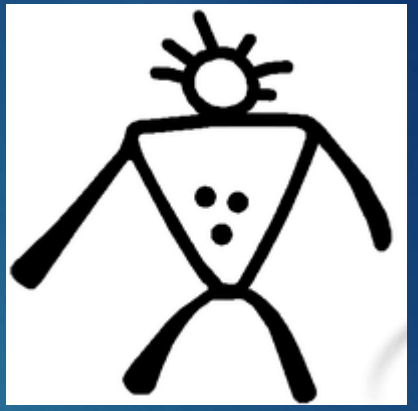
Universidad Nacional de Quilmes

SCGIS CONFERENCE 2021



Gradient of socio-environmental vulnerability in Quilmes Municipality, Argentina

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Introduction

- In order to generate adaptive capacity, that is, to be able to avoid losses and accelerate recovery after any climatic impact, it is essential, among other actions, to have territorial information.
- Detecting vulnerabilities in time, such as territorial fragmentations produced by socio-environmental inequality, can make a difference for efficient risk management.

Introduction

- For this reason, this work proposes an analysis based on a socio-environmental vulnerability index for the Quilmes municipality, Argentina, in order to obtain environmental metadata necessary for possible adaptation and resilience policies to climate change.
- The socio-environmental vulnerability index tries to be inclusive because it includes educational and demographic dimensions, homes conditions, houses infrastructure, equipment, services and poverty, that constitute traits of the person himself and of his closest environment.

Study area

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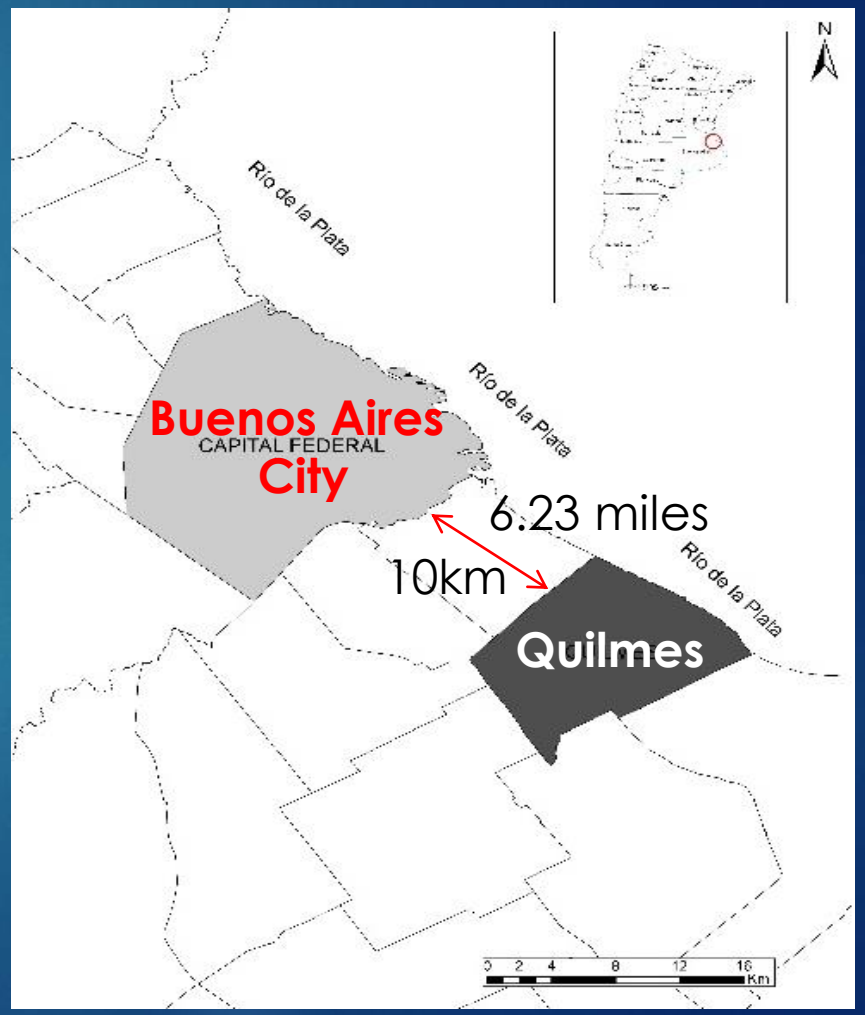
Argentina campeón de América 2021



Methods

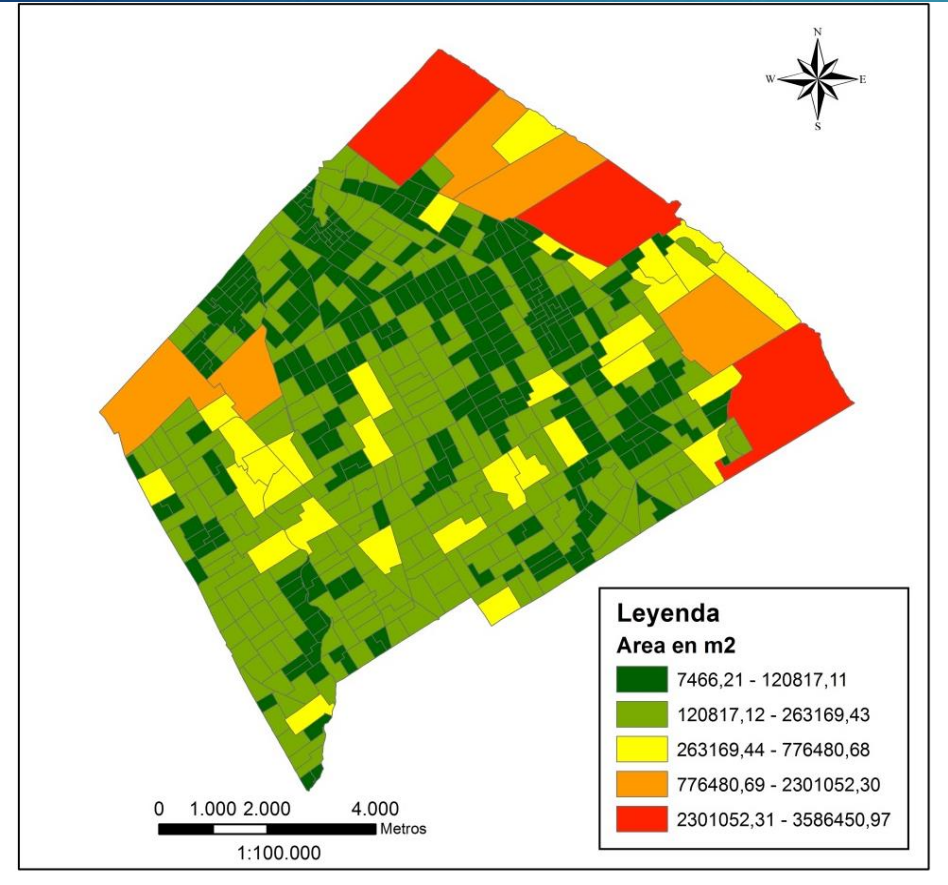
- To establish the socio-environmental vulnerability index, I performed a multi-criteria analysis using 17 social variables taken from the last population census of Argentina (2010). All the variables were measured as a percentage and after we obtained the mean. They all have the same weight. Finally the social index has a scale of values that goes from 0 to 1.
- In addition to this index, the environmental variables of risk of flooding of the Río de La Plata (80 m) and streams in the area, proximity to open-air dumps, proximity to industries and proximity to highways were taken into account. This environmental index is presence-absence and has values ranging from 0 to 0.4.

Social variables

- Population from 0 to 14 years and 65 years and over.
- Illiterate population.
- Population aged 15 years and over with only elementary school.
- Homes with unemployed people.
- Homes without mains water.
- Homes without sewers.
- Homes without network gas.
- Homes with insufficient quality of services.
- Homes without a fridge.
- Homes without a computer.
- Homes without a cell phone.
- Homes with people who are not the owners.
- Homes with insufficient constructive quality.
- Houses made of materials quality 4.
- Cardboard houses.
- Houses with 3 or more people per room.
- Homes with unsatisfied basic needs.

Results

Area of the censal radius of Quilmes



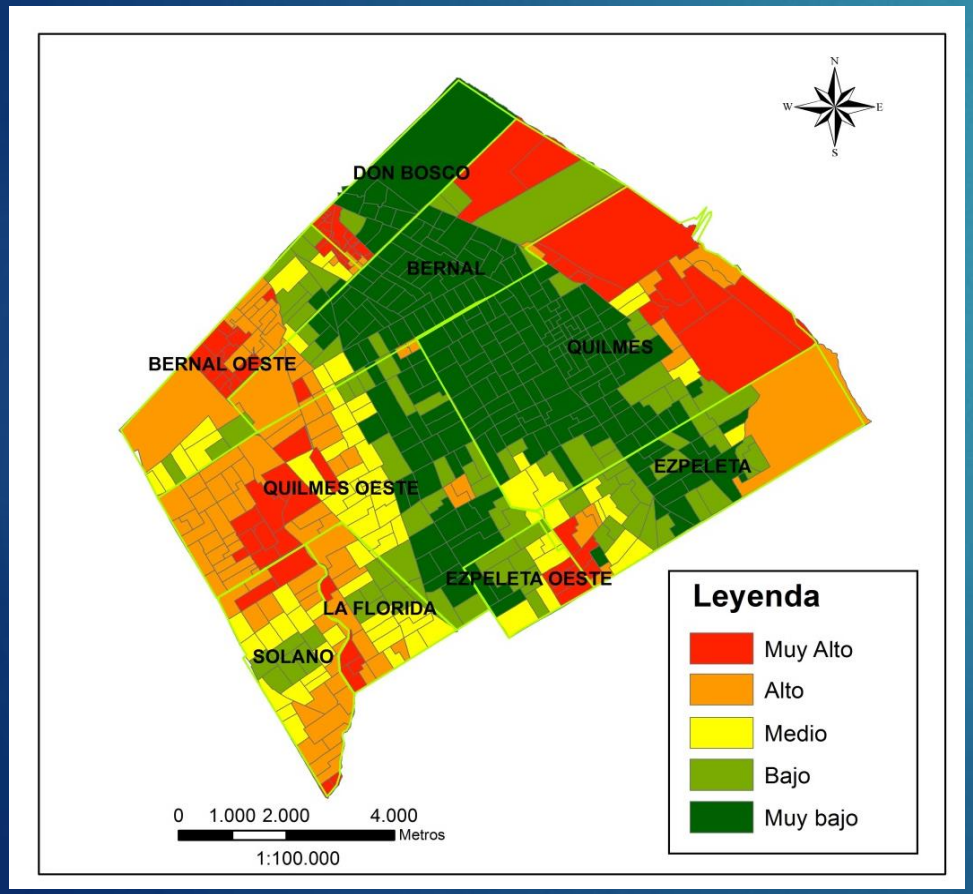
There are 557 divisions (censal radius) in Quilmes. Each one contains the information of each variable.

The area of these divisions varies from 7466.21 m^2 to 3.59 km^2 .
The total is 92,03 km^2

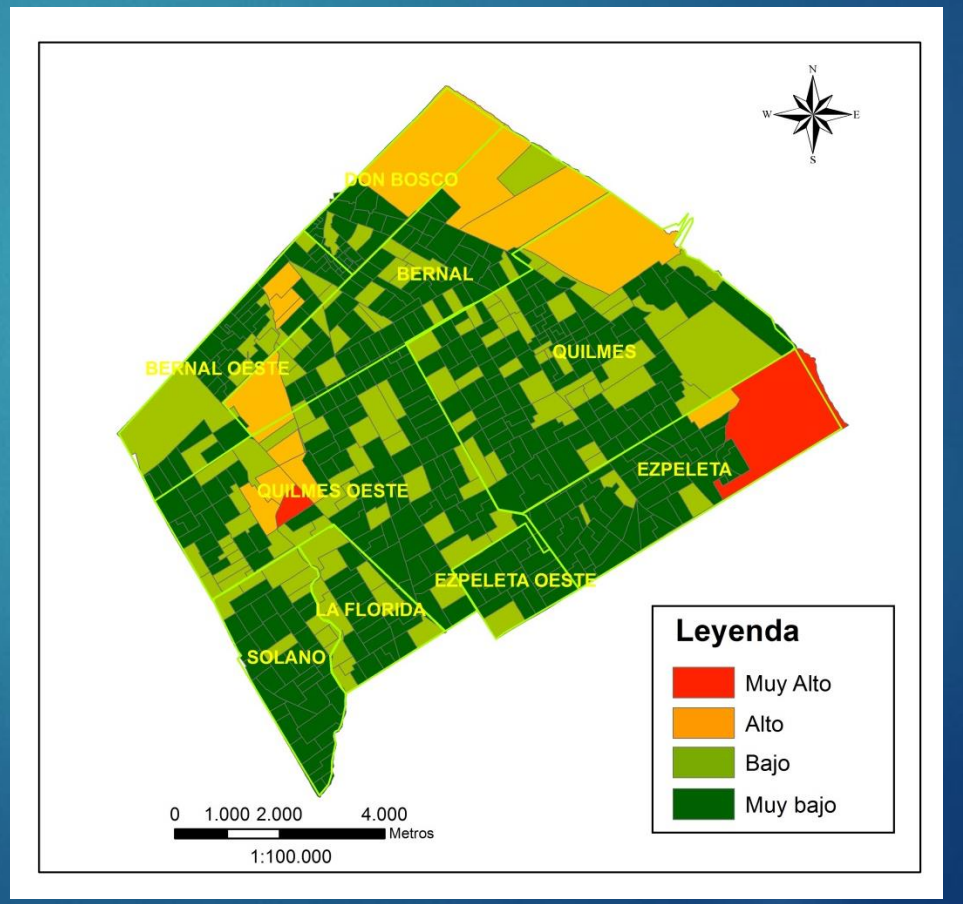
The number of people varies from 50 to 3.284 people.
The total is 582943 people.

Results

Social vulnerability index

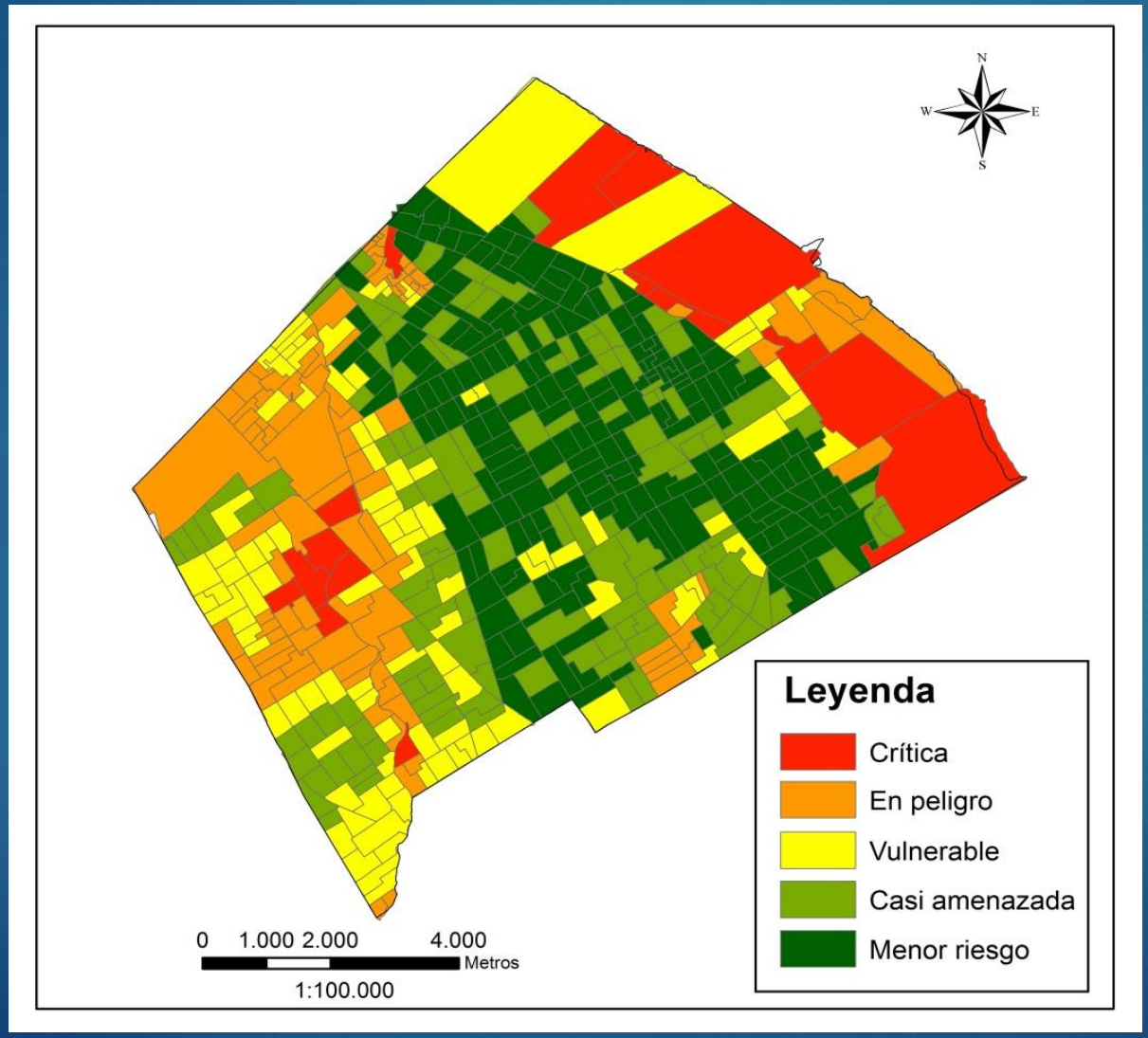


Environmental vulnerability index



Categories	IVSA description
Muy alto (Very high vulnerability)	It expresses the most critical situation and it is when the average of the indicators gives values above 50% and rapid measures must be taken to solve problems. **(Critical endangered)**
Alto (High vulnerability)	In this range a clear dangerous situation is identified. That is, when the situation without being critical is complex enough to be addressed since there is a significant deterioration in the quality of life of the population. **(Endangered)**
Medio (Medium vulnerability)	It is the case in which the population represents data of relative homogeneity towards a degree of vulnerable. And, it is when the best available evidence indicates that it faces a moderate risk of deterioration in the population's quality of life levels in the medium term. **(Vulnerable).**
Bajo (Low vulnerability)	The quality of life of the population is almost threatened when the average of the indicators has not reached the previous categories but is at risk of becoming vulnerable if measures are not taken in the medium term. **(Near threatened).**
Muy bajo (Very low)	The population's quality of life levels are of less concern when the average of the indicators shows that the census radius does not have an environmental or social threat**. (Least concern).**

Socio - Environmental vulnerability index



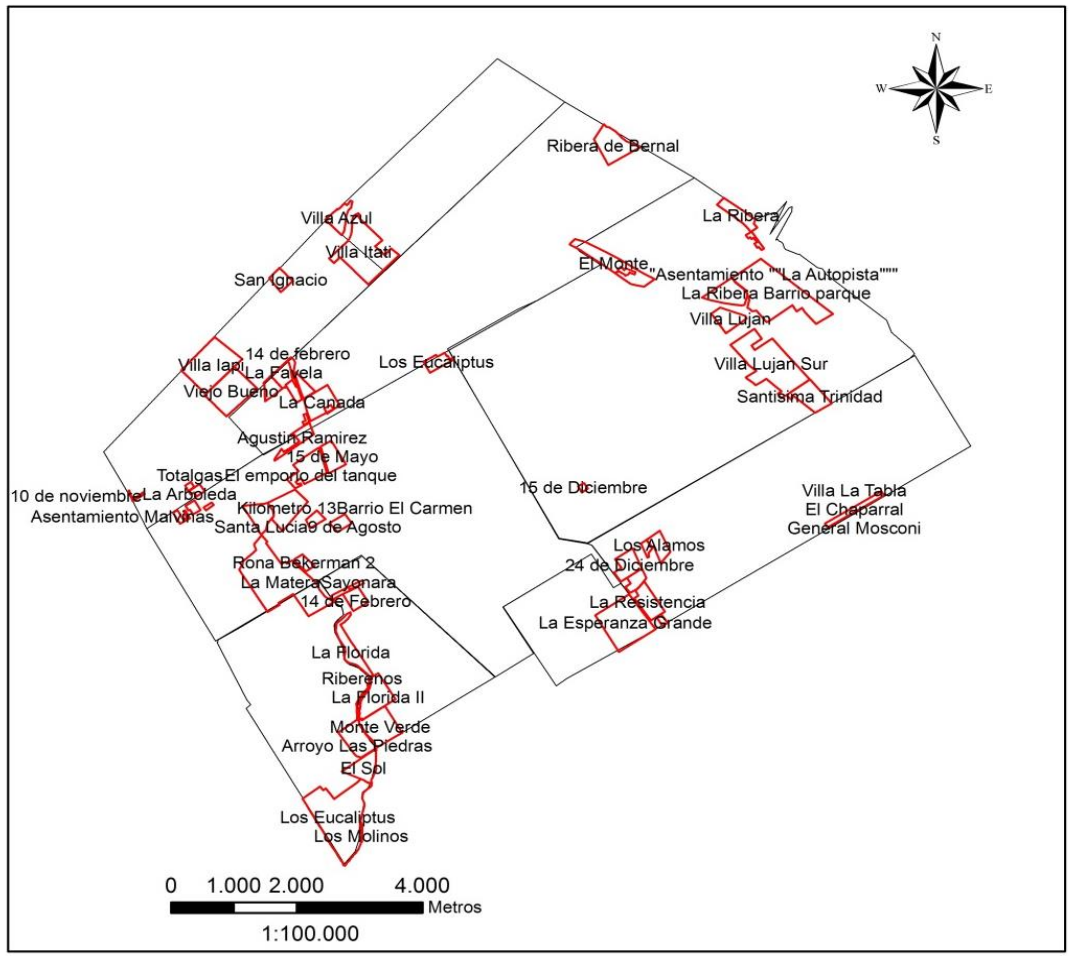
The socio – environmental vulnerability index has values from 0 to 1.4, nevertheless, the maximum value was less than 1 because none of the divisions met all the vulnerability conditions.

Results

IVSA	IVSA	Number of radius	Population	%	Homes	%	Área km²	%
Muy alto	CR	18	19749	3%	5051	3%	13.99	15%
Alto	EN	95	115792	20%	30122	17%	15.39	17%
Medio	VU	101	128495	22%	35865	20%	18.14	20%
Bajo	CA	133	144057	25%	45026	25%	19.99	22%
Muy Bajo	PM	211	174850	30%	61046	34%	24.53	27%
Total		**558**	**582943**	**100%**	**177110**	**100%**	**92.03**	**100%**

Results

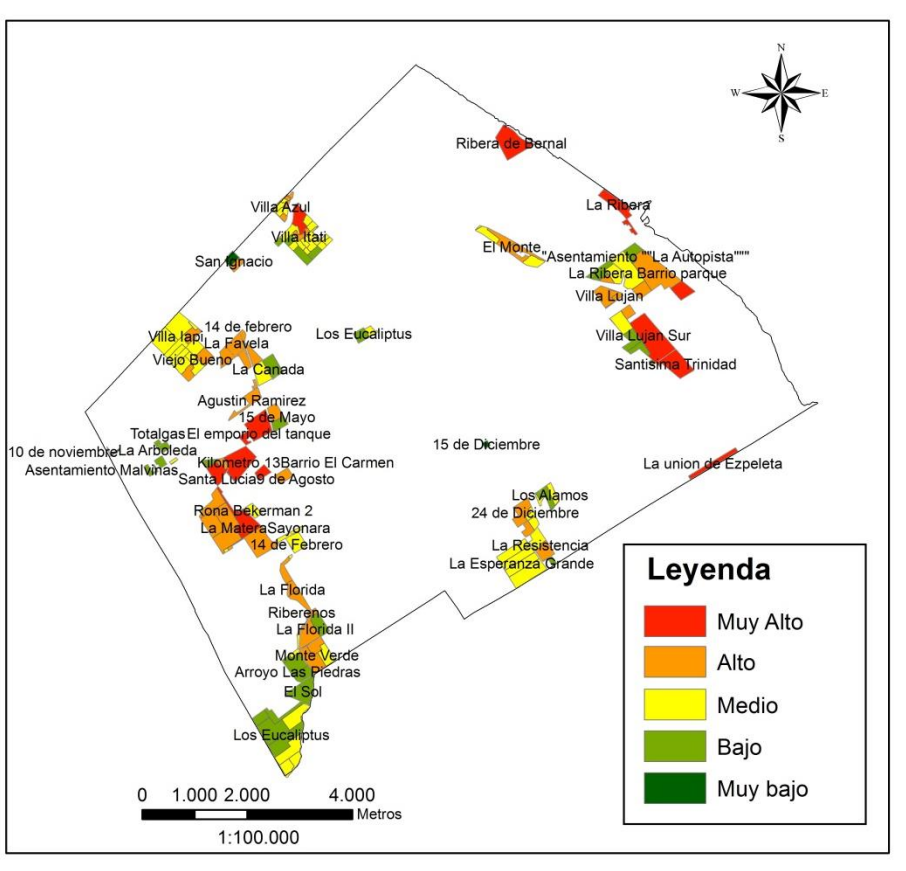
Poorest neighborhoods



55 places with areas that go from 0.17 ha to 88.87 ha for a total of 954.72 ha and 38000 people.

Those places are the 10.2% of the area of Quilmes and 6% of the population.

Results



IVSA	Number of poor places	Population	%	Area km²	%
Muy alto	13	19749	51%	3.49	37%
Alto	21	10122	27%	2.73	29%
Medio	13	5300	14%	2.73	29%
Bajo	8	2860	7%	0.60	6%
Total	55	38031	100%	9.55	100%

Final thoughts

- The socio-environmental vulnerability index allows a territorial vision of the threats in quali-quantitative terms at the local scale.
- In the results of this study, social and environmental heterogeneity is present, even within the villages (poorest neighborhoods) that are the most affected places. The heterogeneity is replicated in these places, finding areas with low vulnerability and, of course, areas with high and very high vulnerability.
- Despite some limitations that the index presents, it ends up being a good indicator of the diversity of social and environmental situations present in Quilmes.

Final thoughts

- This index refers to the quality of services and their accessibility. It not only compares the vulnerability between informal settlements but also compares the situation of informal settlements with respect to the formal city and measures vulnerability with respect to the lack of social and urban integration to the rest of the city.
- There are variables that have more weight than others, when it comes to taking the average for the social index. The variables with the most weight are households not connected to the sewer network, households with insufficient quality of services, households without computers, households without gas, and households with insufficient construction quality.

Final thoughts

- Understanding the territory as a heterogeneous and fragmented space towards its interior enriches the results from several aspects, mainly in the identification of areas with situations of greater socio-environmental degradation, which shows the need for the implementation of differentiated policies, according to the needs of each territorial reality.
- The variables considered representative of the social and environmental factors are adequate for the cases of this study, being able to find other more appropriate ones for other municipalities or scales of analysis.

I would like to thank to all the team of SCGIS, specially to Alexander Yumakaev, Karen Beardsley, Leslie Backus and Steven Blum between many more, because they gave me the opportunity to go to the SCGIS and ESRI conferences in 2014 and they were great hosts.

Also I want to recognize the great work that Carlos (Carlitos) De Angelo does in the Latin-American chapter. Thank you.