

No Social Capital without Biodiversity

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Introduction

- Biodiversity research is not integrated in research agenda or policies
- Causality is explored by using necessary condition analysis (NCA)
- Capabilities approach (on the right)

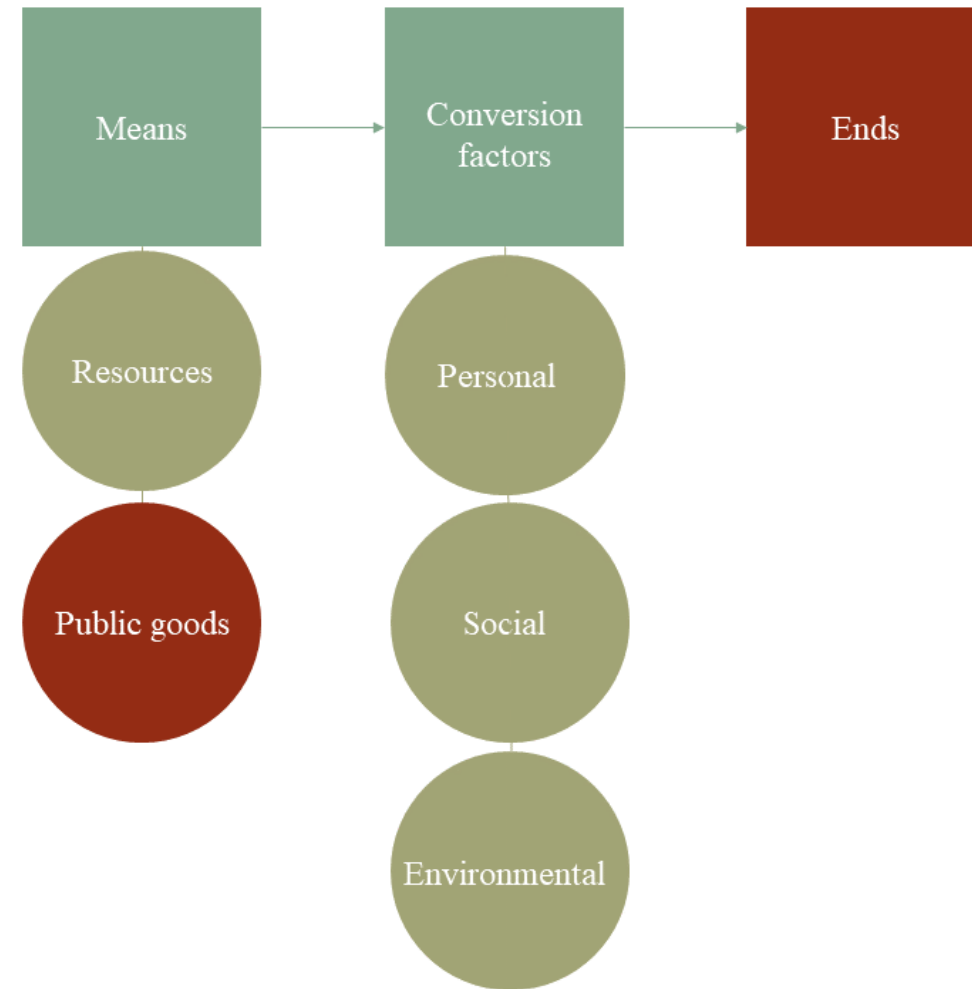
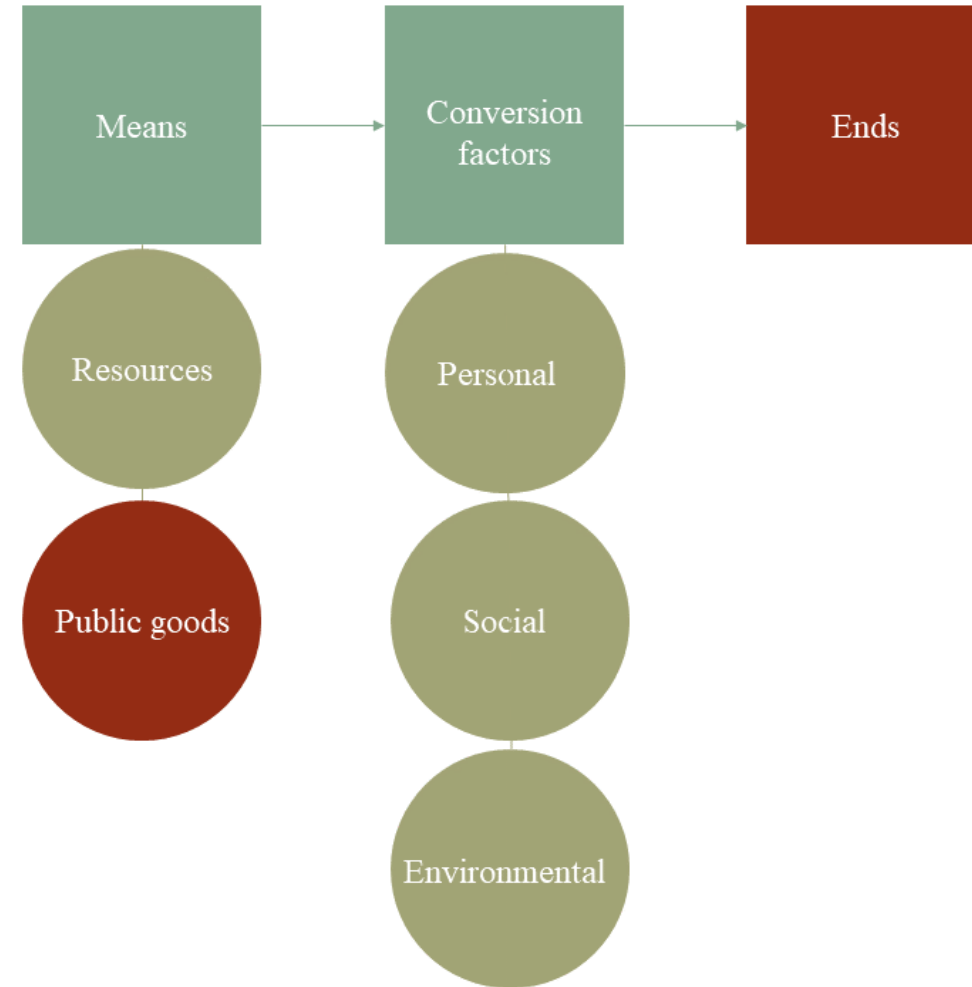


Figure 1. *Capability approach*

How does biodiversity impact economic
connectedness?

We bring novelty by:

- Linking biodiversity with social capital
- Exploring conjunctural causation of economic connectedness
- Undertaking city-level analysis on a national level



Data

Dataset name	Source	Variable/-s	Type	Spatiality	Temporality
Economic Connectedness	Opportunity Insights	EC; NBHD_EC; EC_GRP_MEM	Numerical	ZIP code	instant
Protected Areas Database (PAD-US) 3.0 Data ¹	U.S. Geological Survey (USGS) Gap Analysis Project (GAP)	BIOD; DIST	Geospatial	m ²	instant ¹
500Cities: City Boundaries	US Centers for Disease Control and Prevention	construction factor for BIOD; DIST	Geospatial	m ²	instant
US Major Cities	ArcGIS HUB	BIOD; DIST	Geospatial	m ²	instant
American Community Survey (ACS): Financial Characteristics	US Census Bureau (2021)	INC_SKEW; INC_MEAN INC_HH	Numerical	ZCTA5 ²	2011-2020
ACS: Age and Sex	US Census Bureau (2021)	POP, AGE_SIM	Numerical	ZCTA5 ²	2011-2020
ACS: Educational Attainment	US Census Bureau (2021)	EDU_SIM	Numerical	ZCTA5 ²	2011-2020
US Cities Database Basic	SimpleMaps	conversion factor (see Table A1)	Numerical	ZCTA5 ^{2, 3}	instant

Methodology

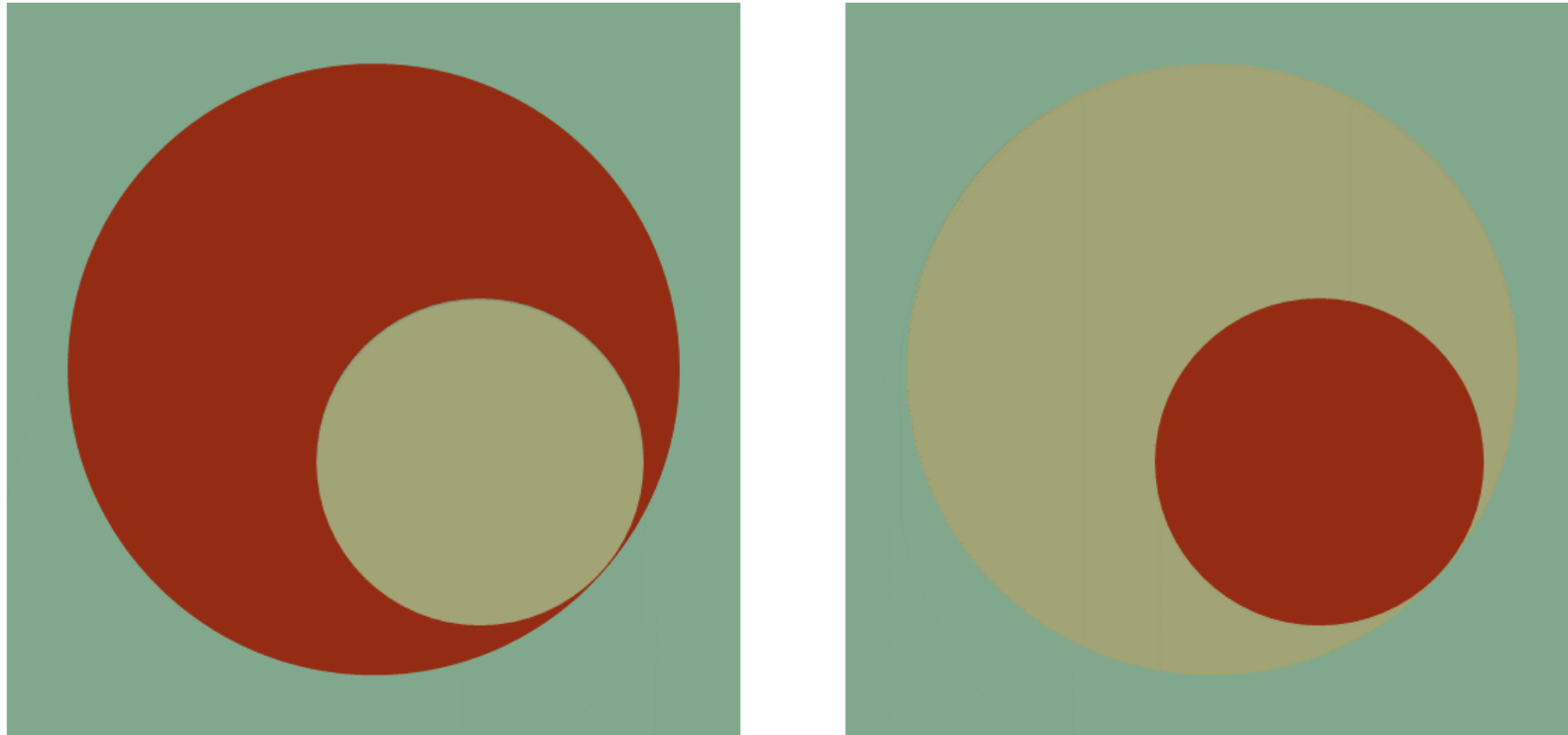


Figure 2. *Sufficiency (left) and necessity (right) conditions.*

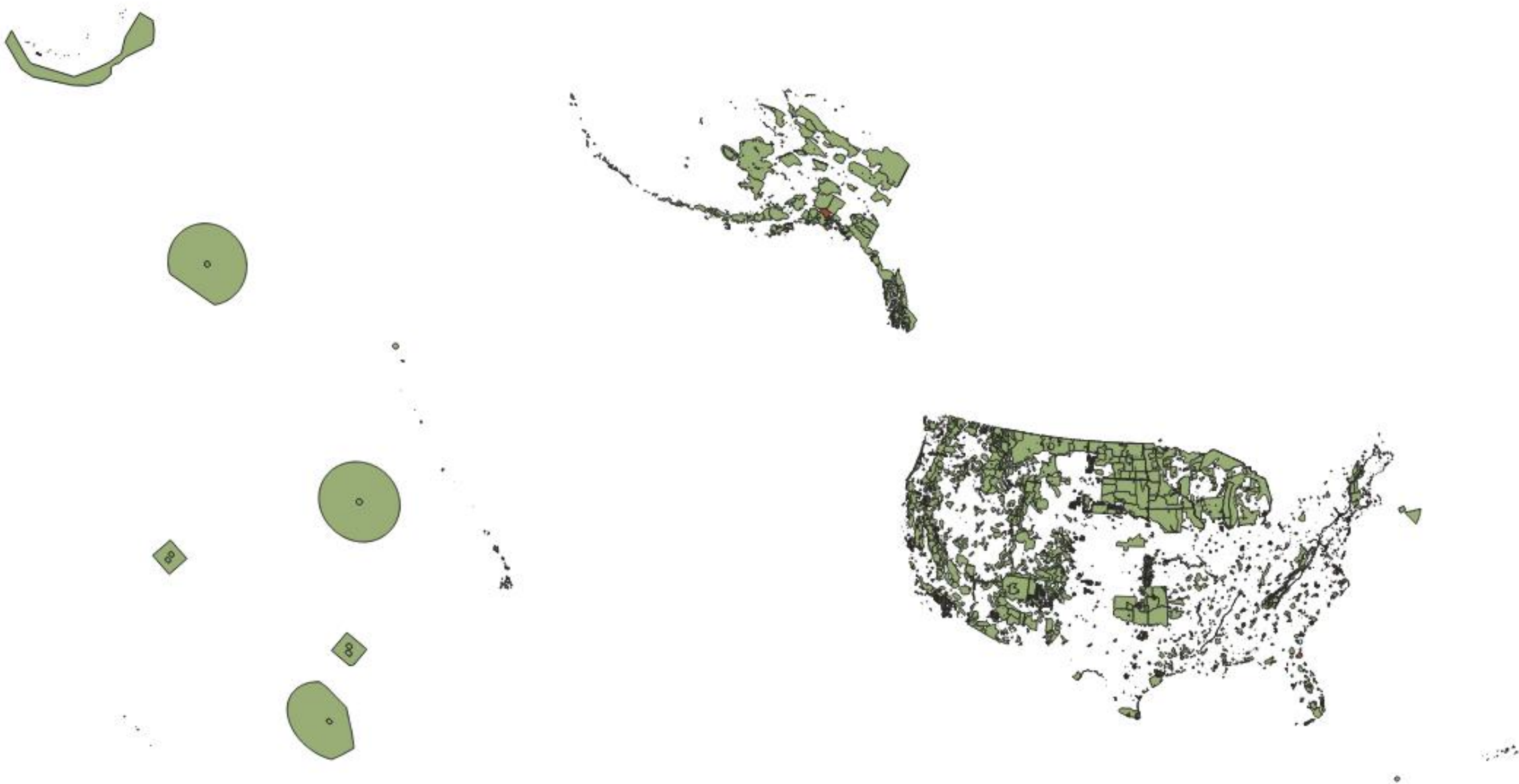


Figure 3. *Biodiversity (green) and city boundaries (red) in the US.*

We find that biodiversity is not sufficient,
but may be necessary for economic
connectedness.

There is a medium effect of biodiversity on economic connectedness within 25, 50 and 100 km radiuses of the nature reserves' area.

Table 2. Necessity of biodiversity for neighbourhood economic connectedness.

Win. 5	Biodiversity (win 5) for neighbourhood economic connectedness				
Biodiversity distance	10	25	50	75	100
Effect size		0.242	0.235		0.255
Accuracy		95.6	95.9		95.4
Fit		NA	NA		NA
Slope		0	0		0
Intrecept		1.315	1.32		1.32
Win. 10	Biodiversity (win 10) for neighbourhood economic connectedness				
Biodiversity distance	10	25	50	75	100
Effect size	0.262	0.250			0.247
Accuracy	95.3	95.6			95.4
Fit	NA	NA			NA
Slope	0	0			0
Intercept	1.287	1.315			1.287

Note: win signifies winsorising at the level of 10th or 5th percentile.

In case there is biodiversity, is there also social capital? Further, we test for sufficiency.

Why fsQCA?

- ability to find modes of causation when single conditions do not individually lead to outcome of interest, that is, to identify conjunctural causation
- entail equifinality (multiple different paths can lead to the same outcome)
- causal asymmetry (the same combination can explain outcome and non-outcome alike)
- we draw analysis on a relatively large dataset to explore the general pattern

Step by step: methodology

1. Calibration of conditions (we use three thresholds determined uniformly for all conditions by complete clustering and Euclidian distance)
2. We use a stable set of conditions throughout the analysis, as the conditions are located at the same level of capability framework

Table 3. *Intermediate solution for high (low) economic connectedness for BIOD-50km data with QCA (sufficiency analysis).*

Outcome		Economic connectedness			Non-economic connectedness					
Path		P1	P2		S1P1	S1P2		S2P1	S2P2	S2P3
BIOD		•	•		●			●	●	
DIST		●	●		⊗	⊗		⊗	⊗	⊗
INC_SKEW		●	●			⊗			⊗	⊗
INC_HH			•		●	●		●	●	●
EDU_SIM		•			•	•		•	•	•
AGE_SIM		•	⊗		•	•		•	•	•
POP		⊗	•			•		•		•
Consistency		0.877	0.914		0.921	0.893		0.928	0.930	0.893
Raw coverage		0.441	0.260		0.285	0.339		0.269	0.255	0.339
Unique coverage		0.186	0.005		0.045	0.099		0.029	0.015	0.099
Solution	Cons.	PRI	CovS		Cons.	PRI	CovS	Cons.	PRI	CovS
	0.877	0.720	0.446		0.887	0.687	0.383	0.887	0.687	0.383

Note 1: ● represents the core condition, • represents the peripheral (complementary) causal condition, and blank space represents the “no care” state for the condition. ⊗ represents negation of the core condition, and ⊗ represents negation of the peripheral condition.

Table 4. QCA (sufficiency analysis) solution paths for economic connectedness.

Outcome		Economic connectedness			Non-economic connectedness				
Paths		P1	P2		S1P1	S1P2	S2P1	S2P2	S2P3
Consistency > 0.8		✓	✓		✓	✓	✓	✓	✓
Consistency > 0.9		(✓)	✓		✓	✓	✓	✓	✓
Frq. 20, cons. >0.8		(✓)	(✓)				✓		✓
PRI > 0.7		(✓)					(✓)		

Note: ✓ denotes that the same solution paths occur. (✓) denotes that the solution is comparable, but 1 condition is added, removed or changed compared to the initial analysis.

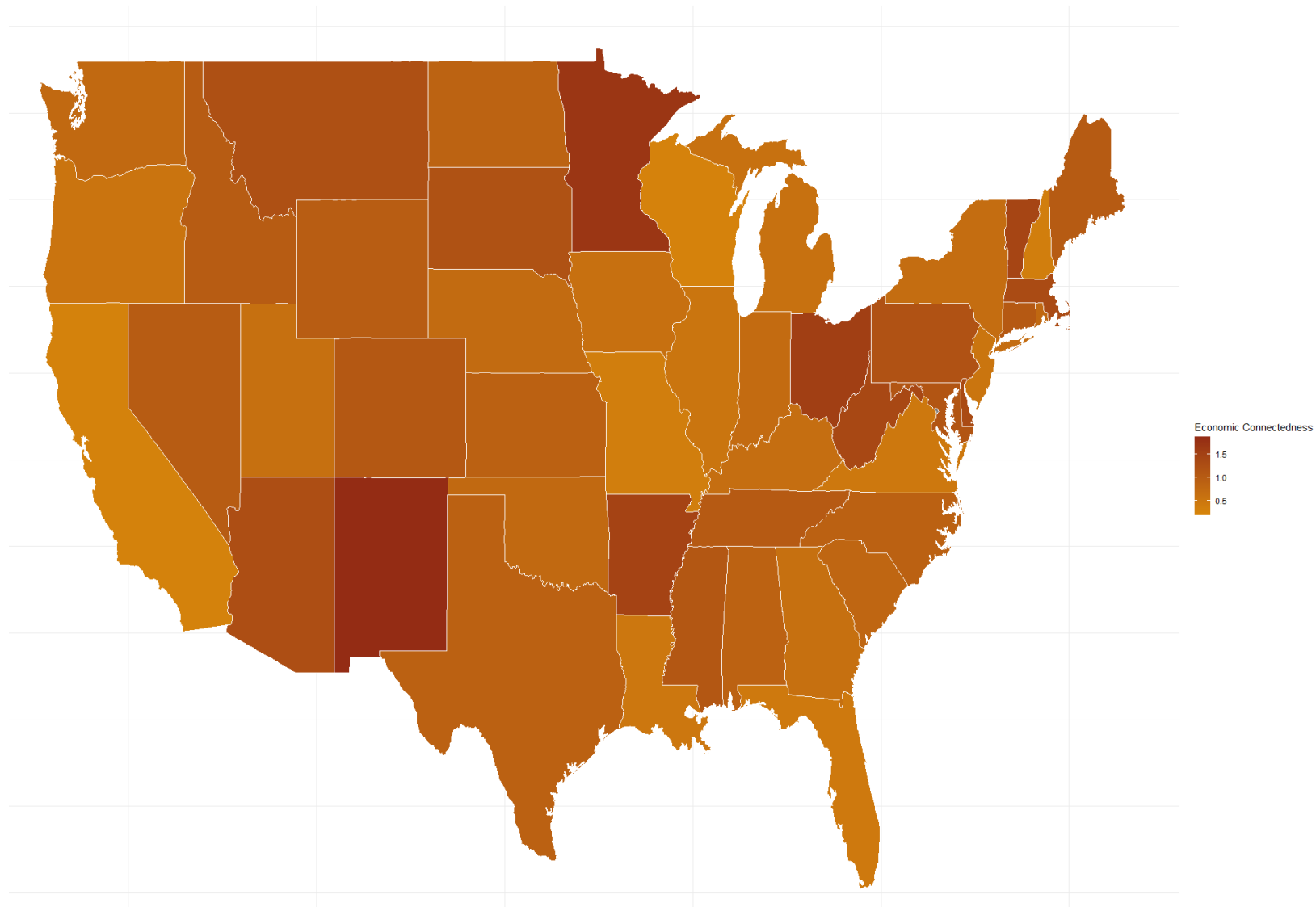


Figure 4. Economic connectedness within neighbourhoods in states of the US.

We find that biodiversity is seldom sufficient (by the QCA method), but quite often necessary (by the NCA method) to guarantee the social capital accumulation within the neighbourhood.

Thank you for your attention.

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