

Preliminary assessment of spatial determinants of farmland abandonment in Rio de Janeiro State

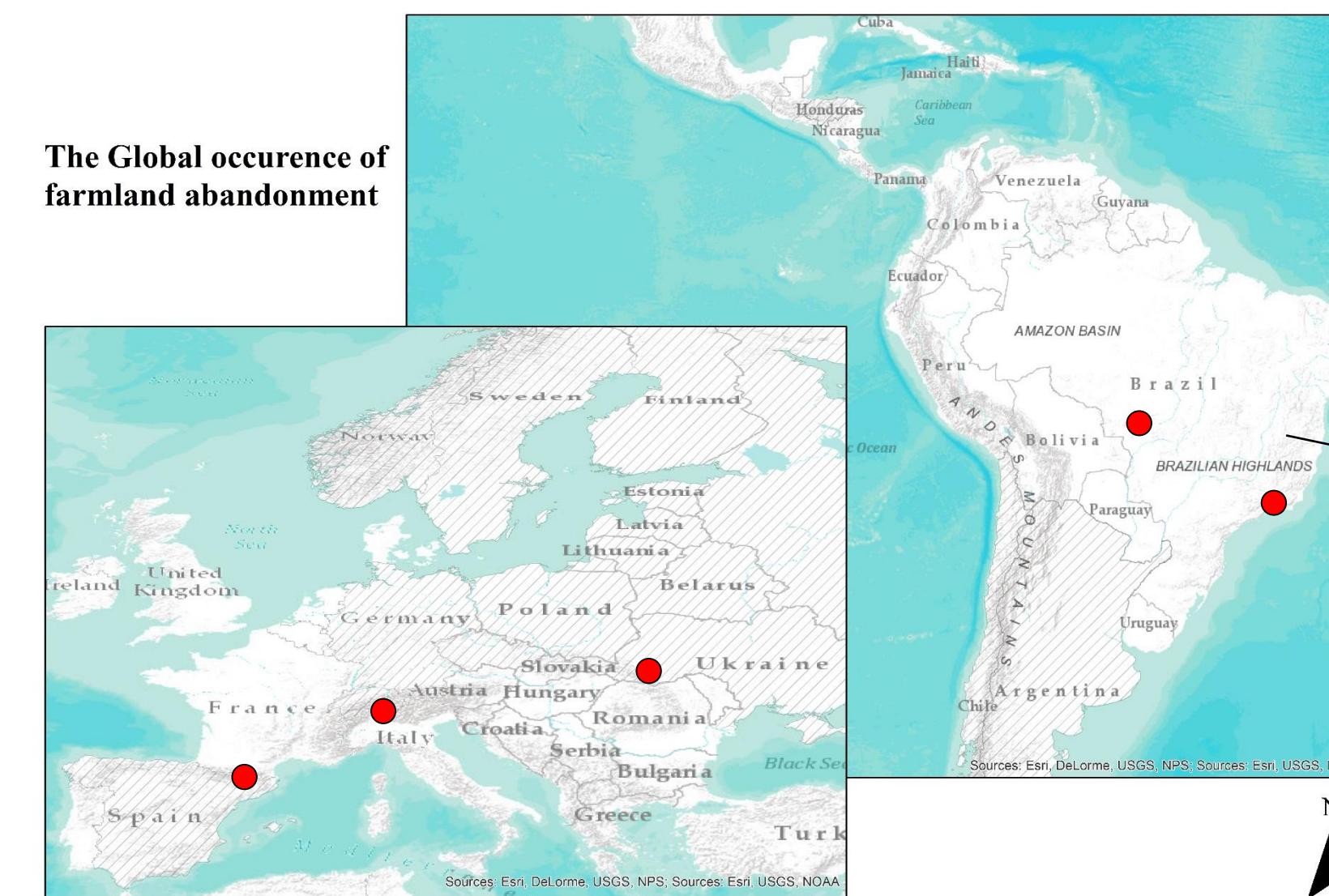
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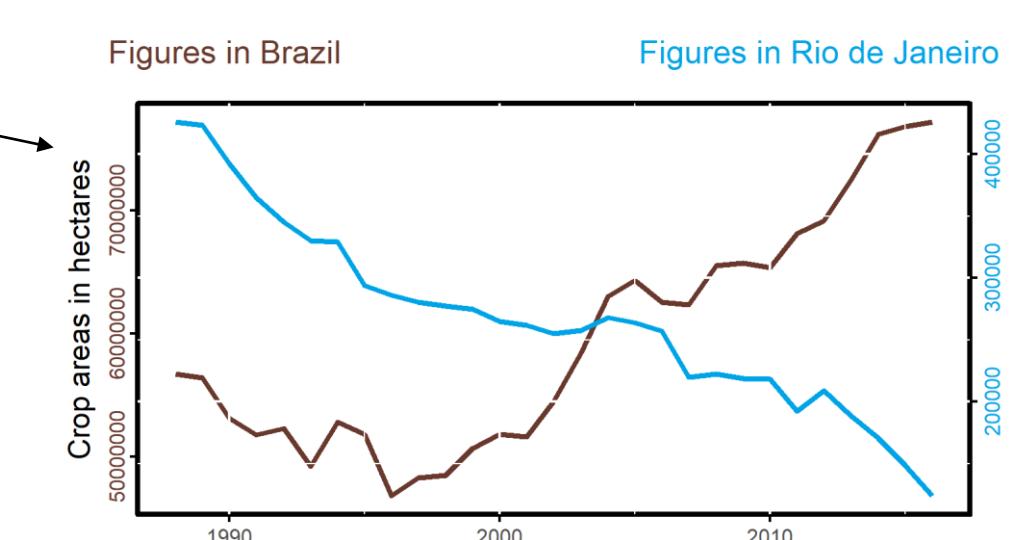
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Definition

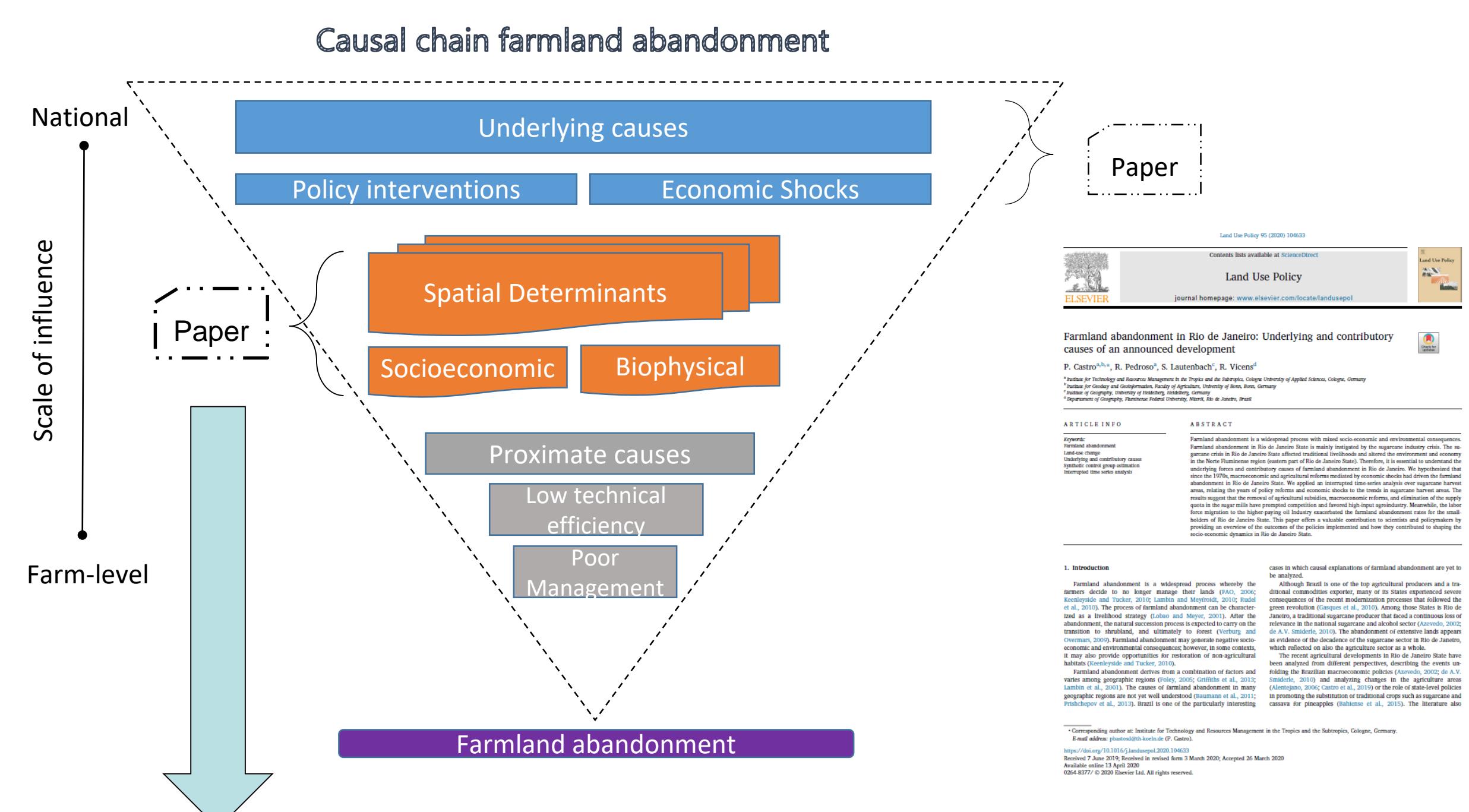
- Farmland abandonment refers to a widespread land use land cover change (LULCC) process whereby the farmland management is withdrawn (FAO, 2006).
- Particular relevance considering food security and environmental implications.
- Causes and local in different regions worldwide remain unclear.



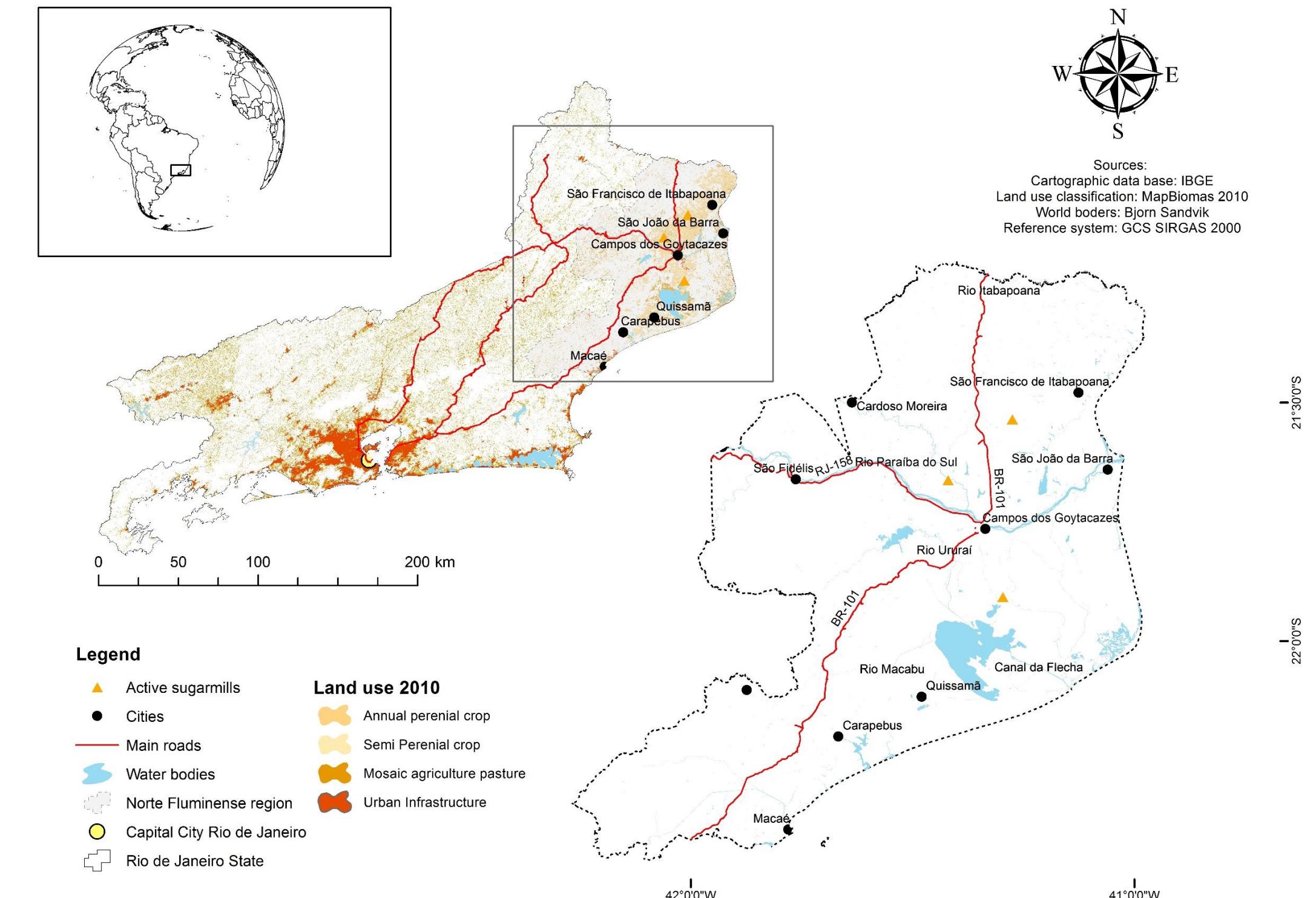
Crop areas in Rio de Janeiro have been **sharply decreasing!**



Background



Study case Region



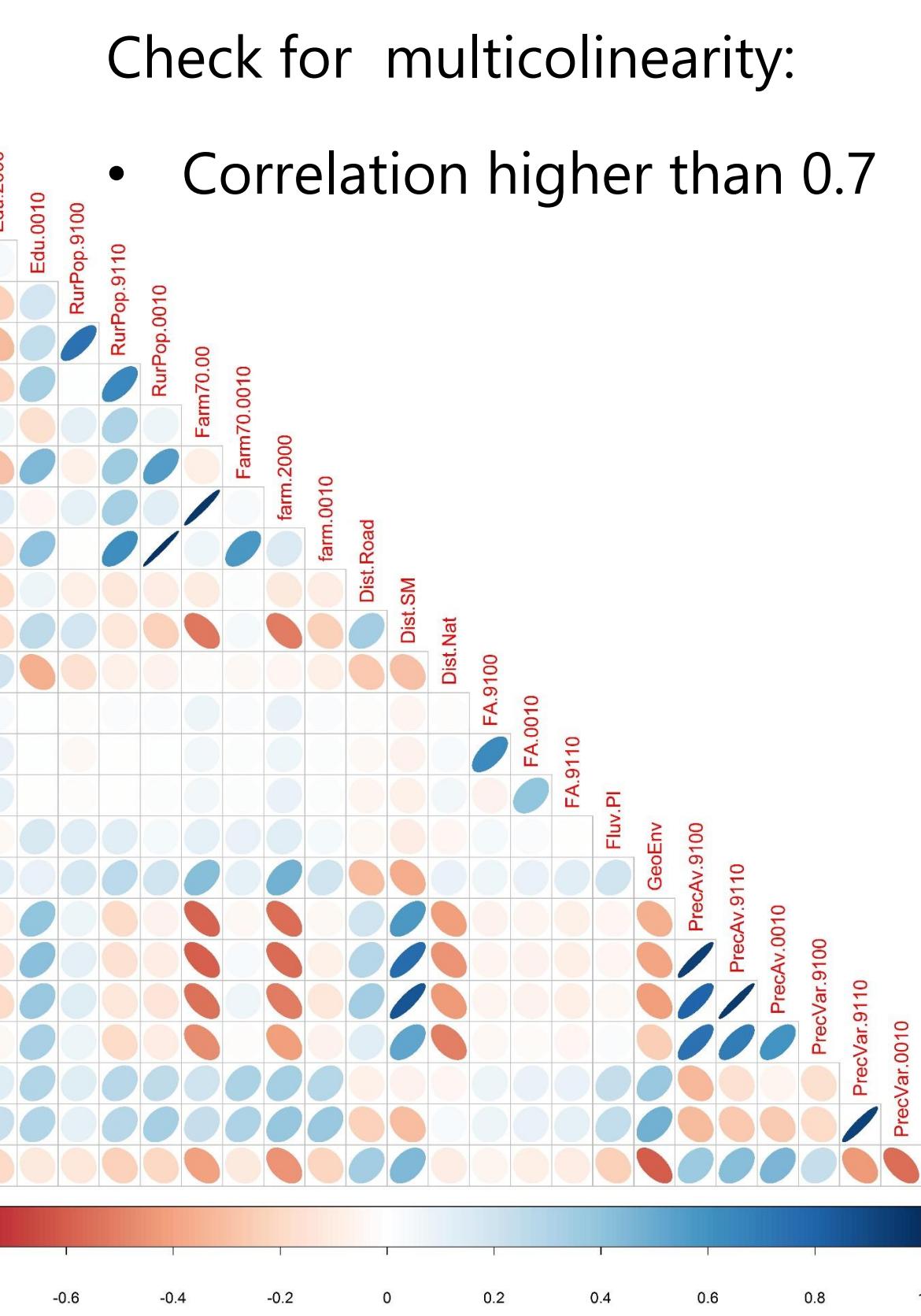
Methods



- Random sampling n=25,000 over the FA dataset.
- Variable in the model: hierarchical and best subsets method.
- Spatial autocorrelation analysis: Spatial Eigenvector Mapping (Doorman et al. 2007)
- The analysis was developed in the R environment.

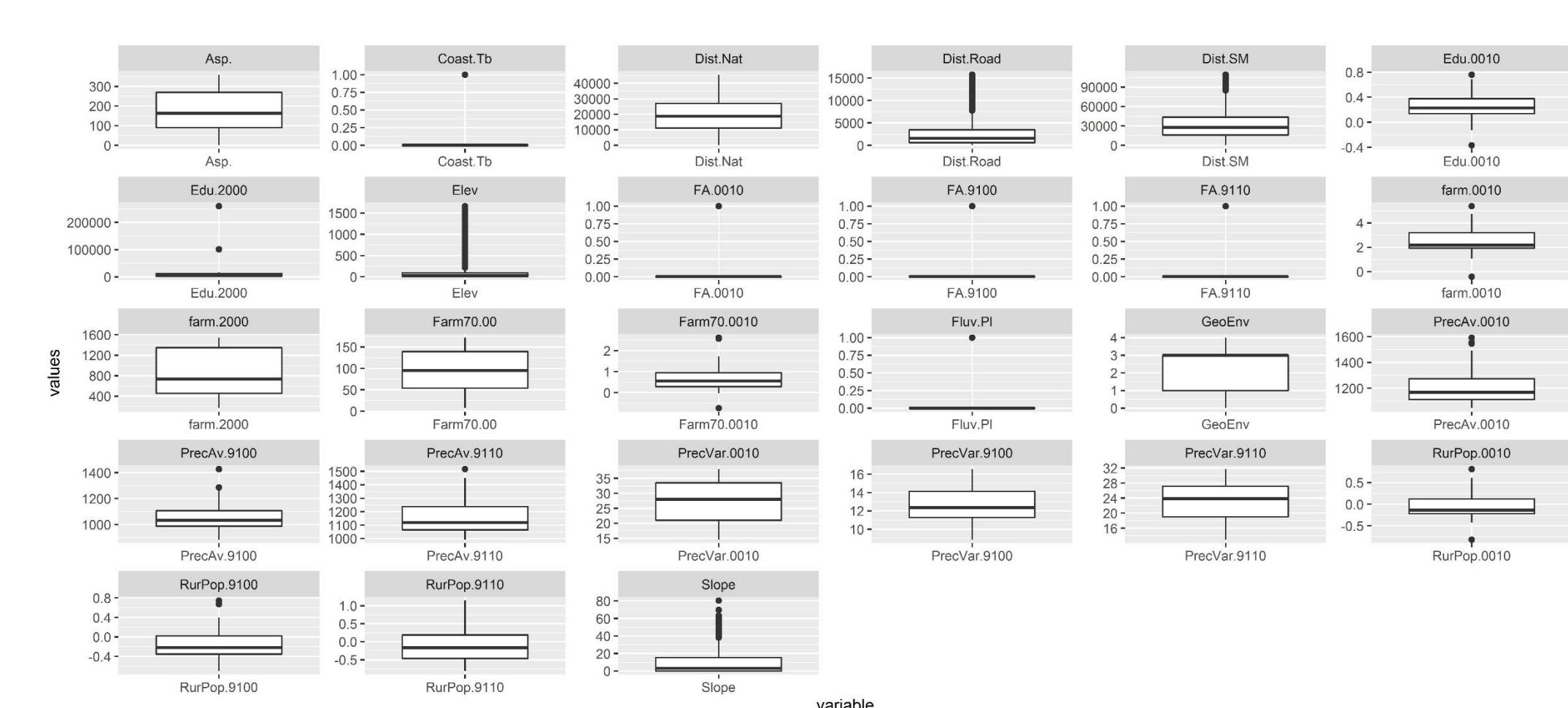
Check for multicollinearity:

- Correlation higher than 0.7



Datasets

Variable	Short name	Time covered	Expected relationship	Source
Farmland abandonment	FA	1991-2000-2010		MapBiomass
Elevation	Elev	2013	+	IBGE
Slope	Slope	2013	+	IBGE
Aspect	Asp.	2013	-/+	IBGE
Coastal tablelands	Coast.Tb		-	CPRM
Fluvial and Fluvial marine plains	Fluv.Pl		-	CPRM
Geodiversity	GeoEnv	NA	-/+	CPRM
Precipitation variability	Prec.Var	1979 - 2018	-/+	Mswep
Average precipitation	Prec.Avg	1979 - 2018	-	Mswep
Rural population change*	RurPop	1991, 2000, 2010	-	IBGE
Farmers over 70 years old*	Farm70	1991, 2000, 2010	+	IBGE
Years of education*	Edu	1991, 2000, 2010	+/-	IBGE
Euclidean distance to main roads	Dist.Road	2013	+	IBGE
Euclidean distance to Sugarmills	Dist.SM	2019	+	Author's contribution
Euclidean distance to nature protected areas	Dist.Nat	2019	-	IBGE



Results

SEVM model

Model Fit:				
$R^2(L2) = 240.33425$, $p = 0.00000$				
Pseudo-R ² (McFadden) = 0.03422				
GeoEnvHills and moderated slopes				
GeoEnvMangroves, terraces and coastal plains				
GeoEnvMountains and Plateaus				
GeoEnvWater				
Standard errors: MLE				
Est.	S.E.	z val.	p	
(Intercept)	-2.39761	0.05077	-47.22265	0.00000
Elev	-0.28003	0.06179	-4.53203	0.00001
Dist.Road	0.17163	0.03804	4.51209	0.00001
GeoEnvHills and moderated slopes	-0.47791	0.09682	-4.95681	0.00000
GeoEnvMangroves, terraces and coastal plains	-0.20992	0.10221	-2.05377	0.04000
GeoEnvMountains and Plateaus	-0.32138	0.11349	-2.83183	0.00463
GeoEnvWater	-0.97840	0.20975	-4.66460	0.00000
PrecAv.9100	-0.30319	0.06096	-4.97321	0.00000
PrecVar.9100	0.22864	0.05227	4.13703	0.00004
vec1 ³	-0.11211	0.03509	-3.45164	0.00056
vec2 ³	0.14223	0.03067	4.63772	0.00000
vec8 ³	-0.12111	0.03509	-3.45164	0.00056
vec7 ³	0.07422	0.03064	2.42263	0.01541

Continuous predictors are mean-centered and scaled by 1 s.d.



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Conclusions

- Model explains very little (3%) of the variation on the outcome variable FA.
- A more robust definition of the variable farmland abandonment is being developed (paper in progress).
- The incorporation of other predictors is also part of the further analysis.

Acknowledgements

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