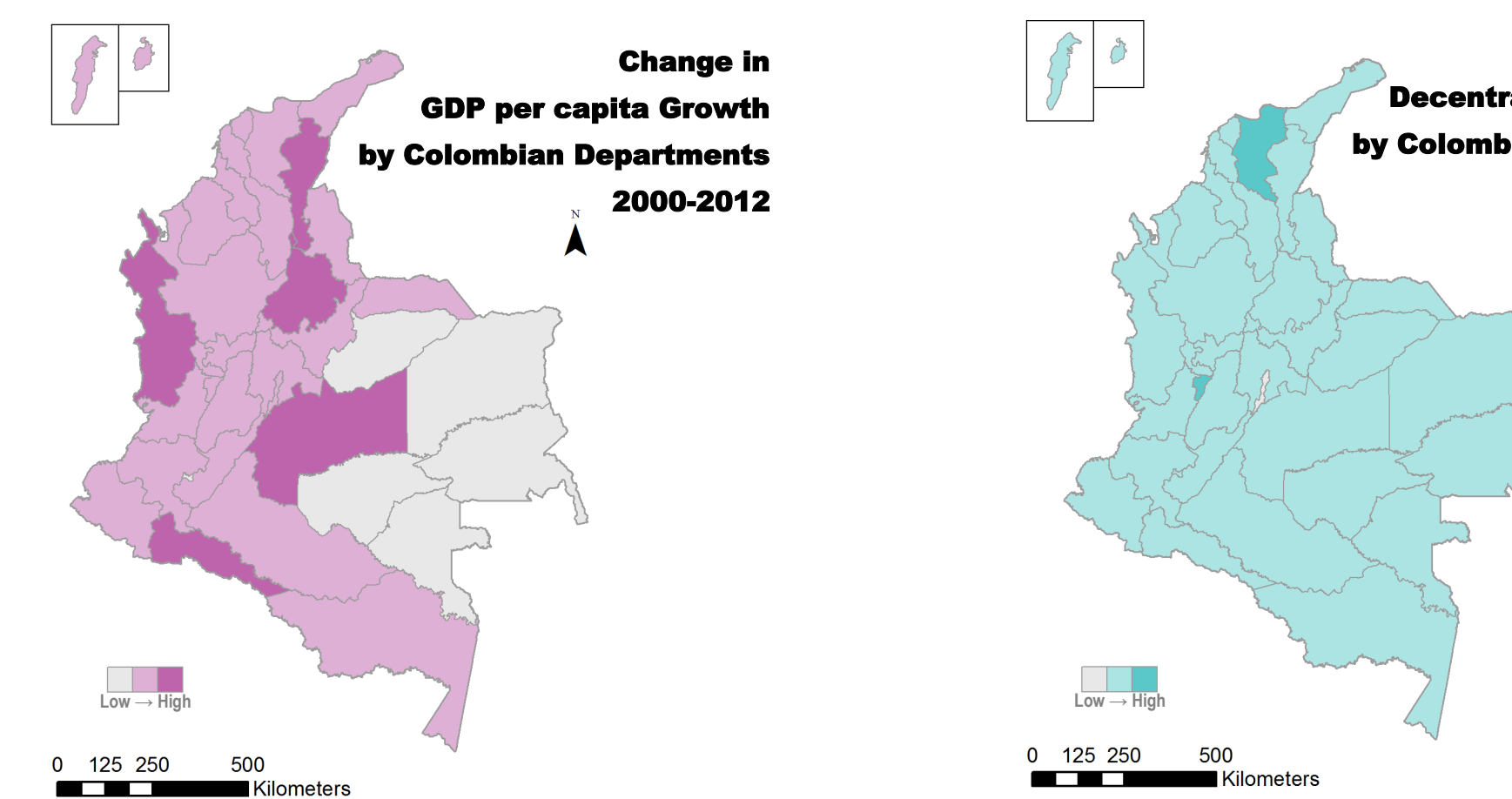
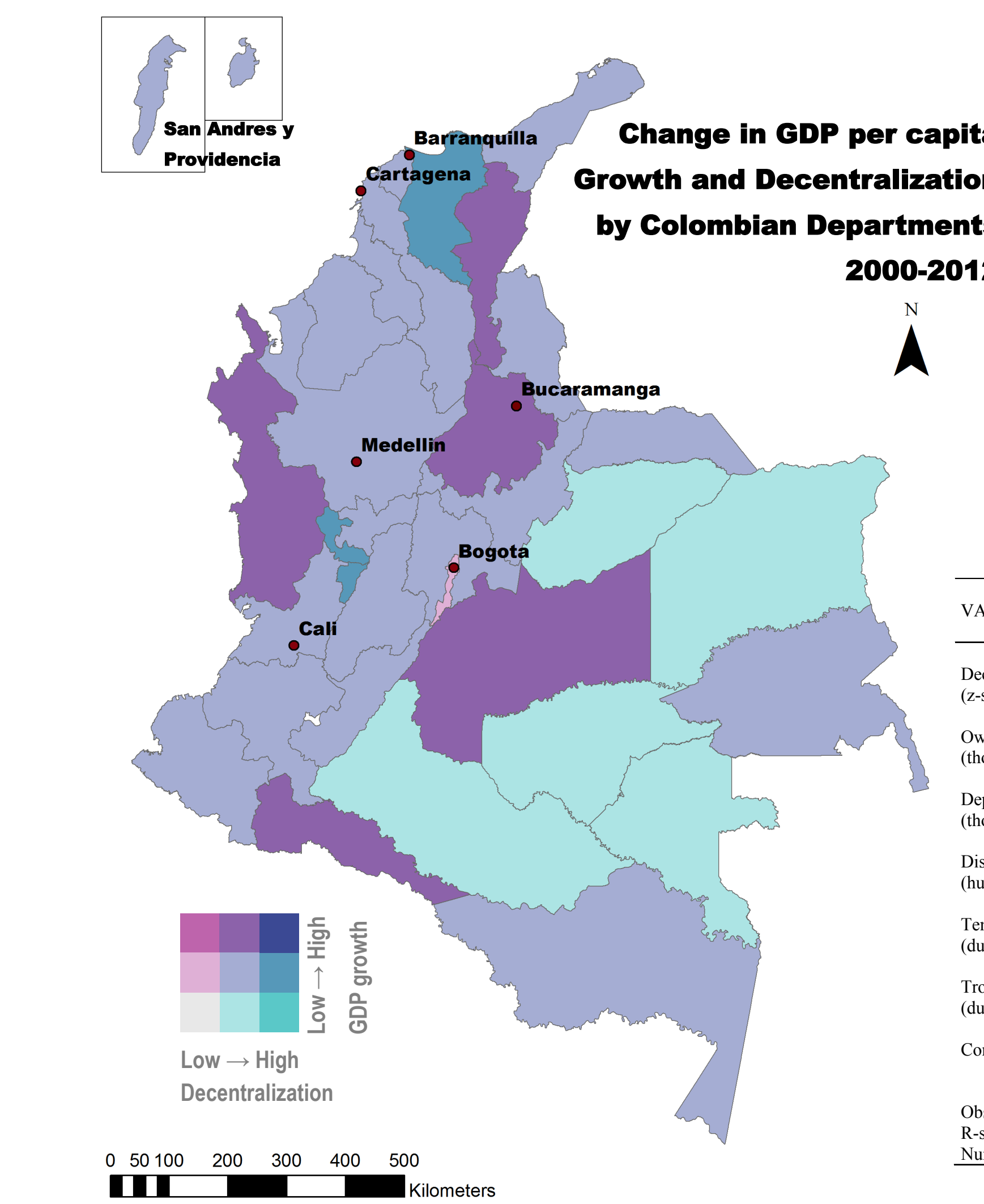


# Linking Decentralization and Economic Development in Colombia

## Introduction

Linking decentralization and economic development was the common assumption that motivated the push for decentralization as a policy recommendation during the last decade of the 20<sup>th</sup> century. However, there is little empirical evidence that supports this assumption. The objective of the project was to understand whether the link between decentralization and development is conditional upon underlying economic, political, or geographical characteristics of Colombian subnational governments.

There are two questions that the project intends to answer. The first is if the growth of GDP for Colombian Departments between years 2000 and 2012, corresponds to a growth in the level of decentralization for the same years. The second is if the level of decentralization of municipalities matches their capacity to have high economic development. Answering these questions will provide some insights on the relationship between decentralization and economic development in Colombia.

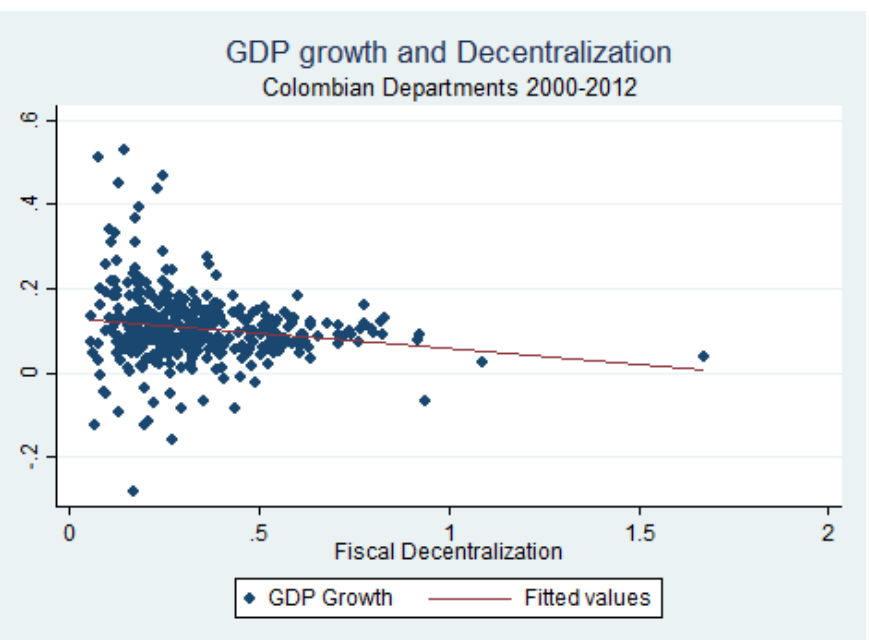


## Methods

The main variable of interest of the project is decentralization, defined as the devolution of authority (over administrative, political, or fiscal issues), from the central to the subnational levels of government. Decentralization is measured using levels of fiscal autonomy as a proxy, which is a technique that has been used by various authors and institutions such as the OECD (2013).

To answer the first question the project focuses on the level of change of Department GDP and Decentralization between 2000 and 2012. After elaborating the relevant maps for the two variables, new maps were created to depict the change in the variables, identifying departments that had high, medium, or low level of positive change. Once the change process for each of the variables is understood it is possible to create a bivariate choropleth map (Stevens, 2015) that compares the two variables.

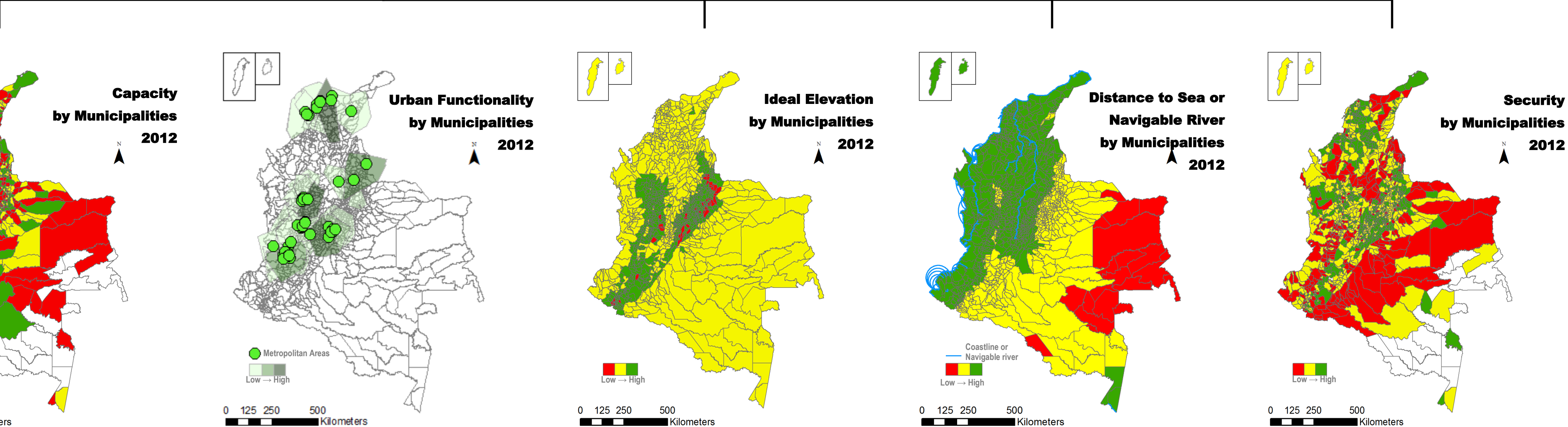
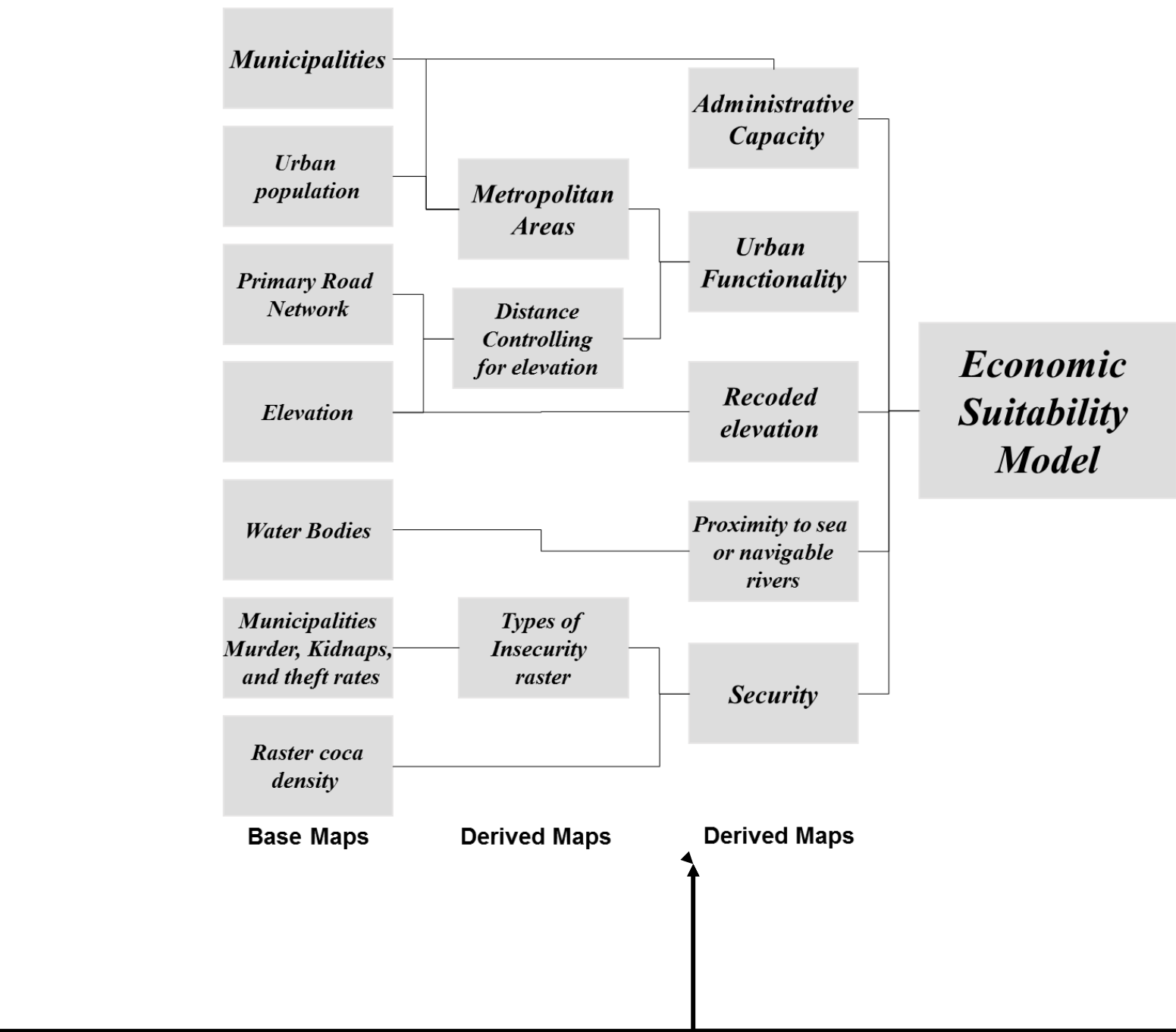
To see if the spatial information depicted was consistent with statistical analyses, two econometric models were run: one using OLS estimations and the other using Fixed Effects for the same panel data. Given the multiple variables that should be controlled for were not available Fixed Effects is used under the expectation of reducing the omitted variable bias. Some control variables were included but a more robust statistical analysis is required before we draw further conclusions on the effect of decentralization. Nevertheless, after these initial analysis we can foresee that higher levels of decentralization reform may be linked to lower levels of GDP growth in Colombia.



Regression analysis for the effect of decentralization on Colombian departments' GDP growth rate from 2000-2012			
VARIABLES	(1)	(2)	
	Model 1 OLS	Model 2 Fixed Effects	
Decentralization (z-scores)	-0.0159*** (0.00488)	-0.0247*** (0.00665)	
Own income <sup>†</sup> (thousands of millions of COP)	-25.29 (37.82)	-60.07 (48.53)	
Department GDP <sub>2000</sub> (thousands of millions of COP)	-0.726 (1.195)	-48.29*** (13.21)	
Distance to Sea or Navigable River (hundreds of km.)	-0.00744* (0.00423)		
Temperate <sup>†††</sup> (dummy variable)	0.0321 (0.0273)		
Tropical (dummy variable)	0.0120 (0.0104)		
Constant	0.105*** (0.00989)	0.310*** (0.0566)	
Observations	396	396	
R-squared	0.044	0.068	
Number of deptcode		33	

Measurements in parentheses in variable column  
Standard errors in parentheses in model columns  
\*\*\* p<0.01, \*\* p<0.05, \* p<0.1  
<sup>†</sup> No administrative capacity measurement available at state level, hence income generated by stated is being used as proxy.  
<sup>††</sup> No security index available for Department for the state period.  
<sup>†††</sup> Excluded category for variable is high mountain.  
<sup>††††</sup> Climate and distance to sea remain constant and drop out in fixed effects.

Given the preliminary results at the Department level the focus turns to the Municipal level. The

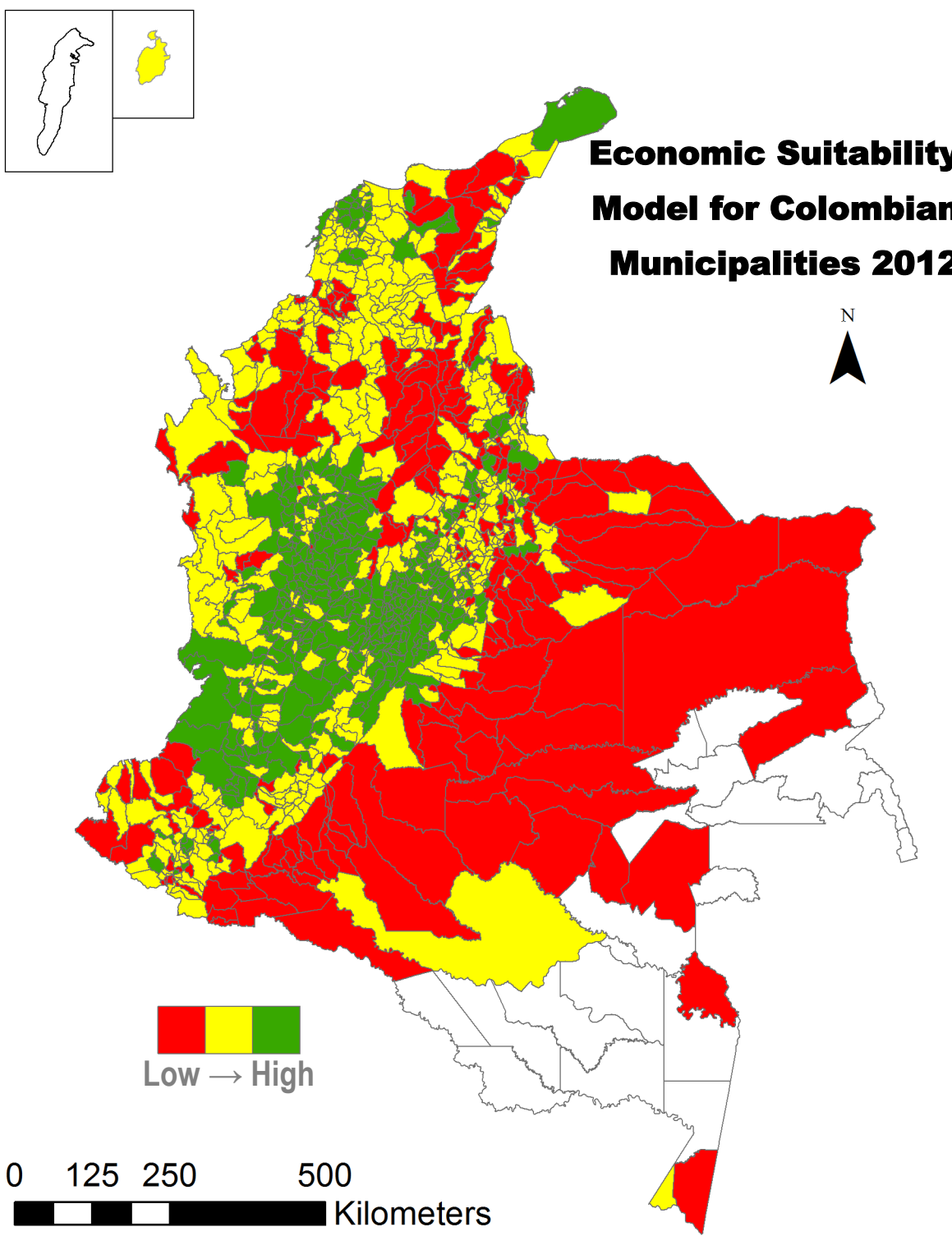


idea was generating a suitability model for economic development, by observing five dimensions. These five dimensions are administrative capacity, urban functionality, climate, distance to the sea or a navigable river, and security concerns. With information from DANE, DNP, IGAC, and the SRTM data and GIS tools it is possible to rank municipalities for each of the dimensions. For capacity and security the rank was done using DNP's categories. For Urban Functionality, network analysis that controlled for elevation was used, to measure proximity to Metropolitan areas. For elevation three categories were ranked being temperate (1000 MAMSL-3000 MAMSL) preferred over tropical (>1000 MAMSL) or high mountain climates (<3000 MAMSL), which implied reclassifying elevation rasters, and using zonal statistics to link elevation to the median level for each municipality. Finally for distance to sea proximity analysis was used to identify distance to coastlines or navigable rivers.

Once we have the suitability map it is possible to compare with decentralization levels. Once again bivariate choropleths are used to evaluate the link between the two variables.

## Conclusions:

From the analysis at the department level we see that there is a negative link between decentralization and GDP growth. From the analysis at the municipal level we see there is a mismatch between level of decentralization and suitability to generate economic growth. Many municipalities have high levels of decentralization, while having low capacities for economic development. On the other hand some of the municipalities with high capacity to generate economic development have low levels of decentralization. Understanding the mismatch between economic capacity and the levels of decentralization might help to understand why in Colombia there is a negative link between these two concepts, but evidently further research is needed before we reach a final conclusion on this issue.



## Municipalities per categories

38	20	45
77	158	196
142	269	183

Notes:  
\*For the municipal level no data is available for some administrative units, hence they are left blank in the capacity and security dimensions and in the economic suitability model and municipal choropleth map.  
\*\*Except stated differently, natural breaks was used to rank the dimensions in high or low scores.

Data Sources:  
• Colombian National Planning Department (DNP): data of capacity index, fiscal data to construct decentralization measures, security index.  
• Colombian National Statistics Department (DANE): data on GDP and population.  
• Instituto Geografico Agustin Codazzi (IGAC): polygons for Colombian municipalities and department, main roads data to run network analysis on urban functionality, main rivers data, shorelines data.  
• SRTM Elevation Data for ideal elevation analysis.

Map projections: GAUSS\_BTA\_MAGNA  
References:  
[1] OECD (2013), *Measuring Fiscal Decentralization: Concepts and policies*, OECD publishing  
[2] Stevens, Josh, *Bivariate Choropleth Maps: A How-to Guide*. Available at <http://www.joshuastevens.net/>