EAGLE Application

Bottom-up prodution and integration

EAGLE hints

- Data model
  - Based on a feature model (ISO 19109)
    - Object oriented (object=Landscape parameter)
    - Components, attributes and characteristics
  - Based on INSPIRE data specifications (LC, LU, Area Management & Regulation Zone, Natural Risk Zones, Production and Agricultural facilities, Energy Resources, and others)
  - Satisfying others initiatives (GMES, EEA, WFD, etc.)
- Parametric descriptors
  - Land cover components, land use identification, other landscape characteristics

EAGLE implementation

Bottom-up application for producing and integrating data at different levels

Regional > National > European

Link between systems & Improvement of existing systems with accurate parameters

I. Bottom-up application

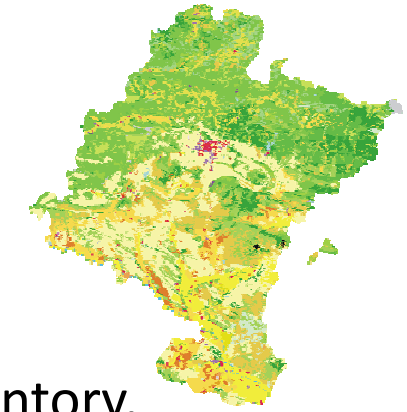
- Acknowledge of regional, national, European and global land monitoring programs is required (common and specific requirements)
- EAGLE parameters focus on semantic definition, instead geometric resolution
- Data should be collected at most appropriate level and supply to others

The infrastructures for spatial information in the Member States should be designed to ensure that spatial data are **stored**, made **available** and **maintained** at the most appropriate level [Directive 2007/2 INSPIRE]

Rural Development, Environment and Local Administration Department, **Navarra, Spain**

MCA – crops and land use map

Gobierno de Navarra
Departamento de Desarrollo Rural,
Medio Ambiente y Administración Local



- Input data
  - **SIGPAC Land Parcel Information System**
    - 1:5.000 scale, continuous update, agricultural scopes
  - Coordinated with Cadastre yearly, Public Works inventory, Forestry Section actions, CAP statements, Ortho-photography and remote sensing (PNOA, PNT, etc.)
- MCA updating
  - SIGPAC change detection > Agricultural changes for MCA
    - Yearly updated
  - Geometric and semantic assembling
    - 1:25.000 scale, mmu checking, re-digitalization accordantly (photo-interpretation over input data)
    - more than 150 classes for all land types to shape infinite combinations

Rural Development, Environment and Local Administration Department, **Navarra, Spain**

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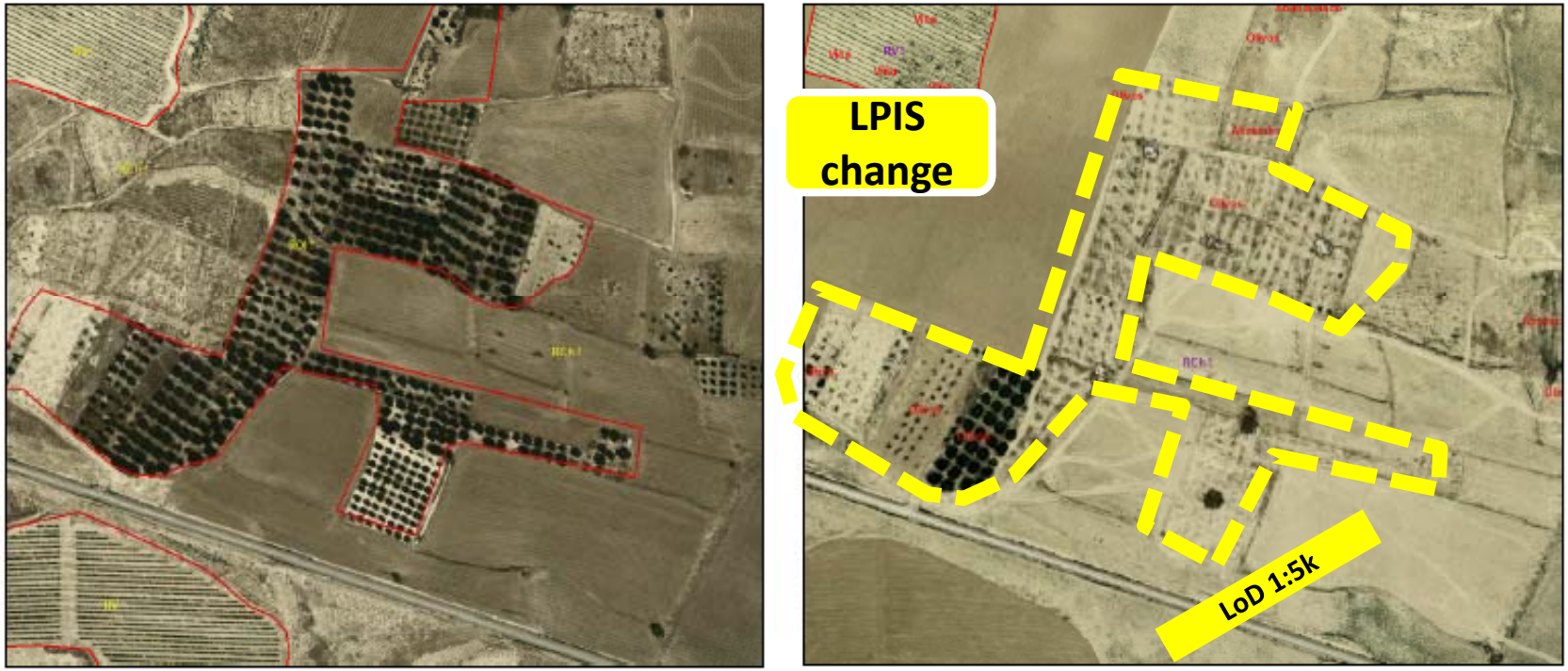
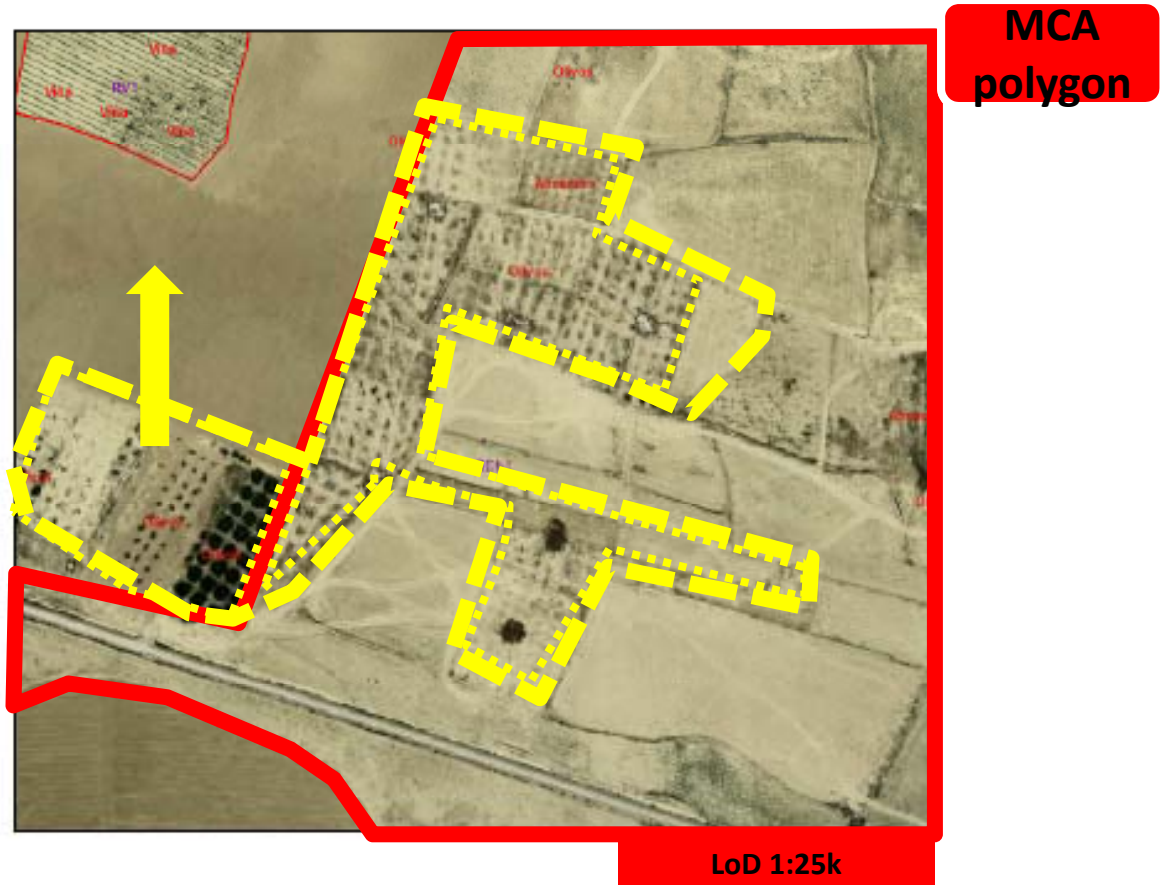


Ilustración 15 *Olivos arrancados en Ablitas. Rec.61716 del mca2011*

Rural Development, Environment and Local Administration Department, **Navarra, Spain**

MCA – crops and land use map

Gobierno de Navarra
Departamento de Desarrollo Rural,
Medio Ambiente y Administración Local



Rural Development, Environment and Local Administration Department, **Navarra, Spain**

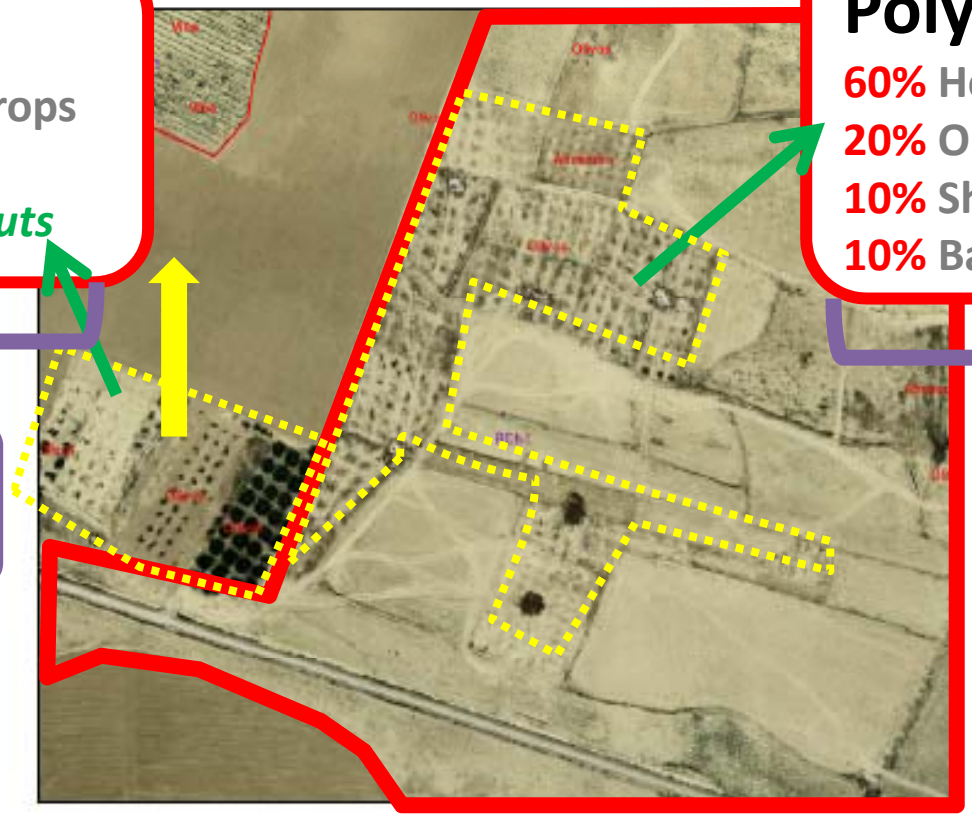
MCA – crops and land use map

Gobierno de Navarra
Departamento de Desarrollo Rural,
Medio Ambiente y Administración Local

Polygon B

60% Herbaceous crops
20% Vineyard
20% Olive trees - *cuts*

EAGLE parameters



Polygon A

60% Herbaceous crops
20% Olive trees - *cuts*
10% Shrub
10% Bare soil

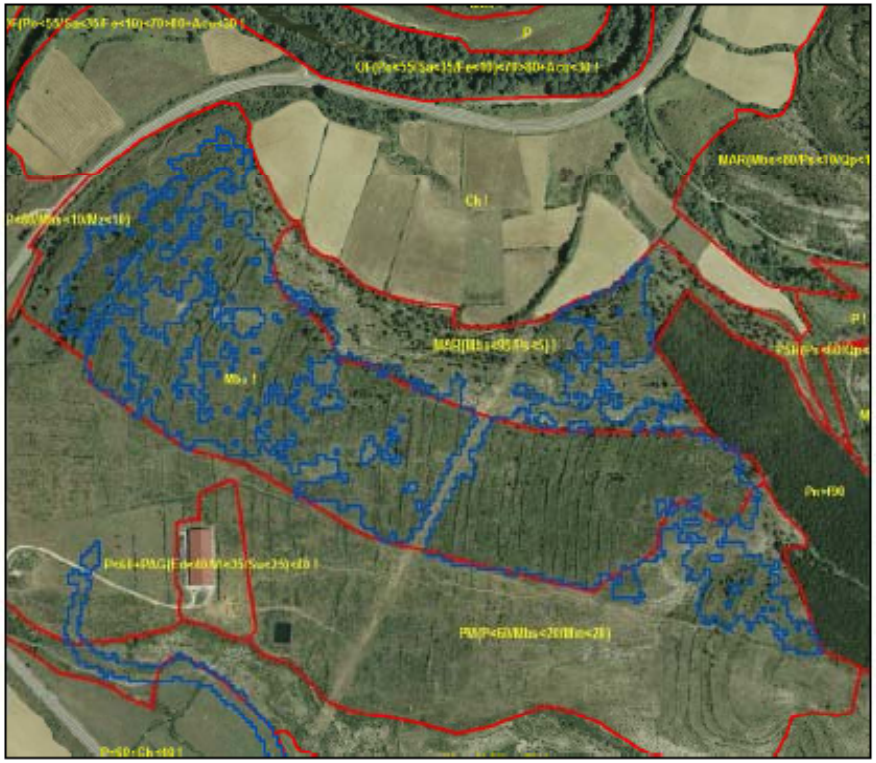
EAGLE parameters

"To manage parameters enrich the database"

Rural Development, Environment and Local Administration Department, **Navarra, Spain**

MCA – crops and land use map

Gobierno de Navarra
Departamento de Desarrollo Rural,
Medio Ambiente y Administración Local



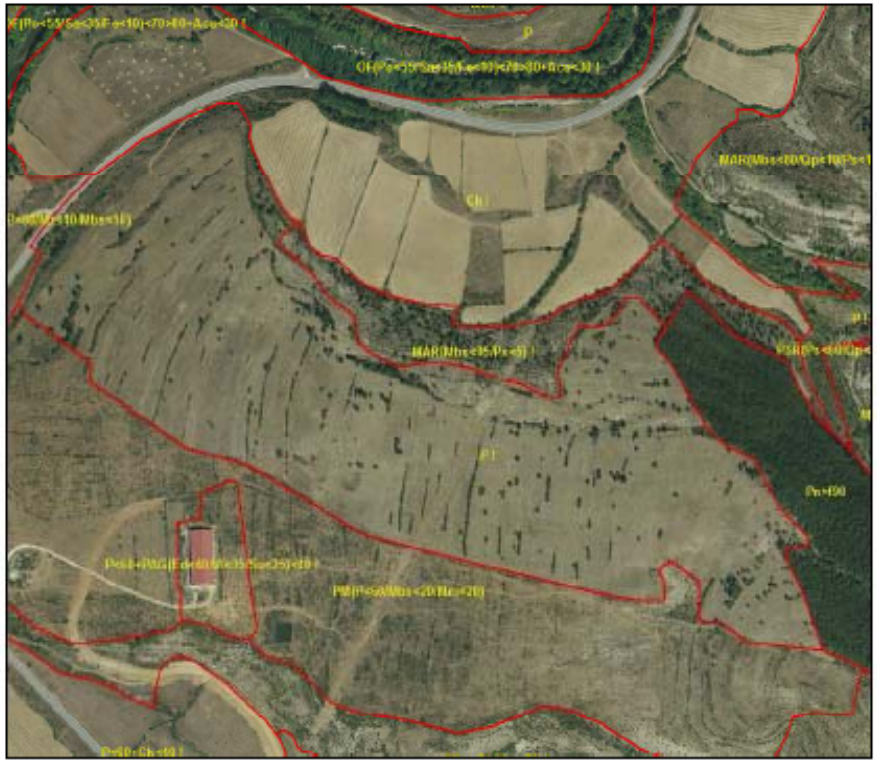


Ilustración 2 *Roturación de un bojeral en Gallués*

Rural Development, Environment and Local Administration Department, **Navarra, Spain**

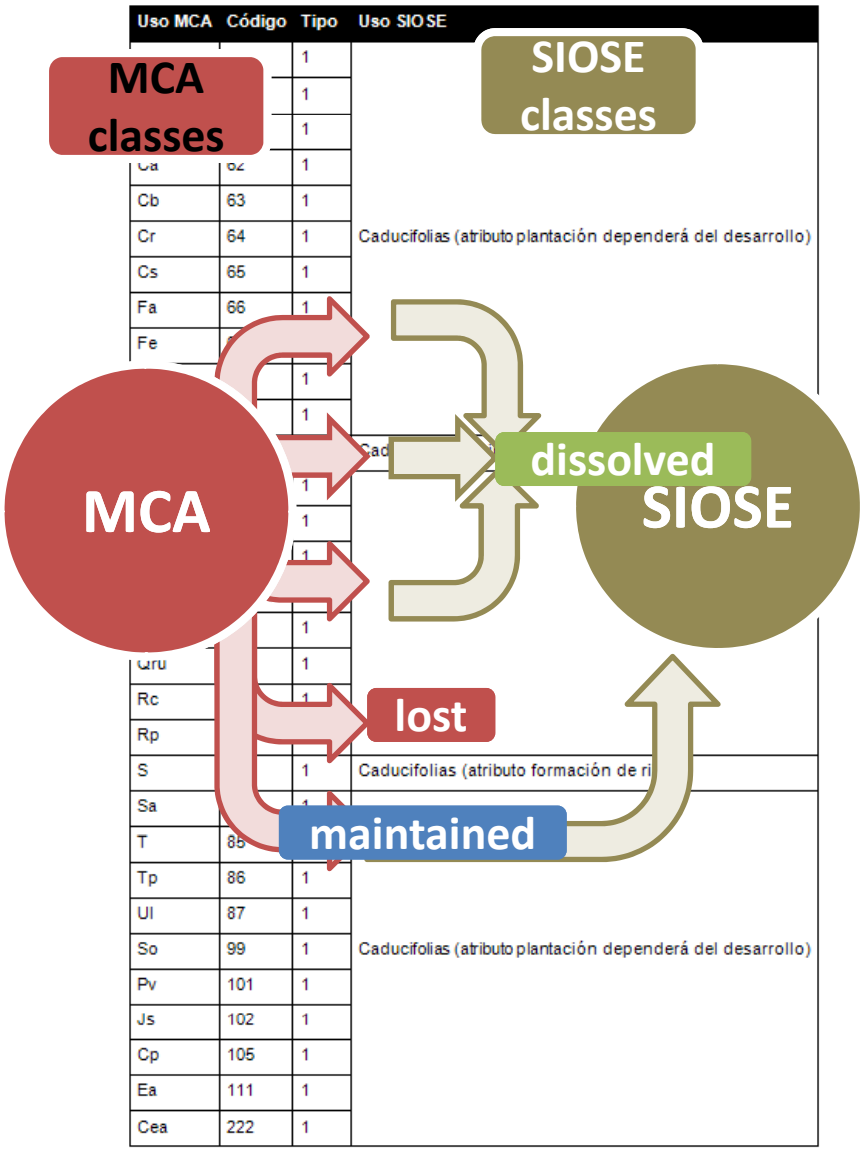
MCA – crops and land use map

Gobierno de Navarra
Departamento de Desarrollo Rural,
Medio Ambiente y Administración Local

Ilustración 9 *Nueva cárcel de Pamplona*

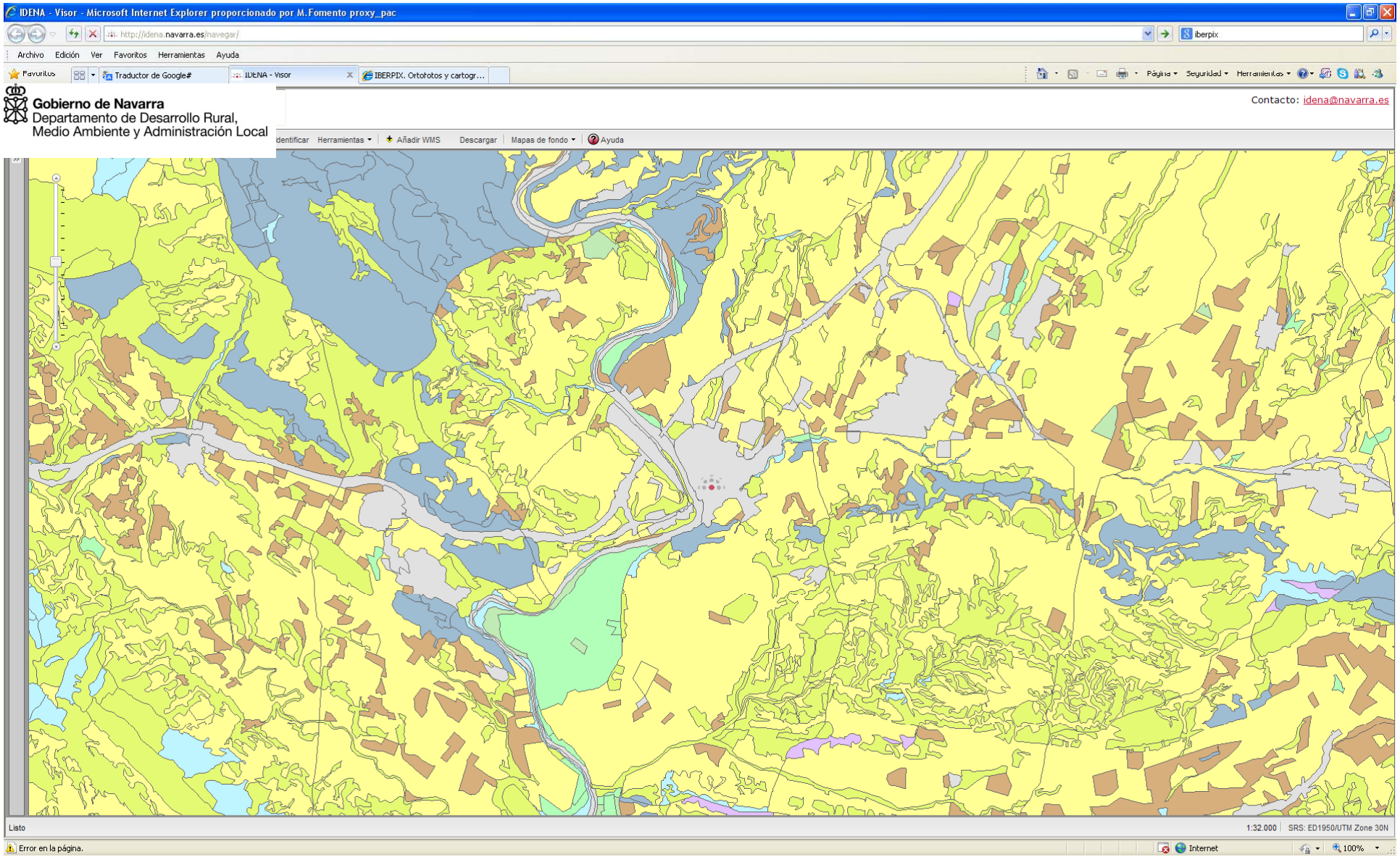
I. Bottom-up application

- National SIOSE generation
  - Geometry (same scale) but higher detail on MCA
    - Adopt to SIOSE mmu (2-0.5 ha) and linear width (15m)
    - Fusion of micro-polygons
  - Semantics
    - **Semantic runway** between MCA-SIOSE classes & percentage values
      - **EAGLE parameters shared by both**

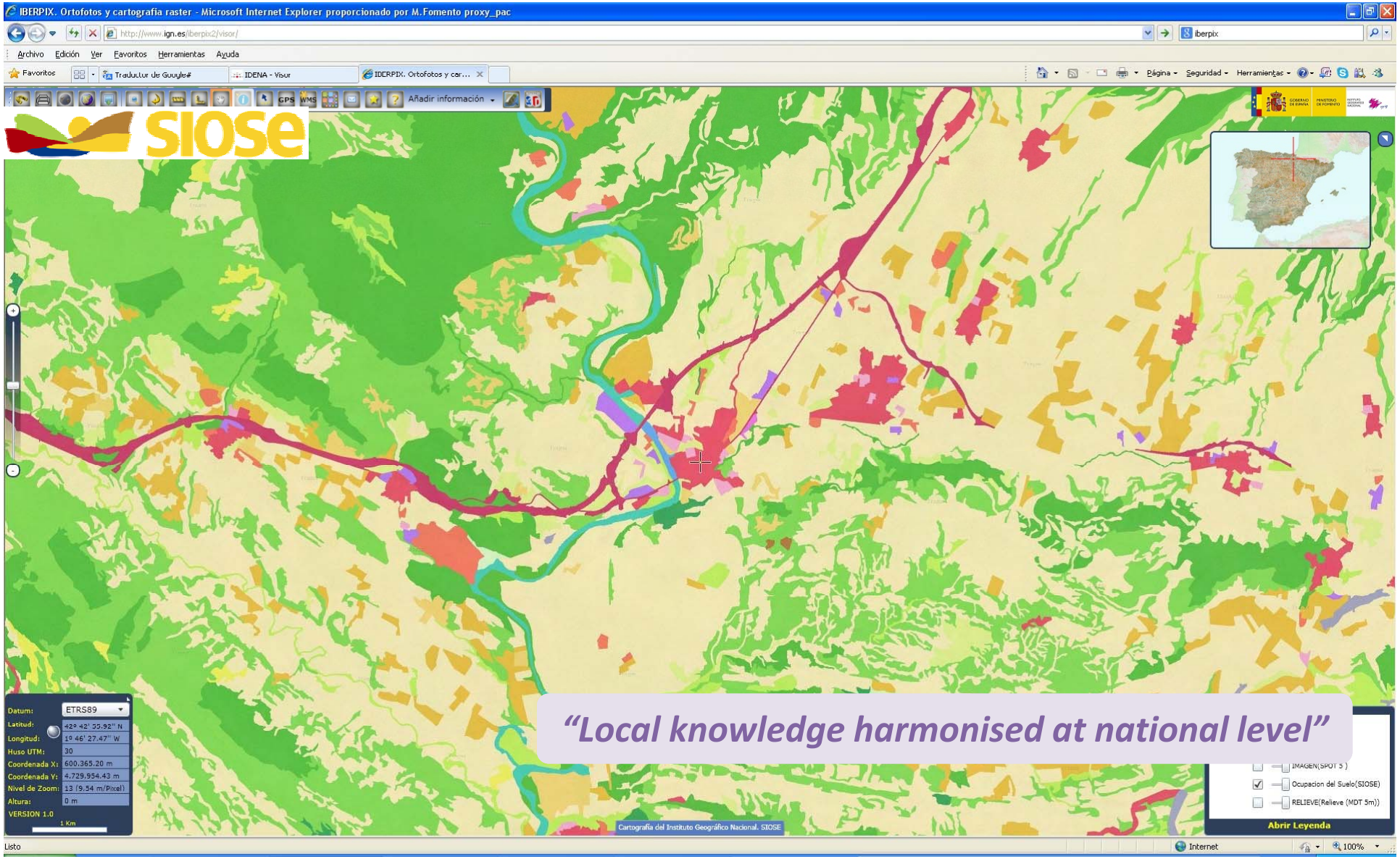


Uso MCA	Código	Tipo	Uso SIOSE
		1	
		1	
		1	
Ca	62	1	
Cb	63	1	
Cr	64	1	Caducifolias (atributo plantación dependerá del desarrollo)
Cs	65	1	
Fa	66	1	
Fe			
		1	
		1	
			Cad
		1	
		1	
		1	
		1	
Qru		1	
Rc		1	
Rp			
S		1	Caducifolias (atributo formación de ri
Sa		1	
T	85		
Tp	86	1	
Ul	87	1	
So	99	1	Caducifolias (atributo plantación dependerá del desarrollo)
Pv	101	1	
Js	102	1	
Cp	105	1	
Ea	111	1	
Cea	222	1	

I. Bottom-up application

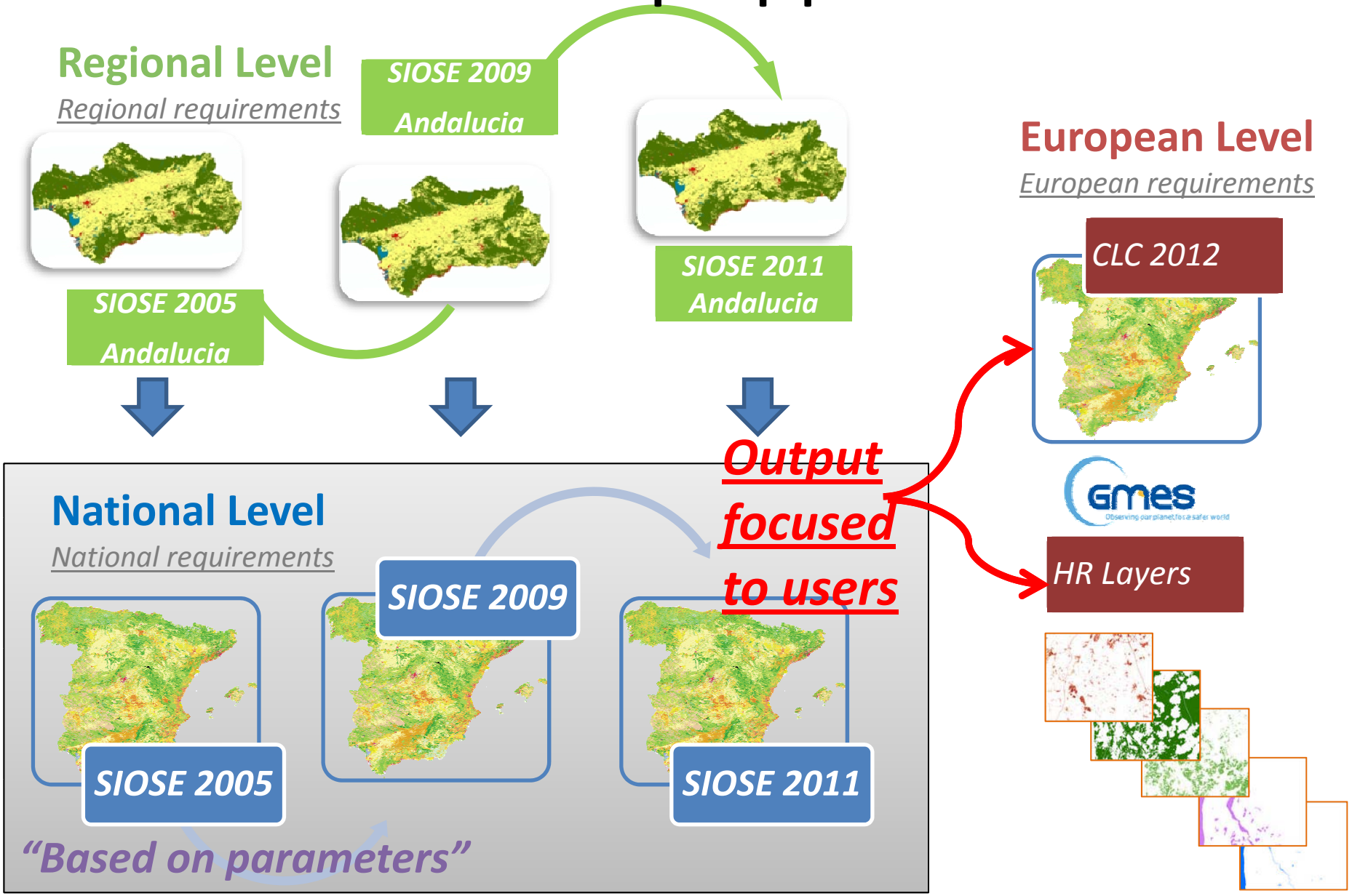


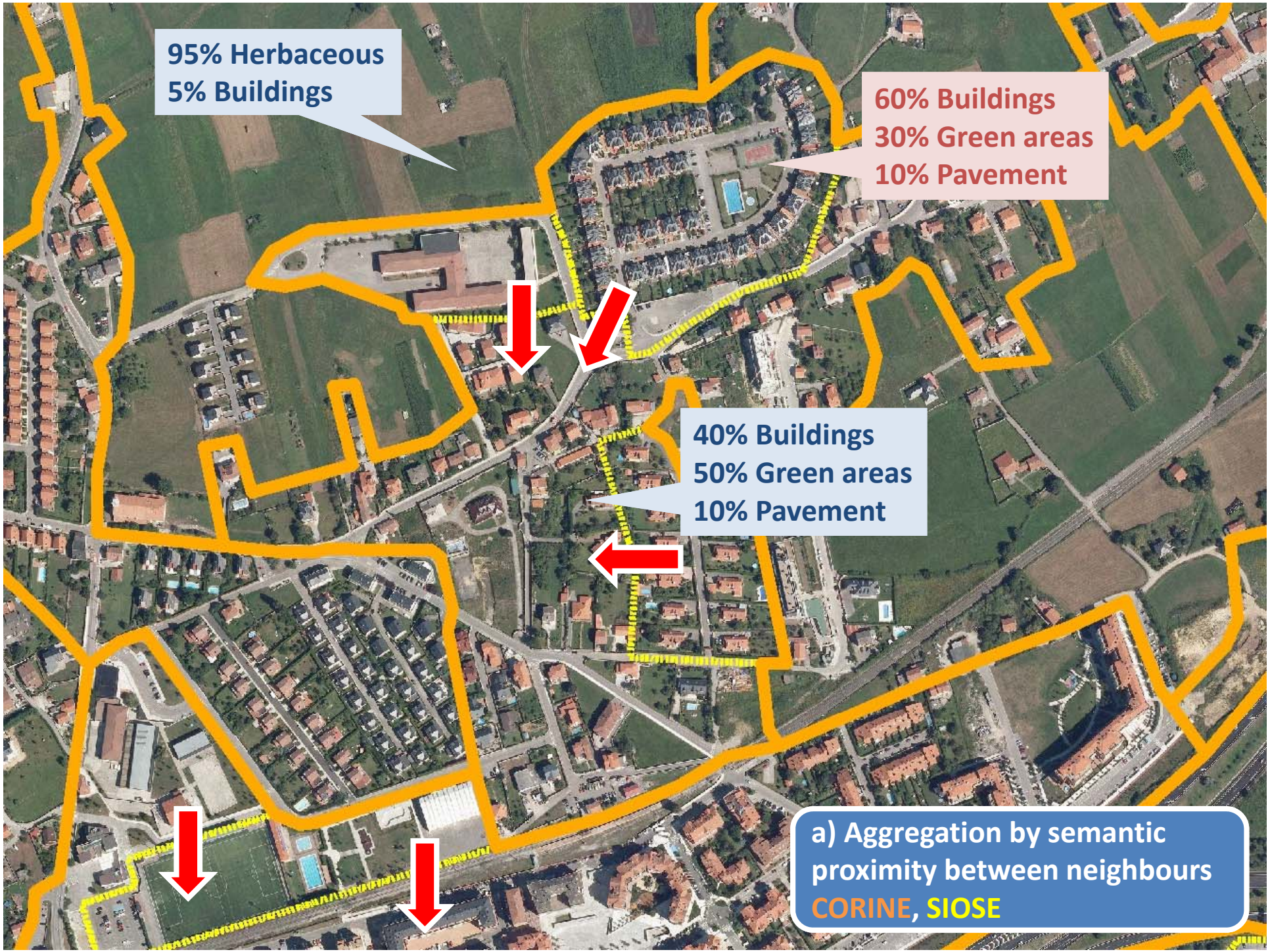
I. Bottom-up application



"Local knowledge harmonised at national level"

I. Bottom-up application





a) Aggregation by semantic proximity between neighbours
CORINE, SIOSE


b) Geometric conditioning:
mmu, linear width, etc.
CORINE, SIOSE

I. Bottom-up applications

CLC

SIO SE

LEVEL 1	LEVEL 2	LEVEL 3
1. ARTIFICIAL AREAS	1. Urban fabric:	1.1.1. Continuous urban fabric: Most of the land is covered by structures and transport network. Buildings, roads and artificially surface areas cover more than 80% of the total surface. Non-linear areas of vegetation and bare soil are exceptional
		1.1.2 Discontinuous urban fabric Most of the land is covered by structures. Buildings, roads and artificially surface areas are associated with vegetated areas and bare soil, which occupy discontinuous but significant surfaces. Between 10% and 80% of the land is covered by residential structures.

2.1.2.1 Frutales

Superficie en la que se cultiva cualquier clase de árboles o arbustos frutales, excluyendo el olivo y la vid.

2.1.2.1.1 Cítricos

Se clasificará como tal la superficie ocupada por plantaciones puras, asociaciones o mosaicos de las siguientes especies de frutales: *limonero mandarino naranjo naranjo amargo pomelo lima*

Se incluyen:

- Todas las plantaciones de cítricos.
- Viveros e invernaderos con cítricos.

2.1.2.1.2 Frutales no cítricos

Superficie de cultivos puros, asociaciones o mosaicos de las distintas especies de frutales de pepita, frutales de hueso, frutales de frutos secos y frutales tropicales.

Se incluyen:

- Plantaciones puras o mezcla de especies como: Manzano, Peral, Membrillero, Higuera, Níspero, Albaricoquero, Melocotonero, Cerezo, Guindo, Ciruelo, Almendro, Nogal, Avellano, Castaño, Algarrobo, Pistacho, Aguacate, Chirimoyo, Granado, Guayabo, Mango, Platanera, Palmera datilera, Papayo, Piña tropical, Caqui y Kiwi.
- Plantaciones de frutales arbustivos como: Frambueso, Zarzamora, Arándano Gigante, Grosellero Rojo, Grosellero Negro, Grosellero Espinoso.
- Plantaciones en asociación o mosaico de frutales arbustivos y arbóreos.
- Plantaciones de frutales de frutos secos con aprovechamiento del fruto. Se identificarán como tal aquellas plantaciones en marco regular (marco real, a tresbolillo, en líneas dobles) con trabajos del suelo que mantiene en buen estado la superficie del mismo. Si se desconoce el aprovechamiento de la plantación, se considerará como cobertura simple de "Cultivo Leñoso de Frutal No Cítrico" siempre que se encuentre en zonas agrícolas.
- Viveros e invernaderos de frutales no cítricos.

Identifiable (**EAGLE**) parameters

- Land cover component
- Land use component
- Characteristic
- thresholds
- intensities

c) Semantic translation

SIO SE

I. Bottom-up applications

CLC

Wooded tree

Perennial woody plant with single, self-supporting main stem or trunk, containing woody tissue and branching into smaller branches and shoots.

Annual crop

Lands under a rotation system used for annually harvested plants and fallow lands, which are permanently or not irrigated. Includes flooded crops such as rice fields and other inundated croplands.

Herbaceous

Grasses, or more technically graminoids, are monocotyledonous, usually herbaceous plants with narrow leaves growing from the base. They include the "true grasses", of the Poaceae (or Gramineae) family, as well as the sedges (Cyperaceae) and the rushes (Juncaceae).

Shrub

Perennial woody plants with shrub growth form i.e. multiple stems arising at or near the base, height usually less than 8 metres. Leaf type can be needle leaf, broadleaf or palm leaf, phenology either evergreen or deciduous.

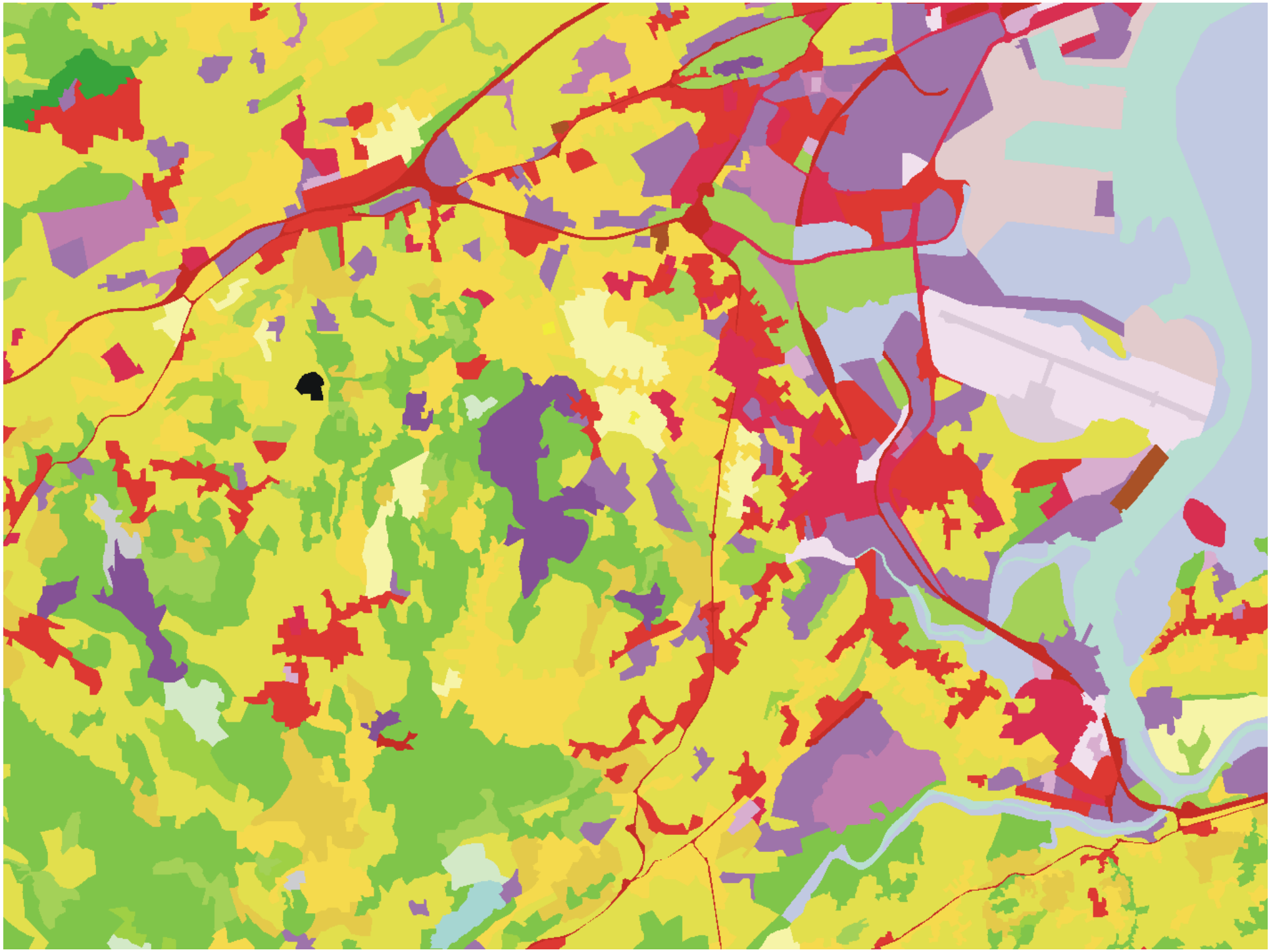
Paring rules
(existence, recommended, possible exclusion, forbidden, etc.)

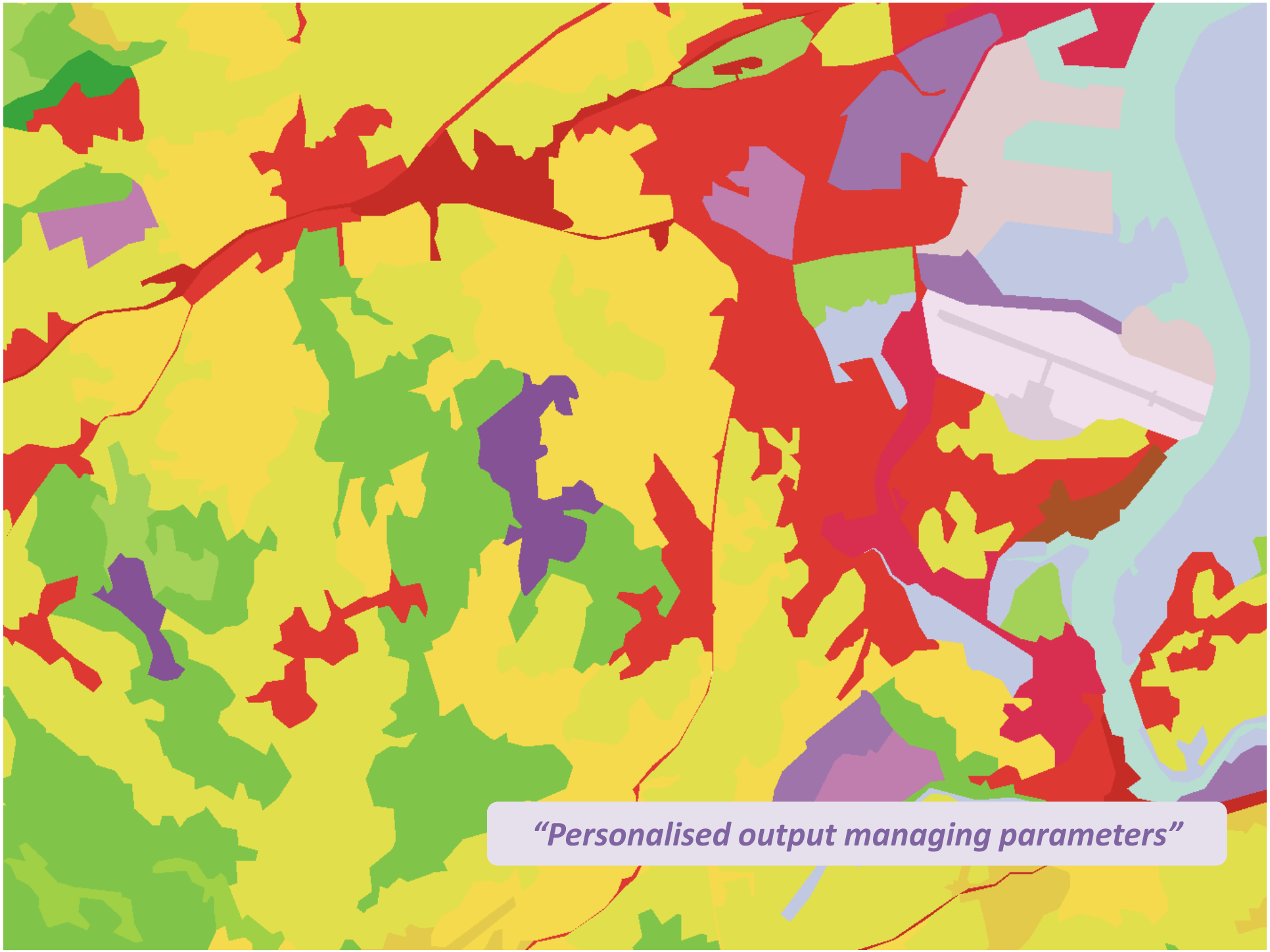
Dehesa
Agro-forestry system

CLC 2.4.4: **Annual crops** or **grazing** land under the **wooded cover** of forestry species. Includes areas of forest **trees** imbricated with **fruit trees/olive trees** while neither of the two kinds of trees dominates; **carob trees** shading agricultural lands; agricultural land shaded by **palm trees** in Mediterranean context.

EAGLE parameters

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V
1	Id	ID_COMI	CODE_AE	DESCRIPCION_COMBI	MINI	PREFE	EXCLU	ID_SU	MINI	MEDI	MAXI	MINHA	MAXH	ID_COBE	CODE_AE	ATRIBUT	MINI	MEDI	MAXI	MINHA	MAXHA	MULT
2	1	21231	CHLsc	001 Cultivos Herbáceos distintos de Arroz en secano (sc)	0	11	100	1	0	100	100	0	9999999	212	CHL	%31%	0	100	100	0	9999999	1
3	2	21232	CHLrg	002 Cultivos Herbáceos distintos de Arroz en regadío (rr, rn)	0	10	100	1	0	100	100	0	9999999	212	CHL	%32%	0	100	100	0	9999999	1
4	3	21232	CHLrg	002 Cultivos Herbáceos distintos de Arroz en regadío (rr, rn)	0	10	100	1	0	100	100	0	9999999	212	CHL	%33%	0	100	100	0	9999999	1
5	4	211	CHA	003 Arroz	0	112	100	1	0	100	100	0	9999999	211	CHA	%	0	100	100	0	9999999	1
6	5	231	LVI	004 Viñedo	0	113	100	1	0	100	100	0	9999999	231	LVI	%	0	100	100	0	9999999	1
7	6	223	LFN	005 Frutales No Cítricos	0	114	100	1	0	100	100	0	9999999	223	LFN	%	0	100	100	0	9999999	1
8	7	222	LFC	006 Frutales Cítricos	0	115	100	1	0	100	100	0	9999999	222	LFC	%	0	100	100	0	9999999	1
9	8	232	LOL	007 Olivar	0	116	100	1	0	100	100	0	9999999	232	LOL	%	0	100	100	0	9999999	1
10	9	241	LOC	008 Otros Leñosos	0	117	100	1	0	100	100	0	9999999	241	LOC	%	0	100	100	0	9999999	1
11	10	290	PRD	009 Prados	0	119	100	1	0	100	100	0	9999999	290	PRD	%	0	100	100	0	9999999	1
12	11	20036	CULfz	000 Invernaderos	0	9	100	1	40	100	100	0	9999999	211	CHL	%36%	0	100	100	0	9999999	1
13	12	20036	CULfz	000 Invernaderos	0	9	100	1	40	100	100	0	9999999	231	LVI	%36%	0	100	100	0	9999999	1
14	13	20036	CULfz	000 Invernaderos	0	9	100	1	40	100	100	0	9999999	223	LFN	%36%	0	100	100	0	9999999	1
15	14	20036	CULfz	000 Invernaderos	0	9	100	1	40	100	100	0	9999999	222	LFC	%36%	0	100	100	0	9999999	1
16	15	20036	CULfz	000 Invernaderos	0	9	100	1	40	100	100	0	9999999	232	LOL	%36%	0	100	100	0	9999999	1
17	16	20036	CULfz	000 Invernaderos	0	9	100	1	40	100	100	0	9999999	241	LOC	%36%	0	100	100	0	9999999	1
18	17	231232	OVD	012 Olivar y viñedo	0	200	100	1	0	40	79	0	9999999	231	LVI	%	0	100	100	0	9999999	1
19	18	231232	OVD	012 Olivar y viñedo	0	200	100	2	0	40	79	0	9999999	232	LOL	%	0	100	100	0	9999999	1
20	19	222232	FCO	013a Frutal cítrico y olivar	0	201	100	1	0	40	79	0	9999999	222	LFC	%	0	100	100	0	9999999	1
21	20	222232	FCO	013a Frutal cítrico y olivar	0	201	100	2	0	40	79	0	9999999	232	LOL	%	0	100	100	0	9999999	1
22	21	223232	FNO	013b Frutal no cítrico y olivar	0	201	100	1	0	40	79	0	9999999	223	LFN	%	0	100	100	0	9999999	1
23	22	223232	FNO	013b Frutal no cítrico y olivar	0	201	100	2	0	40	79	0	9999999	232	LOL	%	0	100	100	0	9999999	1




“Personalised output managing parameters”

EAGLE implementation

Bottom-up application for producing and integrating data at different levels

Regional > National > European

Link between systems & Improvement of existing systems with accurate parameters

Link between systems

- EAGLE Parameters make possible **comparison** between systems where they were applied (like '*landscape bricks*')

EAGLE Param.	CLC	HRLayer	UrbanAtlas	SIOSE	...
Tree	X	X		X	
Building type				X	
Irrigation state	X			X	
Burnt state	X			X	
Economical use	X		X	X	
...					

Describing land cover with EAGLE parameters: „CLC Wetland“

Land cover components (LCC):

LCC1: Inland water bodies,

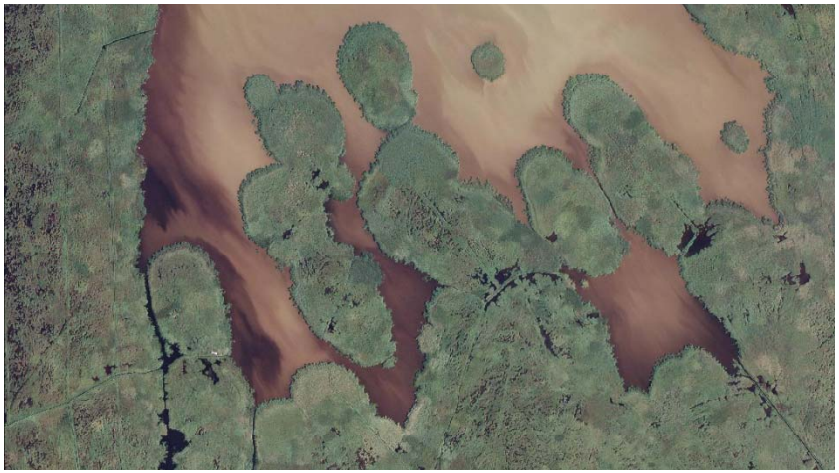
LCC2: Reeds

Land use attributes (LUA):

nature protected land,

Other characteristics (CH):

salinity=fresh water



Describing land cover with EAGLE parameters „Built-up Area“

Land cover components (LCC):

LCC1: conventional buildings,
LCC2: broadleaved trees,
LCC3: herbaceous plants,
LCC4: open sealed surfaces

Land use attributes (LUA):

LUA1: permanent residential,
LUA2: agriculture/production for own consumption,
LUA3: road network (belonging to LCC4)

Other characteristics (CH):

CH1: soil sealing degree = 35%
CH2: built-up pattern = discontinuous, single houses

Link between systems

- Analytic **decomposition** of class definitions (including inconsistencies/gaps/overlaps)
- Values of same parameters on different systems **allows comparation** (in a *'common language'*) independent on classification systems

		LAND COVER Components - LCC	ABIOTIC / NON-VEGETATED																BIOTIC / VEGETATION												WATER						
			Artificial Surfaces and Constructions						Natural Material Surface										Woody Vegetation						Herbaceous			Succulents and Others	Lichens & Mosses		Liquid					Solid	
			Sealed				Non-Sealed		Consolidated		Un-Consolidated Surface								Trees			Bushes Shrubs			Gramina ceous				Lichens	Mosses	Inland Waters		Coastal Waters		Open Sea	Perm.Snow Ice, Glaciers	
			Buildings		Other Construc-tions				Bare Rock	Hard Pan	Mineral Fragments					Bare Soils	Deposits																				
			Conventional Buildings	Specific Buildings	Specific Structures	Open Sealed Surfaces 2D	Waste Material	Other Artificial Surfaces			Boulders, Stones	Pebbles, Gravel	Sand, Silt	Clay, Silt	Infrared Unscored		Inorganic Deposits	Organic Deposit (Peat)	Coniferous	Broadleaved	Palm leaved	Regular Bushes	Dwarf Shrubs	Sclerophytes	Regular Gramineaceous (grasses, cereals)	Reeds	Non-Gramineaceous (forbs)				Water Courses	Water Bodies	Estuaries	Lagoons			
CLC	Discontinuous urban fabric		2	1	0	2	0	0	0	0	0	0	0	0	0	0	0	0	2	2	2	2	2	2	2	2	2	2	2	2	0	0	0	0	0	0	0
Urban Atlas	Discontinuous urban fabric (S.L. 10 - 80%)		2	1	0	2	0	1	0	1	1	1	1	0	0	1	-1	-1	2	2	2	2	2	2	2	2	2	2	2	2	0	1	-1	-1	-1	-1	-1
SIOSE	Discontinuous		2	1	1	2	-1	0	-1	1	-1	-1	-1	-1	-1	0	-1	-1	1	1	1	1	1	1	1	1	1	1	1	1	-1	0	-1	-1	-1	-1	-1
HRLs	Imperviousness		2	2	2	2	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1
LGN NL	semi urban built-up areas		2	2	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
CH Arealstatistic	One- and two -family houses		2	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1

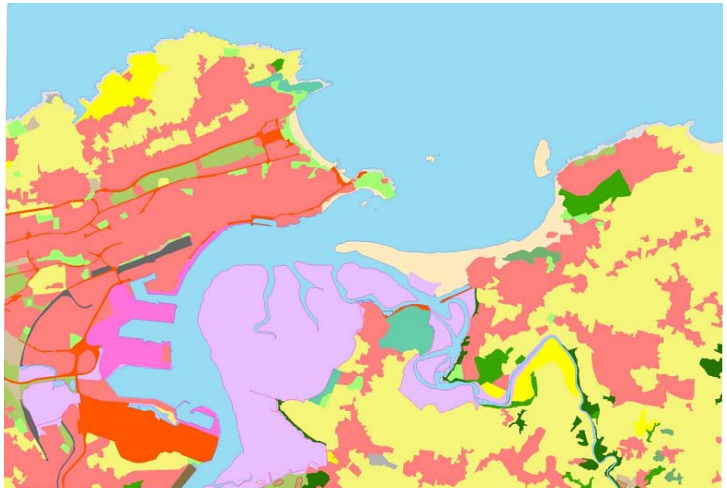
Link between systems

- Generation of **new "ad hoc" classifications** focused on users
  - Automatic generation of existing nomenclatures (i.e. CLC, LUCAS, HR, UrbanAtlas, national thematic classifications, etc.)
  - New nomenclatures 'ad-doc':
    - E.g: MTN25- SIOSE nomenclature: simplified SIOSE nomenclature for mapping purposes (MTN25)

IGN - National Mapping Agency, **Spain**
National Topographic Map 1:25k & 50k

Spanish LC&LU
Information System

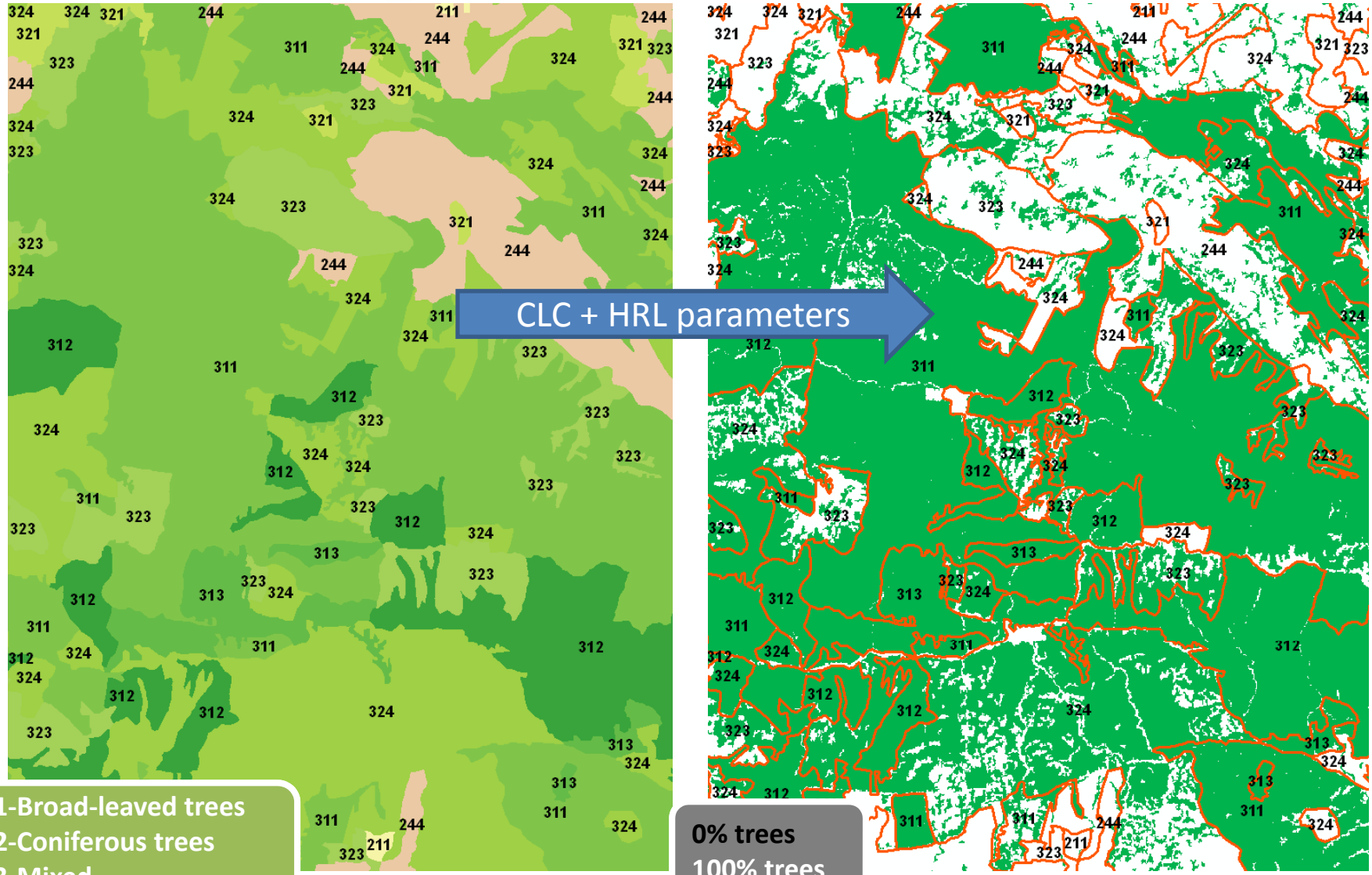
- **Users:** General public (using National Reference Map & DBs at several scales)
- **Key use**: Combination of biophysical cover on the land (vegetation, bare soil, etc.) and its socioeconomic purpose (LC+LU)
- **How?:** National Reference Map & DBs shows LC & LU data queried using synthetic symbology for cartographic purposes
- **Benefits:** Increasing coherence between specialized reference database and general topographic DBs and maps; production cost reduced in 20%.



II. Improvement of existing systems

- Populate existing systems with **EAGLE** landscape parameters
  - Improve medium-accurate systems (current or past) with detailed parameters
- Most of them from automatic techniques (orthoimagery, Lidar, scanners, etc.) → low cost improvement
  - E.g. CLC + HRL Forest

European Comission, **Europe**
CORINE Land Cover, Copernicus



311-Broad-leaved trees
312-Coniferous trees
313-Mixed

0% trees
100% trees

II. Improvement of existing systems

- Parameterization make easier the data flow for reporting and analysis in National/ EU/Global information systems (i.e. CLC, HR, etc.)
  - E.G: Use of soil sealing degree for Risk evaluation → Flood Zone Mapping System

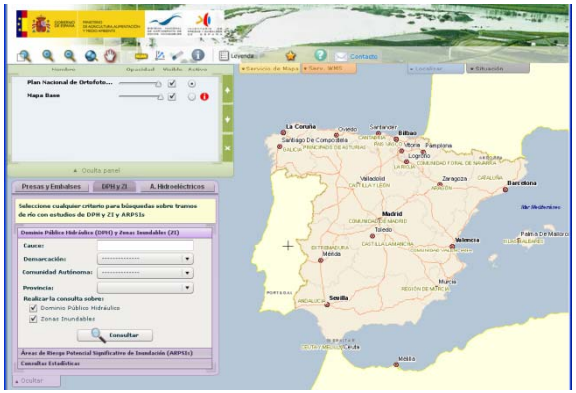
Ministry of Agriculture, Food and Enviroment, **Spain**
Flood Zone Mapping System

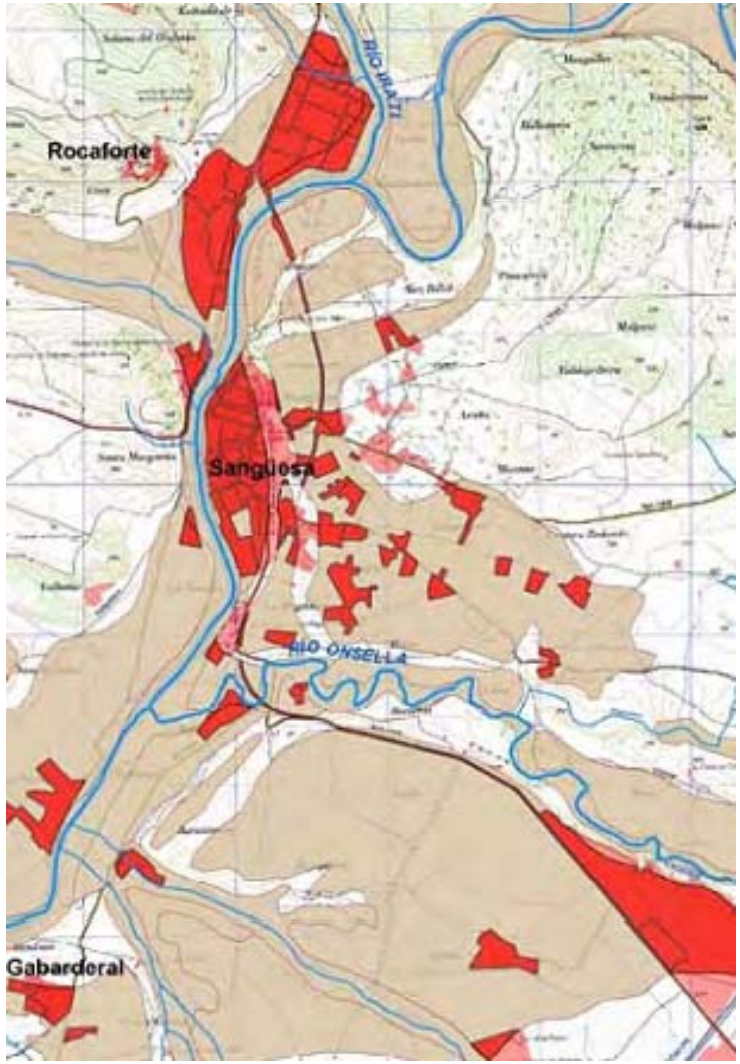
SISTEMA NACIONAL DE CARTOGRAFÍA DE ZONAS INUNDABLES

SIOSE Spanish LC&LU Information System

- **Key use:** National Potential Flood Zone Mapping System providing predictive capacity for flood risk
- **How?:** Identifying areas with more vulnerability and alluvial most dangerous areas, according to SIOSE LC and LU data

Parameter: Soil sealing degree (Buildings+road+sealed surfaces) for runoff water calculations



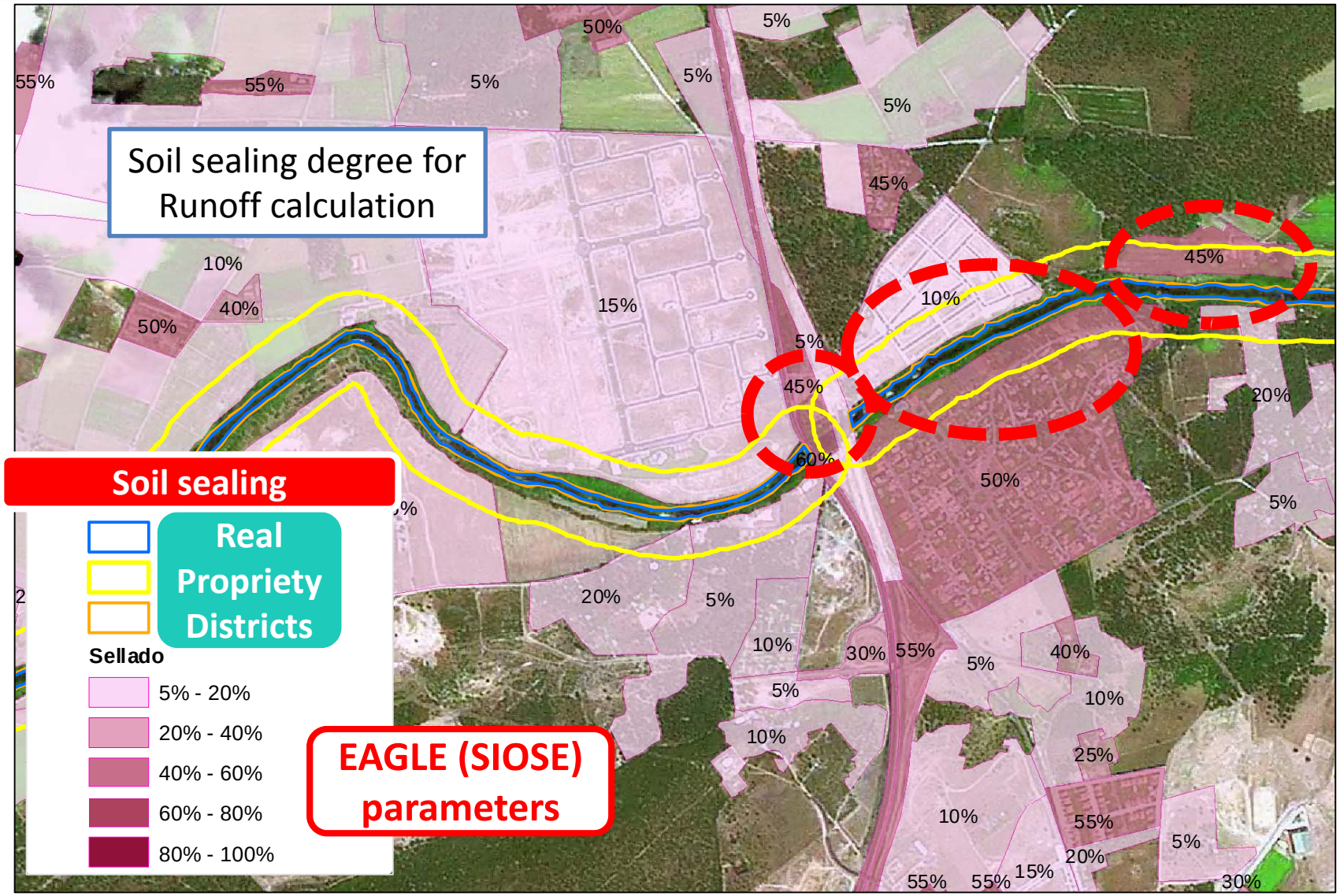


Ministry of Agriculture, Food and Enviroment, **Spain**

SISTEMA NACIONAL DE CARTOGRAFÍA DE ZONAS INUNDABLES

SIOSE Spanish LC&LU Information System

Flood Zone Mapping System



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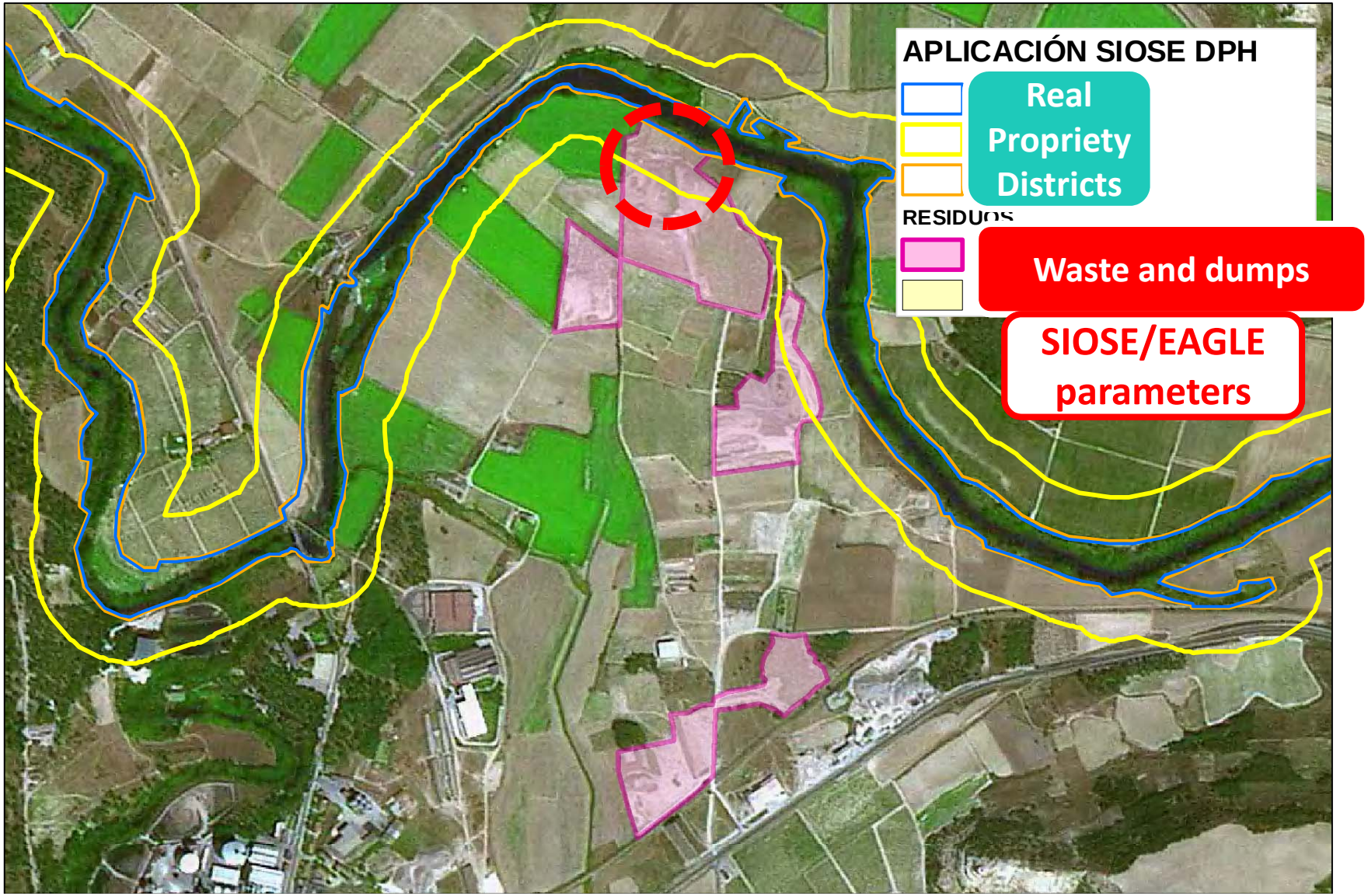

Conclusions

- EAGLE DM provides a flexible **framework for integration** of different land related datasets (past, recent, future)
- fosters **harmonisation** of national and European LM activities following **bottom-up approach** (Inspire Principles)
- **Improves information systems** for reporting and analysis for National/EU/Global obligations& needs.

EAGLE Application

Thank you

for your attention