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Land Use and Land Cover changes in the Colentina sub-basin during 2000-2018 using Land Copernicus data

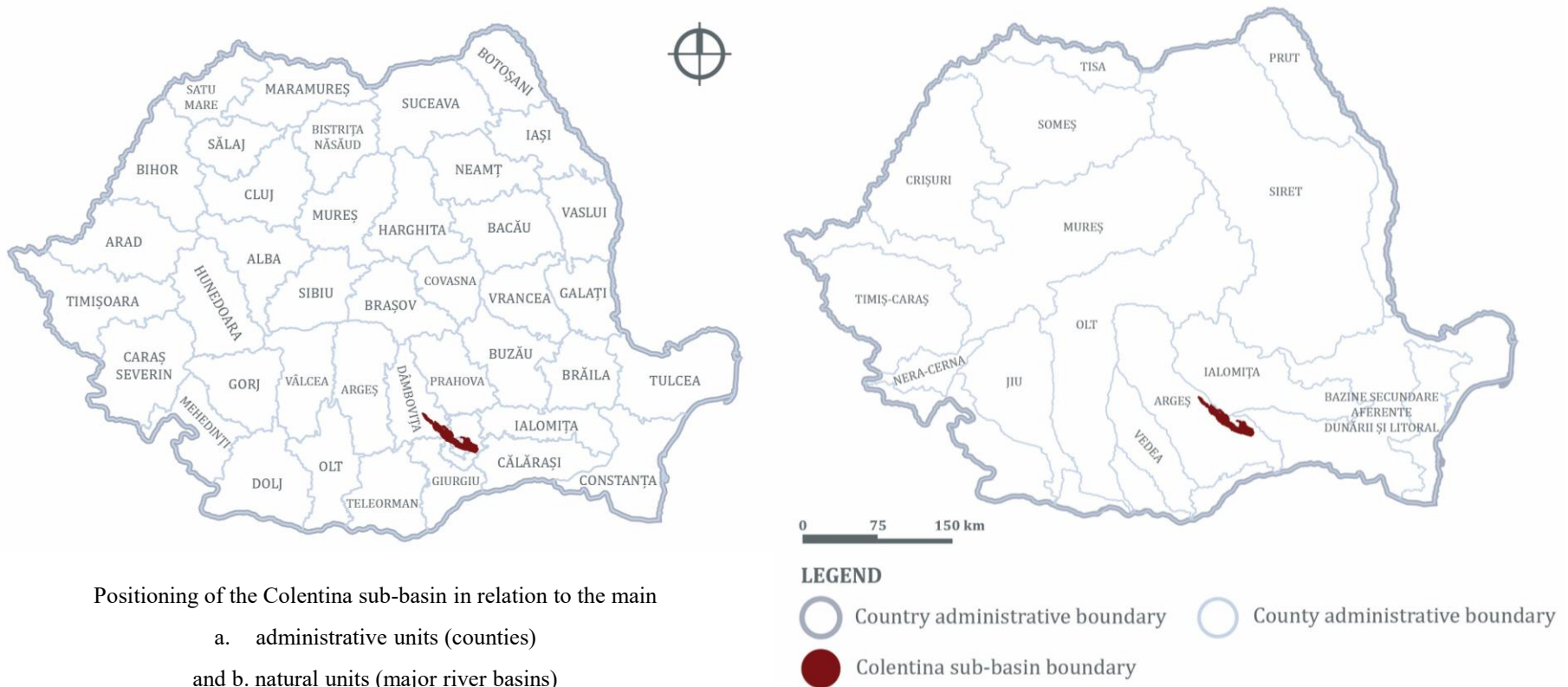
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Introduction



Positioning of the Colentina sub-basin in relation to the main

- administrative units (counties)
- natural units (major river basins)

Boundary data sources: ANAR, INS



Materials and methods

The classification used is based on the CORINE Land Cover (CLC) nomenclature, which adopts a three-level hierarchical structure to describe land use and land cover across Europe.

- Level I includes the most general categories, five in total, representing the major land-use types.
- Level II provides intermediate thematic detail, structured into 15 classes.
- Level III is the most specific level, comprising 44 distinct classes that allow for an in-depth analysis of territorial characteristics.

The Coordination of Information on the Environment (CORINE) inventory provides harmonized land-cover datasets for Europe and includes change layers for four reference periods beginning in 1990.

=> Land use refers to the set of social, economic, and cultural activities that determine how a piece of land is utilized.

=> Land cover, on the other hand, refers to the observable physical and biological layer of the Earth's surface.



Results and discussions

Table 1. CLC Code Classification

CLC - I Code	CLC - II Code	CLC - III Code
1 - Artificial surfaces	11 - Urban fabric	111 - Continuous urban fabric
		112 - Discontinuous urban fabric
		121 - Industrial or commercial units
		122 - Road and rail networks and associated land
	12 - Industrial, commercial and transport units	124 - Airports
		133 - Construction sites
		141 - Green urban areas
		142 - Sport and leisure facilities
2 - Agricultural areas	21 - Arable land	211 - Non-irrigated arable land
	22 - Permanent crops	221 - Vineyards
	23 - Pastures	222 - Fruit trees and berry plantations
		231 - Pastures
	24 - Heterogeneous agricultural areas	242 - Complex cultivation patterns
		243 - Land principally occupied by agriculture, with significant areas of natural vegetation
3 - Forest and semi-natural areas	31 - Forests	311 - Broad-leaved forest
	32 - Scrub and/or herbaceous vegetation associations	321 - Natural grasslands
		324 - Transitional woodland-shrub
4 - Wetlands	41 - Inland wetlands	411 - Inland marshes
5 - Inland waters	51 - Inland waters	511 - Water courses
		512 - Water bodies

* Adapted from Bossard et al., 2000

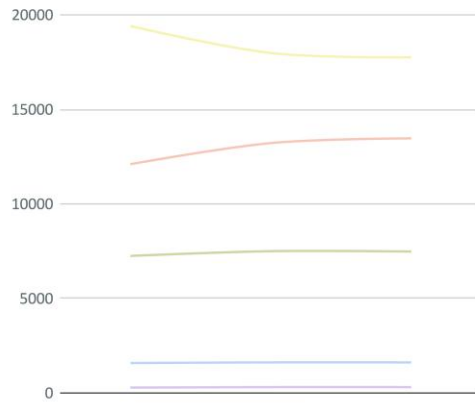


Results and discussions

Table 2. Areas resulting from the CLC Level I classification

CLC Code	Land-use category	Area in hectares (ha) / Year*			
		2000	2006	2012	2018
1	Artificial surfaces	10,854.06	12,101.55	13,218.77	13,469.18
2	Agricultural areas	20,770.74	19,410.29	17,984.46	17,752.52
3	Forest and semi-natural areas	7,248.74	7,249.04	7,499.95	7,481.46
4	Wetlands	185.70	284.71	308.39	308.39
5	Inland waters	1,568.72	1,582.40	1,616.47	1,616.47

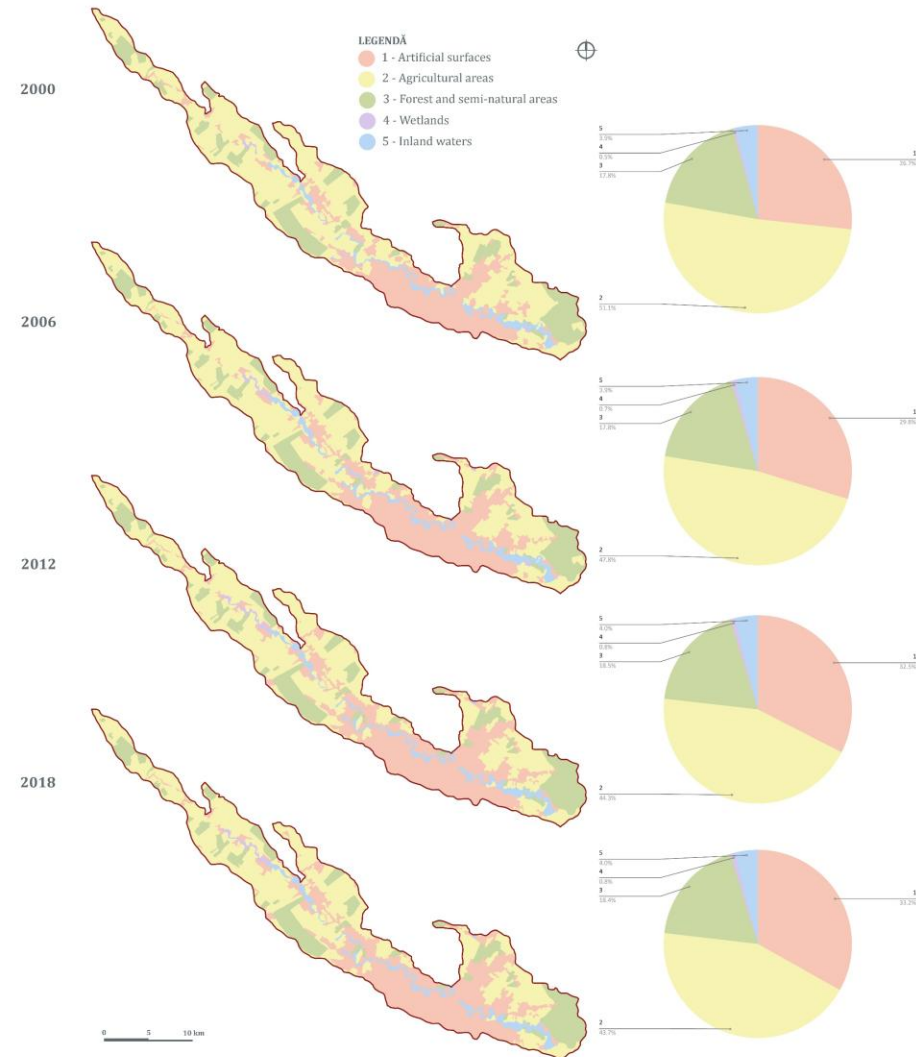
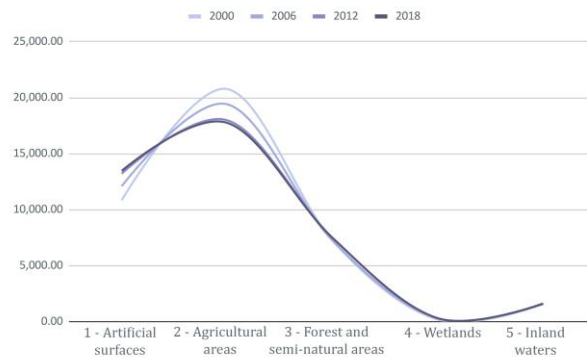
* Areas in hectares resulting from the GIS analyses



Land use according to CLC Level I codes for the years 2000-2018. Data retrieved and interpreted from Land Copernicus

⇒

Evolution of the areas corresponding to the main CLC Level I categories during the period 2000-2018





Results and discussions

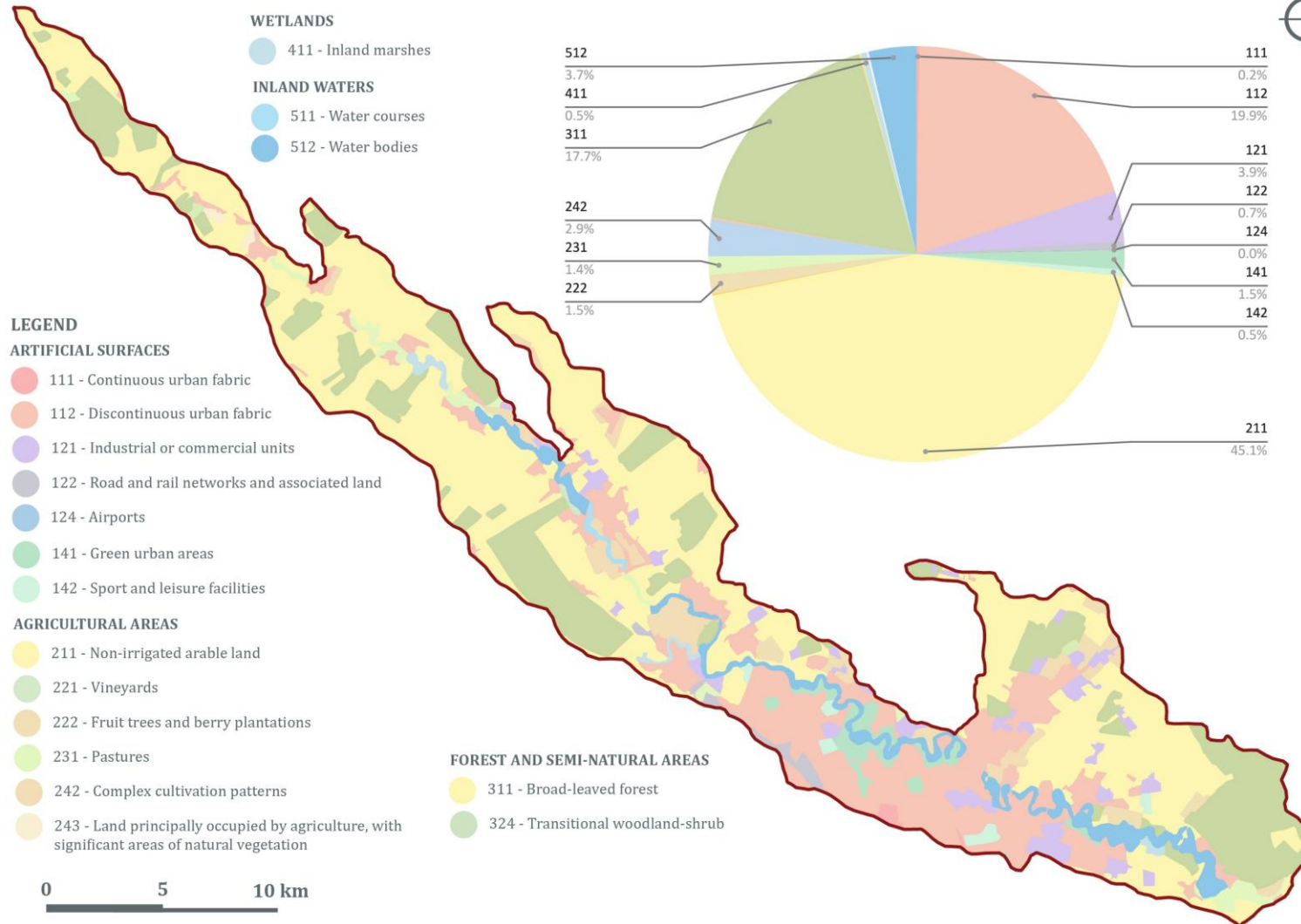
Table 3. Areas resulting from the CLC Level III classification

CLC Code	Land-use category	Area in hectares (ha) / Year*			
		2000	2006	2012	2018
111	Continuous urban fabric	97.90	4,195.95	4,460.14	4,487.66
112	Discontinuous urban fabric	8,083.07	4,395.67	3,811.02	3,869.01
121	Industrial or commercial units	1,568.78	2,405.78	2,171.40	2,211.33
122	Road and rail networks and associated land	267.09	181.76	157.79	157.79
124	Airports	2.76	1.74	1.74	1.74
133	Construction sites		117.09	1,716.52	1,809.33
141	Green urban areas	622.82	511.01	704.59	704.59
142	Sport and leisure facilities	211.64	292.55	195.57	227.73
211	Non-irrigated arable land	18,318.42	16,910.71	12,996.69	13,181.13
221	Vineyards	34.48	34.48		
222	Fruit trees and berry plantations	606.80	808.34	231.32	231.32
231	Pastures	582.41	918.10	3,414.57	2,998.20
242	Complex cultivation patterns	1,164.41	484.18	1,113.51	1,113.50
243	Land principally occupied by agriculture, with significant areas of natural vegetation	64.22	254.48	228.37	228.37
311	Broad-leaved forest	7,196.40	6,910.06	6,587.67	6,304.97
321	Natural grasslands	52.34			
324	Transitional woodland-shrub		338.98	912.28	1,176.49
411	Inland marshes	185.70	284.71	308.39	308.39
511	Water courses	66.41	370.43	335.54	335.54
512	Water bodies	1,502.31	1,211.97	1,280.93	1,280.93

* Areas in hectares resulting from the GIS analyses

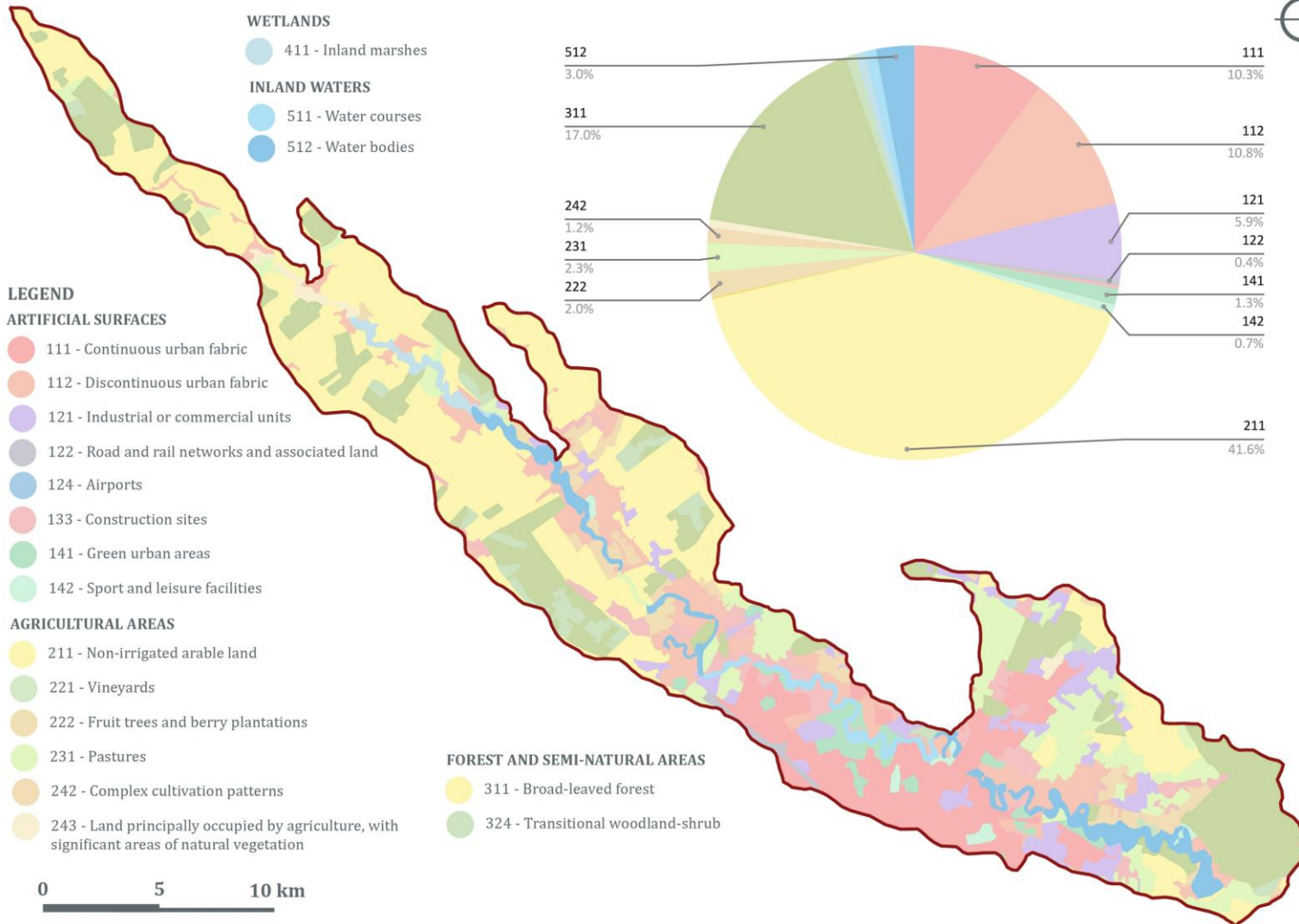


2000



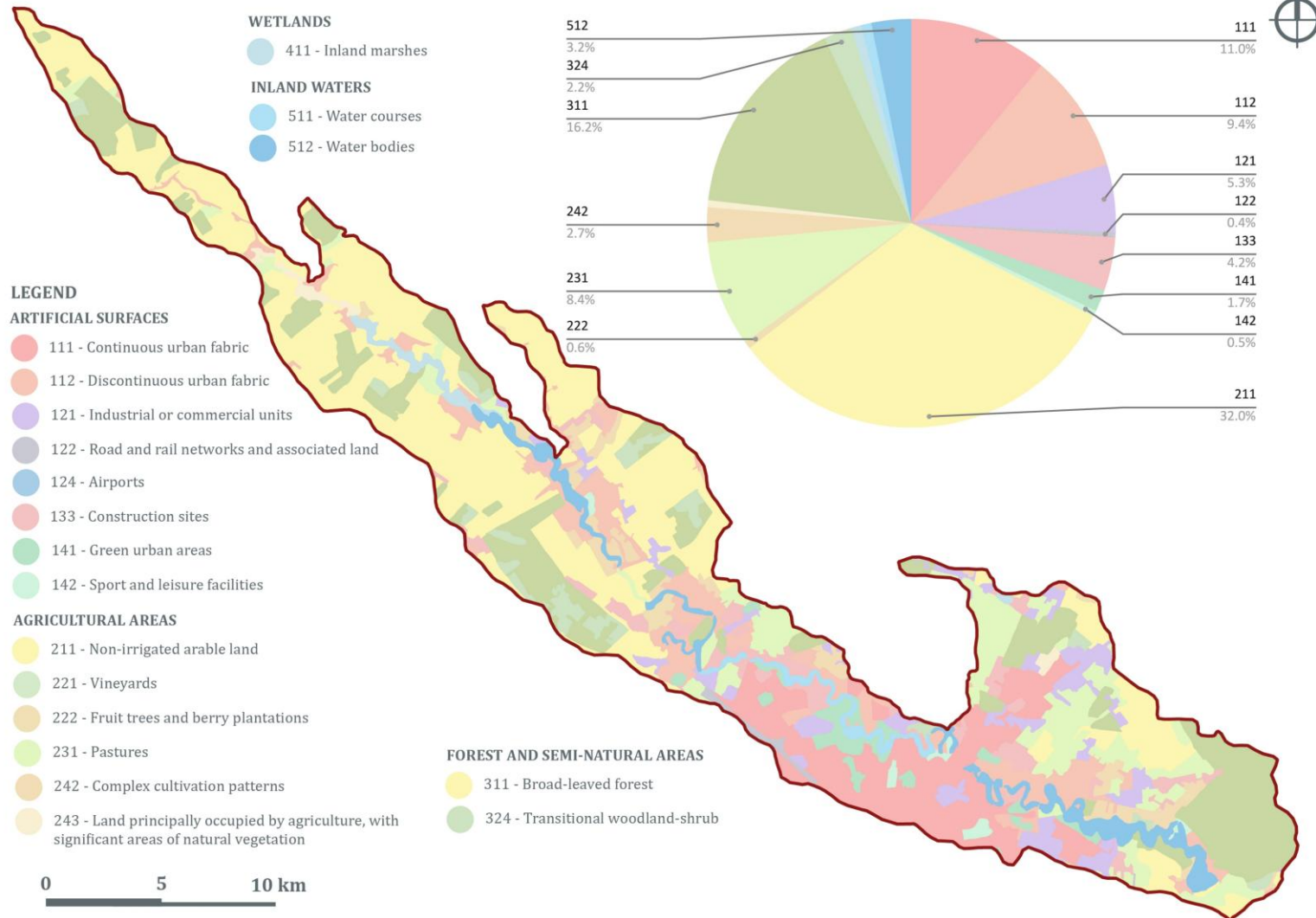


2006



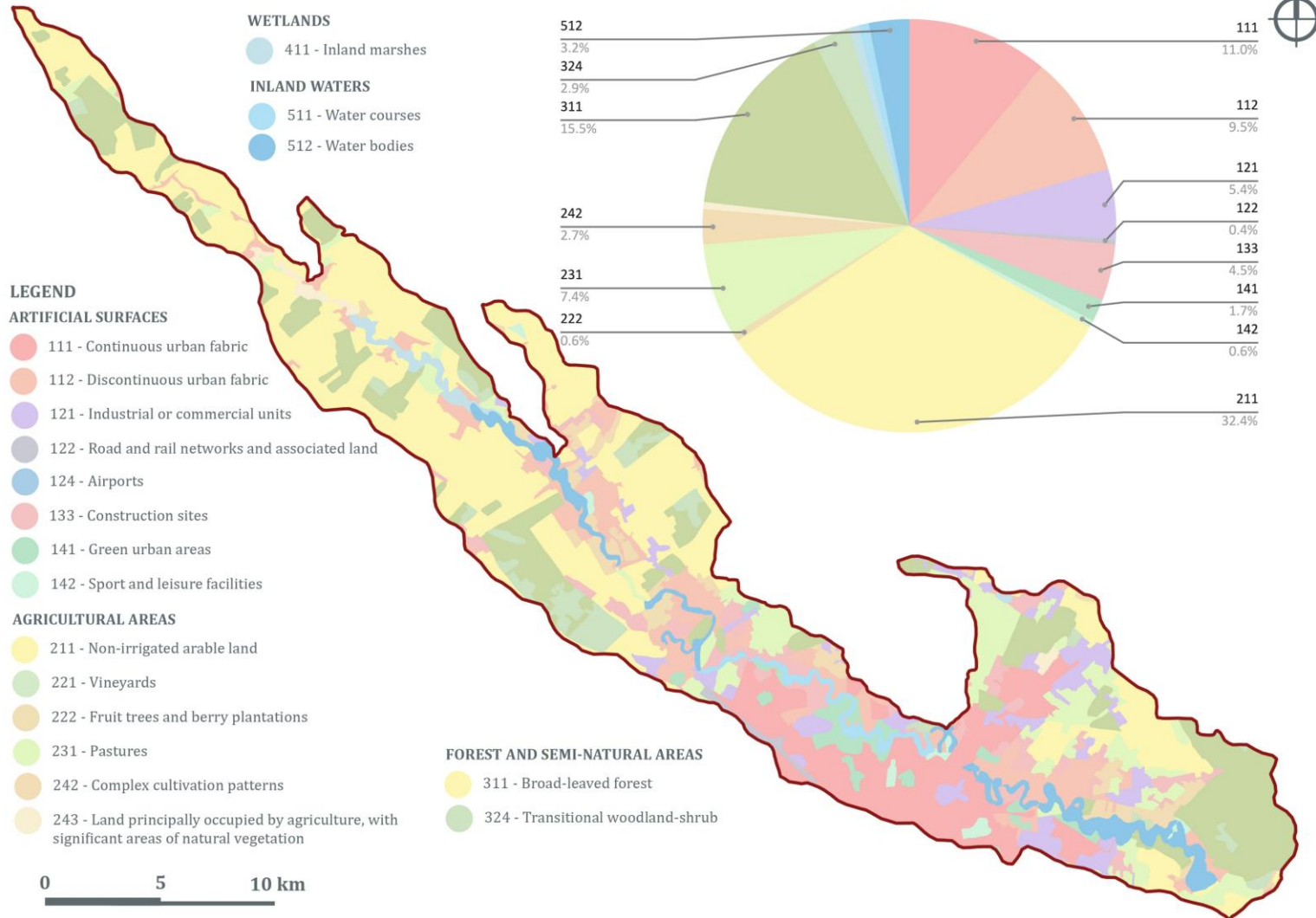


2012





2018





Results and discussions

Table 4. Percentage change for 2000-1018 in CLC Level III categories

CLC Code	Land-use category	Area in hectares (ha) / Year*		Procent (%)
		2000	2018	2000-1018
111	Continuous urban fabric	97.90	4,487.66	+4483.92%
112	Discontinuous urban fabric	8,083.07	3,869.01	-52.13%
121	Industrial or commercial units	1,568.78	2,211.33	+40.96%
122	Road and rail networks and associated land	267.09	157.79	-40.92%
124	Airports	2.76	1.74	-36.96%
133	Construction sites		1,809.33	+1445.25%
141	Green urban areas	622.82	704.59	+13.13%
142	Sport and leisure facilities	211.64	227.73	+7.60%
211	Non-irrigated arable land	18,318.42	13,181.13	-28.04%
221	Vineyards	34.48		0.00%
222	Fruit trees and berry plantations	606.80	231.32	-61.88%
231	Pastures	582.41	2,998.20	+414.79%
242	Complex cultivation patterns	1,164.41	1,113.50	-4.37%
243	Land principally occupied by agriculture, with significant areas of natural vegetation	64.22	228.37	+255.61%
311	Broad-leaved forest	7,196.40	6,304.97	-12.39%
321	Natural grasslands	52.34		0.00%
324	Transitional woodland-shrub		1,176.49	+247.07%
411	Inland marshes	185.70	308.39	+66.07%
511	Water courses	66.41	335.54	+405.25%
512	Water bodies	1,502.31	1,280.93	-14.74%

* Areas in hectares resulting from the GIS analyses



Conclusions and recommendations

- ⇒ There's a significant transformation of the territorial structure.
- ⇒ The most evident trend is the expansion of artificial surfaces, driven by rapid and persistent urbanization.
- ⇒ The continuous decline of non-irrigated arable land highlights the gradual reduction of traditional agricultural functions.
- ⇒ Natural and semi-natural areas show a mixed evolution: while mature forests register a slight decrease, transitional woodland-shrub and pastures increase considerably, indicating both ecological regeneration and possible land abandonment processes.
- ⇒ Monitoring land-cover dynamics is essential for supporting sustainable land-management strategies and enhancing the resilience of ecosystems in the face of ongoing environmental and climatic pressures.



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Thank you for your attention!

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