



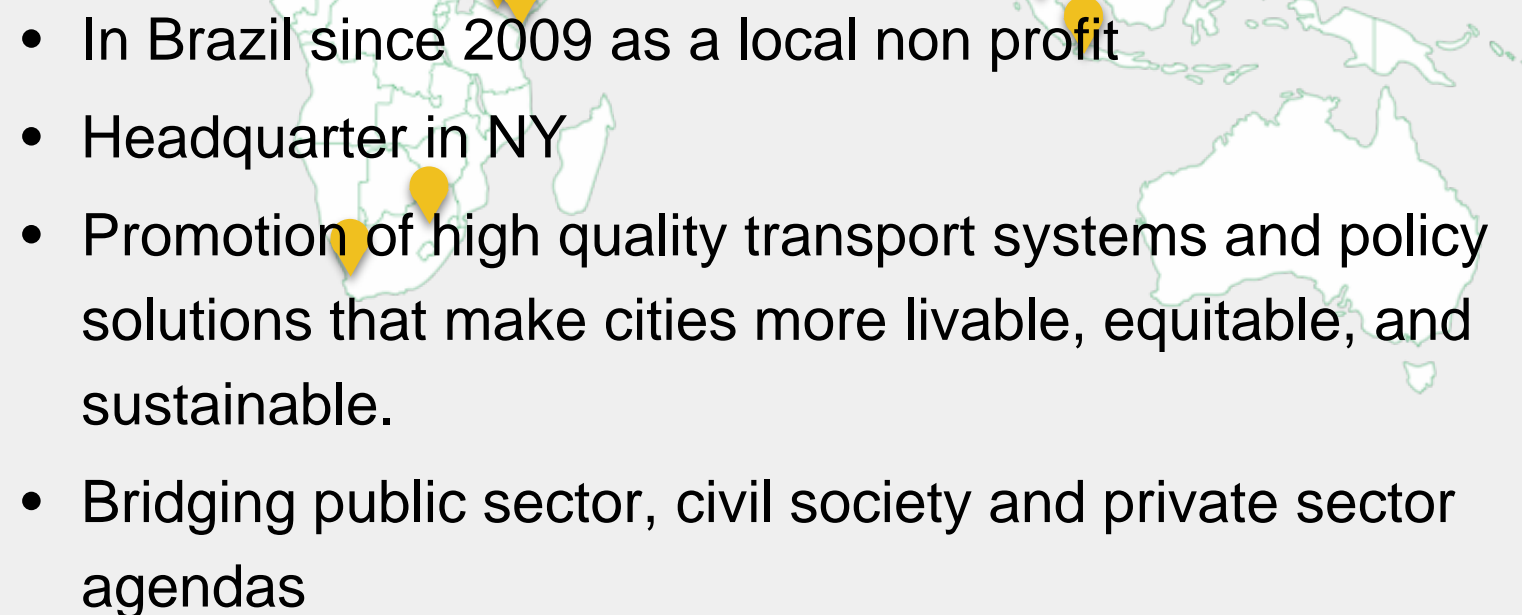
# ITDP

Instituto de Políticas de Transporte  
& Desenvolvimento



# Urban mobility in Brazil: measures for adaptation to climate change

Clarisse Cunha Linke  
September 13, 2018



# Session's objectives

**Context: Urban mobility in Brazil**

**Current vulnerability of existing urban mobility systems to climate**

**Future projections**

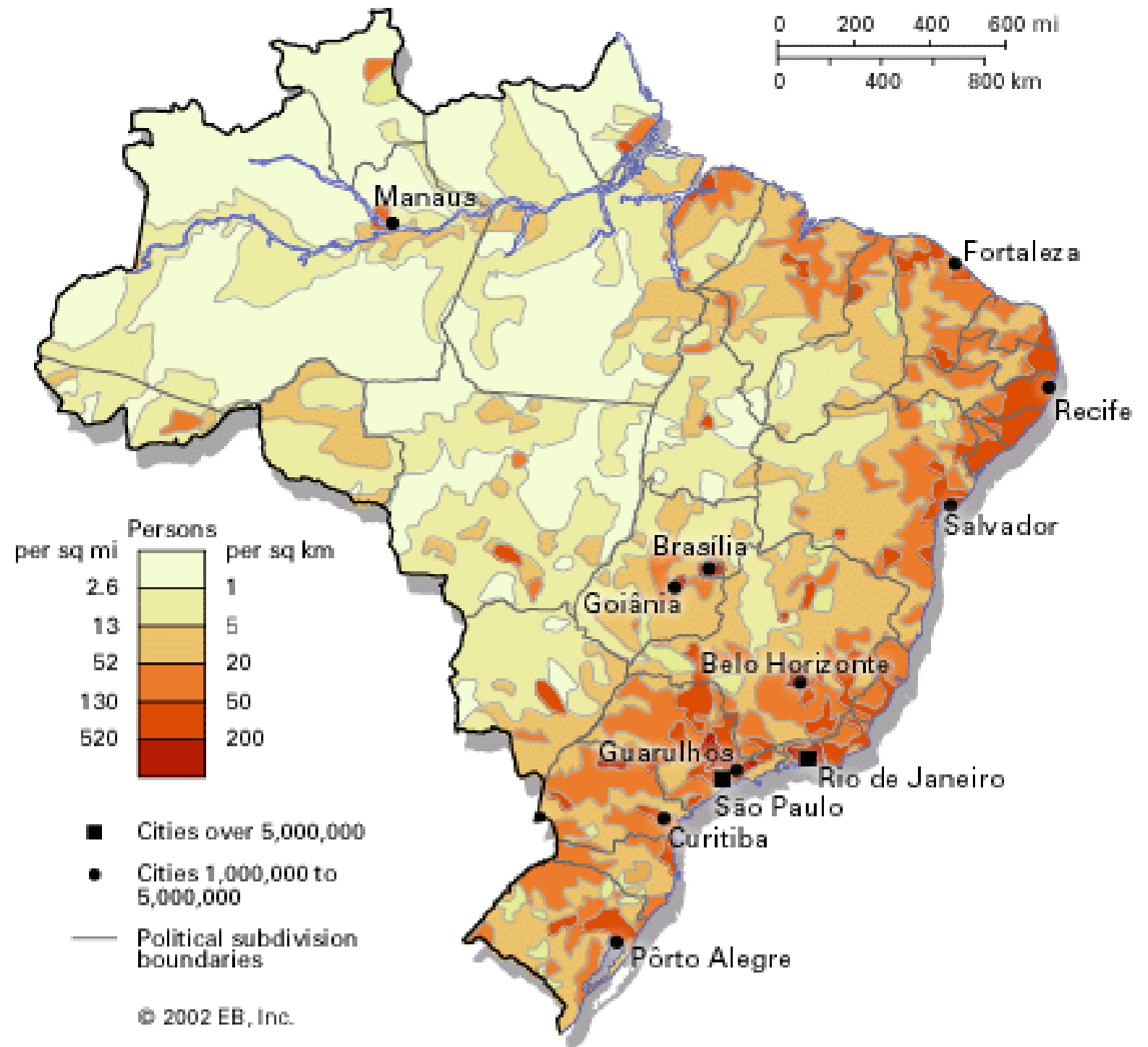
**Assessment of cities' vulnerability to climate change**

**Measures to increase systems' resiliency**

# Context: Urban mobility in Brazil

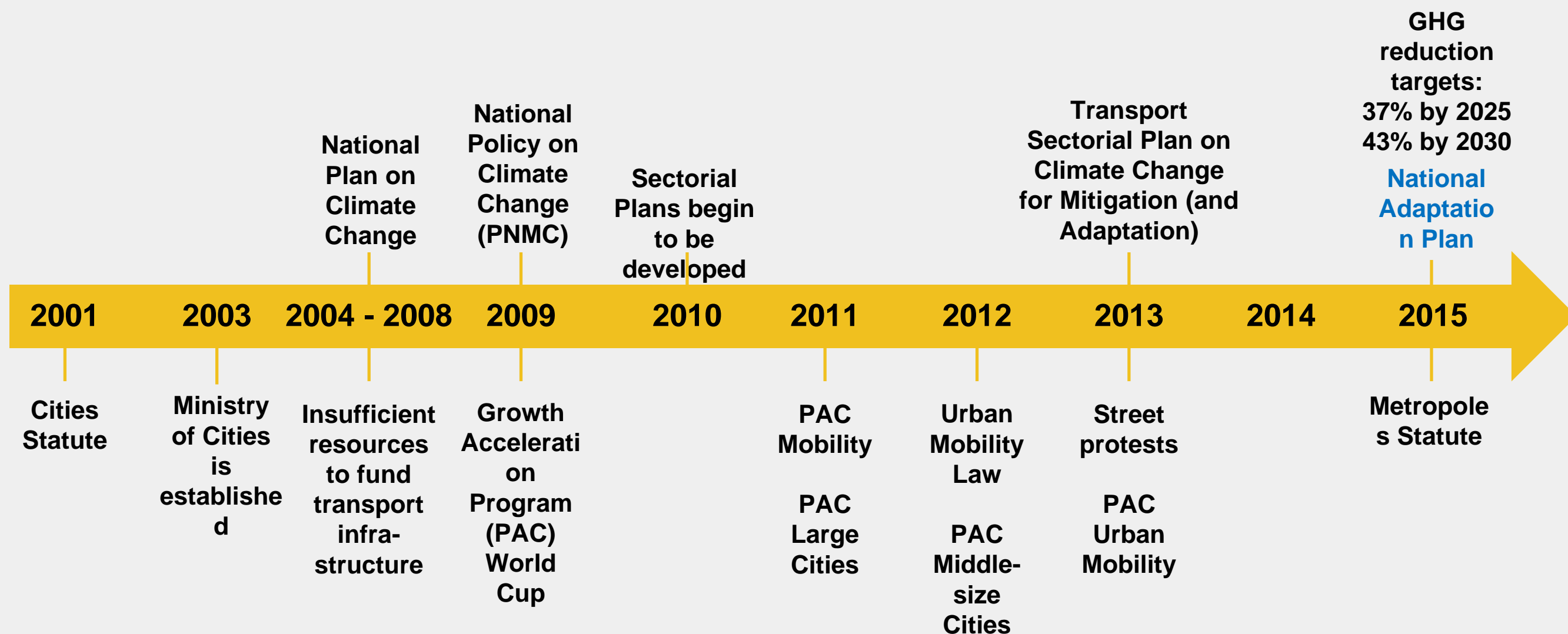
# Urban mobility in Brazil

- 84% urban
- 40% population living in metropolitan regions
- 1970-2010 population increased by 76%, while urban land area by 127%
- Average travel time 38 minutes
- R\$ 150 bi pledged for infrastructure since 2007
- 45% GHG emissions related to transport



Sources: Ministry of Cities (2015), SEEG (2014)

# Climate change and urban mobility policy frameworks



# Current vulnerability of existing urban mobility systems to climate

**From 2001-2010,  
frequency of natural  
disasters has multiplied  
by 270% in Brazil,  
compared to the  
previous decade.**



# Existing vulnerability of urban mobility systems

Maceió, 2010



# Existing vulnerability of urban mobility systems

Recife, 2013





# Existing vulnerability of urban mobility systems

São Paulo, 2015



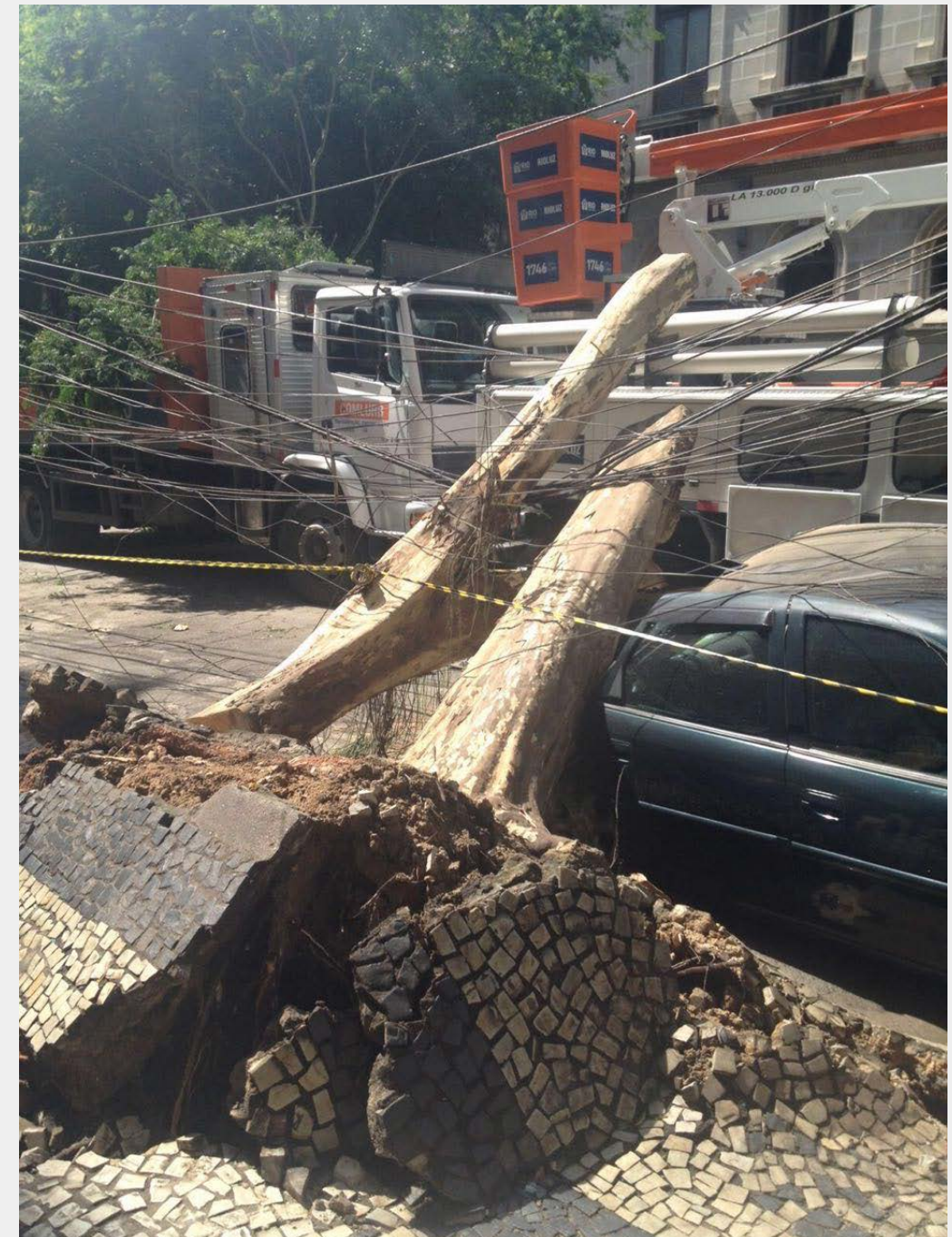


# Existing vulnerability of urban mobility systems

São Paulo, 2014



Rio de Janeiro, 2016





# Existing vulnerability of urban mobility systems



Rio de Janeiro, 2016

# Existing vulnerability of urban mobility systems



Rio de Janeiro, 2016

# Existing vulnerability of urban mobility systems



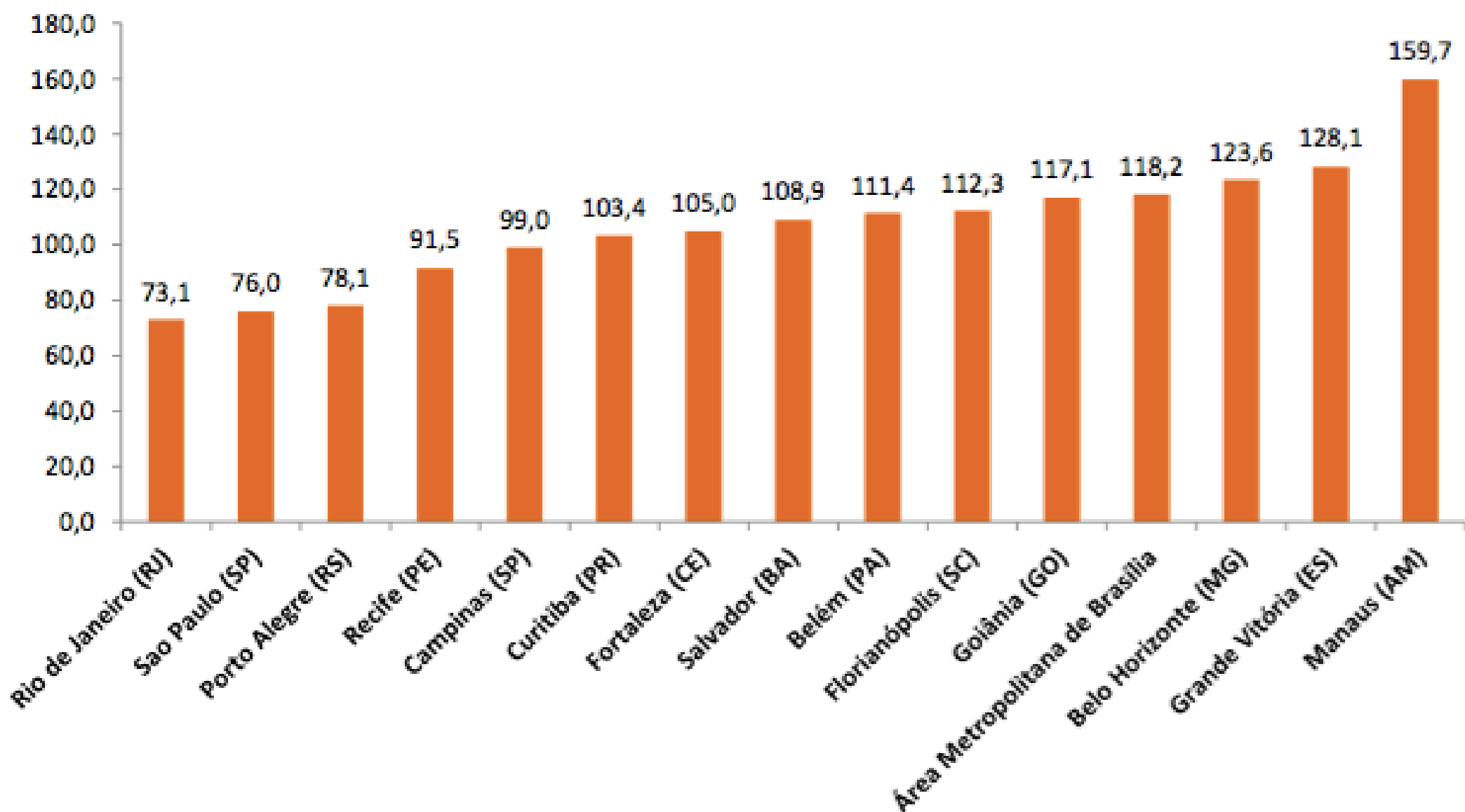
Rio de Janeiro, 2016

# Existing vulnerability of urban mobility systems





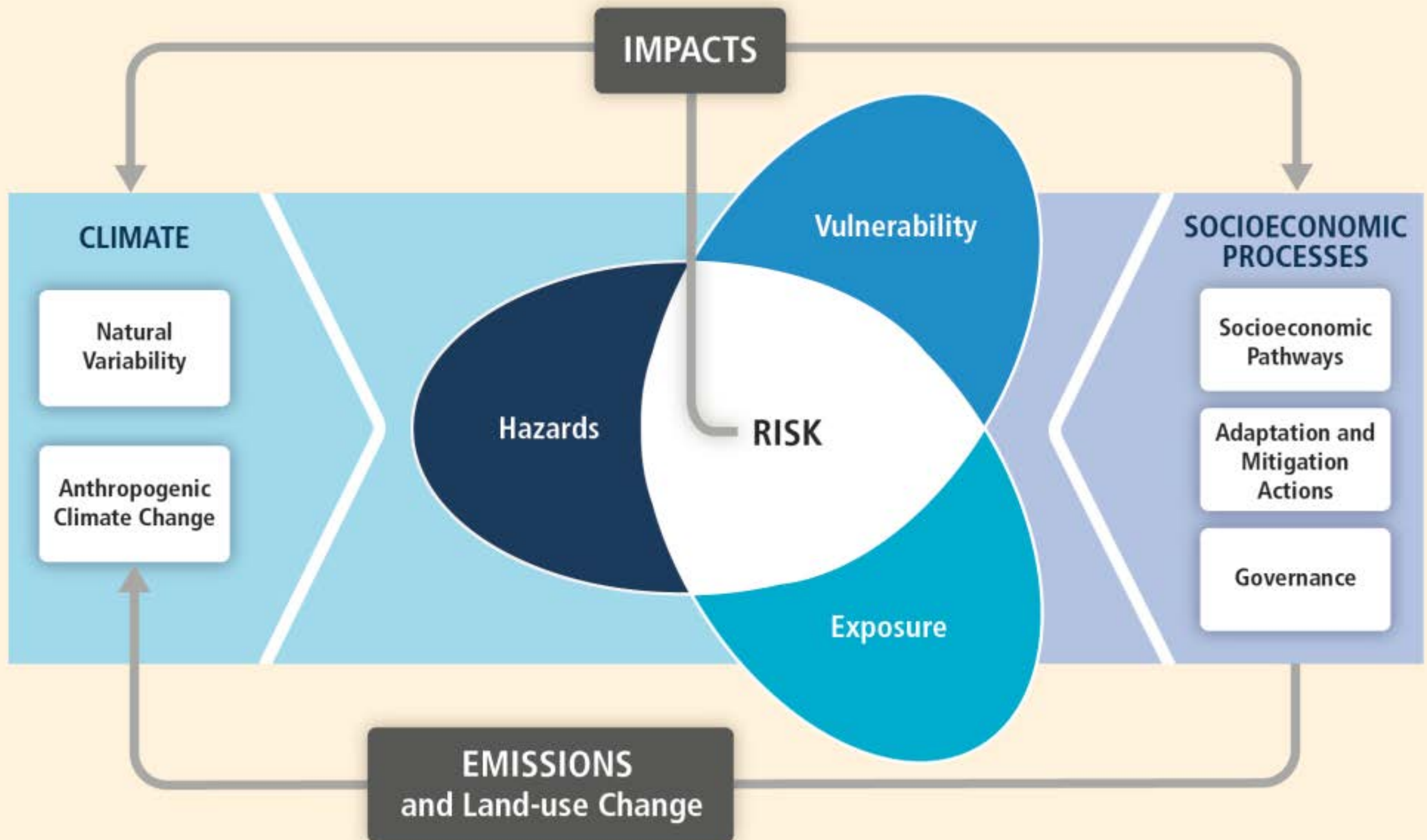
# Vehicle fleet grew by 111% 2003-2015



Fonte: Elaborado pelo Observatório das Metrópoles a partir do Registro Nacional de Veículos Automotores (RENAVAN), do Departamento Nacional de Trânsito (DENATRAN)

# Future projections

# Defining risk



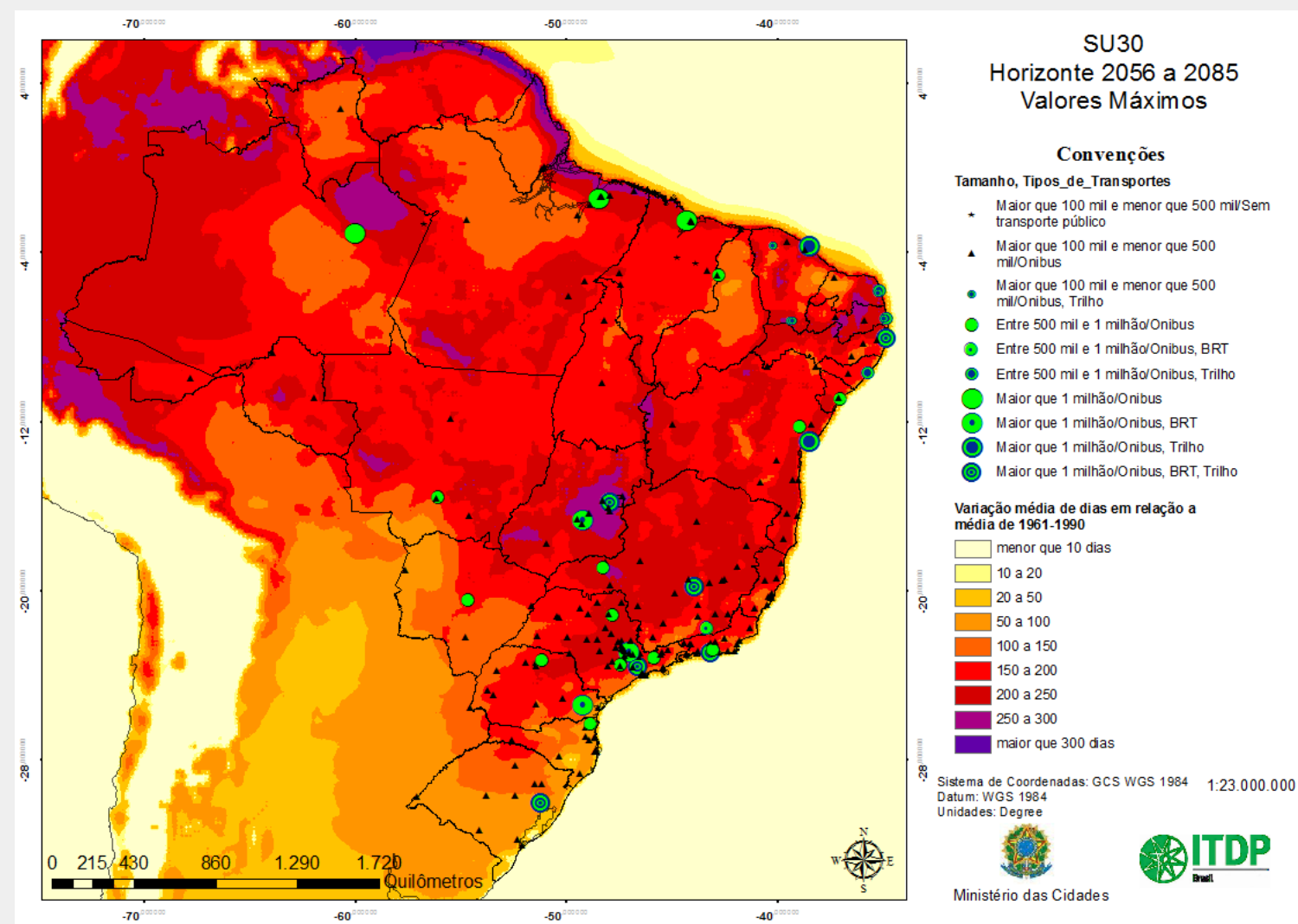
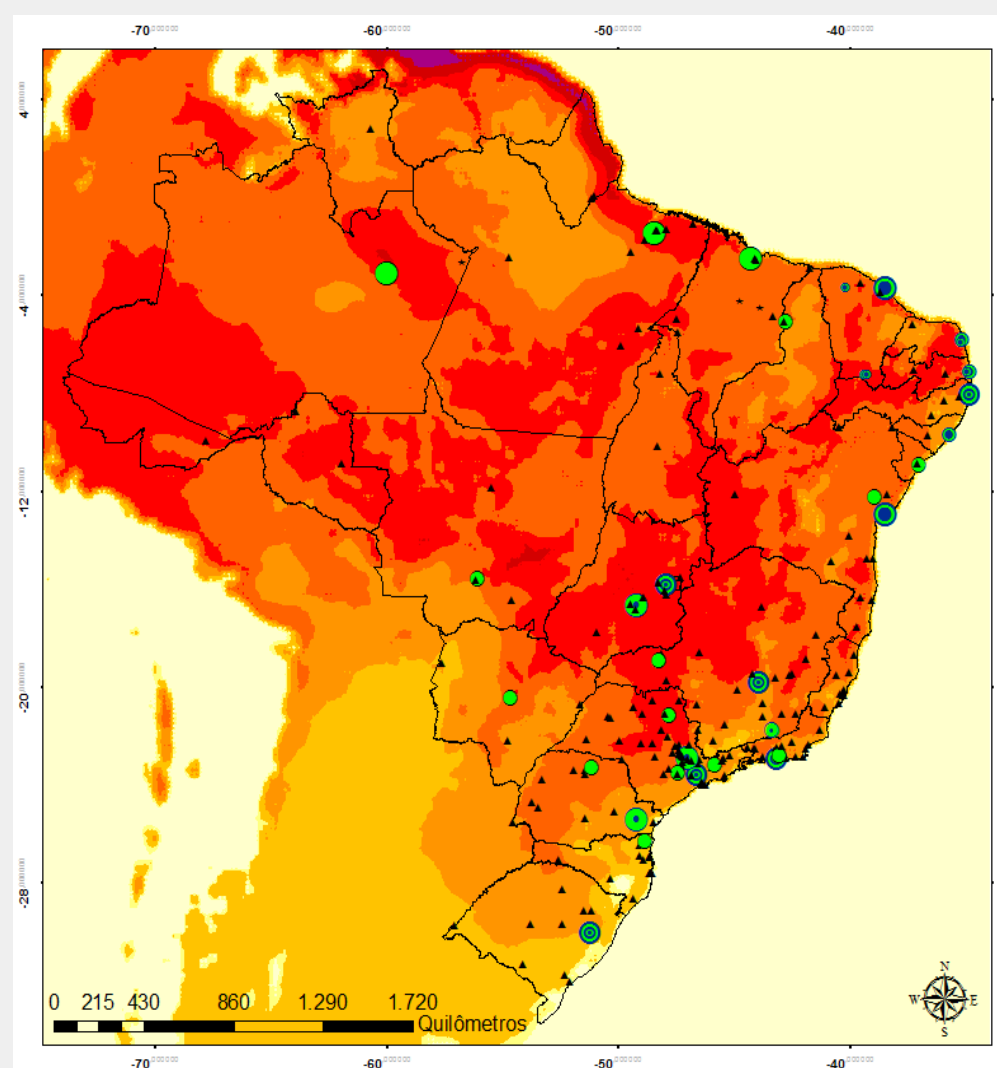
<b>Temperature</b>	<b>Increase in the average</b> : the number of days per year with temperatures above 30° Celsius
	<b>Extreme events</b> : the number of six or more consecutive days of very high temperature per year (heat waves)
<b>Precipitation</b>	<b>Increase in average</b> : the number of wet days per year
	<b>Extreme events</b> : the number of days with rains above 30 mm per year (storms)

- Two horizons: 2026-2055 and 2056-2085
- Two global regional climate models: HadGEM2-ES and MIROC5
- Two scenarios based on degrees of concentration of GHG: major and minor
- 283 municipalities with more than 100,000 inhabitants

# Increase in the number of days with temperature above 30°C

2026-2055

2056-2085



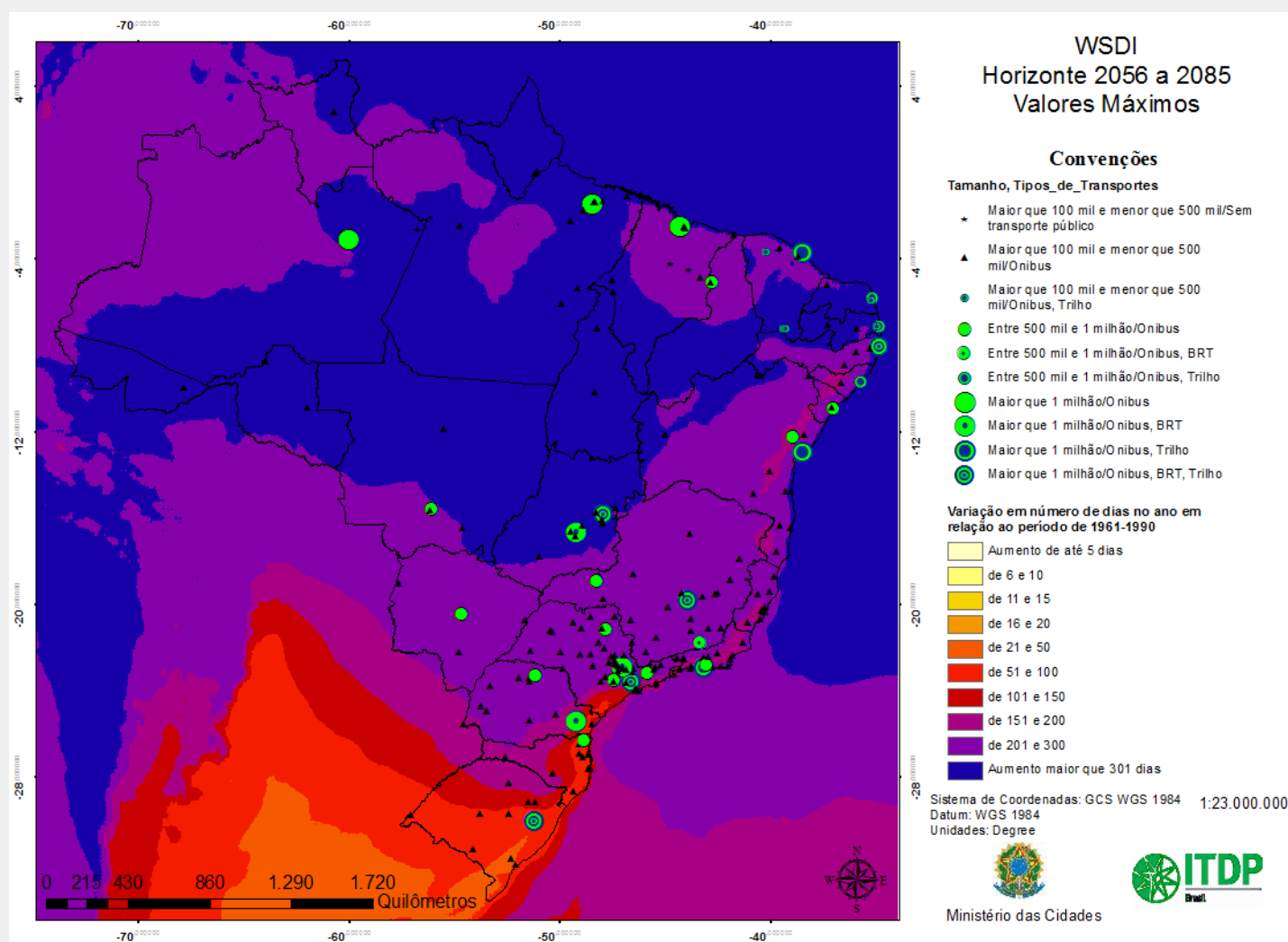
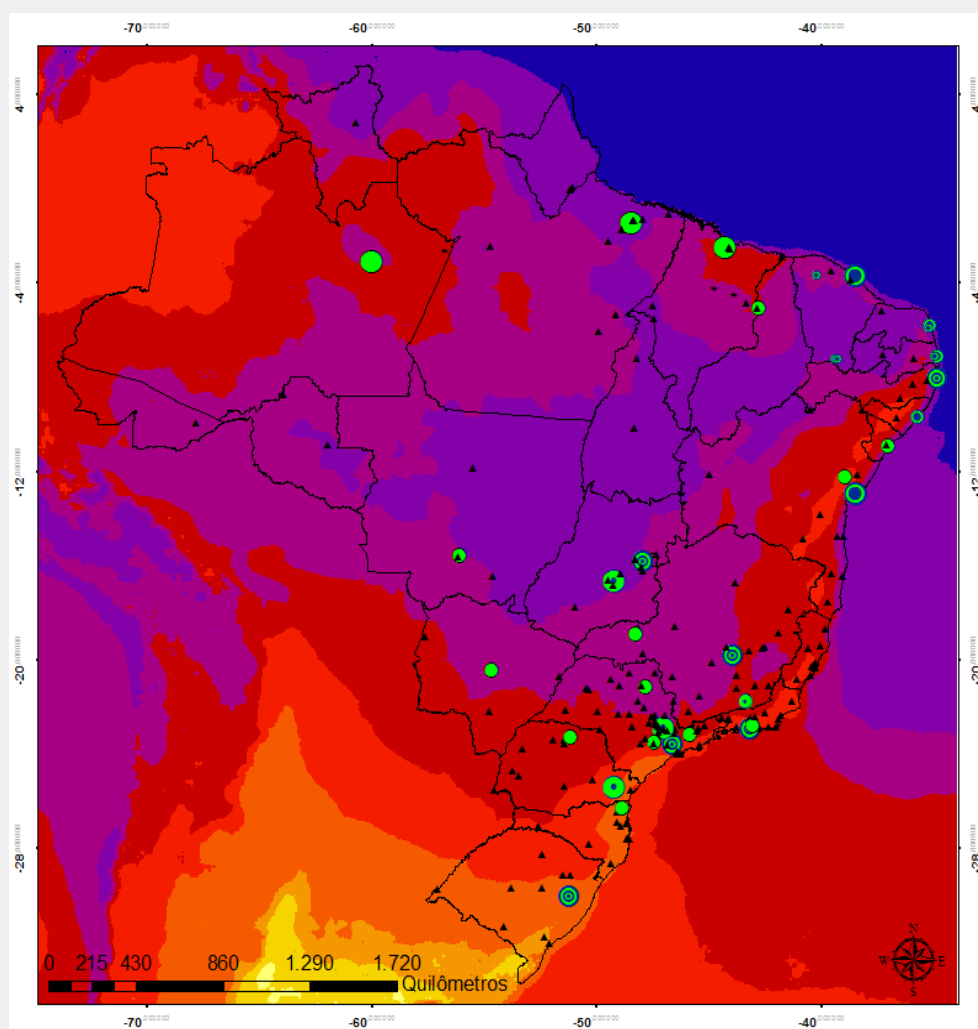
+50 days/year

+150-200 days/year

# Increase in the number of heat waves per year

2026-2055

2056-2085

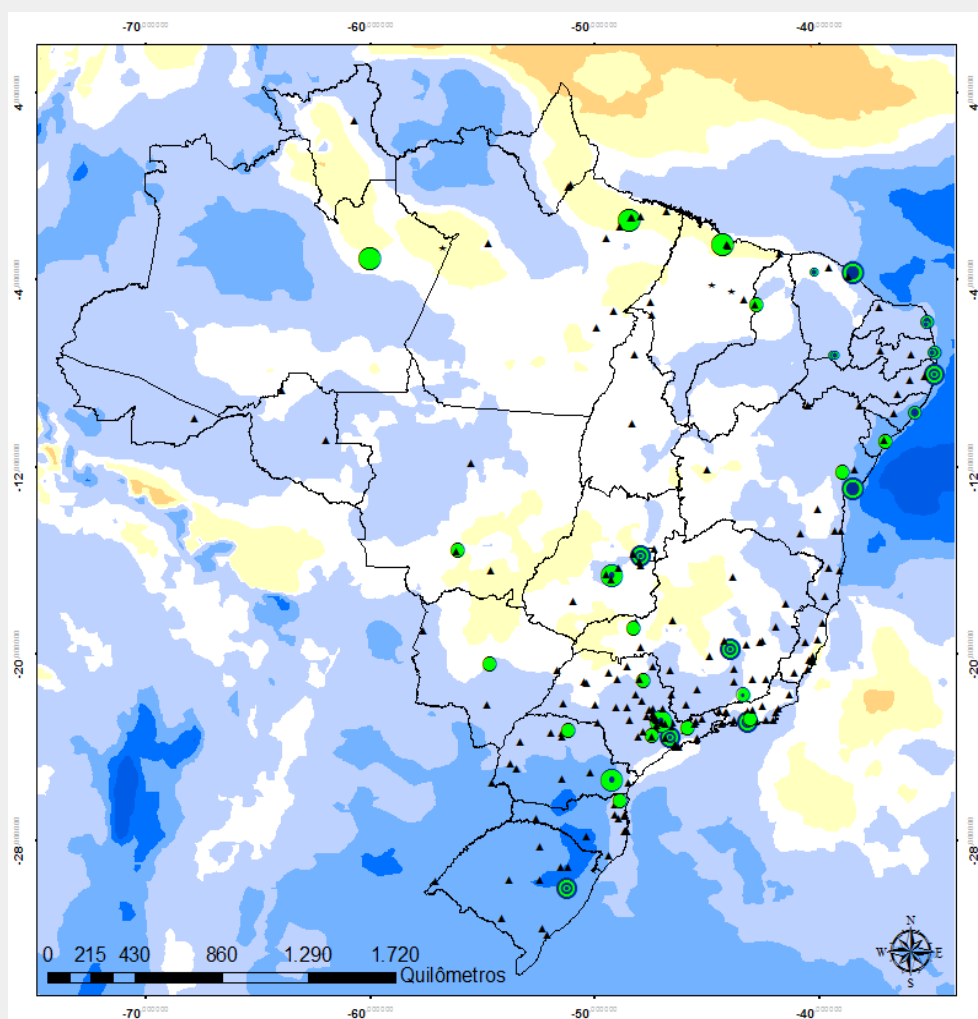


+150-200 days/year

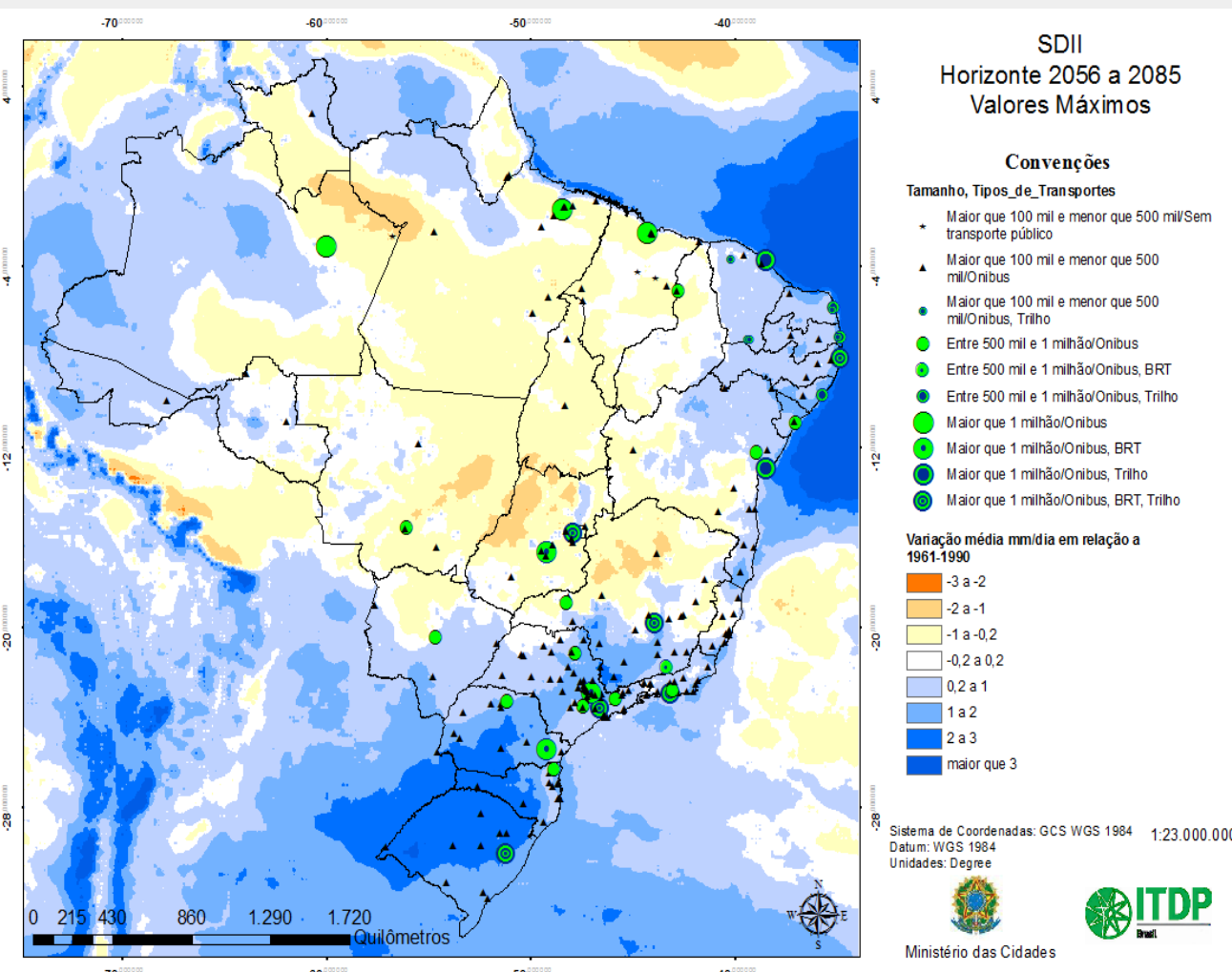


# Increase in the number of wet days

2026-2055



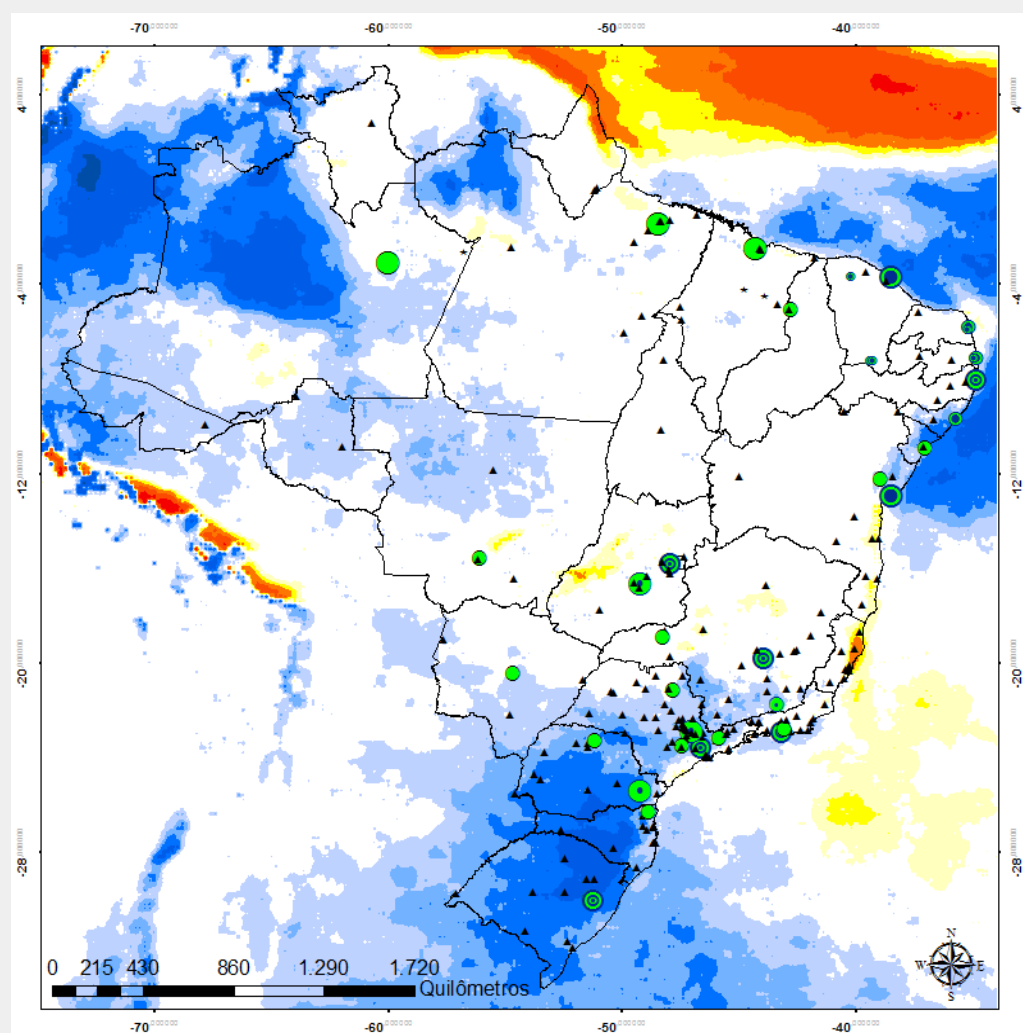
2056-2085



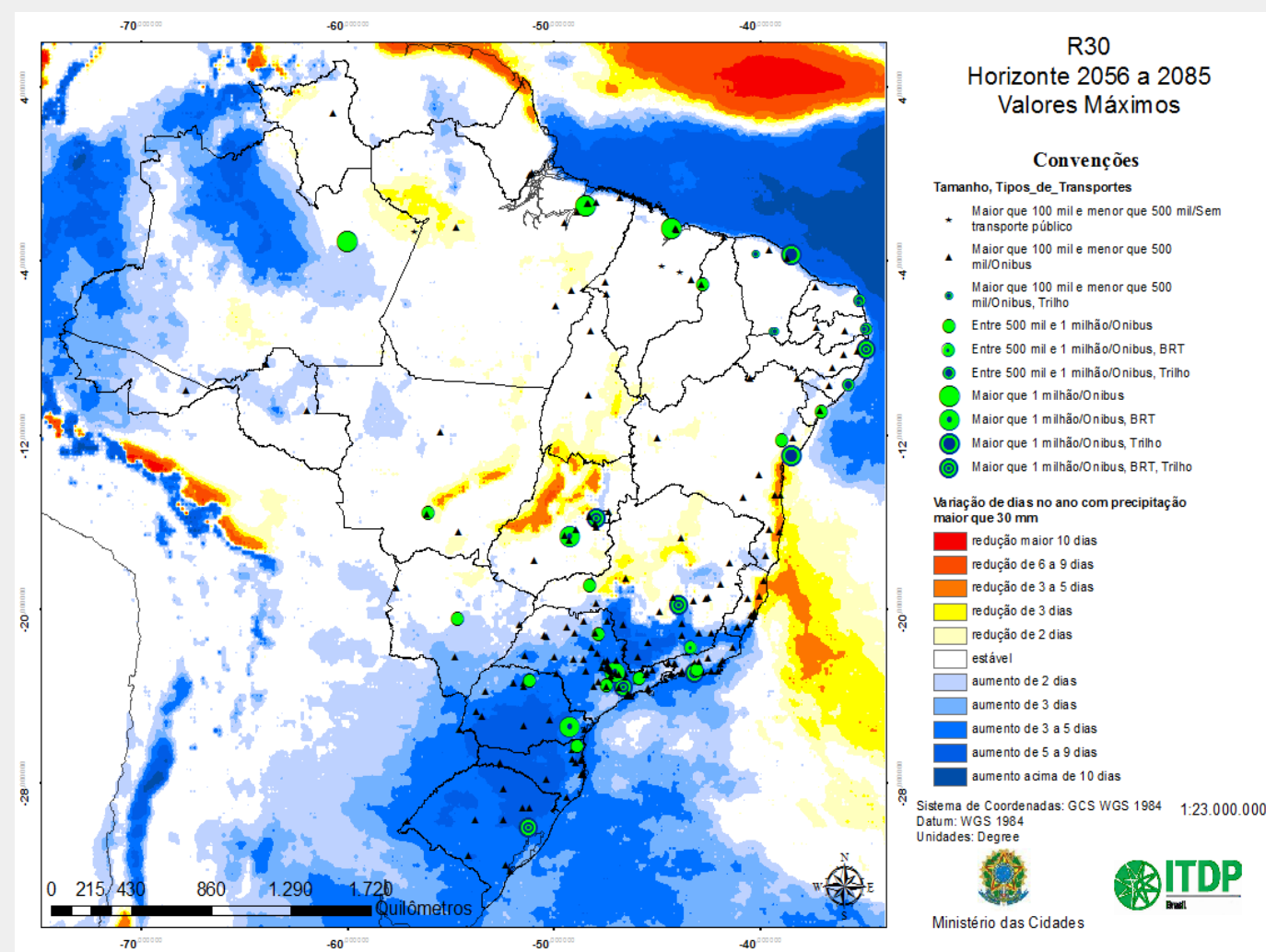
Southern region: 15-20% increase

# Intensification of rainfall in the Southern region

2026-2055



2056-2085

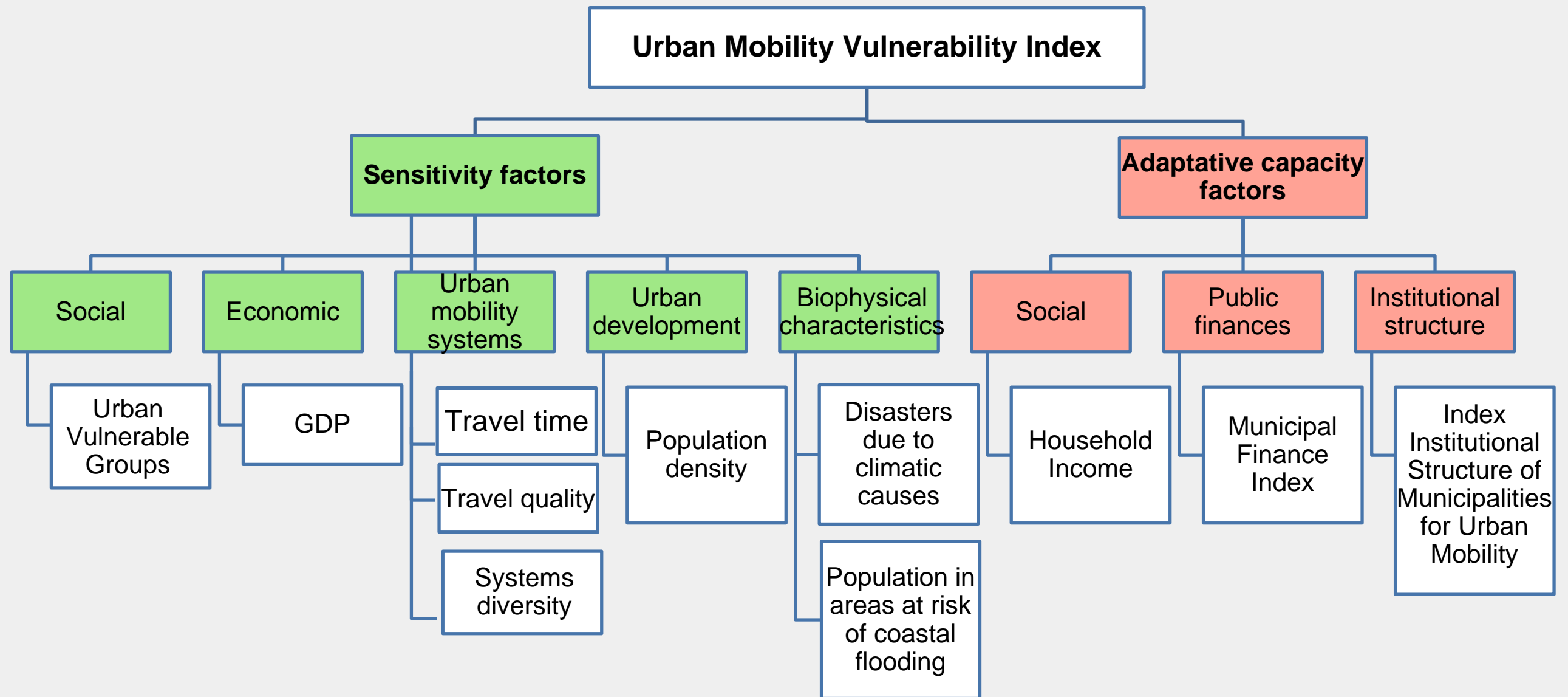


9 extra days of storms per year

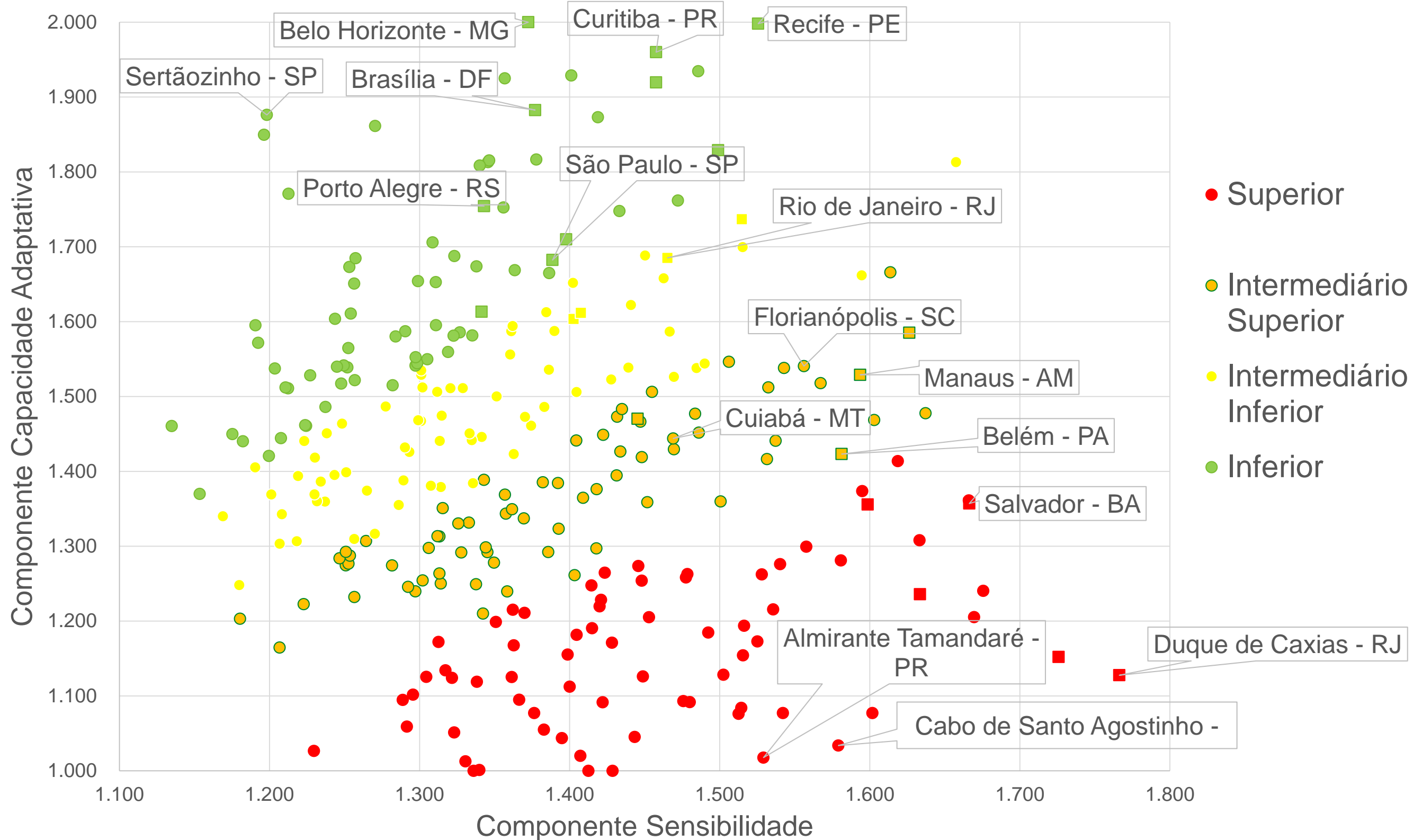


# Assessment of cities' vulnerability to climate change

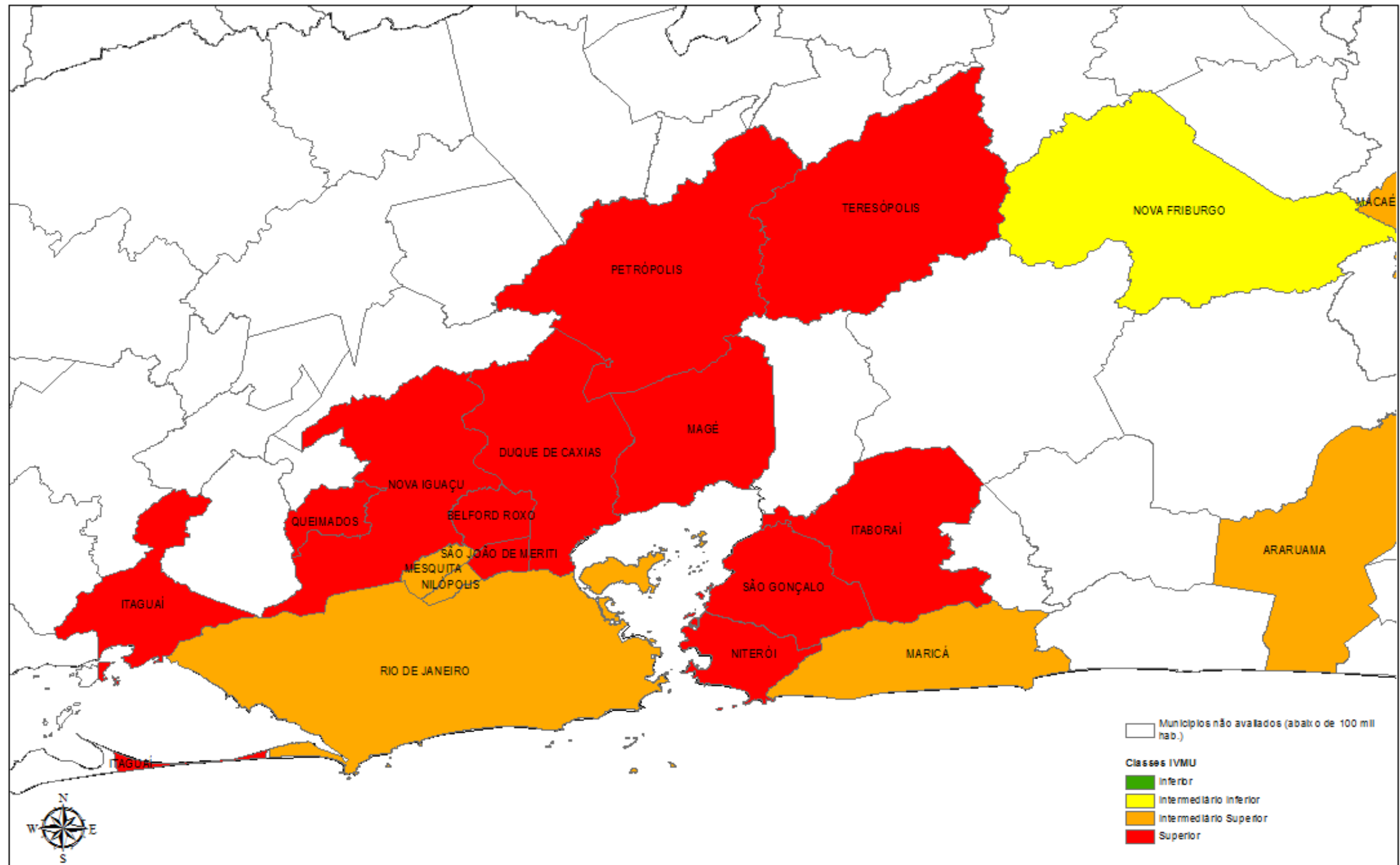
# Urban Mobility Vulnerability Index



# Urban Mobility Vulnerability Index



# Rio de Janeiro: high vulnerability and low capacity to adapt



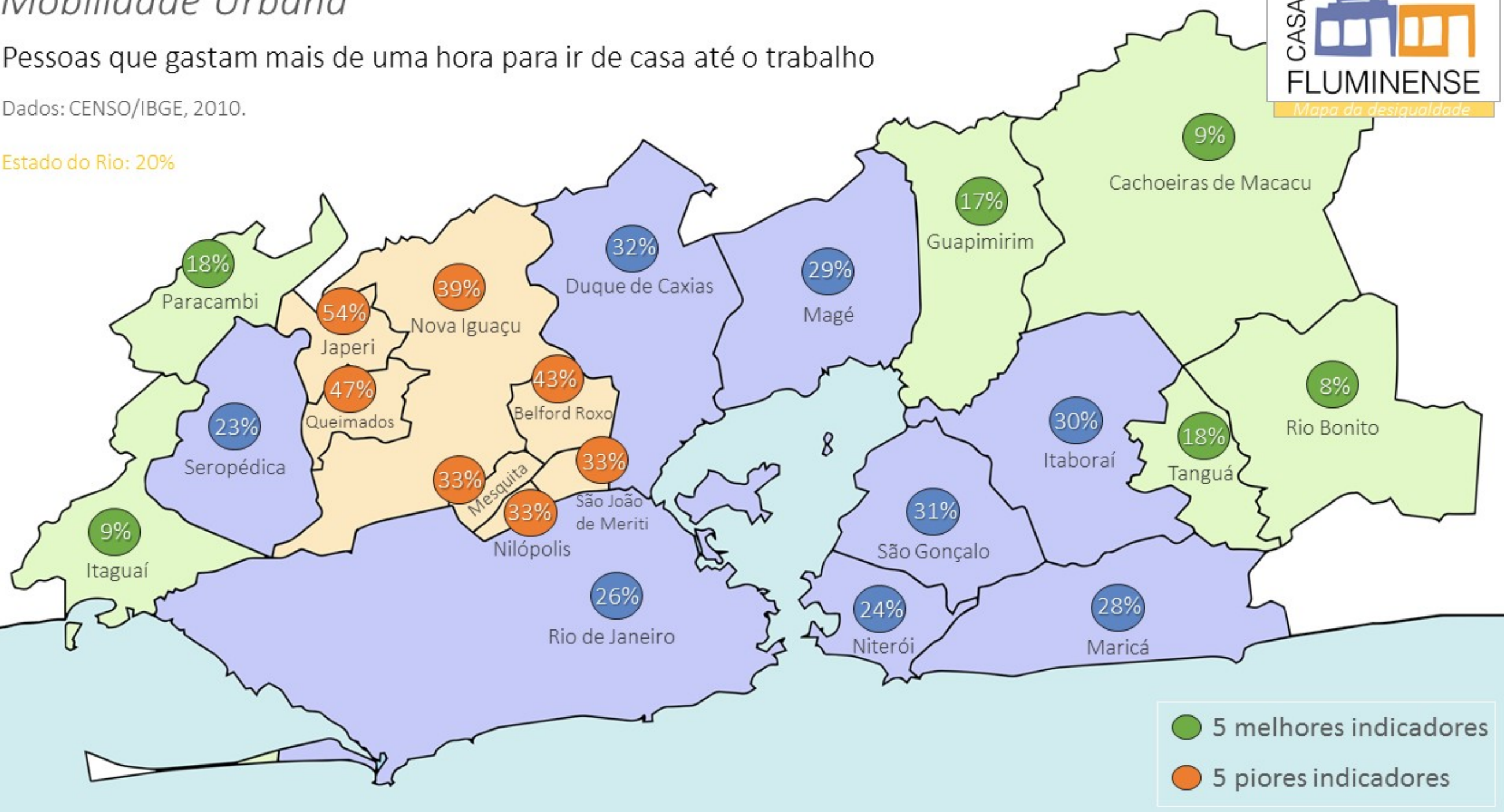
# Rio: high % of residents spend +1 hour day commuting

## Mobilidade Urbana

Pessoas que gastam mais de uma hora para ir de casa até o trabalho

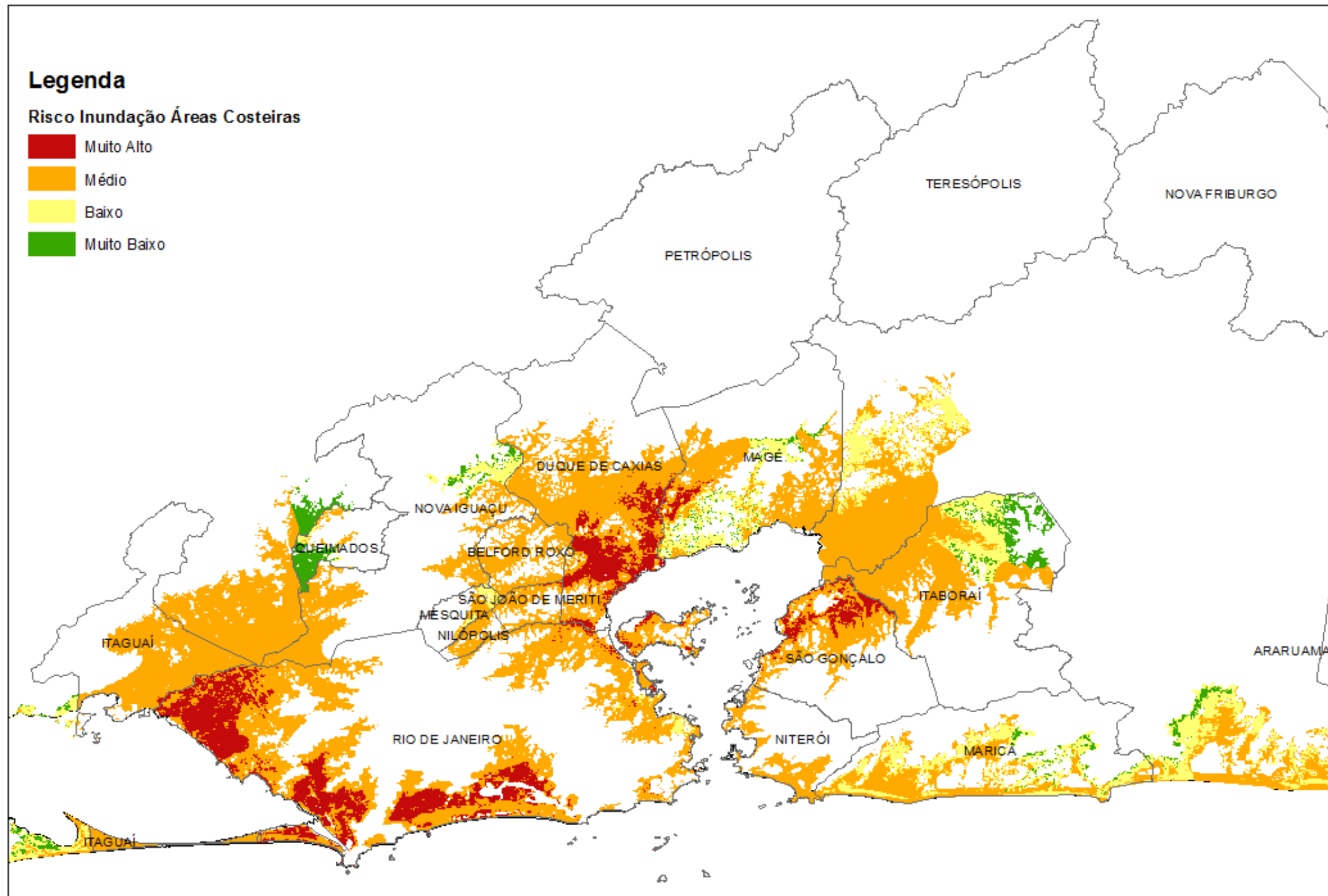
Dados: CENSO/IBGE, 2010.

Estado do Rio: 20%





# Rio: risk of flooding due to sea level rise



# Measures to increase systems' resiliency

# A-S-I Strategy to ensure 2° Celsius scenario

**AVOID**

Reduce or avoid the need to travel –  
**System efficiency**

**SHIFT**

Shift to or maintain share of cleaner modes – **Trip efficiency**

**IMPROVE**

Improve the energy efficiency of transport modes and vehicle technology – **Vehicle efficiency**



# Transit Oriented Development



# Policy and planning

Instruments to mobilize local actors to identify vulnerabilities, ie Mobility Plans and Urban Development Plans.

Metropolitan scale.

Local climate change assessments involving government, private sector (operators), civil society.

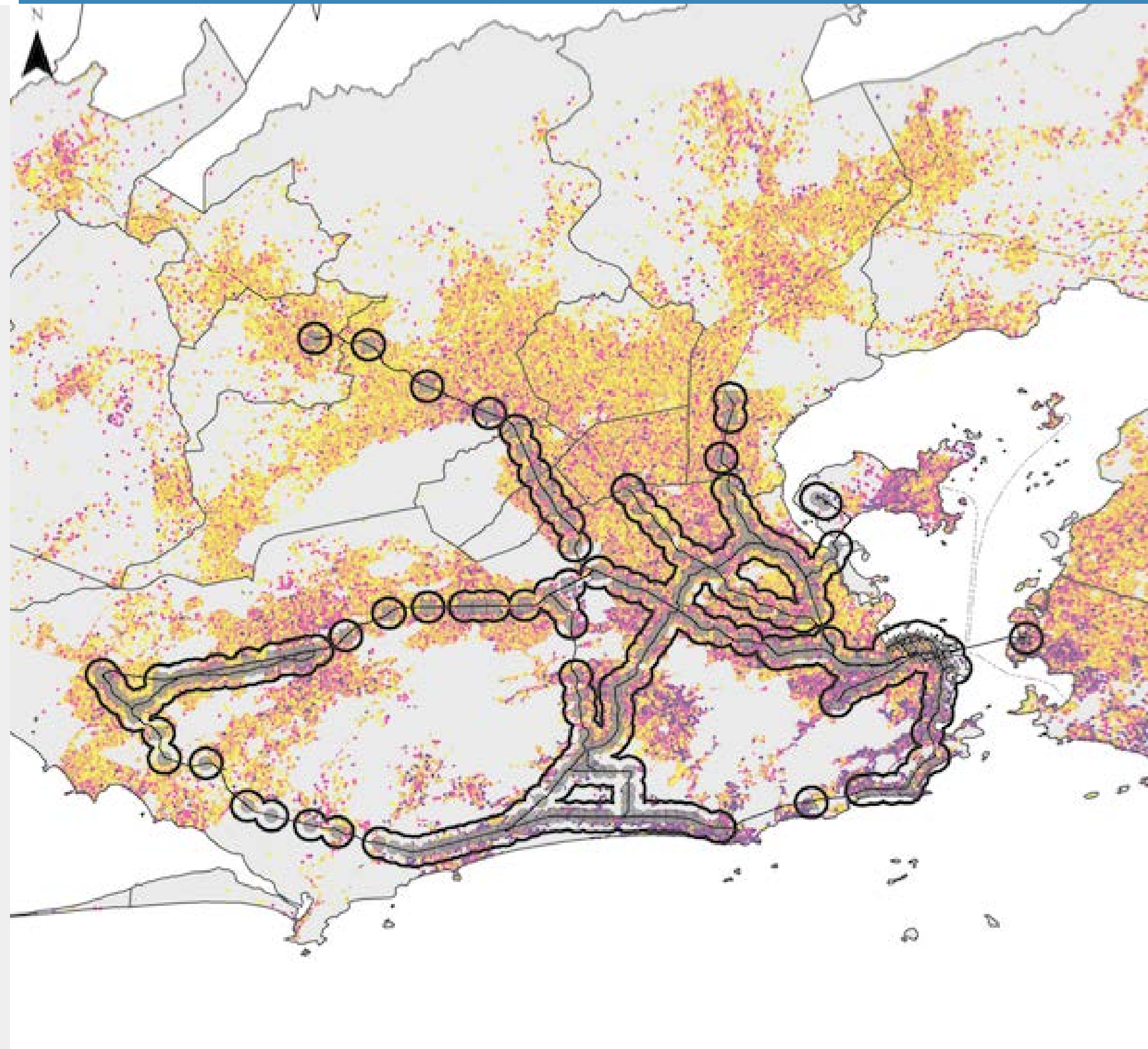
Identification of most vulnerable groups.

Integration to other systems – sanitation and housing.

# Rio: People Near Transit (per income levels)

	2010	2018
City	36%	52%
Metro	23%	31%

	Lower income level	Higher income level
City	46%	66%
Metro	23%	55%



# Infrastructure planning

Assessment of existing infrastructure and service.

Include adaptation measures in the design stage of investments in mobility.

Consider windows of opportunity – less costly and more beneficial:

- renovation of infrastructure systems,
- maintenance cycles,
- review of sectoral plans.

Take advantage of infrastructure maintenance, replacement and improvement processes to incorporate incremental adjustments that adapt infrastructure to new standards.

# Adaptation as part of design stage of new infrastructure

Rio de Janeiro, 2014

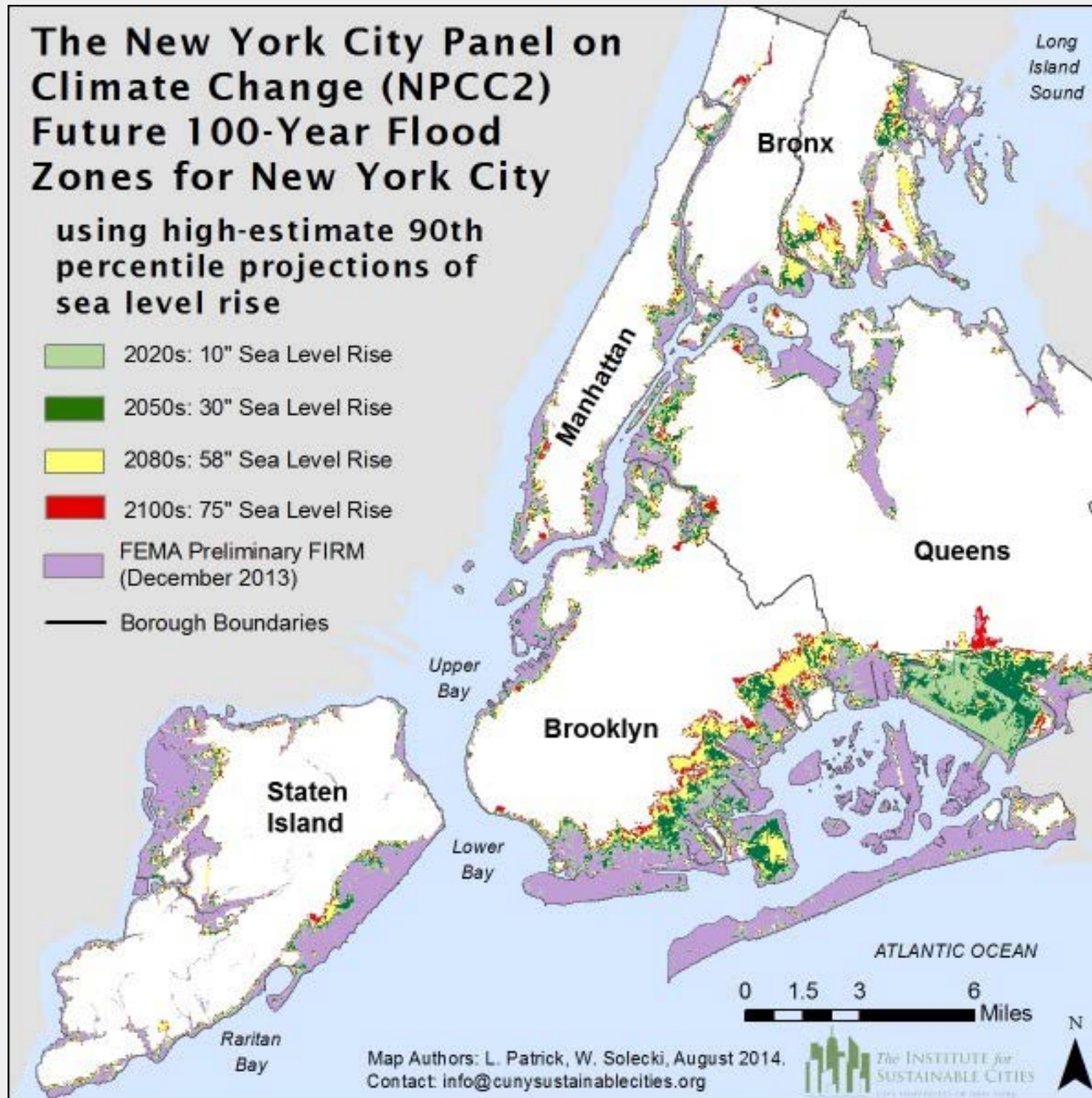


# Adaptation as part of design stage of new infrastructure

Rio de Janeiro, 2016











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Page header: MAYOR OF LONDON LONDONASSEMBLY

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Breadcrumbs: Home > Press Releases > Mayoral > Mayor delivers 100 parks

## Mayor celebrates delivery of 100 pocket parks across London

12 August 2015

A green scheme launched by the Mayor of London Boris Johnson to create 100 new pocket parks in the capital has been so successful there are plans to roll it out across the country.

The Mayor has today confirmed he has delivered his manifesto pledge to create 100 rejuvenated spaces as part of his pocket parks programme in 26 London boroughs.

From a rain garden in Vauxhall to a dinosaur playground in Hornsey and edible gardens along a south London bus route, more than 25 hectares of community land across the capital have been converted into new enhanced green areas, thanks to £2million of funding from the Mayor. This was match-funded from the Boroughs, as well as grants from businesses and trusts.

The programme to transform underused urban spaces across the city into mini oases for Londoners to enjoy has been a roaring success and proposals to develop it nationwide are being considered by the government.

The Mayor of London, Boris Johnson, said: "From what started as a green shoot in 2012, dozens of glorious spaces have sprouted up across almost every corner of the capital, offering an oasis of calm from the hustle and bustle of city life.

"They may have been pocket-sized pieces of previously forgotten land, but they pack a real punch in what they now offer local people, thousands of whom have given up their time to make the capital greener and more resilient. It really underlines London's status as one of the greenest world cities."





# Non-structural measures

Develop strong connections between adaptation planning, disaster risk reduction and sustainable development.

Raise awareness among different constituencies.

Integrate systems and social impact analysis.

Collect, maintain, integrate high-quality data.



# Thank You

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