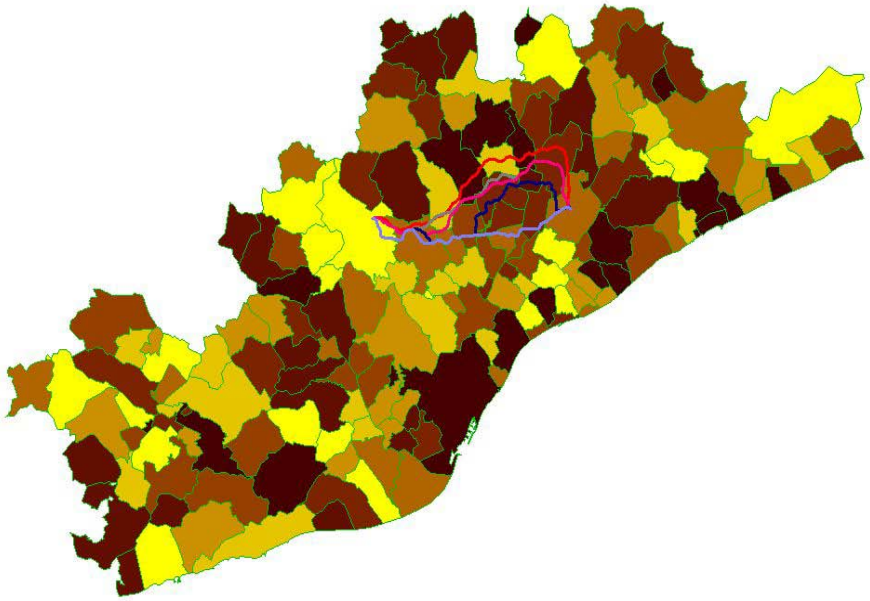

TERRITORIAL ANALYSIS BY MODELING TRAVEL
Case Study orbital motorway B 40 Barcelona

Civil Ing. M. Sc. **Mónica Suárez Pradilla**
Civil Ing. M Sc**. Jorge Cerda Troncoso**
PHD of Architecture. **Josep Roca Cladera**

Centre of Land Policy and Valuations, CPSV | Polytechnic University of Catalonia, UPC

OBJECTIVE

Present the methodology developed to determine a structure bounded to source modeling "**predicts proportions of arrival**" and is sensitive to change of the attractions of destinations and the changing role of friction, as well as it can be calibrated with observed matrix .

The analysis was performed using a gravity model that calculates the likelihood ratio target LTL ẇork of the municipalities of the metropolitan area of Barcelona and redirect routes based on changes in the cost matrix.

The project to analyze is the fourth ring road of Barcelona yet built.

This communication includes current situation and the four (4) paths listed in the Barcelona Metropolitan Territorial Plan (BMTP)

Work Methodology

1. Review topological road coverage Catalunya

2. Incorporation of alternative projects

3. Calculation of minimum distance matrices for the base situation and projects

4. Analysis of the results of the effect on distance

5. Calibration base gravity model with distance (without project)

6. Application of the model calibrated with the distance matrices according to the project

7. Analysis effect results in the proportion

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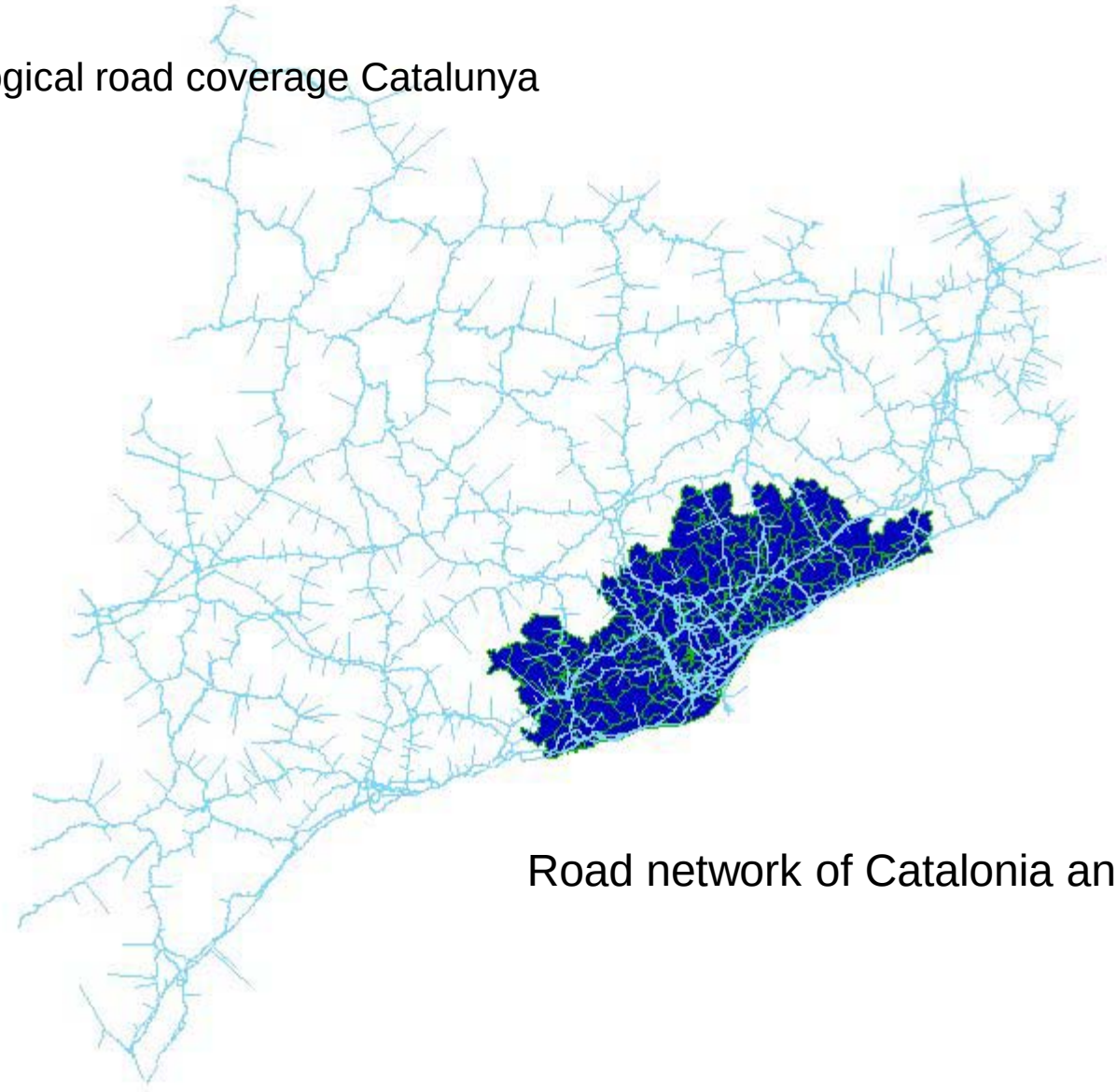
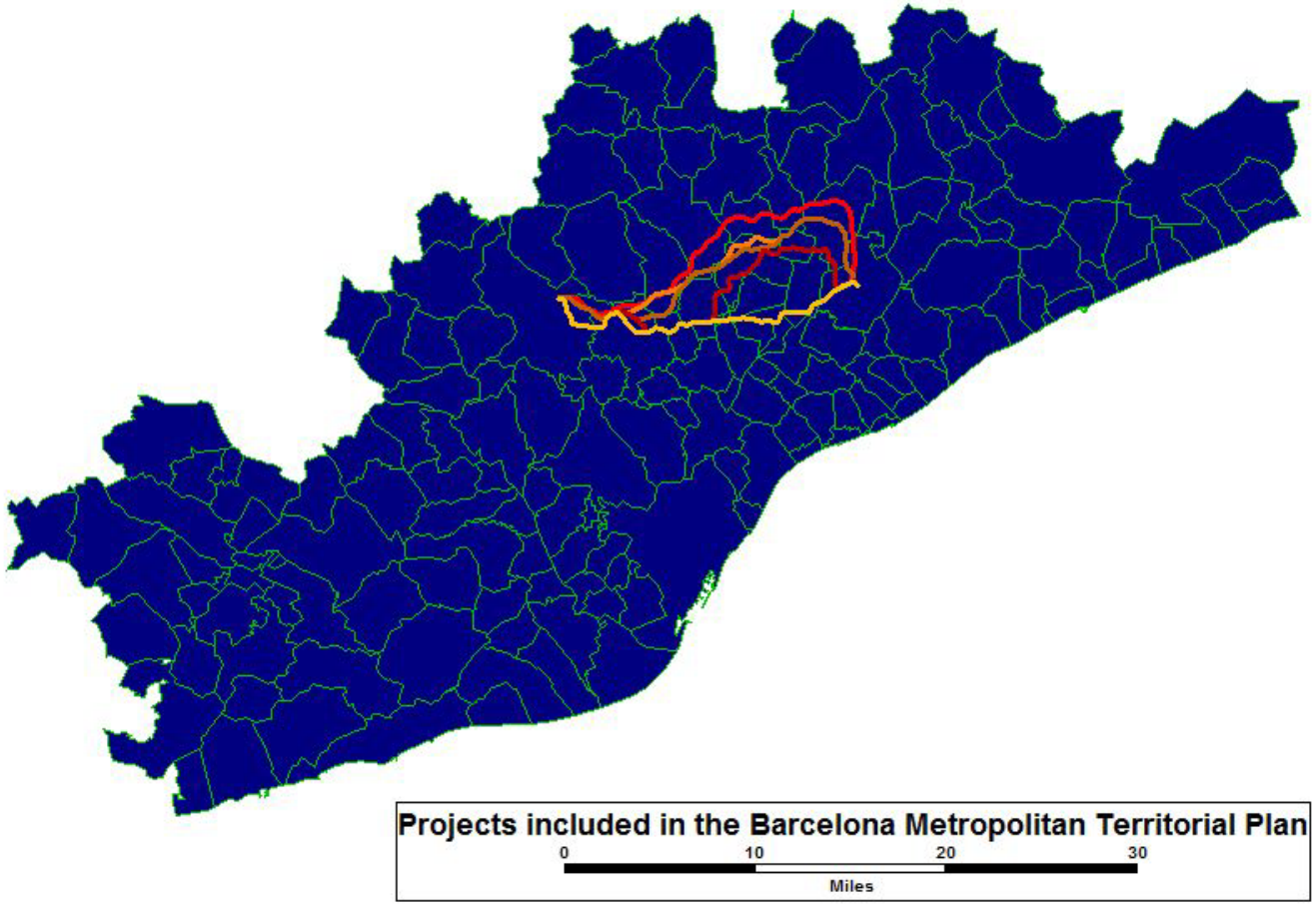
Application of the Methodology of work

1. Review topological road coverage Catalunya

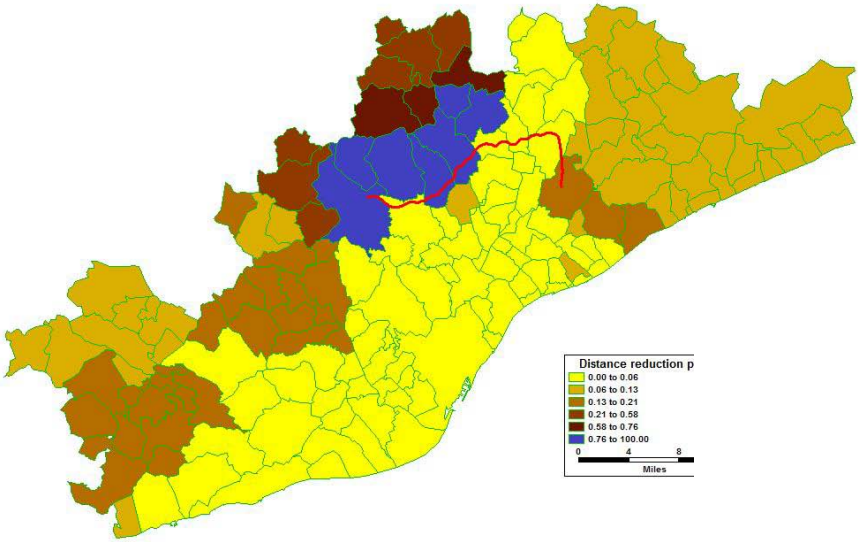


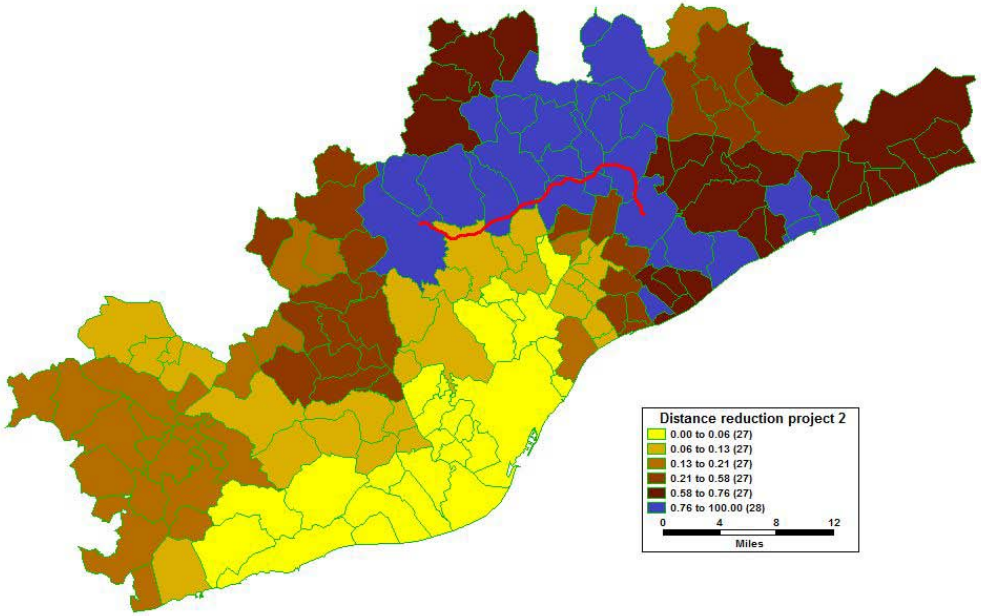
Road network of Catalonia and RMB

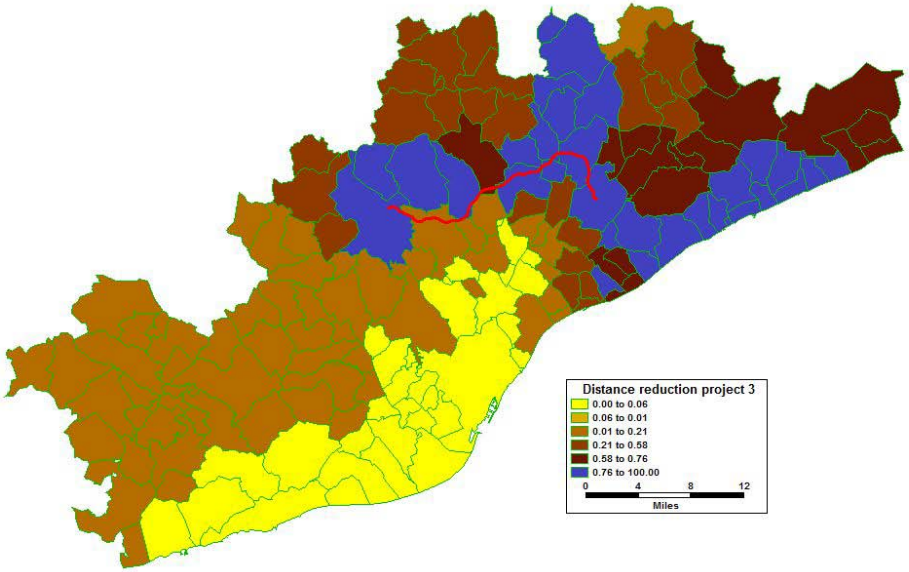
2. Incorporation of alternative projects

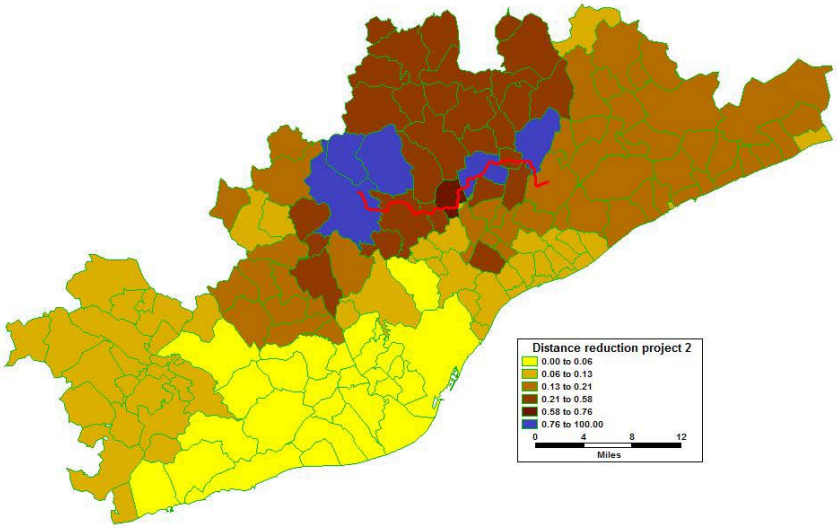


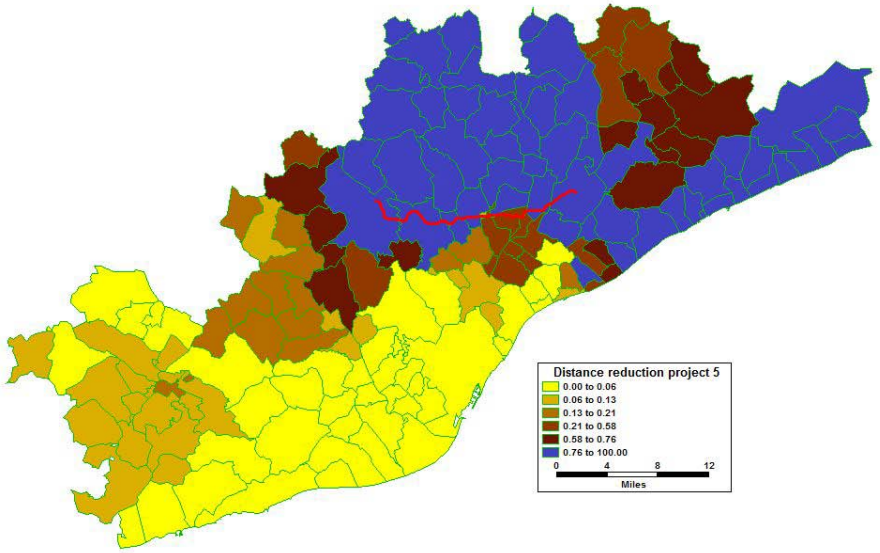
3-4 Results of the effect on distance






Distance reduction project 3
0.00 to 0.06
0.06 to 0.01
0.01 to 0.21
0.21 to 0.58
0.58 to 0.76
0.76 to 100.00
0 4 8 12
Miles


Distance reduction project 2
0.00 to 0.06
0.06 to 0.13
0.13 to 0.21
0.21 to 0.58
0.58 to 0.76
0.76 to 100.00
0 4 8 12
Miles


Distance reduction project 5
0.00 to 0.06
0.06 to 0.13
0.13 to 0.21
0.21 to 0.58
0.58 to 0.76
0.76 to 100.00
0 4 8 12
Miles

5. Calibration base gravity model with distance (without project)

The mathematical expression used to represent a double-bounded model is:

$$V_{ij} = A_i O_i B_j D_j \mathbf{e}^{-(\beta * d_{ij})}$$

V_{ij}	: Travel from i to j
O_i	: all trips departing from i
D_j	: all trips arriving at j
d_{ij}	: measure of separation between i and j
A_i, B_j	: balancing factors, which are calculated internally
β	: friction coefficient of the function **e**

This analysis uses a model that simply limited by the above expression reduces to

$$V_{ij} = O_i B_j \mathbf{e}^{-(\beta * d_{ij})}$$

It is from this expression that predict considering only a proportion of trips you can build an initial model that delivers results in the proportion of trips that leave an area and to reach all areas and

$$P_{ij} = \frac{V_{ij}}{O_i} = B_j e^{-(\beta * d_{ij})}$$

P_{ij} : proportion of trips out of reach i and j
B_j : attractiveness of zone j
d_{ij} : measure of separation between i and j
α_j : attraction coefficient j
β : coefficient of friction function space

Through this expression can calculate proportions and changes in the attractiveness variable or variable distance, but prevents the parameter to gauge the appeal (which makes for friction) also does not ensure that the sum of all proportions leaving a given area is 1.

The above expression can be transformed into a potential standard type that meets the gravitational structure and ensures that the sum of proportions for a given area is 1, in addition to calibrate the coefficient of friction function β (unique for all zones) and the different coefficients of attractiveness of the destination zone Bj referring to the weight of each destination

$$P_{ij} = \frac{B_j^{\alpha j} * e^{-(\beta * d_{ij})}}{\sum_k B_k^{\alpha k} * e^{-(\beta * dik)}}$$

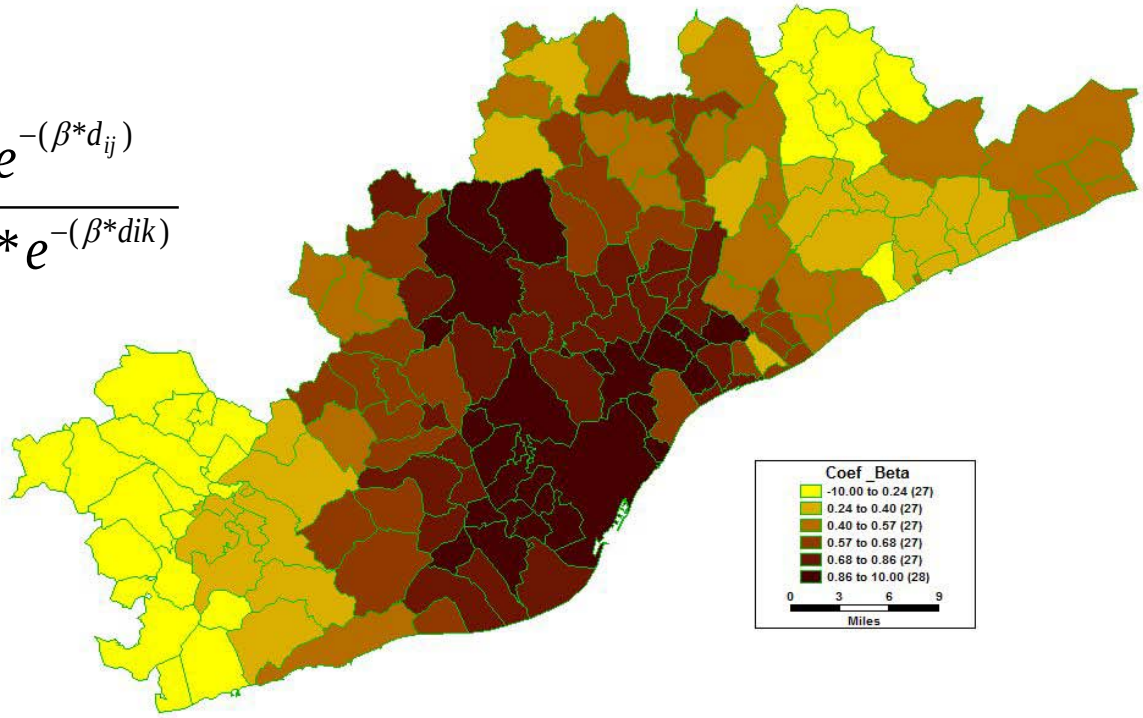
P_{ij} : proportion of trips out of reach i and j
B_j : attractiveness of zone j
d_{ij} : measure of separation between i and j
α_j : attraction coefficient j
β : coefficient of friction function space

This model was calibrated at the municipal level of the RMB using the forced mobility matrix Census 2001 (**POR-LTL**) and **adjusted by the method of least square**s. Attractive values are the total LTL and interaction costs are represented by a matrix of travel times obtained from the Metropolitan Transportation Authority (**AMT**) from **SIMCAT** model (transport modeling system of Catalonia)

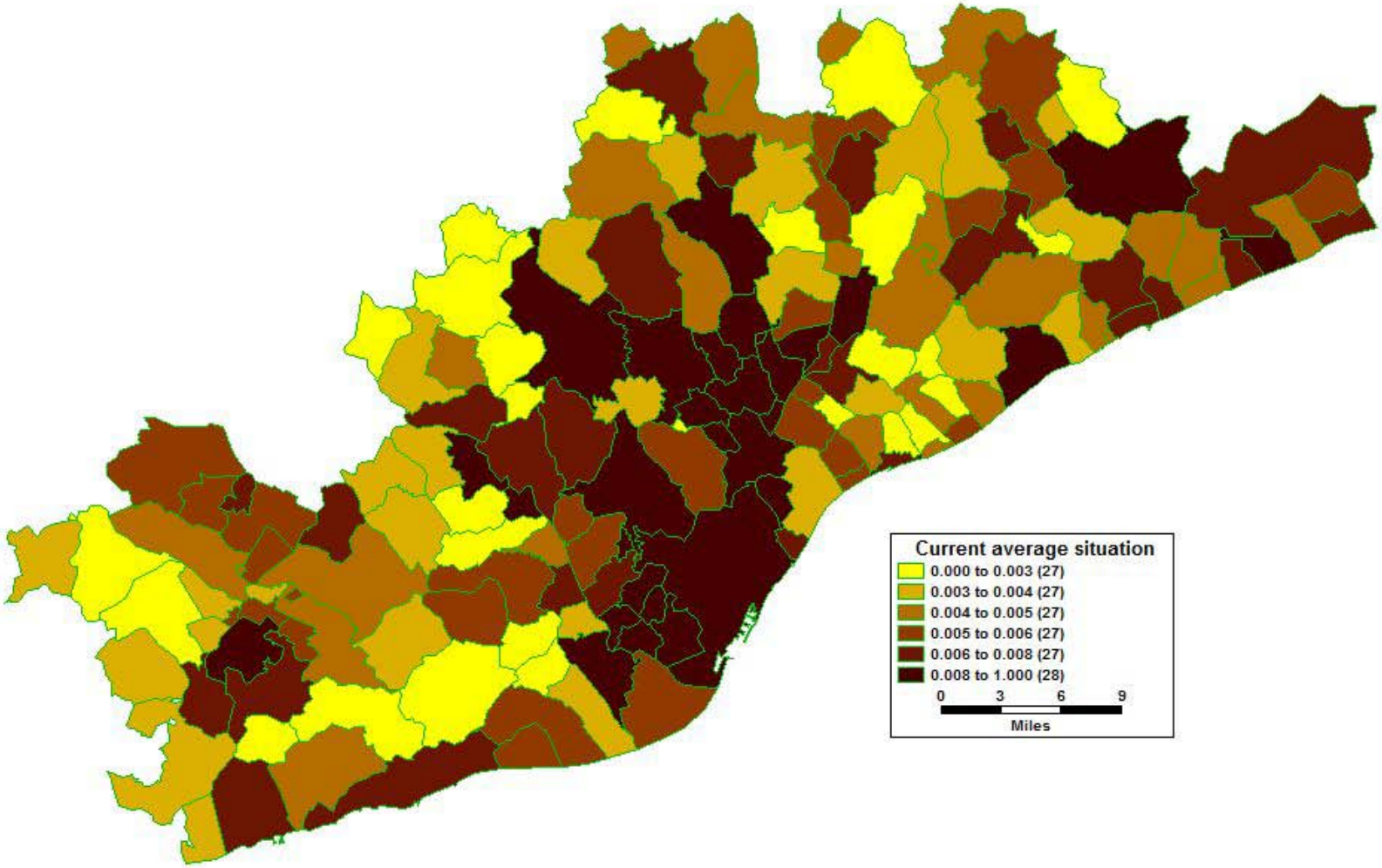
6. Application of the model calibrated with the distance matrices according to the project

Coefficient β= -0,465776285797172
Coefficient variation α

$$P_{ij} = \frac{B_j^{\alpha j} * e^{-(\beta * d_{ij})}}{\sum_k B_k^{\alpha k} * e^{-(\beta * dik)}}$$



7.- Results of the capture proportion of travel – current situation



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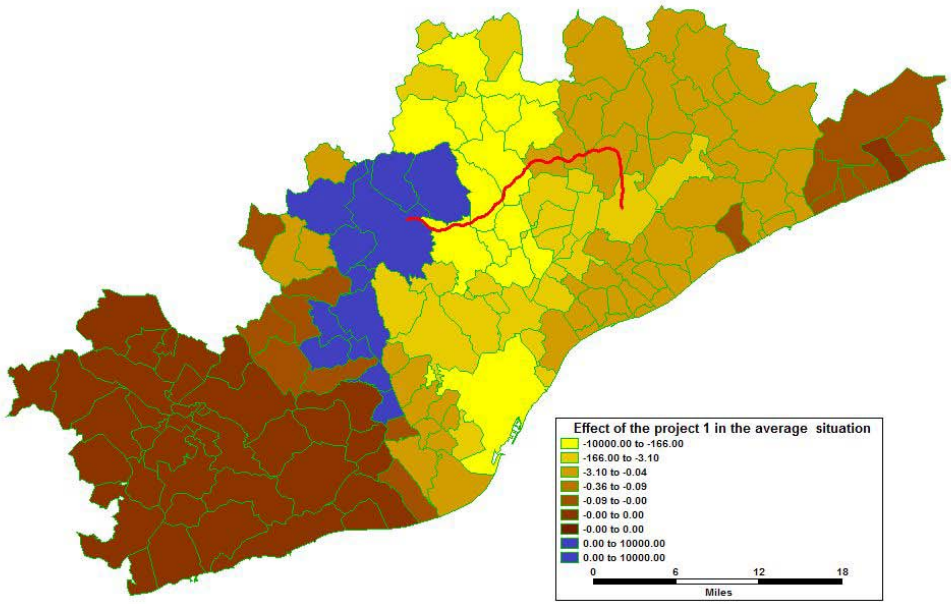
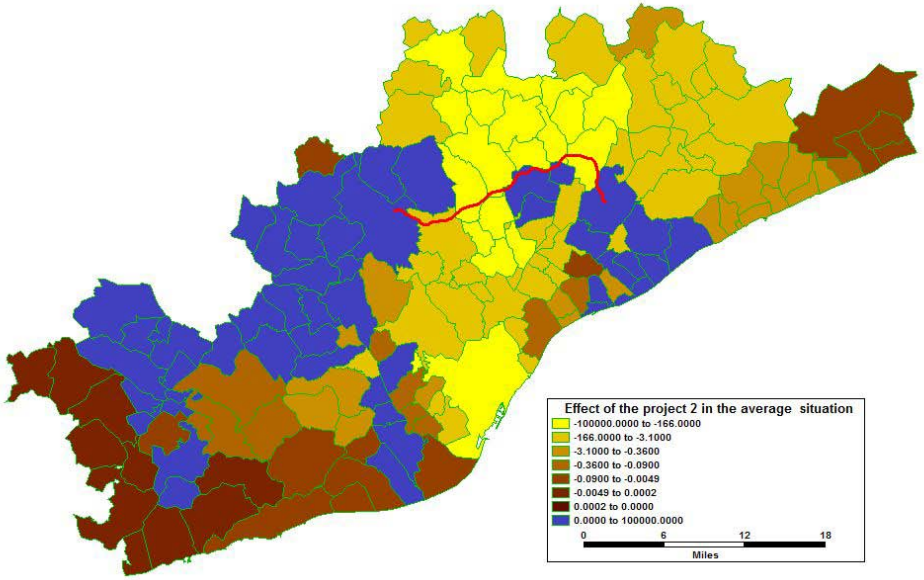
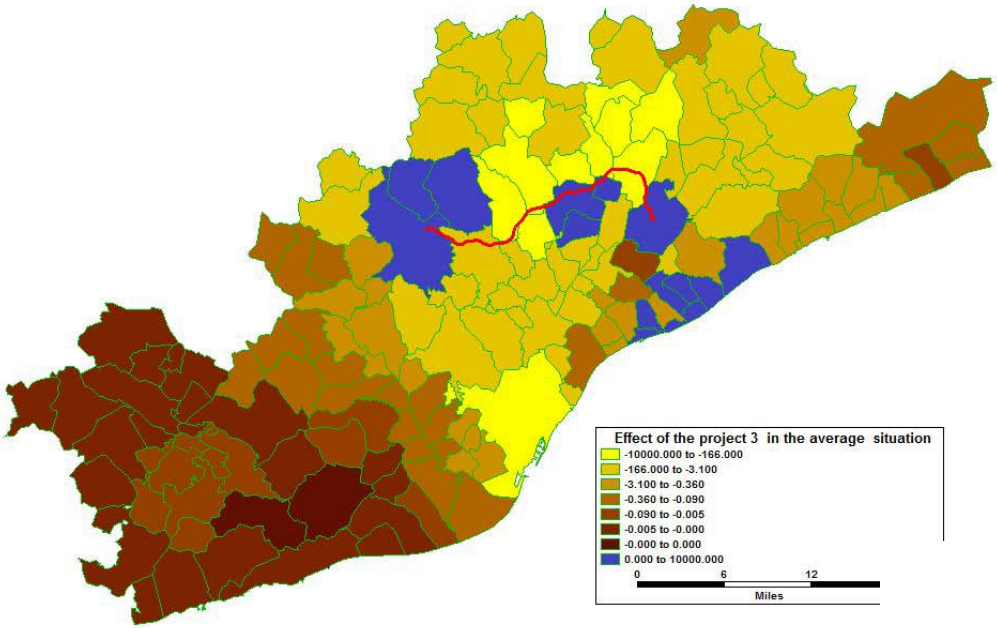
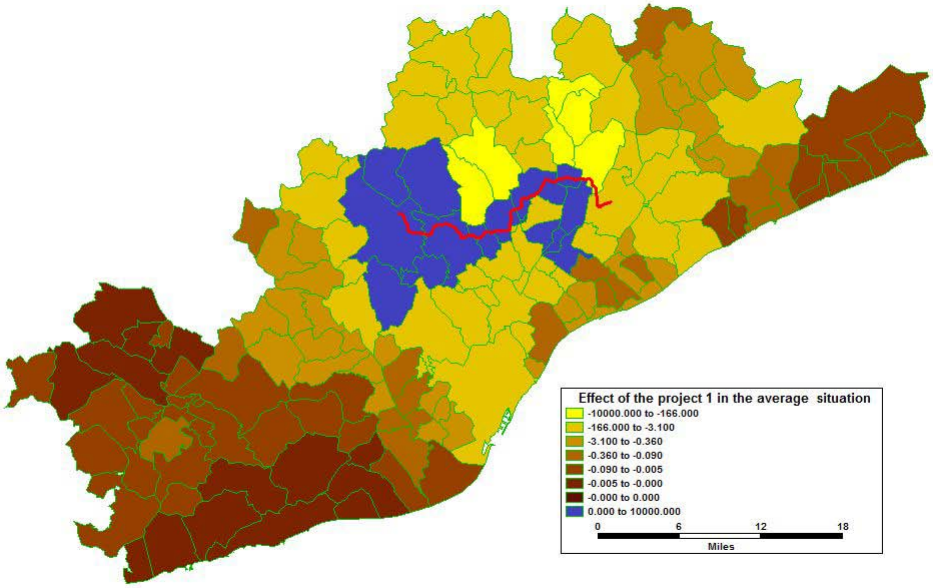
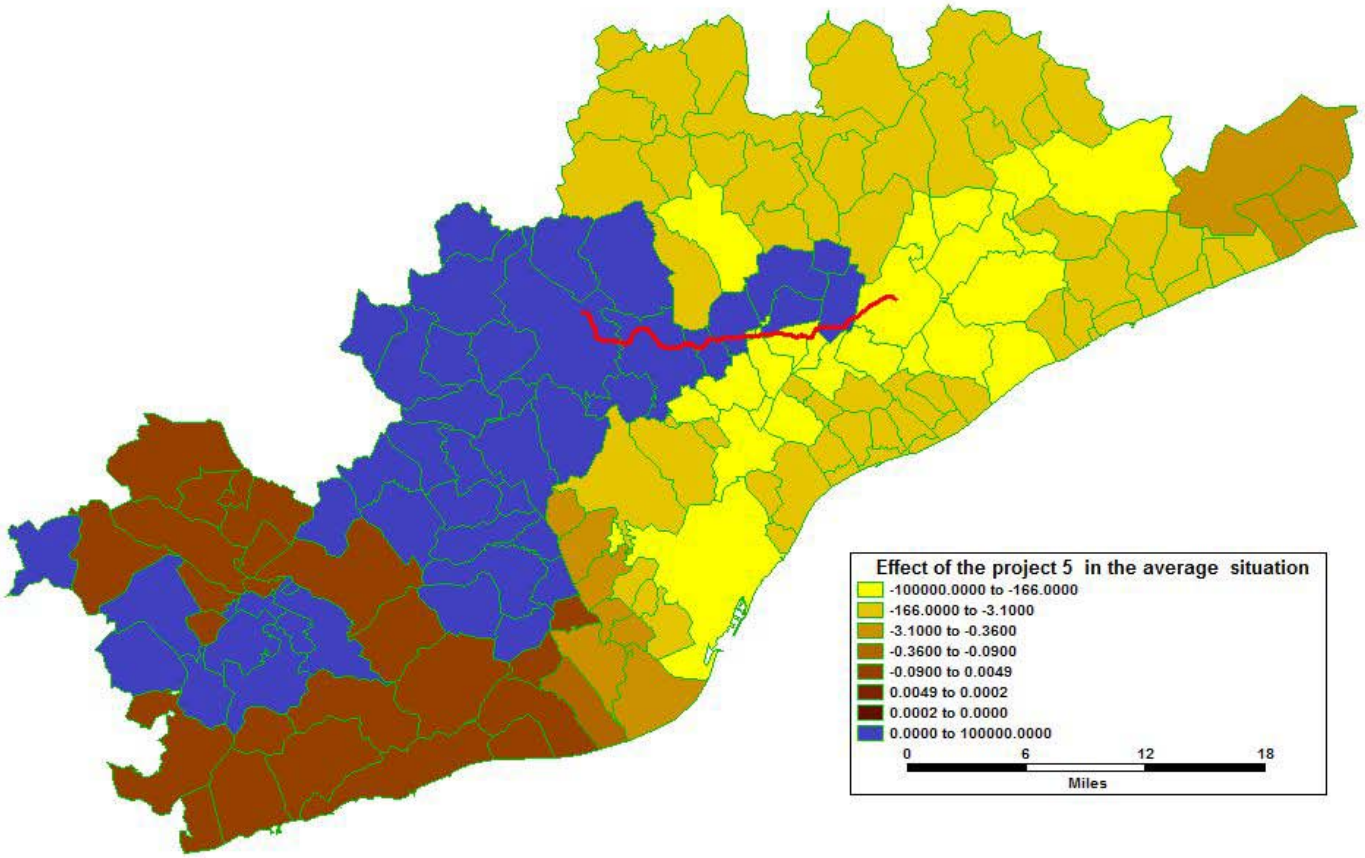
7. Results of the projects effect on the average capture situation





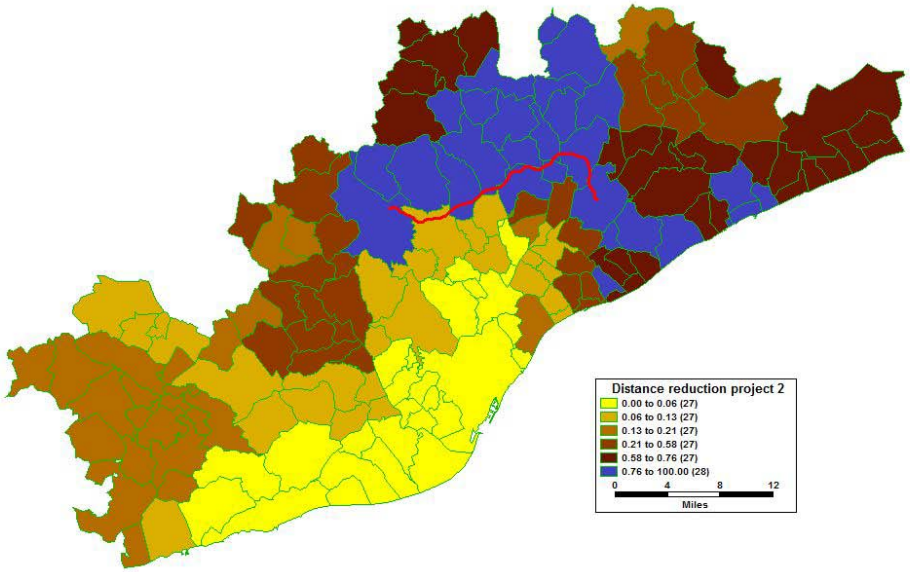

Effect of the project 3 in the average situation
-10000.000 to -166.000
-166.000 to -3.100
-3.100 to -0.360
-0.360 to -0.090
-0.090 to -0.005
-0.005 to -0.000
-0.000 to 0.000
0.000 to 10000.000
0
6
12
Miles

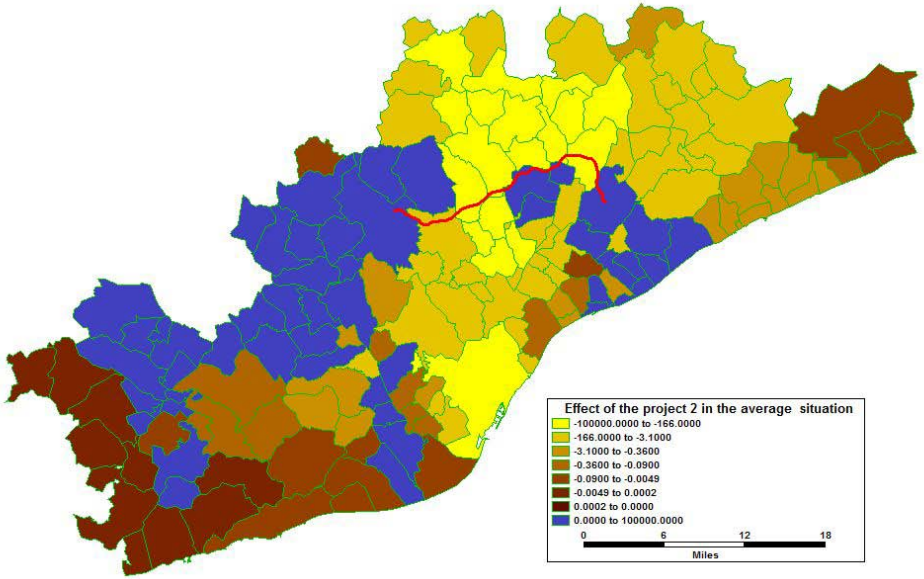

Effect of the project 1 in the average situation
-10000.000 to -166.000
-166.000 to -3.100
-3.100 to -0.360
-0.360 to -0.090
-0.090 to -0.005
-0.005 to -0.000
-0.000 to 0.000
0.000 to 10000.000
0
6
12
18
Miles


Effect of the project 5 in the average situation
-100000.0000 to -166.0000
-166.0000 to -3.1000
-3.1000 to -0.3600
-0.3600 to -0.0900
-0.0900 to 0.0049
0.0049 to 0.0002
0.0002 to 0.0000
0.0000 to 100000.0000
0
6
12
18
Miles

Conclusions

The results indicate that changes occur not only topological effects (network) are produced by mobility.





THANKS