#SomosUNAL

Multicriteria Spatial Analysis: Ideal areas for living in Cundinamarca

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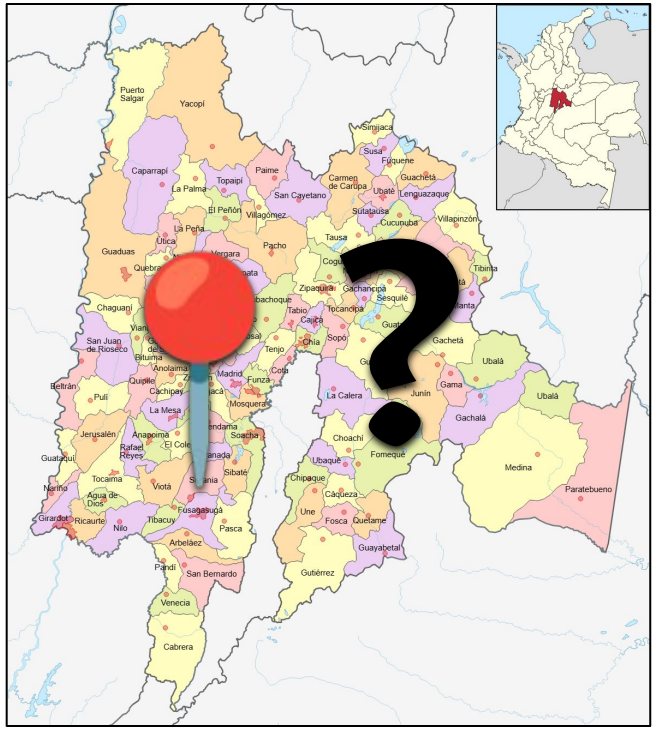
Objective

To identify the most suitable areas for living in Cundinamarca through a spatial multi-criteria analysis (SMCA), integrating environmental factors, infrastructure and regulatory restrictions



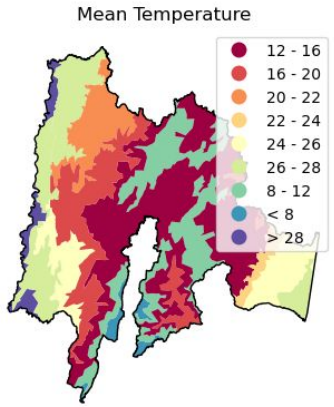
Data

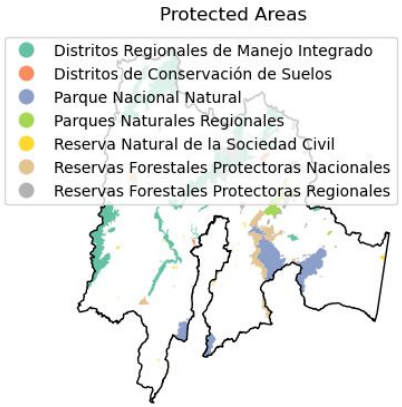
Vector and raster layers are used to represent

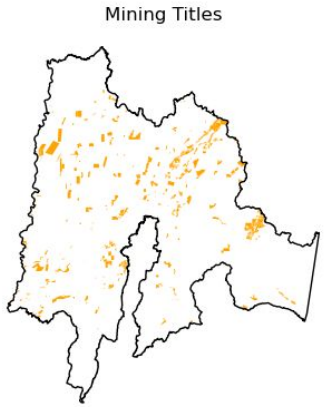
Physical conditions		Infrastructure and services		Legal restrictions	
Slope	-	Aqueduct and sewerage coverage	+	Protected areas (RUNAP)	x
		Road network	+	Mining titles	x
Mean temperature	-	Populated centers	+	Indigenous reserves	x
Land cover (natural areas)	+	Municipal categories	+	Land cover (water bodies)	x

All data are reprojected and cropped to the Cundinamarca area to ensure spatial consistency

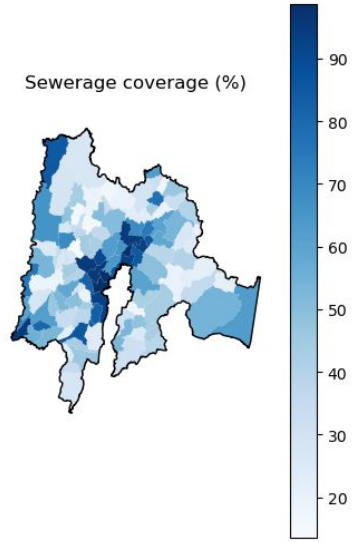
Data

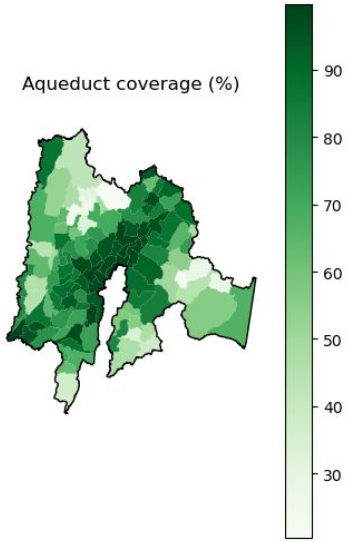

Mean Temperature
12 - 16
16 - 20
20 - 22
22 - 24
24 - 26
26 - 28
8 - 12
< 8
> 28

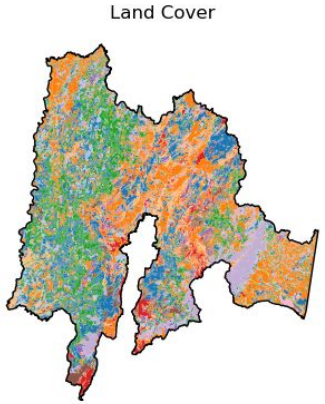

Protected Areas
Distritos Regionales de Manejo Integrado
Distritos de Conservación de Suelos
Parque Nacional Natural
Parques Naturales Regionales
Reserva Natural de la Sociedad Civil
Reservas Forestales Protectoras Nacionales
Reservas Forestales Protectoras Regionales

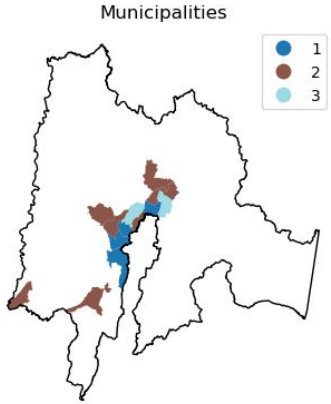

Mining Titles


Indigenous Reserves

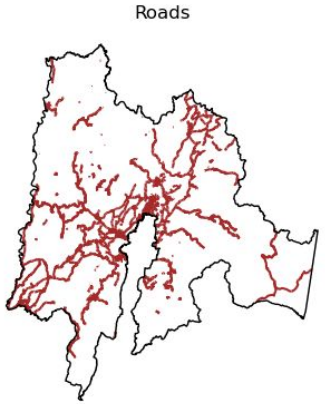

Sewerage coverage (%)
90
80
70
60
50
40
30
20


Aqueduct coverage (%)
90
80
70
60
50
40
30


Land Cover


Municipalities
1
2
3


Populated Centers


Roads

Scenarios

1 Equal importance

Slope: 0.143
Roads: 0.143
Pop. center: 0.143
Natural areas: 0.143
Aqueduct: 0.143
Sewerage: 0.143
Climate: 0.143

2 Accessibility priority

Slope: 0.10
Roads: 0.25
Pop. center: 0.25
Natural areas: 0.10
Aqueduct: 0.10
Sewerage: 0.10
Climate: 0.10

3 Services priority

Slope: 0.10
Roads: 0.10
Pop. center: 0.14
Natural areas: 0.10
Aqueduct: 0.23
Sewerage: 0.23
Climate: 0.10

4 Nature areas priority

Slope: 0.10
Roads: 0.05
Pop. center: 0.05
Natural areas: 0.40
Aqueduct: 0.10
Sewerage: 0.10
Climate: 0.20

Methodology

1. Data Processing

- Vector: Filter and clip according to relevant criteria
- Rasterization: Vector layers are converted to raster aligned to the reference DEM

2. Factor calculations

- Euclidean distance layers to roads, population centers and natural areas are generated
- All factors are normalized to a common scale (0-10)

3. Constraints

- Combined mask created to exclude unsuitable areas

4. Multicriteria analysis

- Weight matrices are defined for different scenarios
- Suitability is calculated as a weighted combination of the normalized factors
- Restrictions are applied, excluding unsuitable areas

Results

- Maps of categorised suitability based on each scenario

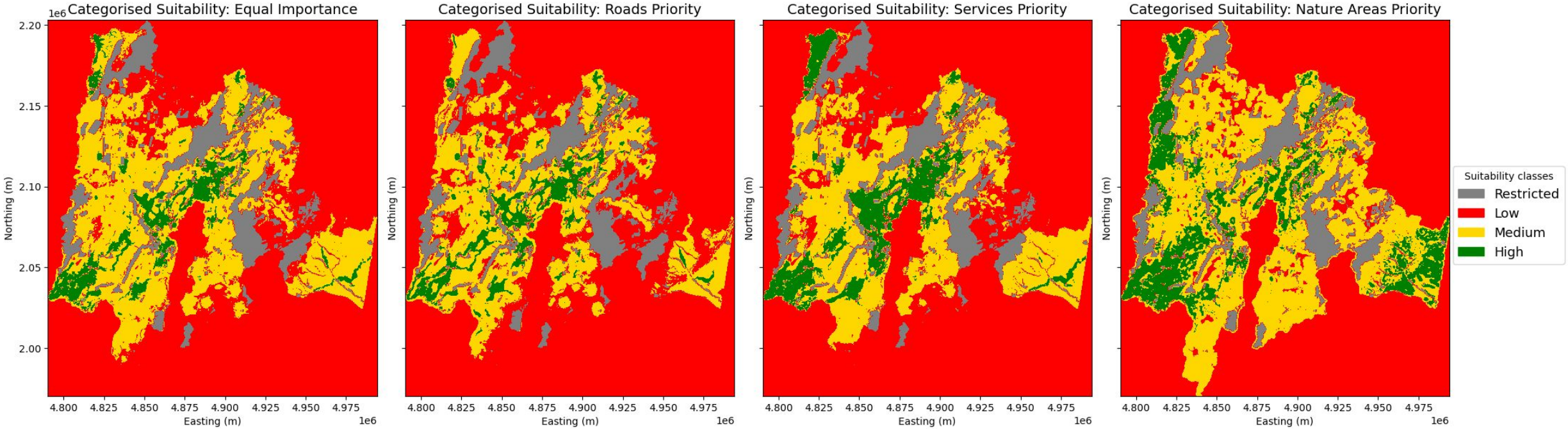
Results

1

2

3

4



- The most suitable zones are concentrated in flat areas, close to infrastructure and services, mainly in the center and west of Cundinamarca.
- Legal and environmental restrictions exclude large areas, especially in mountainous and protected areas.

Conclusions

The results demonstrate how varying the weight of decision criteria leads to different spatial patterns of suitability within Cundinamarca. This region, known for its diverse topography and mix of rural and urban zones, presents a complex landscape where the definition of "suitable" depends strongly on the priorities of a person for living in a determined area.

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Thanks

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