Assessing Risk and Vulnerability in Brazil

Cartographer: Laura Smith
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Background

Brazil is especially concerned with the impact of extreme weather, caused by global warming on its citizenry. According to the United Nations Office for Disaster Risk Reduction, the three most damaging natural disasters in Brazil are flood, landslides, and drought.

It is not enough to simply target the areas of greatest risk as populations are affected differently by natural disasters. Likewise, it is important to determine the locations for people who are most likely to experience vulnerability. According to many scholars in the gender field, children, the elderly, people with disabilities, and female headed household are population groups most vulnerable to natural disasters due to unique physical limitations and social expectations. As these groups have different needs, conducting a social vulnerability analysis disaggregated by social group can help bring the necessary aid to the correct area in a timely manner.

Methodology

Creating an analysis of composite risk and vulnerability comprised of first creating an environmental risk analysis and a separate a vulnerability analysis. The environmental risk data involved reclassifying existing raster data for global flood, landslide, and drought to levels of low to high risk within Brazil and utilizing the zonal statistics as table to assign each municipality a score for these environmental factors of which the maximum score is 3 and the minimum as 0.

The vulnerability assessment focused on population groups most likely to experience vulnerability. From my literature analysis, these population groups are the elderly – which I defined as over 80 years old, people with disabilities, female headed households – as they are more often than male headed households to live below the poverty line, and young children – which I defined as under four years old. Taking these groups as a percentage of municipal population translated to assigning high levels of vulnerability to municipalities with high percentage of these populations and low vulnerability with low percentage on a scale from 0 -3. When added, each municipality could receive a score between 0 – 12 for the four different population groups. A composite vulnerability and risk analysis brings these two together by joining the mean composite environmental risk score by municipality and adding this to the four population groups producing a score from 0 – 13+.

The same process was applied to flood risk alone rather than all three environmental factors together.

Findings

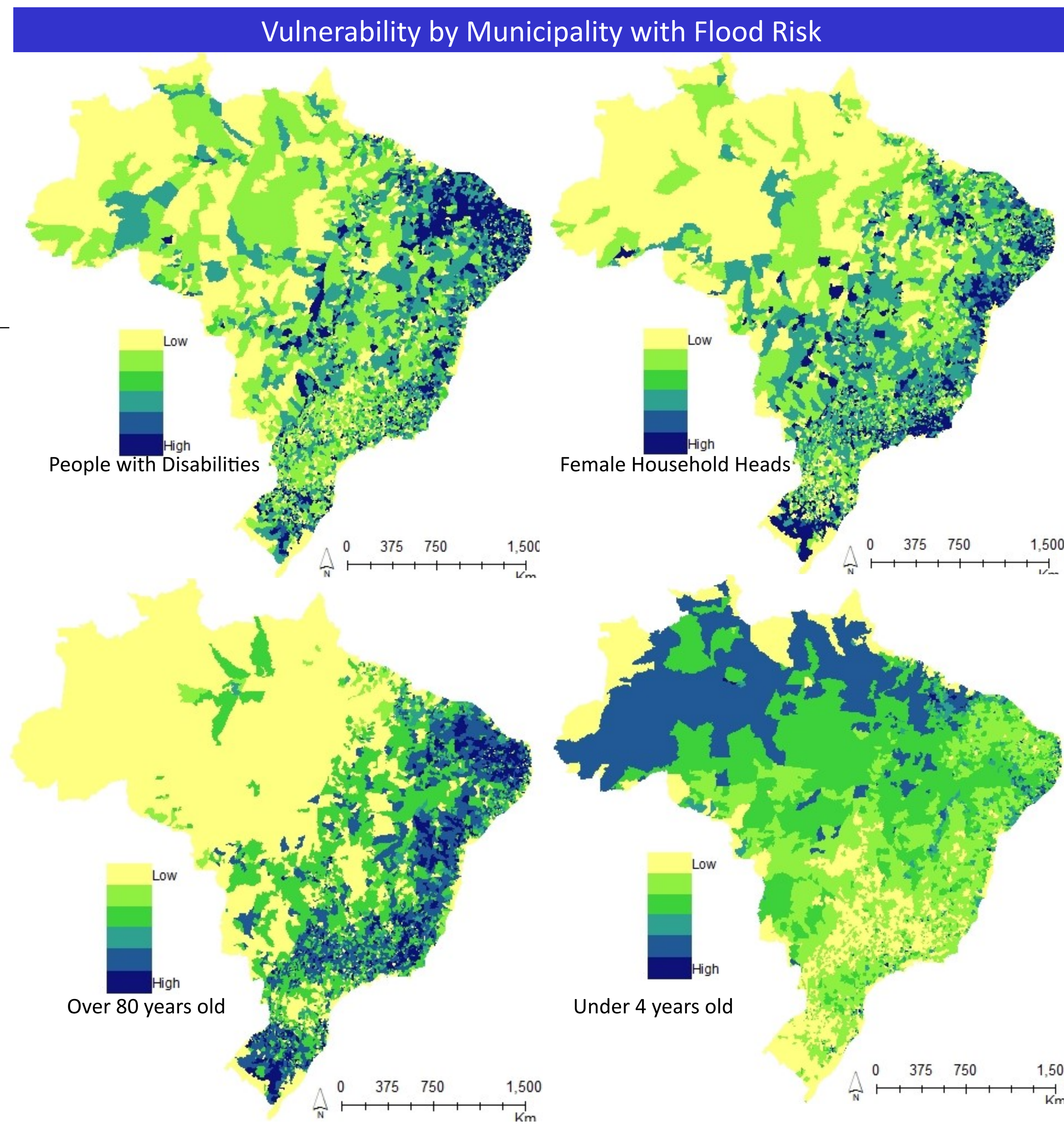
The composite risk and vulnerability assessment shows that many municipalities along the coast of Brazil and in the border near Uruguay have the highest score when combining these two assessments. This table shows the number of people most likely to experience vulnerability in the most at risk municipalities in Brazil.

Municipality	Total Population	Over 80	Under 4	Female HH heads	People with Disabilities	Vulnerability Score
Pedro Velho	14,114	386	1,218	1,164	4,757	13
Recife	1,537,704	29616	96,529	165,406	431,359	12.5
Doña Francisca	3,401	122	178	269	864	12
Porciúncula	17,760	452	1,225	1,884	4649	12
São José De Mipibu	39,776	749	3,266	2,979	12,357	12
São Miguel De Taipu	6,696	138	584	581	1,953	12
Araçoiaba	18,156	227	1,554	1,438	5,368	12
Condado	24,282	346	1,995	2,060	7291	12

When disaggregating the data by type of environmental disaster (flood), the loci of greatest need is different which highlights the importance of disaggregated data.

Municipality	Total Population	Over 80	Under 4	Female HH head	People with Disabilities	Flood Risk + Vulnerability Score
Solânea	26693	737	2186	2753	8427	11.5
Cumaru	17183	508	1206	1369	5102	11.5
Porciúncula	17,760	452	1,225	1,884	4649	11.33
Pedro Velho	14,114	386	1,218	1,164	4,757	11.33
Altinho	22353	699	1442	2337	6770	11.2

Vulnerability by Municipality with Flood Risk

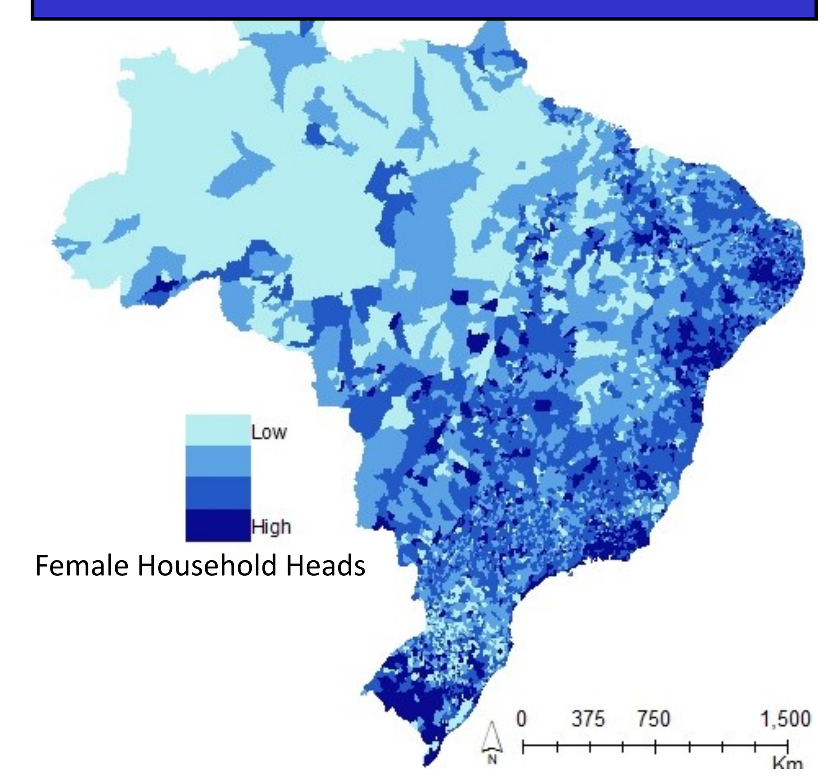


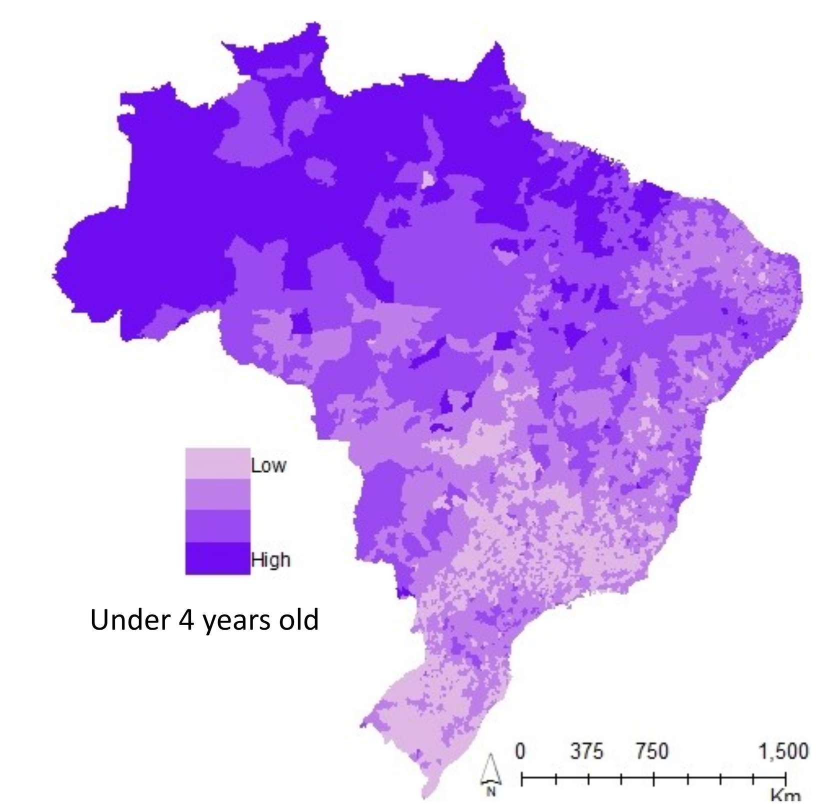
Limitations

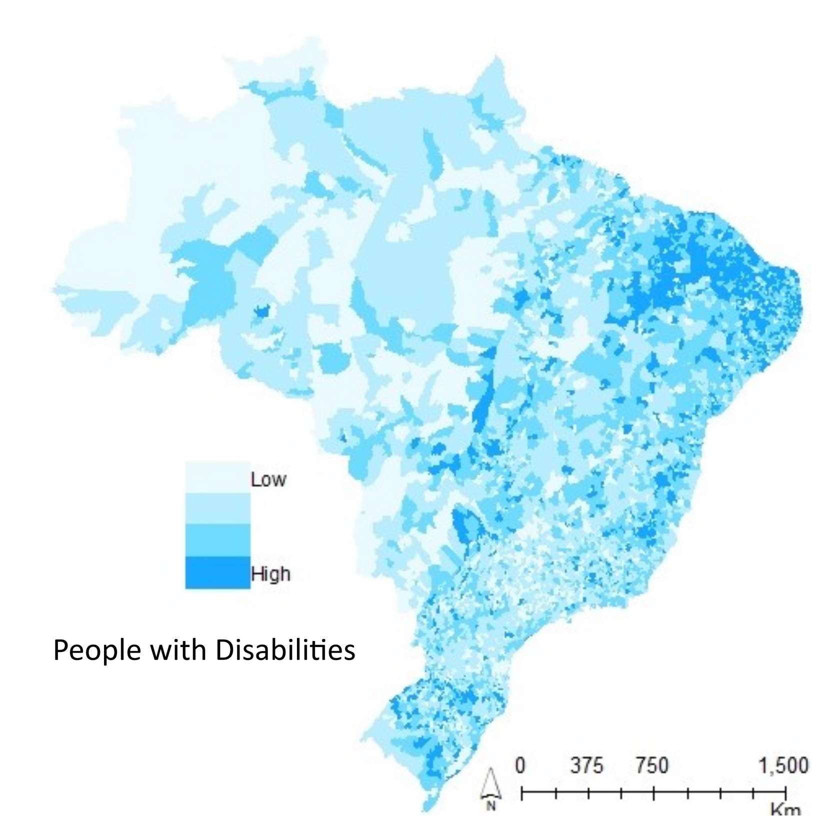
Some of the many limitation to this study includes the fact that I gave equal weight to each population group and risk score. A more nuanced analysis would assign proper weight to the environmental risk as well as to the population groups most likely to experience vulnerability. Additional disaggregation on the differing types of disabilities is needed in further analysis in order to target aid more effectively, this analysis comprises of all registered disabilities with the Brazilian census. No data on poverty level is included in this analysis which will change the results if included and further create a more accurate vulnerability analysis. Furthermore, the census data is from 2010 and demographics may have shifted in the past eight years. Likewise the data used to calculate risk to natural disaster is from 2011 and different factors may have changed the risk levels for each municipality.

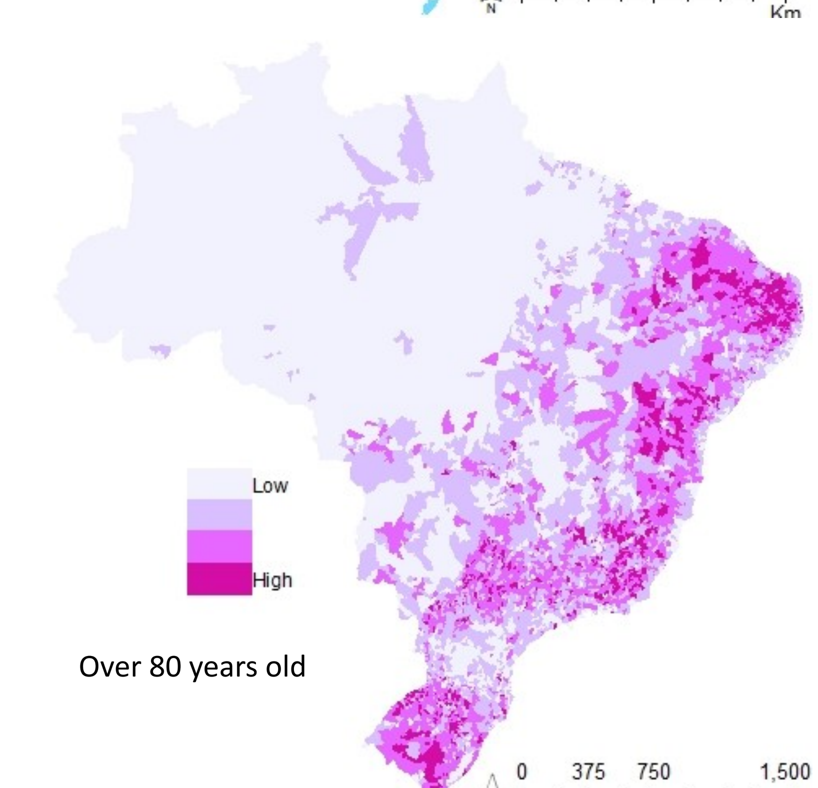
Sources: Global Risk Data Platform (GRID)-Europe, Instituto Brasileiro de Geografia e Estatística (IBGE), Database of Global Administrative Areas (GADM)

Vulnerability by Municipality

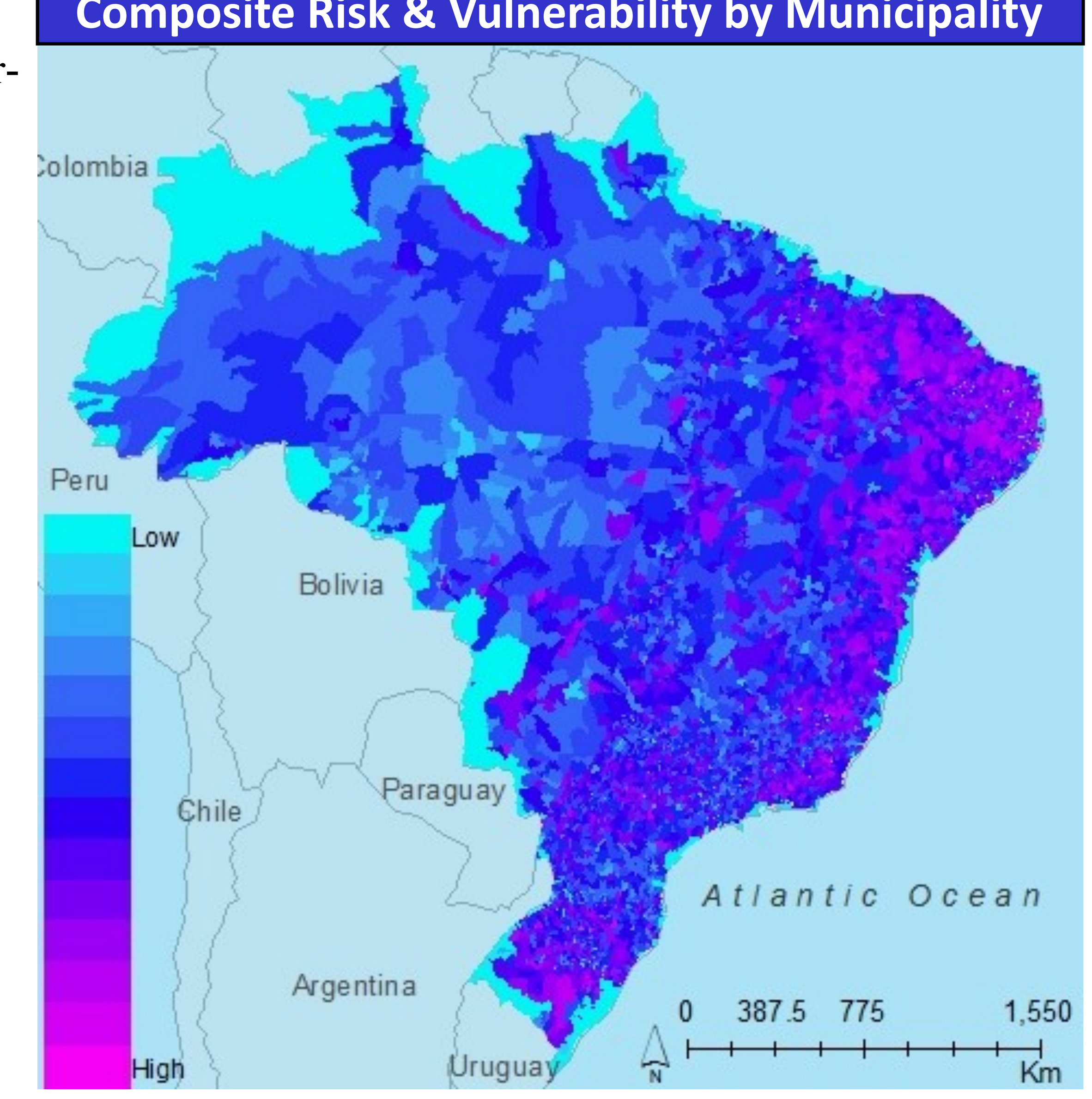








Composite Risk & Vulnerability by Municipality



Environmental Risk by Municipality