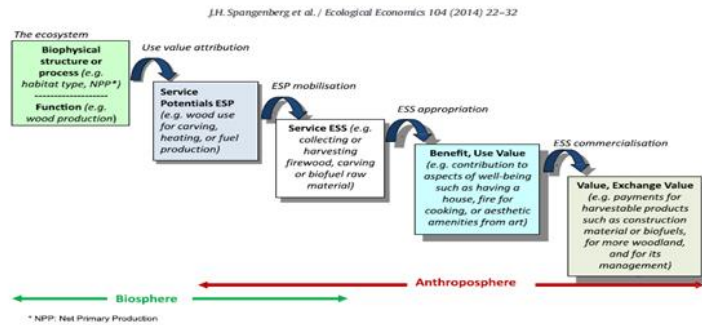
- Global climate regulation.
- Heritage preservation
- Erosion control
- Crop production
- Animal rearing and its products
- Vegetable biomass for energy
- Fibers and other materials obtained from vegetables
- Filtration and retention of pollutants
- Physical use of the landscape for open air activities that promote health
- Wildfire protection
- Preservation of habitats and breeding populations
- Preservation of the water cycle
- Water for human consumption
- Chemical conditioning of fresh water
- Flood protection

CICES 5.1



<https://cices.eu/>

# Examples mapping of Ecosystem Services



- *Burkhard et al. (2017)*: ES production potential is the basis for GI planning
- Use land cover as a proxy of ecosystems (*Burkhard et al, 2010*)
  - SIOSE 2014
- Use additional variables when available:
  - Average annual precipitation, average annual temperature, DTM, soil information...
- Produce maps of 25x25 m resolution









# Examples of mapping of ES

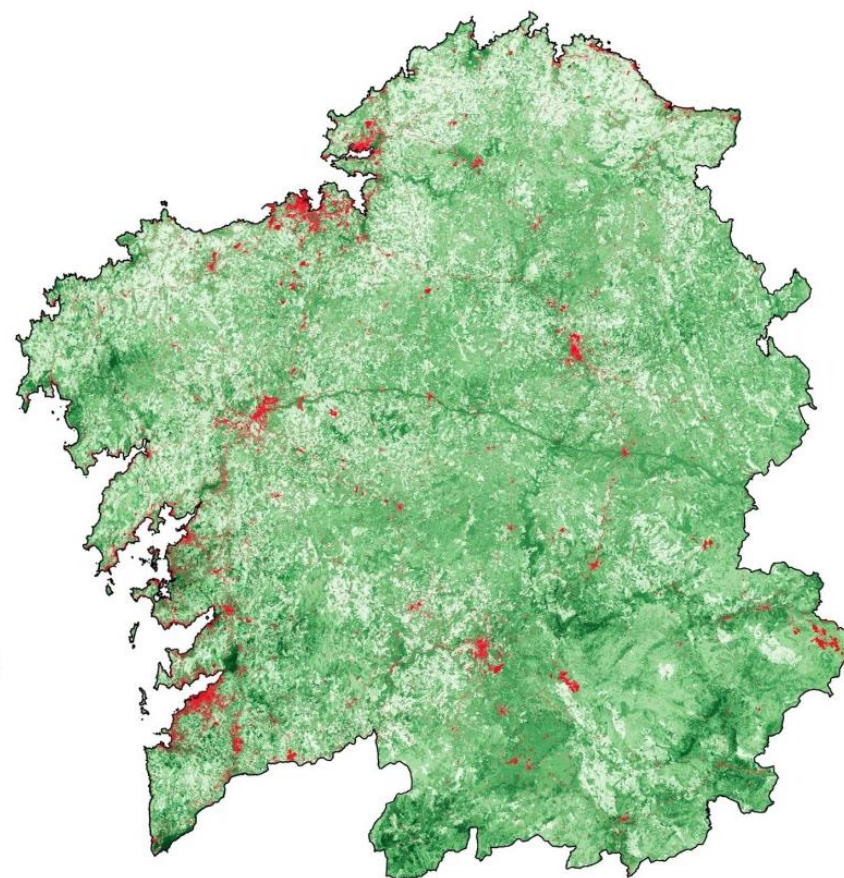
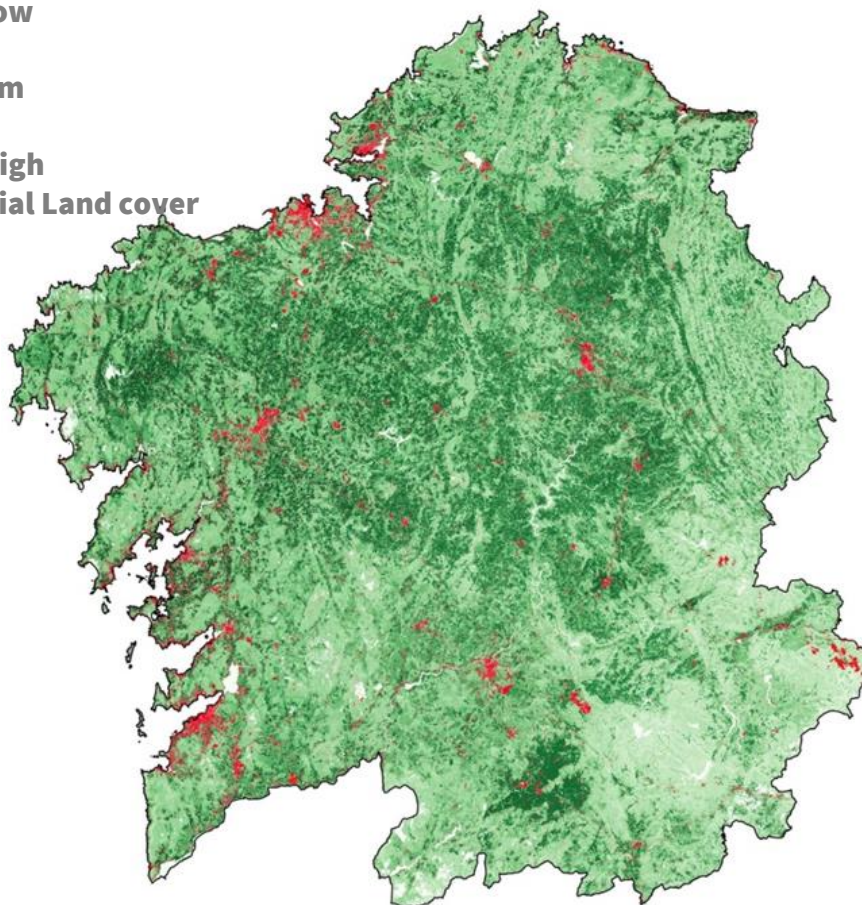
Provision Potential: Crops

*Pot= (biomass potential x 0,5 + Land cover potential x 0,5*

Provision potential physical use of the landscape

*Pot= (Visibility map\*0.5+land cover landscape potential\*0.5)\*masc*

 Very low  
 low  
 Medium  
 High  
 Very high  
 Artificial Land cover





## Analysis of ES bundles and trade-offs

- Methodology: *Raudsepp-Hearne et al. (2010)*
- All ES maps normalized between 0 and 1
- Spearman correlation matrix:
  - $\rho \leq 0.3$  Non correlated
  - $0.3 < \rho < 0.5$  Moderately correlated
  - $\rho \geq 0.5$  Strong correlation
- Elements zoning:
  - Buffer areas\*
  - Multifunctional areas

	Water consump.	Biodiversity	Biomass	Water quality	C. capture	C. Short storage	C. Long storage	Wildfire	Crops	Cultural h	Erosio	Fibra	Filter	A. breeding	Flood protection	Water cycle reg
Water consump.	1															
Biodiversity	-0,1	1														
Biomass	0,1	-0,3	1													
Water quality	0,1	0,1	0,0	1												
C. capture	0,1	-0,3	0,8	0,0	1											
C. Short storage	0,0	0,3	0,2	0,2	0,1	1										
C. Long storage	0,4	0,0	0,0	0,1	0,0	-0,1	1									
Wildfire	-0,1	0,5	0,0	0,0	-0,1	0,1	0,0	1								
Crops	0,0	-0,3	0,2	-0,1	-0,2	-0,4	0,1	0,2	1							
Cultural h	0,0	0,3	-0,1	0,1	0,0	0,2	0,2	0,1	-0,2	1						
Erosio	0,1	0,0	0,6	0,1	0,5	0,6	-0,1	-0,1	-0,4	0,1	1					
Fibra	0,1	-0,4	0,9	0,0	0,7	0,1	0,0	0,0	0,3	-0,2	0,4	1				
Filter	0,1	0,1	0,5	0,1	0,5	0,8	-0,1	-0,1	-0,5	0,1	0,9	0,4	1			
A. breeding	0,0	-0,2	-0,1	0,0	-0,4	-0,5	0,2	0,1	0,8	-0,1	-0,5	0,0	-0,6	1		
Flood protection	0,1	0,1	0,3	0,1	0,2	0,3	0,3	0,1	-0,1	0,1	0,4	0,2	0,4	0,0	1	
Water cycle reg	0,1	0,0	0,3	0,2	0,2	0,3	0,4	0,0	-0,1	0,1	0,5	0,3	0,5	0,0	0,9	1

Strong bundle

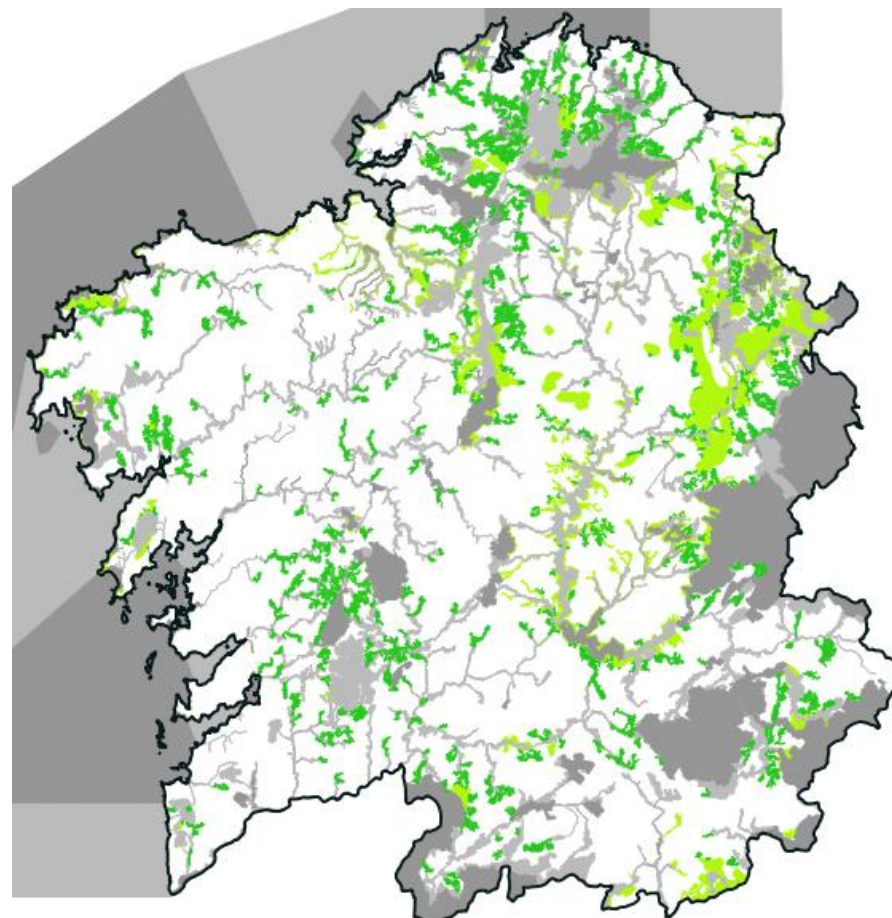
Bundle

Strong trade-off

Trade-off

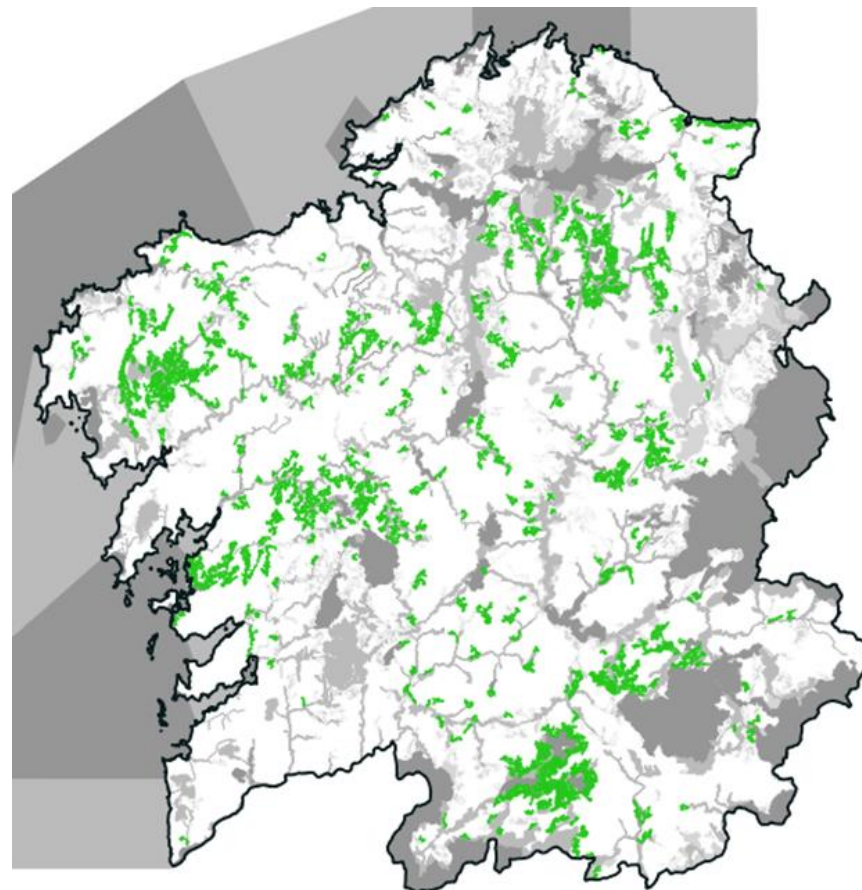
## Zoning of buffer areas

- Two methodologies:
  - **According to natural values (IBADER):**
    - Areas with high natural values which are not part of the core areas and corridors
  - **According to ecosystem services (LaboraTe):**
    - Average provision potential value of 10 regulating ES normalized between 0,1
    - Areas with 20% highest average value.
    - >100 ha.
    - Annex to corridors, core areas and other buffer areas.



## Zoning of multifunctional areas for sustainable food production

- Main ESs: Crops and animal breeding
- Complementary ESs: All those which do not present trade-offs with the main ESs or other ESs considered.
- *Potential= (0.6\*Main ESs+0.4\*Complementary ESs)\* masc*
- Criteria for location:
  - Areas 20% highest value ESs provision potential (each province).
  - Patches >100 ha
  - Patches annex to other GI elements





## Conclusions

- Specific evaluation methodologies
- Improvement and access to information
- Importance of public participation and expert knowledge since the beginning of the projects
- Integration in urban planning or land planning instruments.

*Thanks for your  
attention*

