

Depopulation Risk in Castilla-La Mancha

Design of a Spatial Depopulation Risk Indicator

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Motivation

Did you know that some areas of Cuenca y Guadalajara have a lower population density than Siberia? !!!

Figure 1 shows that 444 municipalities of the region lost more than 20% of their population* in the last two decades (in red):

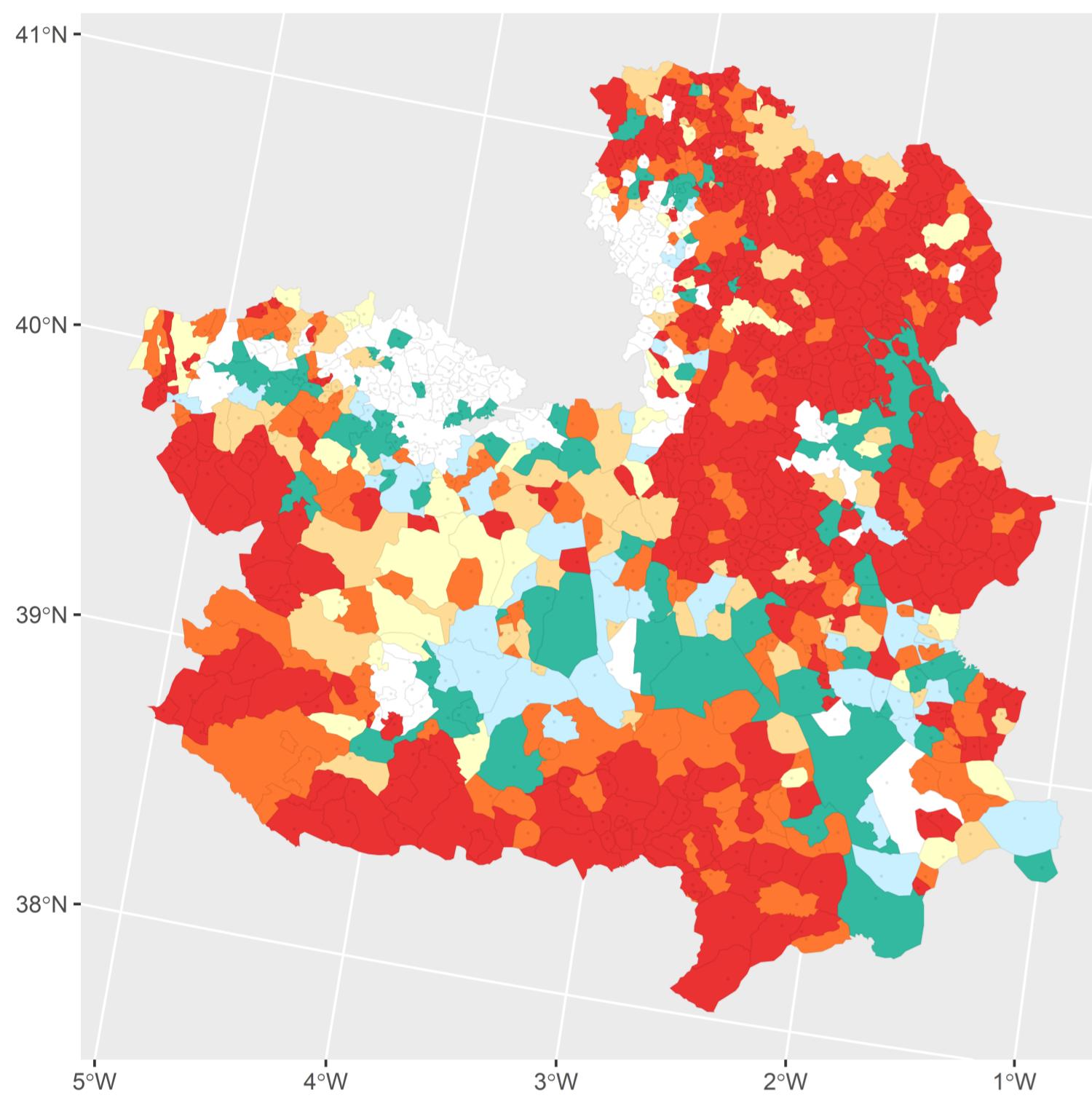


Figure 1: Population Growth in municipalities of Castilla-La Mancha between 2001 and 2020

Results

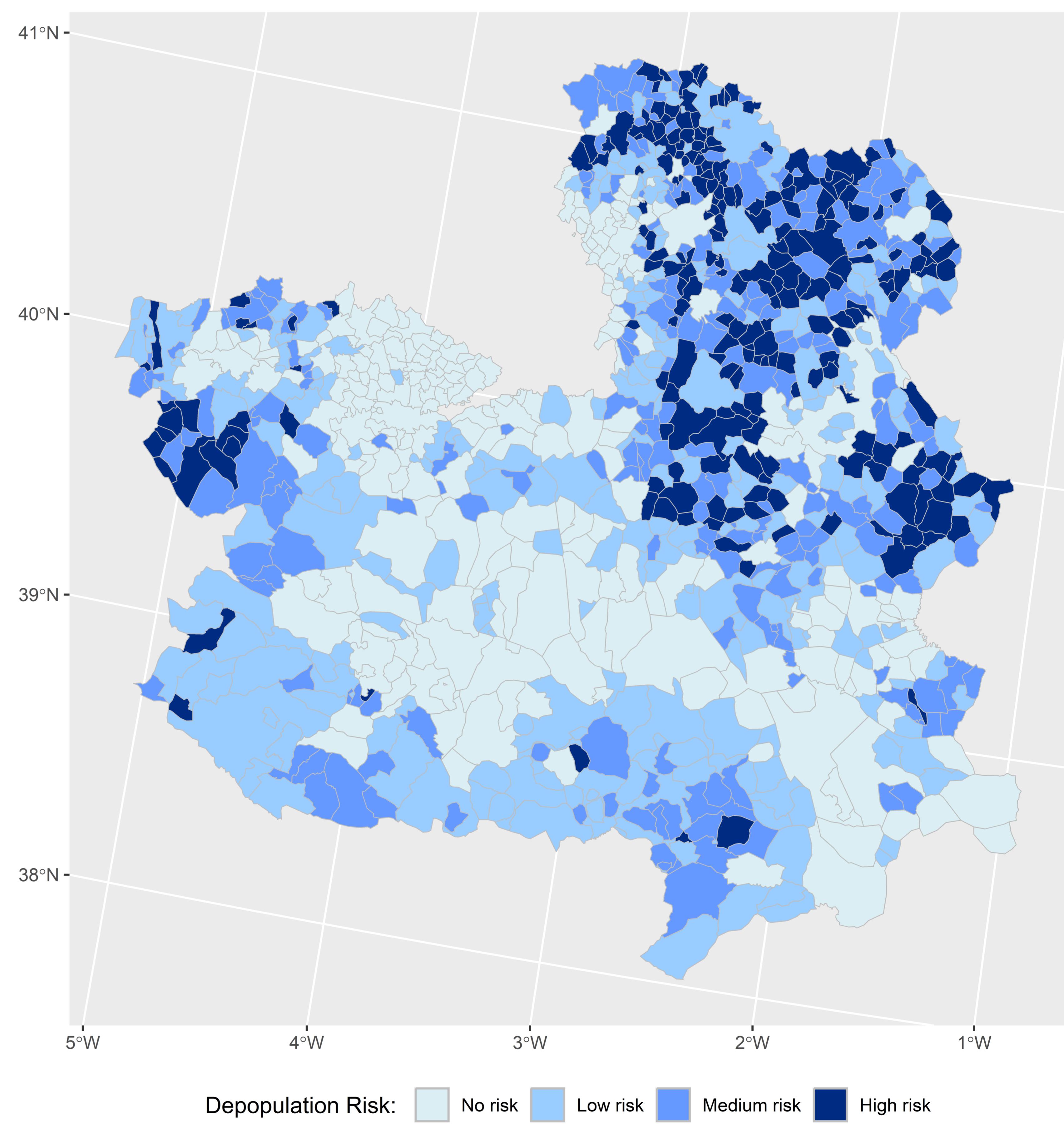


Figure 3: Depopulation Risk in municipalities of Castilla-La Mancha according to sDRI Indicator

Objectives

- **General:** Construction of a Spatial Depopulation Risk Index using spatial Principal Component Analysis to ranking the municipalities of Castilla-La Mancha
- **Secondaries:**
 - To detect spatial dependence of depopulation in Castilla-La Mancha.
 - To calculate the range of the spatial dependence.
 - To include the spatial dependence in a depopulation risk index.
 - To rank the municipalities of Castilla-La Mancha in terms of risk depopulation in order to identify areas in which counter-measures can be applied.

Methods

Spatial dependence is checked with Moran's I:

$$I = \frac{N}{\sum_i \sum_j w_{ij}} \frac{\sum_i \sum_j w_{ij}(X_i - \bar{X})(X_j - \bar{X})}{\sum_i (X_i - \bar{X})^2}$$

Range of spatial dependence is extracted from the semivariogram, the heart of Geostatistics, which is a tool that catch the spatial dependence according to the distance (see Figure 2):

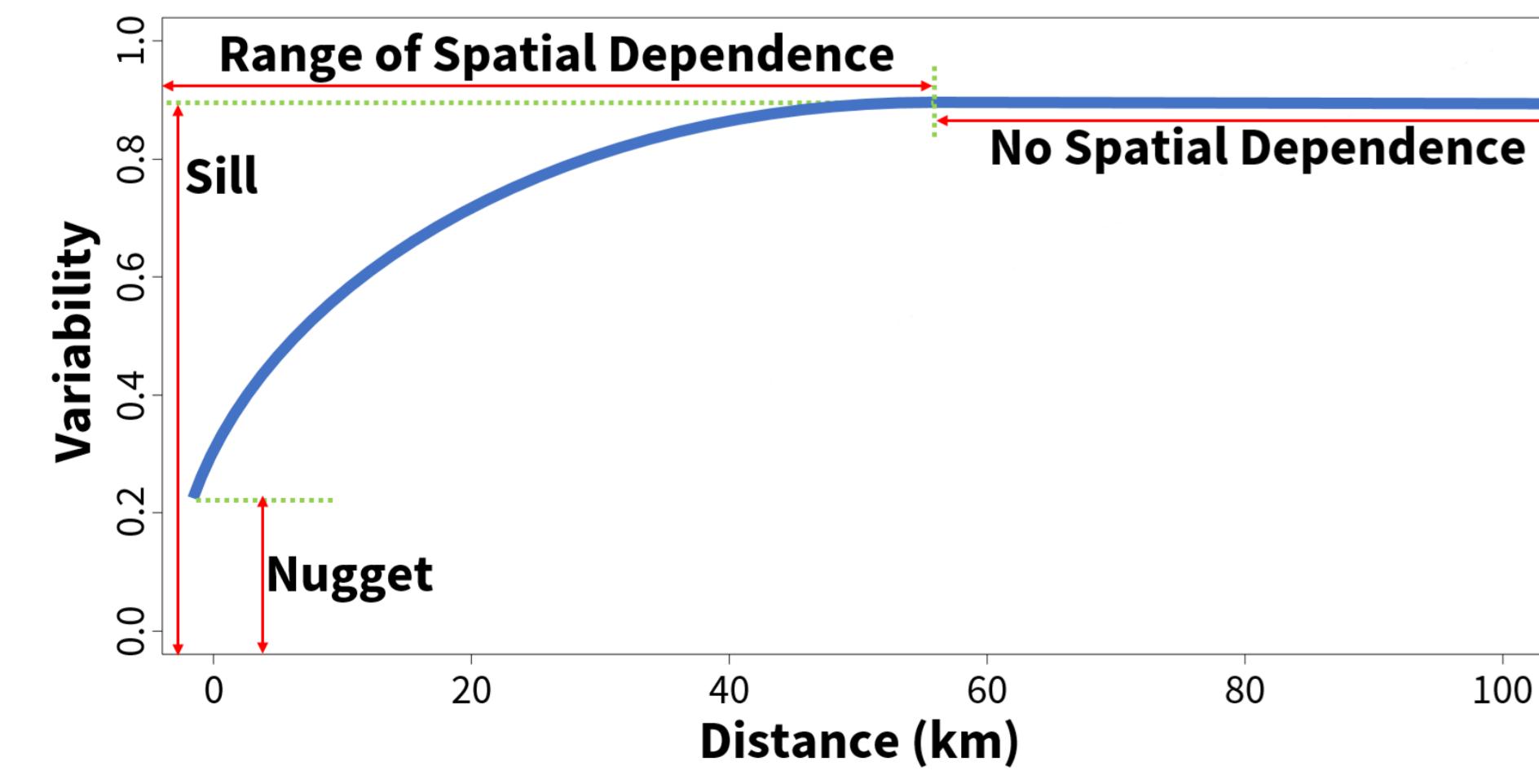


Figure 2: The semivariogram is the heart of Geostatistics

References

Jombart, T.; Devillard, S.; Dufour, A.-B.; Pontier, D. *Revealing cryptic spatial patterns in genetic variability by a new multivariate method*, Heredity, 101 (2008), 92-103.

