Post-abandonment landscape trajectories in Terras de Trás-os-Montes

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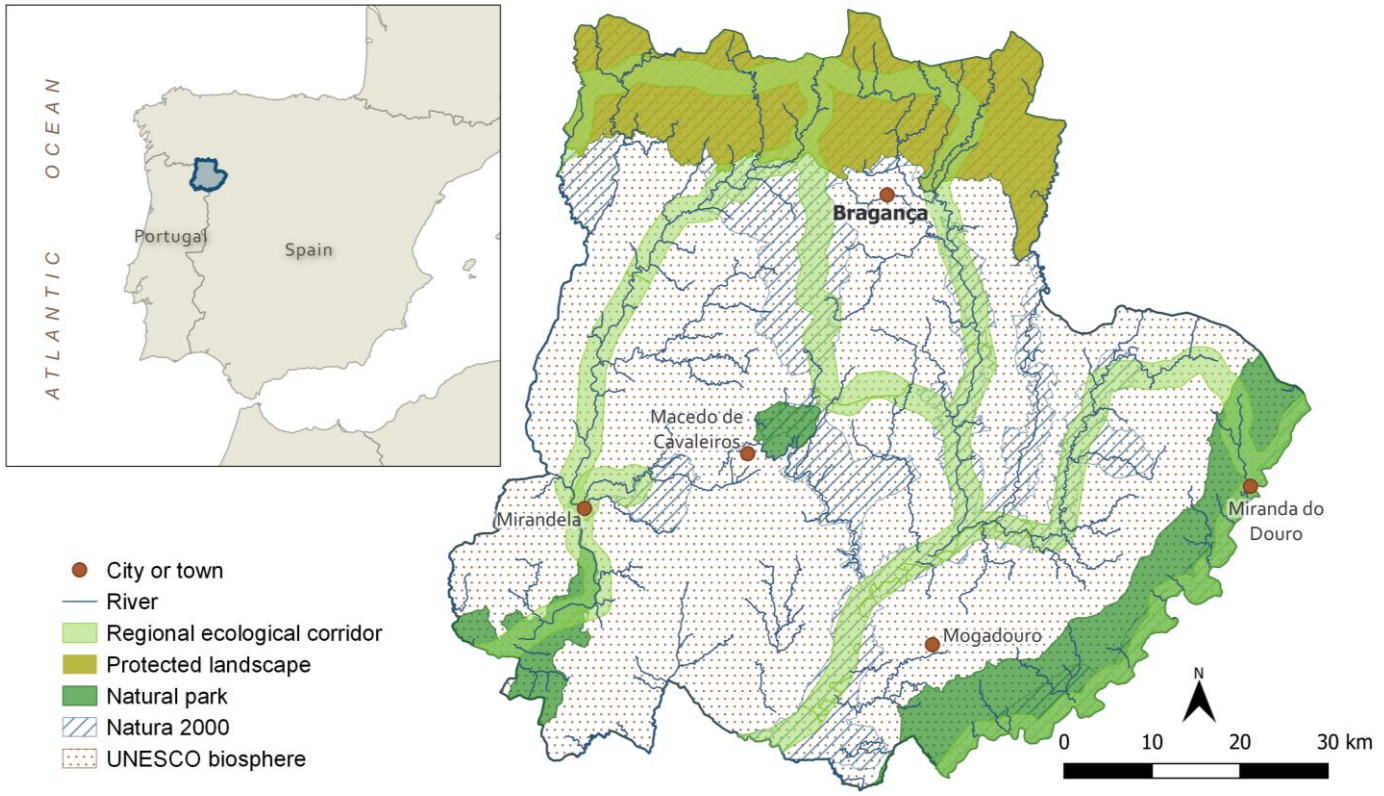
Setting the scene: Terras de Trás-os-Montes



- Area: 5544 km^2
- Population: 107 272 (2021)
- Pop. density: 19.35 / km^2

- Mountain landscape with rich culture
- 2 climate zones
- 4 Natural Parks (1 Protected Landscape)
- Fully included in UNESCO biosphere

- Population decline since 1960s: ~ -50%
- Agricultural land abandonment since 1960s: ~ 50 000 ha

Source: based on ICNF, 2023, DGT, 2022.

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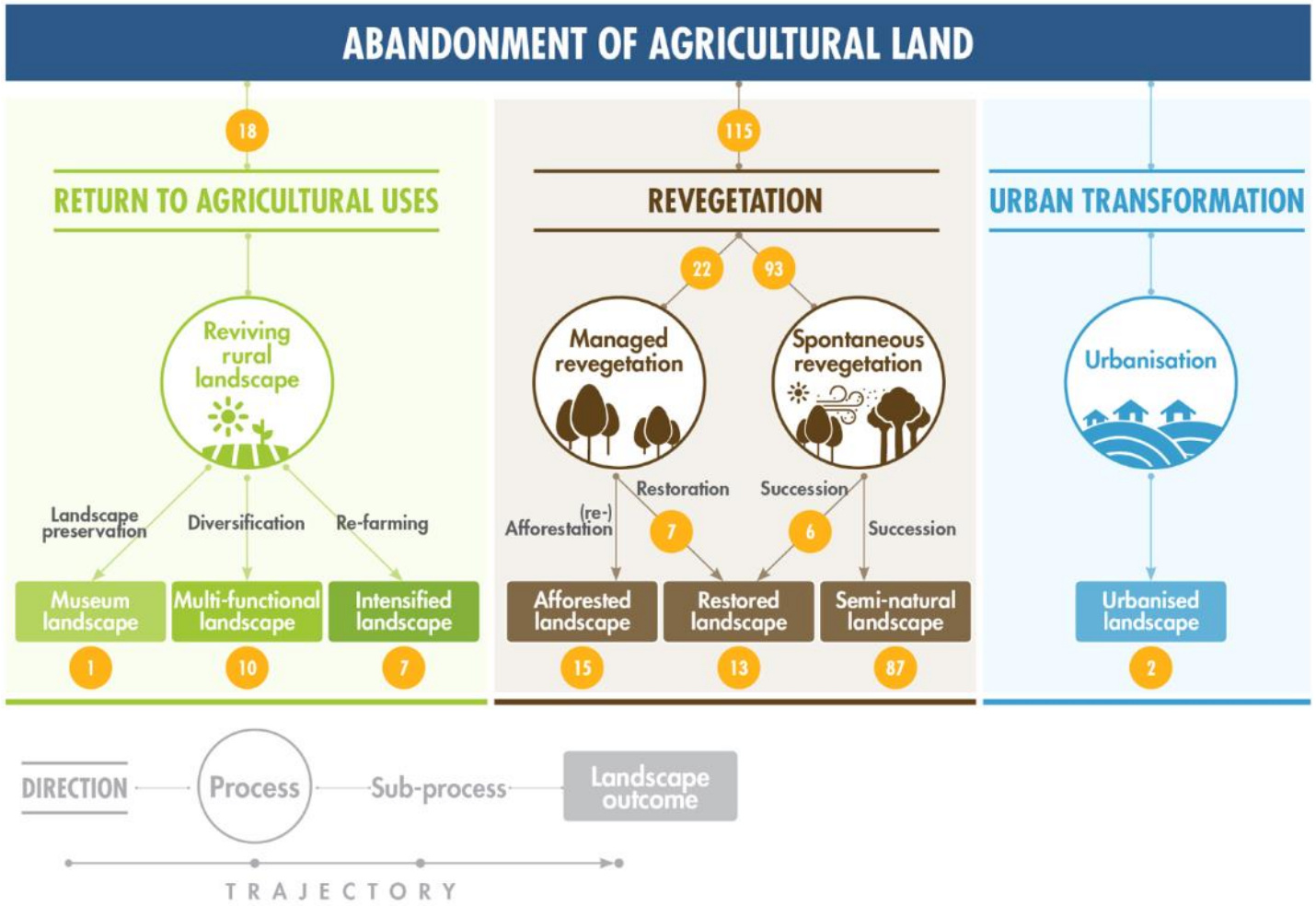
What happens *after* agricultural land is abandoned?



Source: *Fayet et al., 2022*

Abandonment is not an end-state

"post-agricultural abandonment trajectories [are] the changes in land cover and land use observed after the cessation of agriculture activities." (Fayet et al., 2022)

- Landscapes continue to change.
- Land uses and associated values also continue to change.
- Changes can happen in various directions simultaneously.

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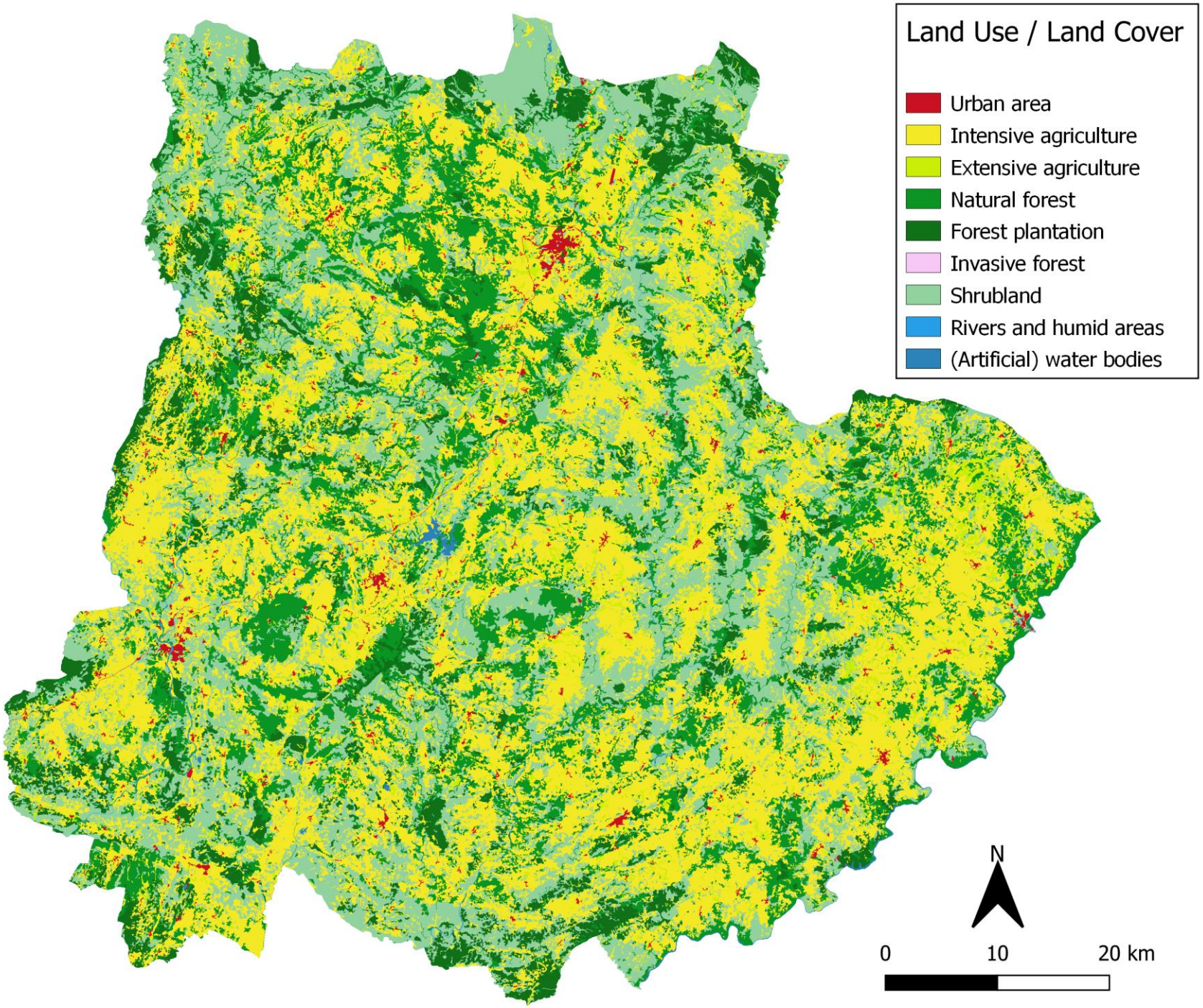
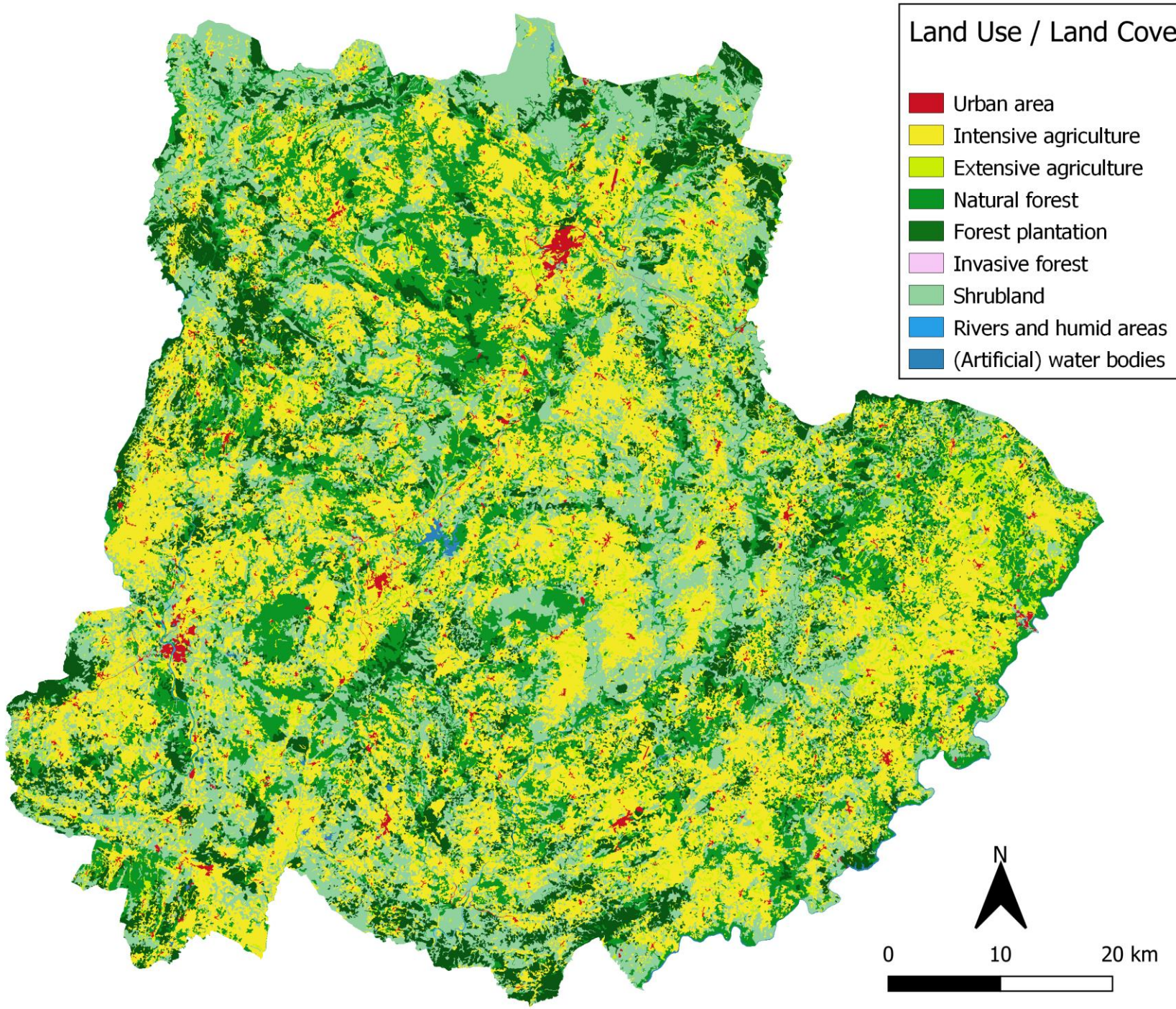
LULC 1995


Land Use / Land Cover
Urban area
Intensive agriculture
Extensive agriculture
Natural forest
Forest plantation
Invasive forest
Shrubland
Rivers and humid areas
(Artificial) water bodies
N
0
10
20 km

LULC 2007



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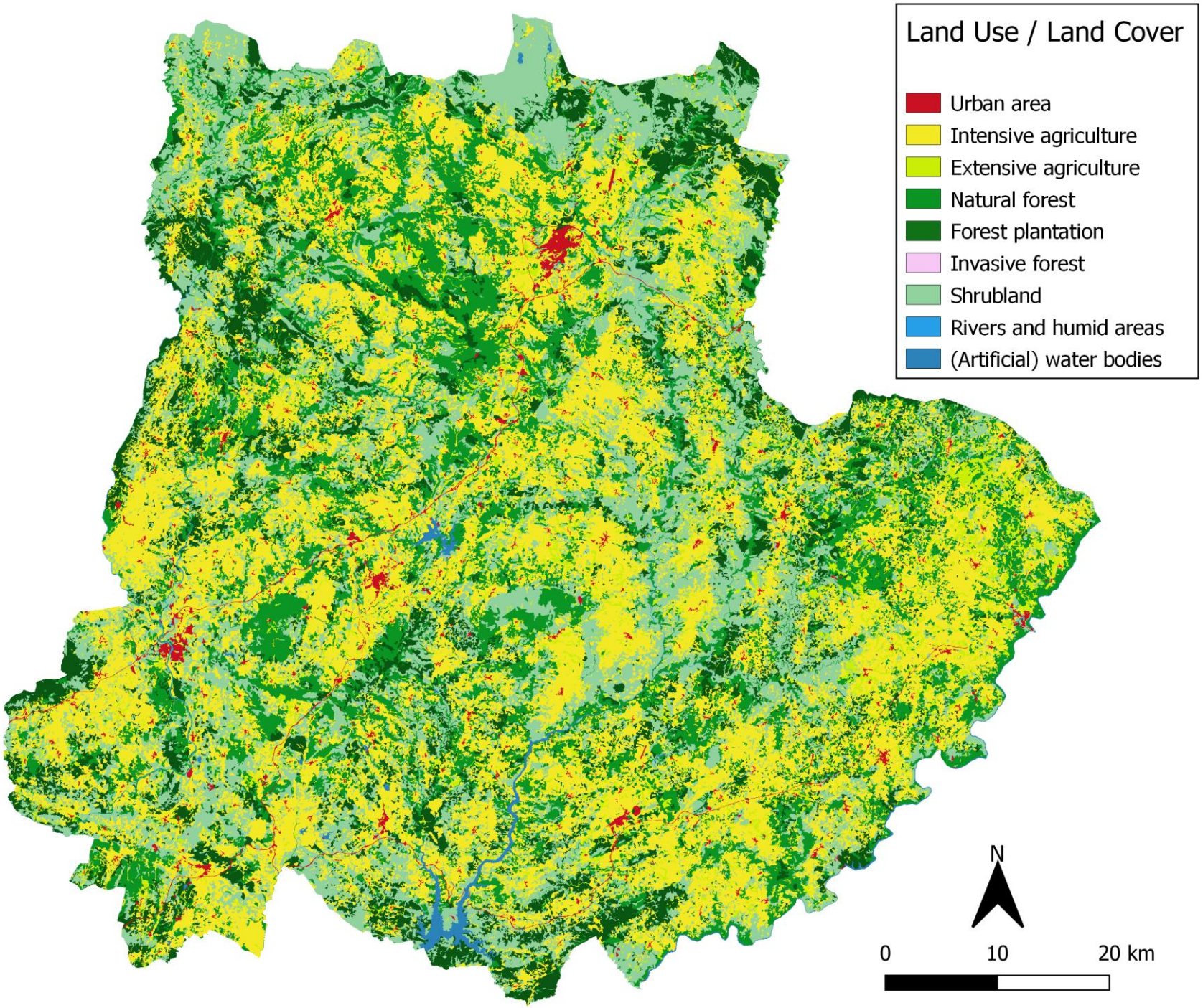
LULC 2018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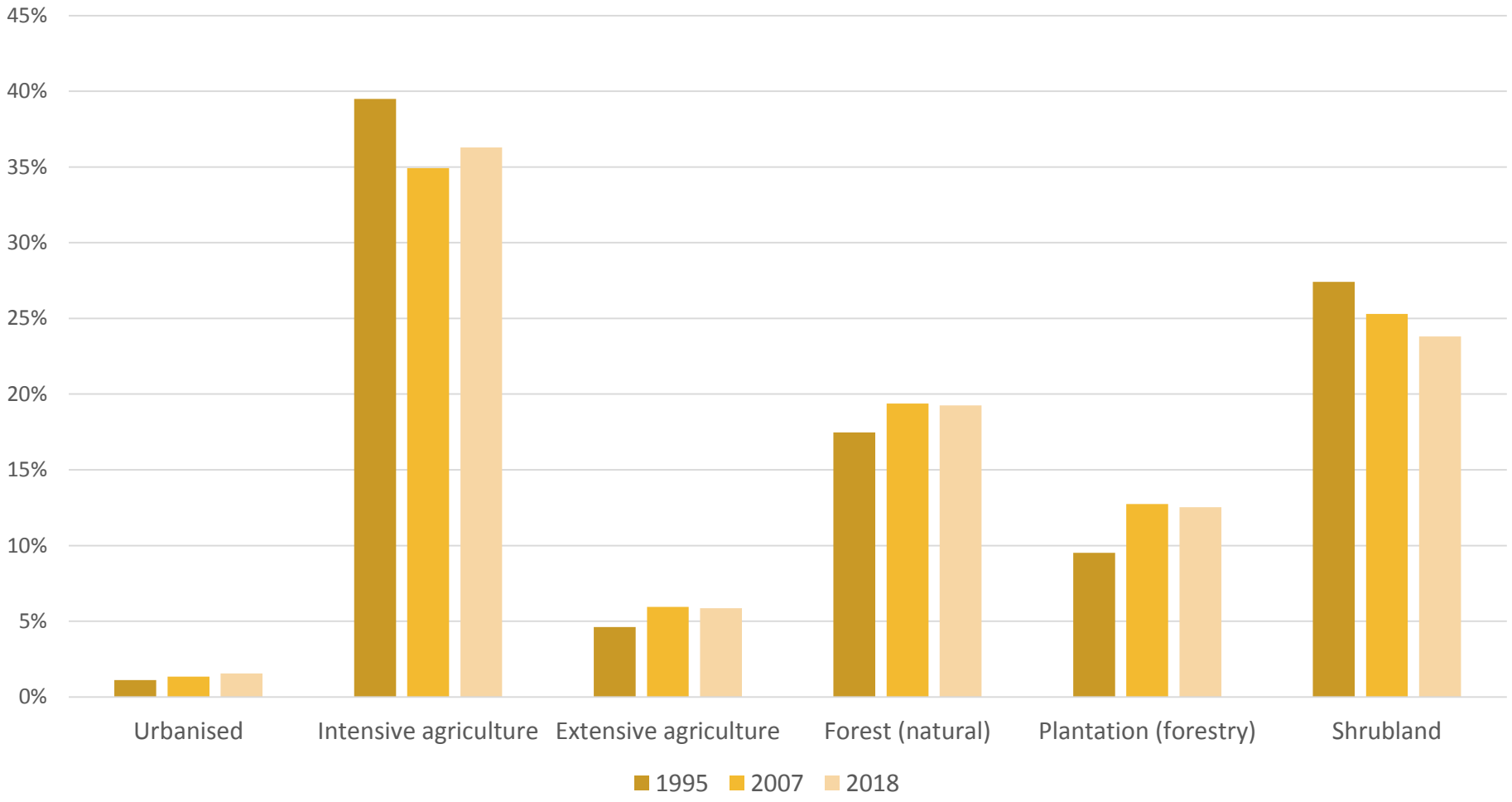
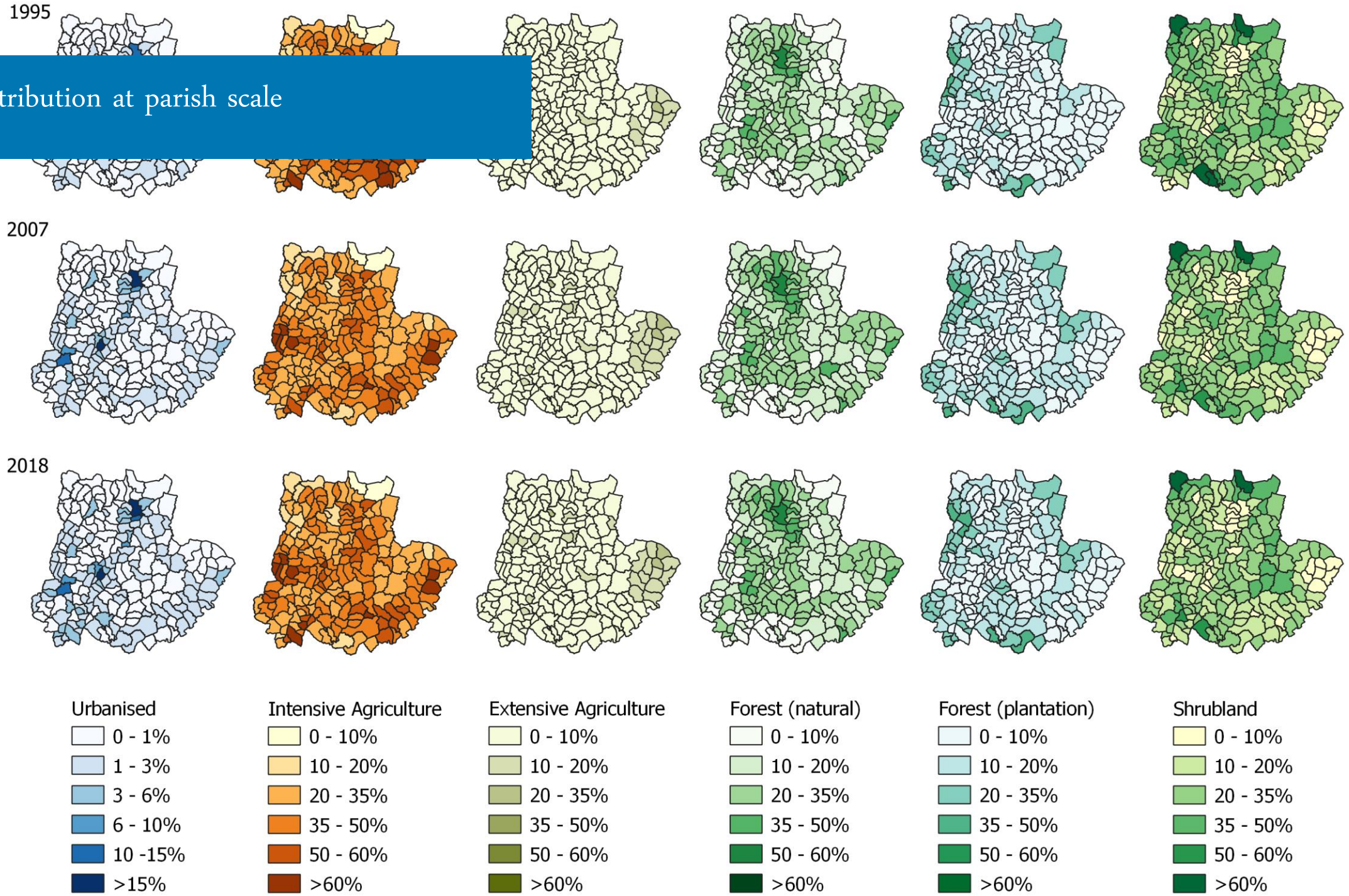
Recent Land Use / Land Cover changes: 1995 – 2007 – 2018



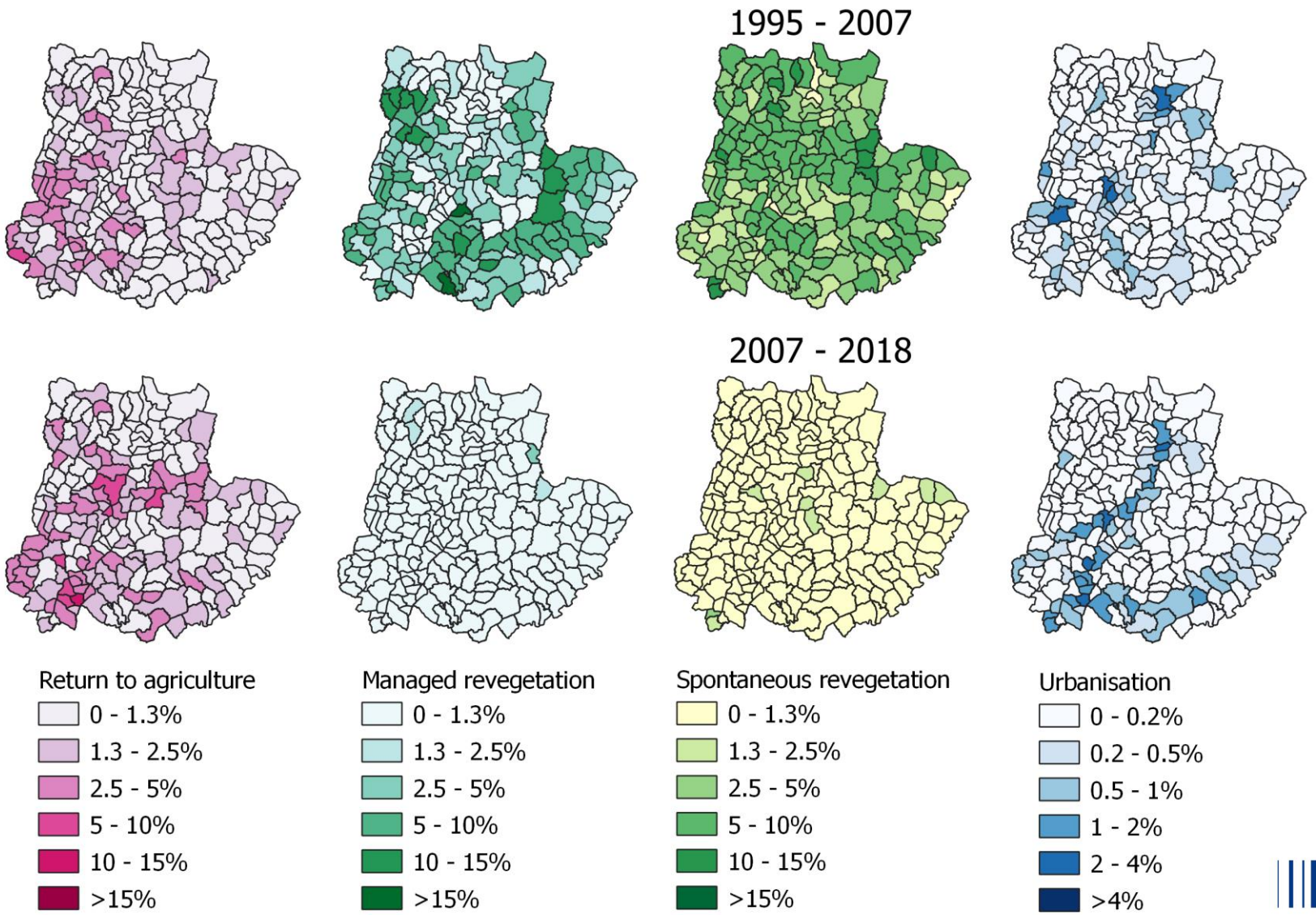
Spatial distribution at parish scale



Transition matrix → Post-abandonment trajectories

		Land use (t+1)					
	LULC category	Urbanised	Intensive agriculture	Extensive agriculture	Forest (natural)	Shrubland	Plantation (forestry)
Land use (t)	Urbanised	*No change*	*Unlikely*	*Unlikely*	*Unlikely*	*Unlikely*	*Unlikely*
	Intensive agriculture	Urbanisation	*No change*	Extensification	Natural succession	Natural succession	Afforestation
	Extensive agriculture	Urbanisation	Intensification	*No change*	Natural succession	Natural succession	Afforestation
	Forest (natural)	Urbanisation	(Re-)cultivation	(Re-)cultivation	*No change*	Natural succession	Afforestation
	Plantation (forestry)	Urbanisation	(Re-)cultivation	(Re-)cultivation	Natural succession	Natural succession	*No change*
	Shrubland	Urbanisation	(Re-)cultivation	(Re-)cultivation	Natural succession	*No change*	Afforestation
Direction of change (Fayet, 2022b)		**Urbanisation**	**Return to agriculture**		**Spontaneous revegetation**		**Managed revegetation**

Change trajectories at parish scale: 1995 – 2007 – 2018



- Spontaneous Revegetation is the most widespread trajectory
- Extensive areas on Managed Revegetation trajectory
- Return to agriculture trajectories emerge in SW

- Return to agriculture trajectories gain dominance
- Revegetation trajectories reduce to minimum
- Urbanisation trajectories determined by road infrastructure development

Who brought the ongoing abandonment to a halt?

- Population growth rate

1991-2001	2001-2011	2011-2021
-4.04	-7.54	-8.68

- Mean farmer age

1989	1999	2009	2019
58	59	63	66

- Mean farm size (ha)

1989	1999	2009	2019
10.04	9.71	8.78	8.62

Source: Statistics Portugal (INE), 2022

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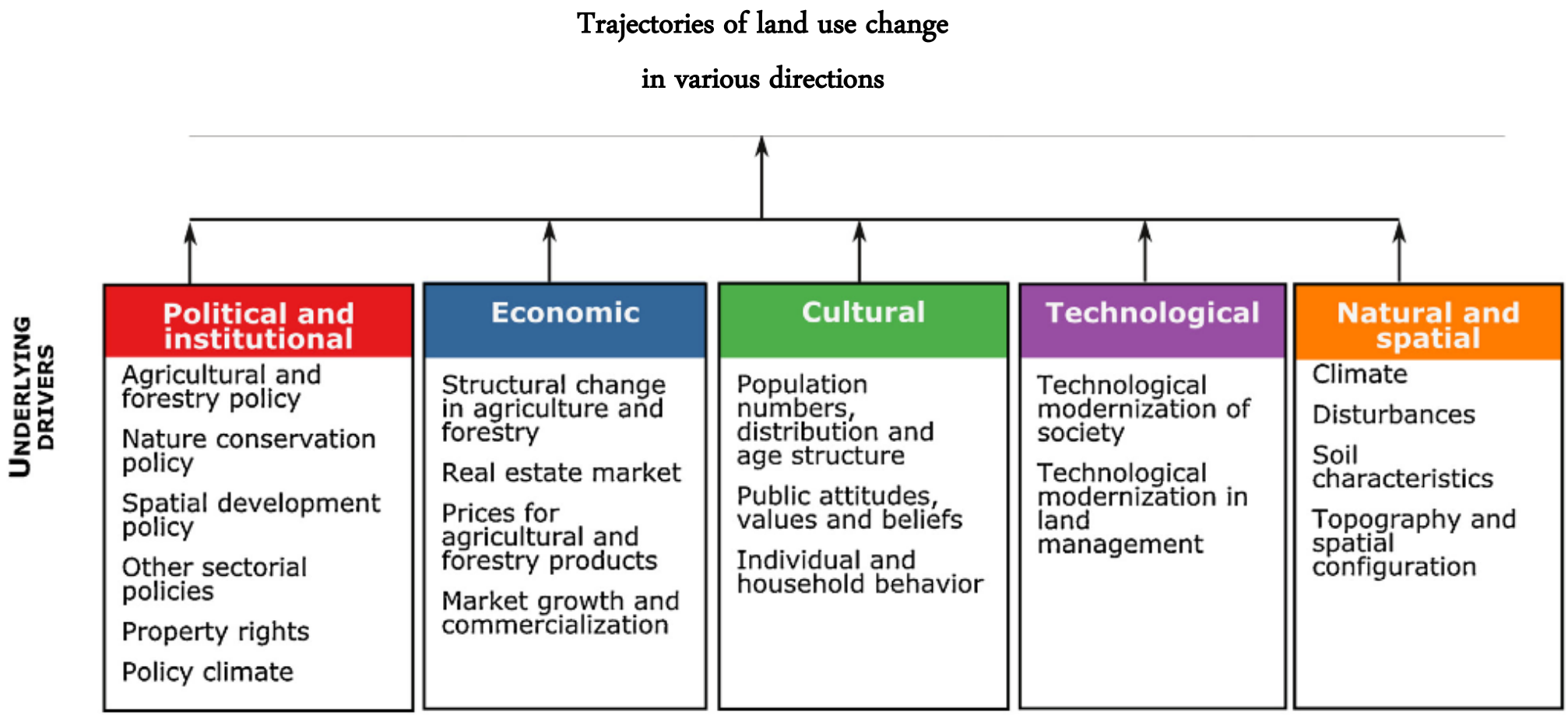
Next steps: how can we explain these trends and patterns?



Source: based on Plieninger et al., 2016

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