# Rio de Janeiro, Brazil

In its History, Shocks and Stresses, Favelas, and Resiliency

Adina S. Banayan

## Climate

South America, Brazil

Sunny 65 - 92 F

Tropical Rainstorms

## Topography

South Atlantic Ocean

Guanabara Bay

Lagoon

Mountains

## Culture

Positive

Energetic

Carnival Festivals

## Demographics

6.45 Million in 2016

47% Identify as Mixed Race
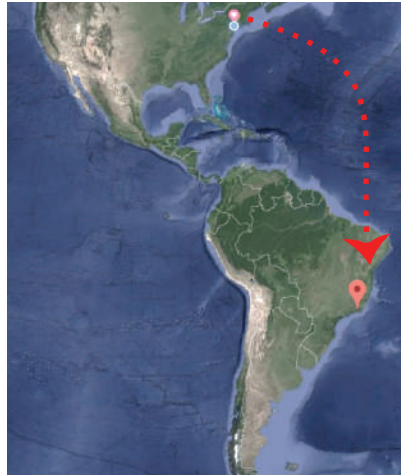
8% Identify as Black

# Characteristics

Rio de Janeiro

## Climate

South America, Brazil

Sunny 65  - 92  F

Tropical Rainstorms  58"- 78"
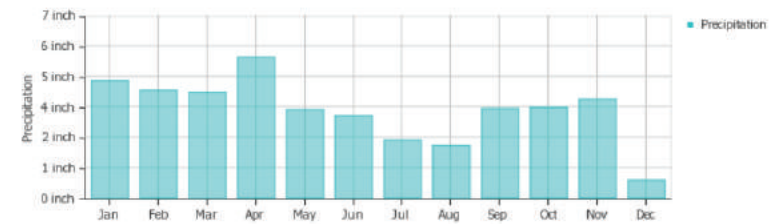
## Topography

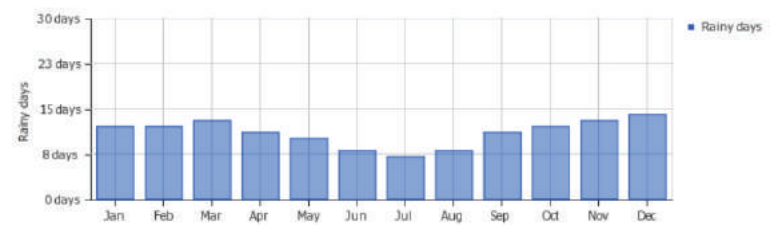South Atlantic Ocean

Guanabara Bay

Lagoon

Mountains

Rio de Janeiro

Average precipitation (rain/snow) in Rio de Janeiro, Brazil   Copyright © 2016 www.weather-and-climate.com

Average rainy days (rain/snow) in Rio de Janeiro, Brazil   Copyright © 2016 www.weather-and-climate.com

Average monthly sunhours in Rio de Janeiro, Brazil   Copyright © 2016 www.weather-and-climate.com
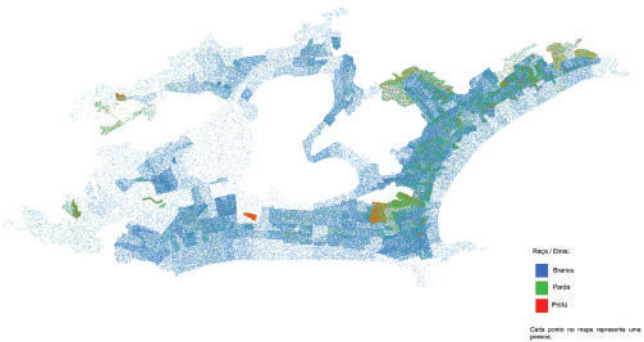
Rio de Janeiro

## Culture

Positive

Energetic

Carnival Festivals







**Ethnicity**



| | | |
|---|---|---|
| American Indian/Alaskan Native | 2% | |
| Asian | 4% | |
| Black/African American | 11% | |
| Hispanic/Latino | 17% | |
| Not Specified | 8% | |
| White | 58% | |



### Main ethnic groups in Brazil



| Indian | — | White | — | Black | — | Yellow (Mongoloid Asian) |
|---|---|---|---|---|---|---|

Pardo (Mixed-race)

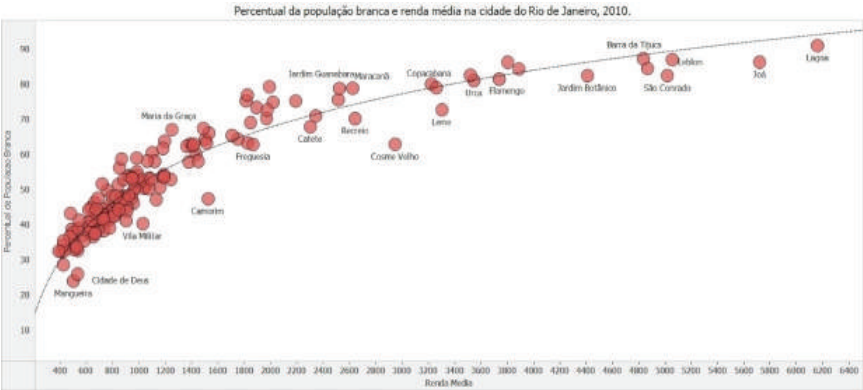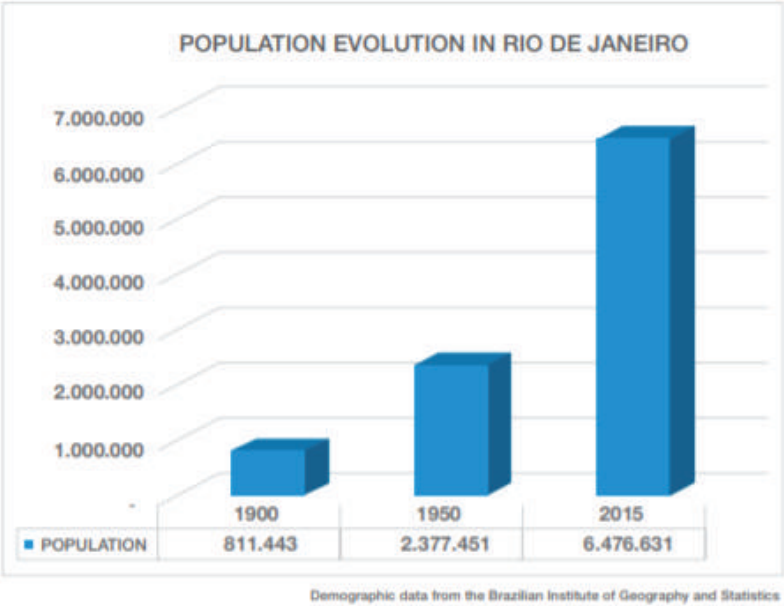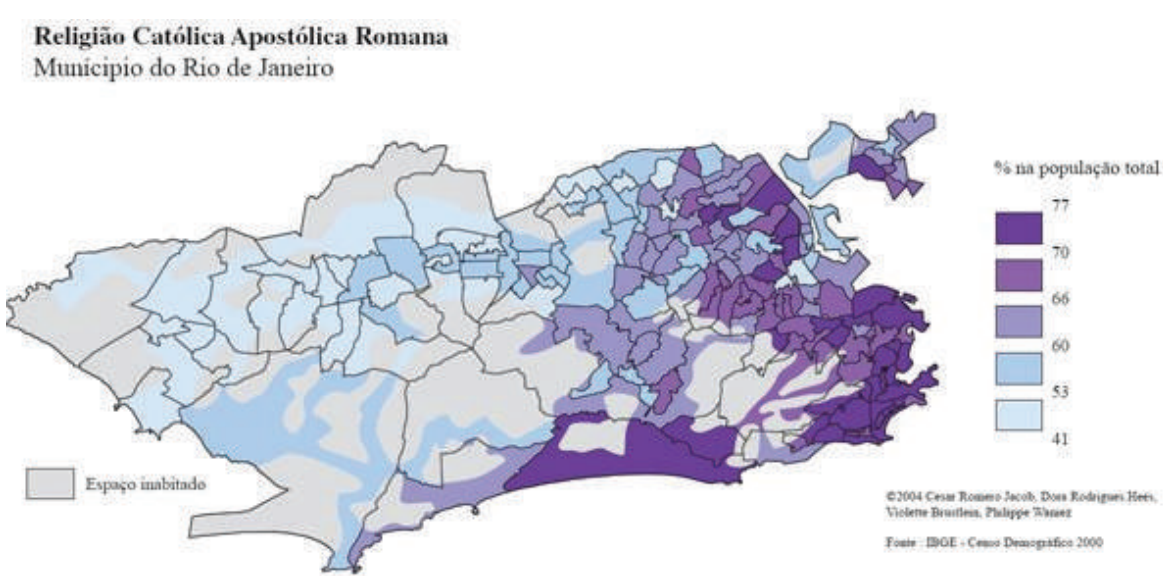| Mulatto | Cafuzo | Caboclo (Mamluk) | Juçara | Ainocô |
|---|---|---|---|---|
| Black + White | Black + Indian | White + Indian | Black + Indian + White | White + Japanese |



Rio de Janeiro

## Demographics

6.45 Million in 2016

**Population Centers – Brazil** 176,274,000

**(POPULATIONS FROM 2000 CENSUS)**

| Name | Population | Name | Population |
|---|---|---|---|
| São Paulo | 10,057,700 | Curitiba | 1,642,300 |
| Rio de Janeiro | 6,029,300 | Manaus | 1,524,600 |
| Salvador | 2,539,500 | Recife | 1,464,100 |
| Belo Horizonte | 2,307,800 | Pôrto Alegre | 1,355,100 |
| Fortaleza | 2,230,800 | Belém | 1,344,900 |
| Brasília (capital) | 2,089,500 | Goiânia | 1,132,600 |

**SOURCE:** Instituto Brasileiro de Geografia e Estatística (IBGE— Brazilian Institute of Geography and Statistics).

**Religião Católica Apostólica Romana**
Município do Rio de Janeiro



% na população total
77
70
66
60
53
41

Espaço inabitado

©2004 Cesar Romero Jacob, Dora Rodrigues Heés, Violette Brustlein, Philippe Waniez

Fonte: IBGE - Censo Demográfico 2000

### POPULATION EVOLUTION IN RIO DE JANEIRO



| | 1900 | 1950 | 2015 |
|---|---|---|---|
| POPULATION | 811.443 | 2.377.451 | 6.476.631 |

Demographic data from the Brazilian Institute of Geography and Statistics

Percentual da população branca e renda média na cidade do Rio de Janeiro, 2010.



Rio de Janeiro

### Indigenous Brazilians

### Portuguese Colony

### Guanabara Bay
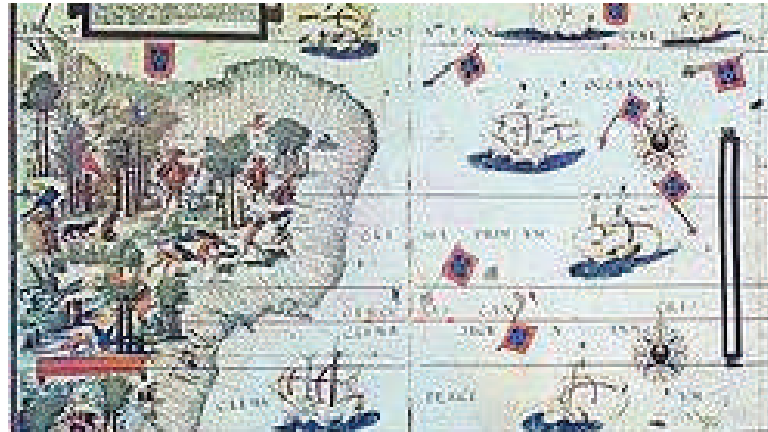
Tupi
Puri
Botocudo
and Maxakali Peoples

Portuguese navigators discovered Rio in January 1502.
They mistook Guanabara Bay for a river and named it:
"January River" = Rio de Janeiro.
The city was founded in 1565.

This became a very active major trading port for Rio's economy.
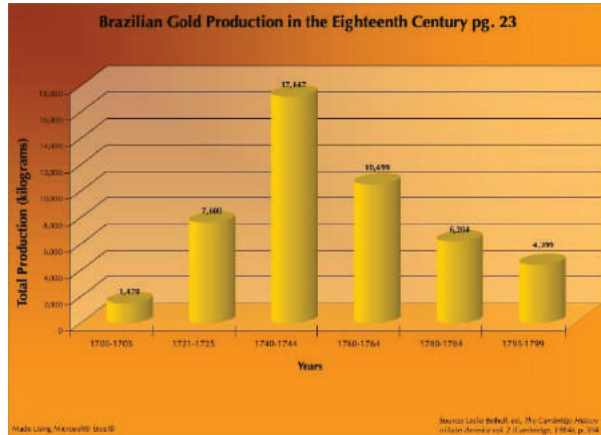For Sugar, Gold, Diamonds... and Slaves.

# History

They mistook Guanabara Bay for a river and named it:
"January River" = Rio de Janeiro

Rio de Janeiro

### All for Riches and Sugar



### A Nation of Slaves



### Independance of Brazil

In the late 17th Century, Bandeirantes discovered gold and diamonds in addition to the sugar in Rio. This made Rio more appealing that the capital of the time. The city grew to 8,000 inhabitants, two thirds who were probably African slaves or Indians.
On 1763 the capital of Brazil was moved from Salvador to Rio.

Between 1532 - 1888, Brazil imported over 5 MILLION enslaved Africans- more than any other country in world history during the Atlantic Slave Trade. Rio de Janeiro's port, the largest port of slaves in the Americas, imported 5 Million slaves. In 1888, Brazil was the last country to abolish slavery.

In 1822, Brazil declares independance from Portuagal, who has neglected progressing the city. The Brazilians start to think og Urban Renovation.

Rio de Janeiro

# PROGRESS OF RIO FROM 1822 UNTIL 1900



Independance of Brazil

In 1829, oxcart traffic was banned from the Rua do Ouvidor, then the city's most elegant street.

In 1838, the first public transportation—horse-drawn buses—began to run to the districts of São Cristóvão, Engenho Velho, and Botafogo.

In 1868, the first tramcars, also drawn by animals, were introduced.

In 1835, a steamboat service to Niterói began to operate.

In 1852-8, the first railroad was built to Petrópolis, and a line reached Queimados in the Nova Iguaçú area.

In 1854, gas replaced oil for street lighting, and wireless telegraphy was inaugurated.
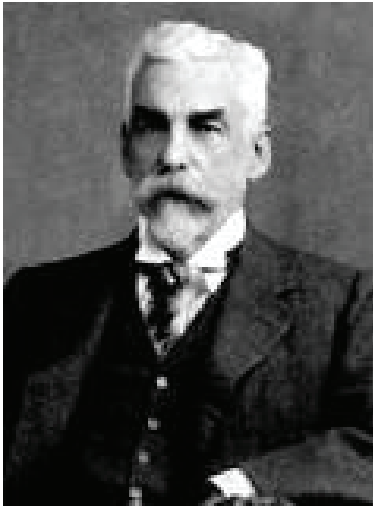
In 1864, a sewage system was installed.

In 1877, telephone service began.

In 1889, the government in Brazil switches from a Monarchy to a Republic!



Rio de Janeiro

Francisco Pereira Passos
Engineer
Mayor of Rio



Largo da Glória, flanked by Avenida Beira-Mar, circa 1913. In the center of the square sits a monument to Pedro Álvares Cabral, dated 1900. At left rises the City Improvements chimney, inaugurated in 1884.



Fig. 1.4  Project of construction and pavement of streets for the area that was formed from the excavation of Castelo hill and for the land filled area from Glória up to Ponta do Calabouço, according to the proposal of a committee of engineers and architects appointed by the mayor of Rio de Janeiro, Carlos Sampaio, 1920–1922

From 1902 to 1906:
A team of administrators and technicians drained swamps, cleared slums, paved and widened streets, and markedly improved health conditions, notably by reducing cases of yellow fever and smallpox.  (Haussmann Style)
The central avenue (called Avenida Rio Branco from 1912), still the most important of the Centre, was opened during that period; Avenida Beira-Mar, running parallel to part of the south shore, was built on reclaimed land; and several other important avenues were opened.

Rio de Janeiro

Expsição Nacional de 1908 RIO DE JANEIRO — Palacio dos Estados.

This building at Praia da Saudade, on present-day Avenida Pasteur, already stood and served as a military academy. During the National Fair it housed the Palácio dos Estados and, afterward, the Ministry of Agriculture. Nowadays it is the Museu de Ciências da Terra, and is the only construction remaining from that memorable event.



Exposição Nacional de 1908 RIO DE JANEIRO

Visitors stroll on the Cais da Urca, where fireworks were set off during the festivities of the 1908 National Fair.
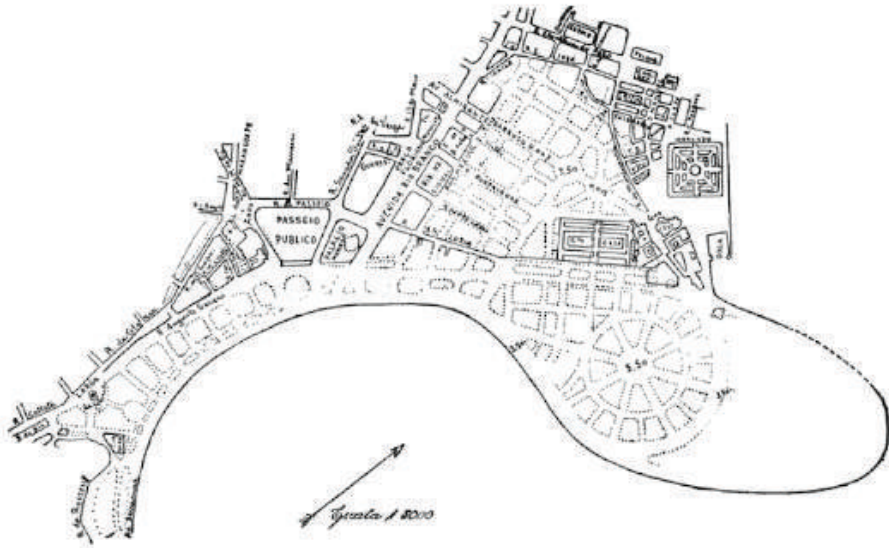
31

**Fig. 1.4** Project of construction and pavement of streets for the area that was formed from the excavation of Castelo hill and for the land filled area from Glória up to Ponta do Calabouço, according to the proposal of a committee of engineers and architects appointed by the mayor of Rio de Janeiro, Carlos Sampaio, 1920–1922

Modernizing the Port of Rio de Janiero, and beginging the construction of the Municipal Theater.
Water systems with aqueducts.
Sewage systems.
Street Infrastructure.



Fig. 3. Aqueduct bringing water to the city from Corcovado Mountain in the last decade of the nineteenth century. Photograph by Marc Ferrez. Jennings Hoffenberg

Rio de Janeiro

# PROGRESS OF RIO FROM 1902 UNTIL 2012
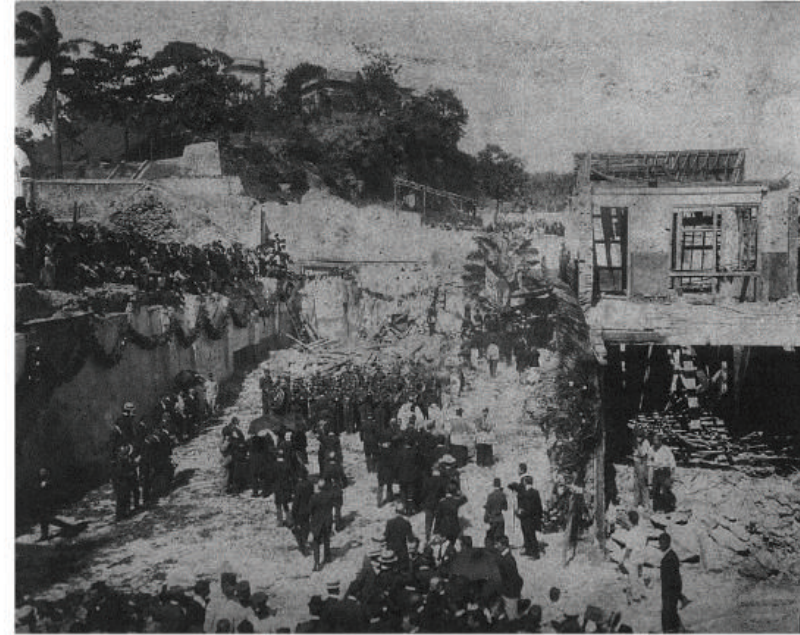


Fig. 5. Ceremony opening the demolition of São Bento Hill for the construction of Avenida Central (now Rio Branco), 1904. Photograph by Marc Ferrez, Jennings Hoffenberg Collection.

1960:Capital move to Brasila

1992: UN meeting

2012: Conference on Sustainable Development

Despite improvements in sanitation and urban development, Passos's plan neglected where the people who lived in these buildings were going to move to. This was one of the causes of the formation of Favelas.

Rio de Janeiro

Renovated Port Maravilha (wonder)

Museum of Tomorrow (Calatrava)

Museum of Art in Rio

Demolish "highway" for underground tunnel, eliminates crime that was happing under the bridge

New Metro Line

# Olympic Renovations 2016

Rio de Janeiro

## Rio de Janeiro
rede de transporte público

SuperVia · Trens Urbanos
Metrô
METRÔRIO
VLT
VLT Carioca · Light Rail Transit
BRT Rio – Bus Rapid Transit
Linhas de Ônibus Expresso
Metrô de Superfície
Barcas
Bonde de Santa Teresa

BRT TransBrasil
VLT Carioca
Porto Maravilha
Samboromba
Bonde de Santa Teresa
Jardim Zoológico
SuperVia
Metrô 2
Metrô 1
Linha Paracambi da SuperVia
Linha Japeri da SuperVia
Linha Saracuruna da SuperVia
Linha Belford Roxo da SuperVia
Linha Santa Cruz da SuperVia
Linha Deodoro da SuperVia
Linha Guapimirim da SuperVia
Linha Vila Inhomirim da SuperVia

Trem do Corcovado
Jardim Botânico
Metrô 1
Metrô 1 & 2
Metrô 4
BRT TransOeste
BRT TransCarioca
BRT TransOlímpica
BRT TransBrasil
Museu de Arte Contemporânea
Maracanã
Parque Natural Municipal
Parque Estadual da Pedra Branca
Parque Florestal da Tijuca
Vista Chinesa

Baía de Guanabara
Baía de Sepetiba
Oceano Atlântico

Metrô
**Linha 1**
Subway Line 1

Metrô
**Linha 2**
Subway Line 2

Metrô
**Linha 4**
Subway Line 4

Metrô + Ônibus
**Metrô Na Superfície**
Subway + Subway Bus

Estação de Integração com a
**SuperVia**
Interchange with SuperVia Trains

Metrô + Ônibus Expresso
**Integração**
Subway + City Bus

**BRT TransCarioca**
BRT Bus

**BRT TransOeste**
BRT Bus

SuperVia
Pavuna
Eng. Rubens Paiva
Acari/Fazenda Botafogo
Coelho Neto
Colégio
Irajá
Vicente de Carvalho
Ônibus BRT
Thomaz Coelho
Engenho da Rainha
Inhaúma
Jacarepaguá Barra Fundão
Nova América/ Del Castilho
Maria da Graça
Triagem
SuperVia
Maracanã
SuperVia
Uruguai
Saens Peña
São Fco. Xavier
Usina Muda Andaraí Grajaú
Méier Vila Isabel
São Cristóvão
Cidade Nova
SuperVia
Pres. Vargas
Central
Uruguaiana
Carioca
Praça Onze
Estácio
Afonso Pena
Rodoviária São Cristóvão/Caju
Cinelândia
Glória
Catete
Cosme Velho
Largo do Machado
Flamengo
Botafogo
Metrô Na Superfície Urca
Cardeal Arcoverde
Siqueira Campos
Cantagalo
General Osório
Metrô Na Superfície Barra
Copacabana

Marquês de São Vicente
Baixo Gávea
Hosp. da Lagoa
Humaitá
Jardim Botânico
Maria Angélica
Cobal do Humaitá
PUC
Bartolomeu Mitre
Alto Leblon
Afrânio de Melo Franco
Nossa Sra. da Paz
Baixo Leblon
Antero de Quental
Anibal de Mendonça
Vinícius de Moraes

Ônibus BRT
São Conrado
Jardim de Alah
Jardim Oceânico
Antero de Quental
N. Sra. da Paz

┌ Rio de Janeiro

Intense Rainfall

Sea Level Rising

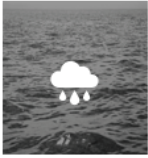Flooding and Landslides
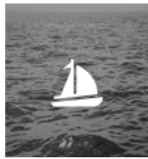
Poor Sanitation

Industrial Waste

# Problem 1: Water

## Let's Talk about Flooding:

Severe Flooding Causes:

1) Feb-March rainstorms up to 78"

2) Sea level rising 1.5' - 5'

3) Mountain water

3) and a poor drainage system

Intense Rainfall

Sea Level Rising

Flooding and Landslides

Rio de Janeiro

## 1966 Flash Flood

In Rio de Janeiro, Brazil, more than 10 inches of rain falls in 12 hours on this day in 1966, causing a flash flood. Four hundred people were killed and 50,000 needed to be evacuated due to the sudden influx of water

The first to suffer from the flash flood were the hillside shack dwellers. The water caused several mudslides that collapsed many homes. Scores of victims were buried and crushed by mud and debris. Within a day, however, nearly the entire city of Rio was feeling the effects of the flood. The Marcano River rose seven feet above flood level and nearly half the city lost power and water. The high-rise buildings were flooded and some lost their access completely, as mud and debris blocked the entrances.
The official death toll was an estimated 400 people, making this one of the worst flood disasters in Brazil's history.

**400 people dead**
**50,000 people needed to evacuate**

## 2011 Flash Flood

In the 24-hr perioed between 11 and 12 of January 2011, the local weather service registered more rainfall that what is expected for an entire month. Flooding of many areas in the region followed immediately. The diaster caused a widespread property damage and supple of public utlities such as electricity, running water and phone lines were affected. Around 2960 people had their homes destroyed.

**903 people dead**
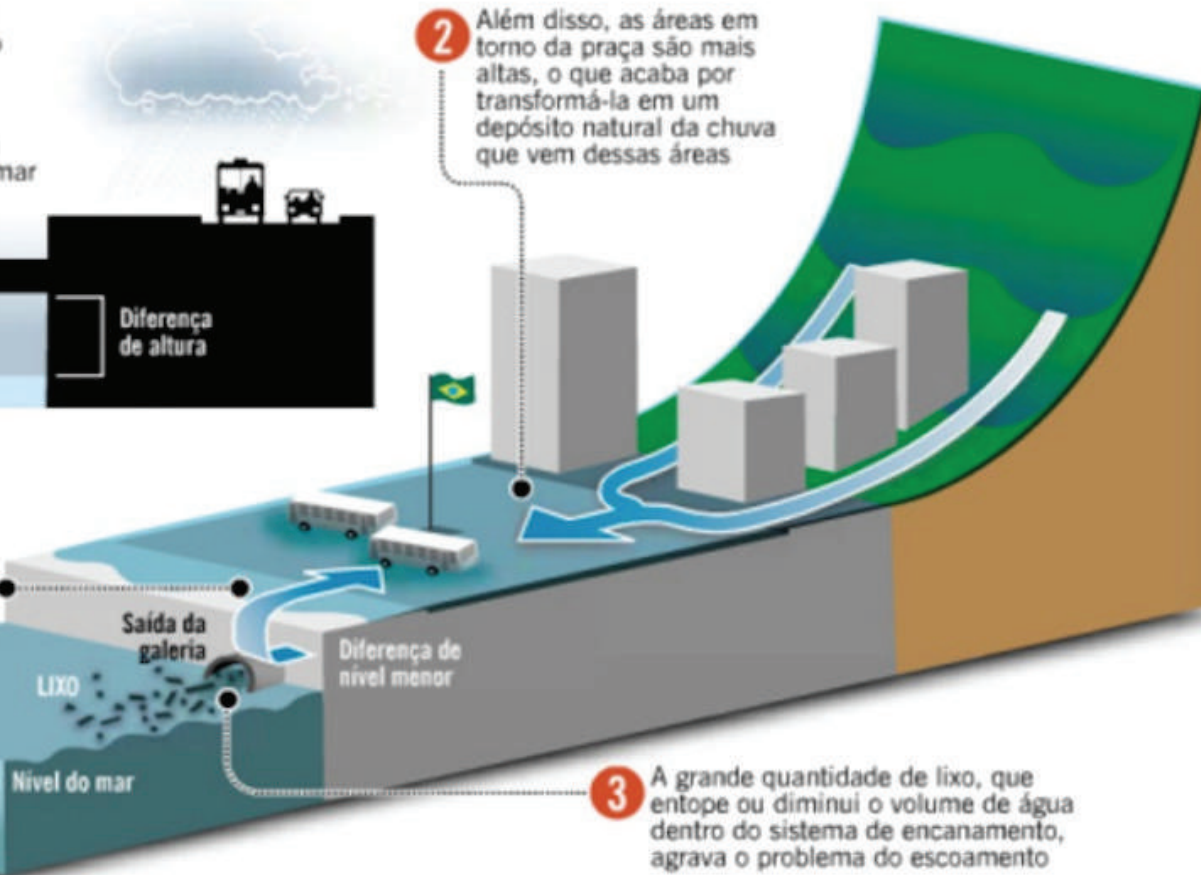**2960 homes destroyed**



Rio de Janeiro

# Why is it so bad?

## POR QUE A REGIÃO ALAGA

Na maior parte da cidade, o nível das ruas é bem mais alto que o do mar, para onde é escoada a água das chuvas.

Com a diferença da altura, a saída das galerias pluvias joga água no mar em quantidade suficiente para permitir um rápido escoamento.

**Saída da galeria**

**Diferença de altura**

Nível do mar

**2** Além disso, as áreas em torno da praça são mais altas, o que acaba por transformá-la em um depósito natural da chuva que vem dessas áreas

**1** Na Praça da Bandeira, como o nível médio das ruas é um pouco mais alto do que o mar, o escoamento é mais lento. O volume de água que inunda a praça é maior que a vazão

**Saída da galeria**

LIXO

Nível do mar

**Diferença de nível menor**

**3** A grande quantidade de lixo, que entope ou diminui o volume de água dentro do sistema de encanamento, agrava o problema do escoamento

Severe Flooding Causes:

1) Feb-March rainstorms up to 78"

2) Sea level rising 1.5' - 5'

3) Mountain water

3) and a poor drainage system

**The Poor Drainage Sytem:**

System is not equipped for so much water to drain at one shot.
Rainwater to gutters which go back to body of water like lagoon, or bay.
It is not allowed to be mixed with the sewage system to preserve the grey water.
Sounds great and all but these waters are polluted so the grey water is not being perserved.

Rio de Janeiro

# Poor Sanitation
## +
## A Broken Sewage System



**Poor Sanitation**

In the city of Rio, 57% of people have access to the complete cycle of basic sanitation. The unequal access to sanitation causes various impacts in public health, increasing the number of infectious diseases, including those transmitted by Aedes aegypti, and infant mortality.









The Sewage System: Cedae, was continuously progressing until the games.
Don't see the sewage system: under ground- under polititions problems!
Now, instead of making a better sewage system, the goverment makes new developers pay for the new system to connect to the old one.

Rio de Janeiro

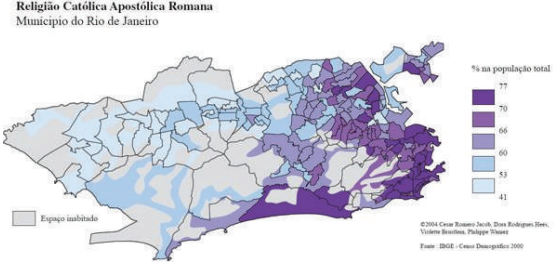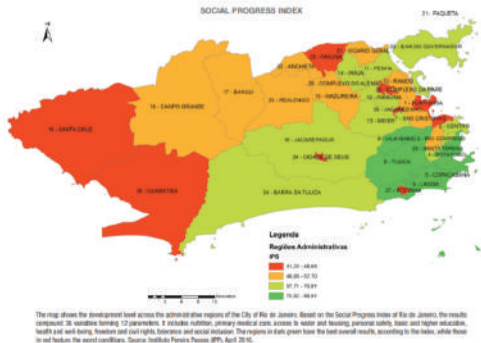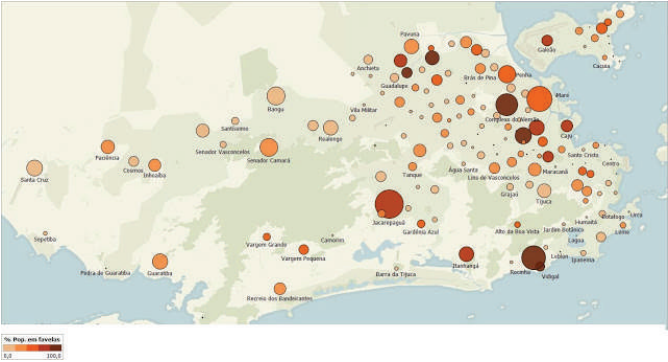Industrial Waste







**Key Threats**

→ Trash

→ Sewage

☣ Pathogens

◆ Toxins

In the 70's-80's Industrial waste was being thrown into the water with the rainwater. Now illegal, but not controlled.

Rio de Janeiro

Urban Inequality
and Poverty

Overpopulation

Segregation

# Problem 2: Security

Religião Católica Apostólica Romana
Município do Rio de Janeiro
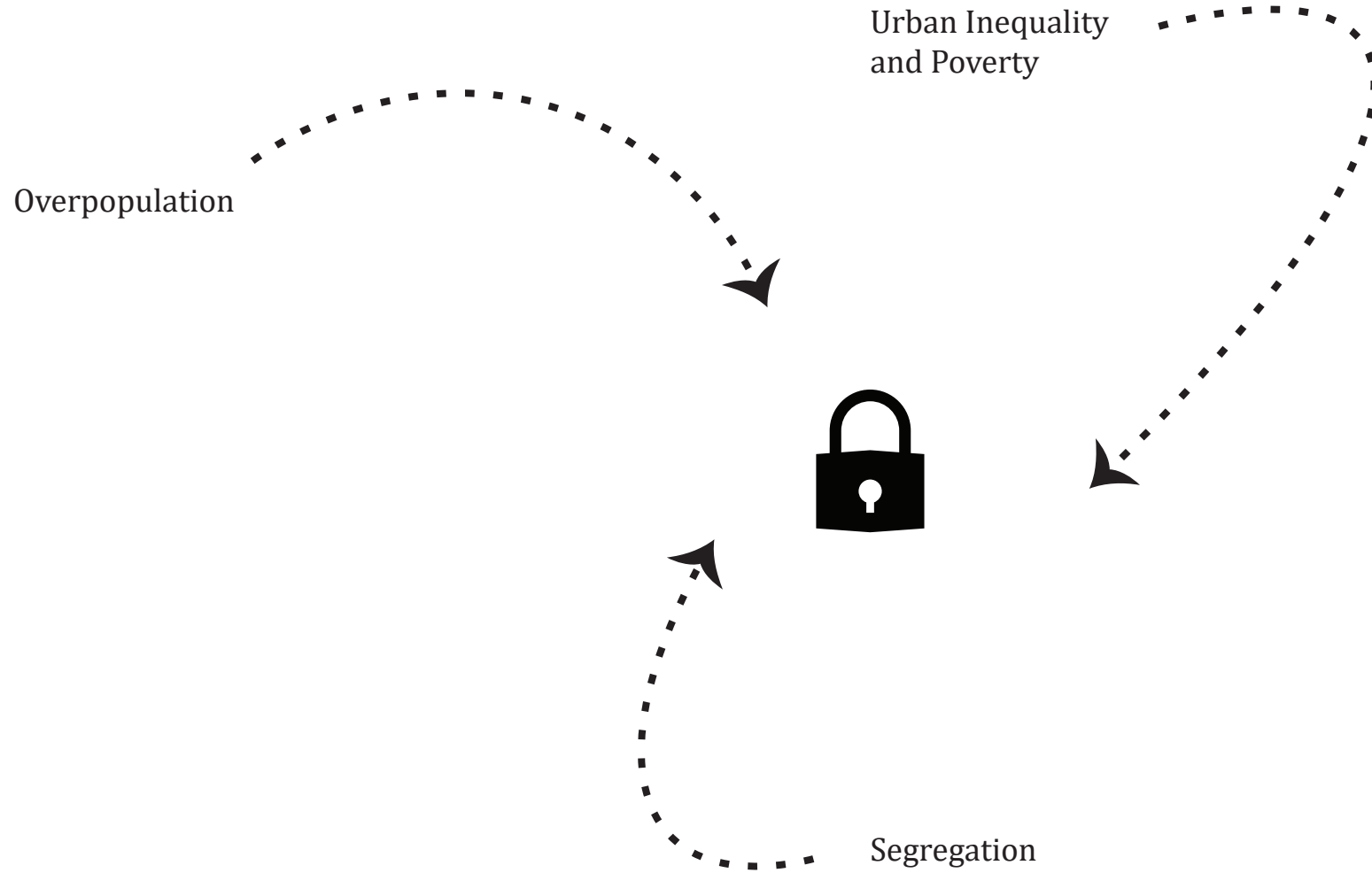


From 1950 to 1980 the number of people living in favelas in Rio de Janeiro alone increased from about 170,000 to more than 600,000, and by the early 21st century it was estimated that there were as many as **1,000 favelas** there. According to the 2010 census, 6 percent of Brazil's total population lived in favelas.

http://catcomm.org/what-is-a-favela/

https://youtu.be/c3BRTlHFpBU

# Favelas

Rio de Janeiro

HIgh crime areas

Crossfires between gang rivals

Goverment Negect: No Public Infrastructure

No police protection/ police brutality

Not secure home/ land

Lack of Saftey
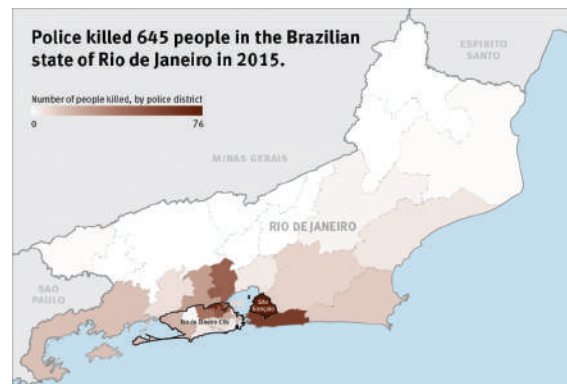
Poor to No Education System

Solution? Better Education
Public School Systems
1 Teaher per 60 kids, Limited Space
Teachers on strike for 6 months

Police killed 645 people in the Brazilian state of Rio de Janeiro in 2015.

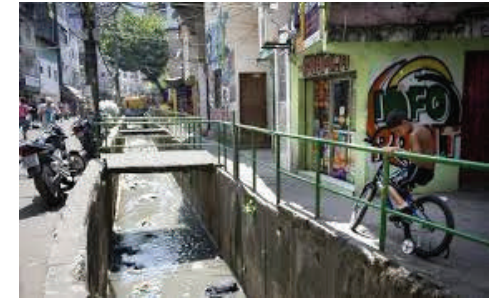Number of people killed, by police district

0 — 76

Rio de Janeiro

Strong Sense of Community

Gato Net: "Stealing" wifi, phone, electricity, water

Self-Made: Sewage and Housing

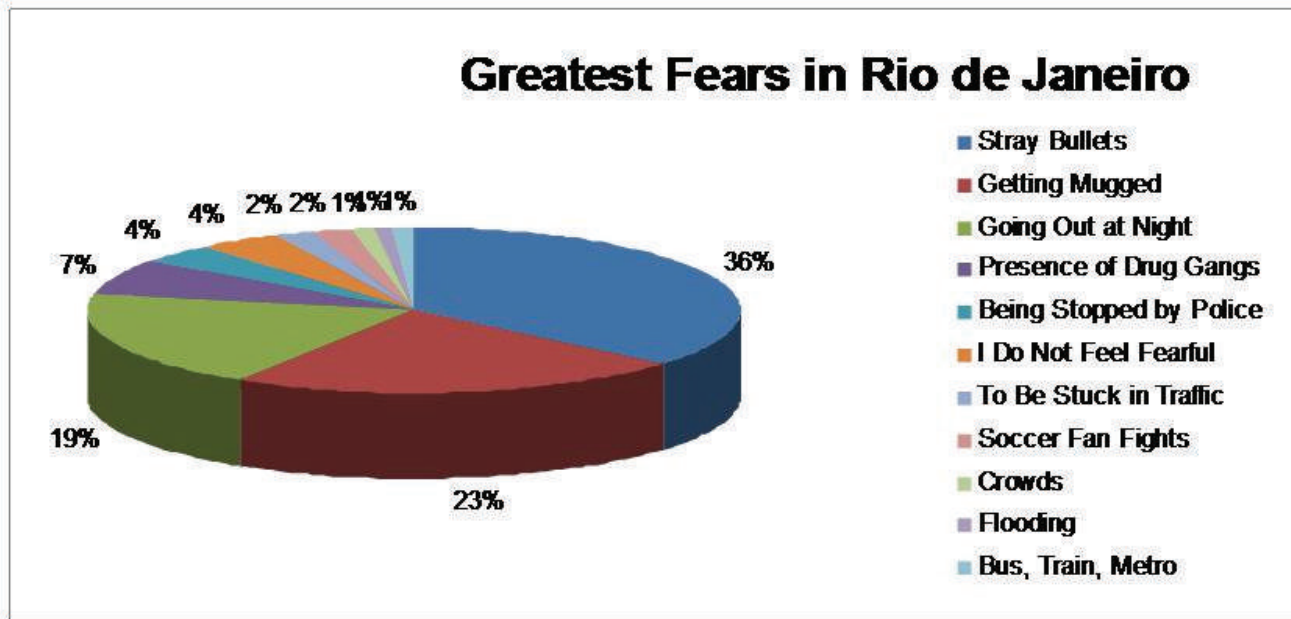Organic growth

Safety: "Banks in Favelas were not being robbed."



Rio de Janeiro

Security from the favelas or for the favelas?

"Drive car, stop at a red light, shot."

"Everyone has a story about being mugged."

## Homicides in Rio de Janeiro (2018)

■ Total homicides  ■ Homicides linked to police intervention

0     200     400     600     800

Feb/Mar 2018
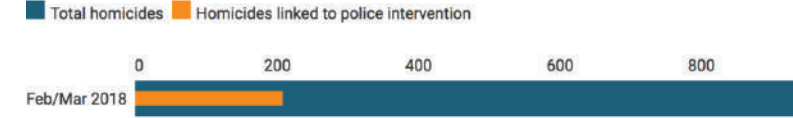
Chart: The Brazilian Report • Source: Institute for Public Security • Get the data

## Greatest Fears in Rio de Janeiro

- ■ Stray Bullets
- ■ Getting Mugged
- ■ Going Out at Night
- ■ Presence of Drug Gangs
- ■ Being Stopped by Police
- ■ I Do Not Feel Fearful
- ■ To Be Stuck in Traffic
- ■ Soccer Fan Fights
- ■ Crowds
- ■ Flooding
- ■ Bus, Train, Metro

36%  23%  19%  7%  4%  4%  2%  2%  1%  1%  1%

## No more good news

Rio de Janeiro, deaths per 100,000 people

Murders — State, City
Killings by police — City, State

2000 02 04 06 08 10 12 14 16

Source: Institute of Public Safety

Economist.com

Rio de Janeiro

# What are the people doing?

Catalyic Communities:
Helping favelas (more than 50% of Rio) with group meetings, fundings, housing material, community centers, and sanitation

"mutirao" = Mutual Collaboration

PreparaNem: education with meals and transportation for classes. Teachers are volunteers.

Activist of the Lanndless Movement (MST)
Terra Crioula "Creole Land" is a "space for small scale farming collectives to sell their produce while bringing urban dwellers closer to the struggle for land reform."

Casa Brota "Sprout House" provides a "space for entrepreneurs to work in the heart of one of Rio's largest favela complexes"
Workshops, poetry slam, talks, crypto currencies, nutrition, self care

Staying Safe: Fogo Cruzado "is a collaborative data lab that brings together inofrmation to create a map of gunfire incidents and help people dodge getthing caught in crossfire.

Bolsa Familia
Provides food monthly to families of no income. Calcuates for each child.

Groups of friends pick up trash in lagoon
and beaches.


Back to Rio
a Favela Painting Project

Rio de Janeiro

# Resilient Strategic Plan 2017-2020

## A. EMBRACE OUR WATER

water in the rivers, lakes and beaches will be clean, fostering vibrant tourism and economic activities; it will be managed and consumed conscientiously and there will be potable water for the metropolitan region at all times.

## B. BUILD FOR OUR FUTURE

the urban spaces will be safe, green, climate-smart and will promote the well-being of citizens; no Carioca will live in a high-risk area; and housing and high-quality basic services, especially sanitation, will be available for all.

## C. EMPOWER OUR PEOPLE

Cariocas will have plenty of jobs within a diversified, inclusive, low-carbon and circular economy; they will participate actively in the decisions that affect them; and will be ready to learn, prevent, mobilize and grow from the shocks and stresses that affect the city and the planet.

Rio de Janeiro

## GOAL #1
### Better understand and mitigate impacts of severe weather and climate change

**#A**: Establish Rio de Janeiro Panel on Climate Change

**#B**: Implement portfolio of climate mitigation and adaptation

**#C**: Monitor Climate Trends and Impacts

**#D**: Integrate Multi-hazard Risk Maps

## GOAL #2
### Mobilize Rio to be prepared to respond to extreme weather events and other shocks

**#A**: Create a Disaster Recovery Plan for the Metropolitan Region

**#B**: Develop an Operational Olympic Legacy

**#C**: Execute Simulations for Crisis Response

**#D**: Expand the Program Resilient Communities

POTENTIAL OF REUSE FROM RAINWATER HARVESTING

[%]
0 - 10
10 - 20
20 - 30
30 - 40
40 - 50
50 - 60
60 - 70
70 - 80
80 - 90
90 - 10
>100
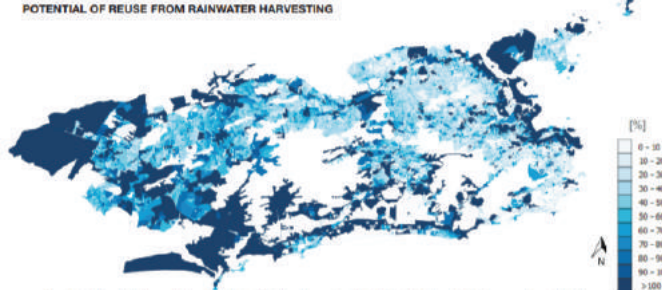
The analysis of the potential for reuse of rainwater in the city of Rio de Janeiro was produced through the interpolation of rainfall volumes, as determined by System Alerta Rio in the period between 2010 and 2015, crossed with rainfall volume in possible harvesting areas (rooftops) and consequent reduced need for water from the underground distribution system, based on consumption data from the population. The consumption data was acquired from the Sanitation National System of Information (SNIS) and the 2010 demographic census from the Brazilian Institute of Geography and Statistics (IBGE). The areas in dark blue show which parts of the city could benefit more from harvesting rainwater to lower consumption and water bills.

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**Develop a Water Strategy**

using grey water and rainwater for irrigation
consistent accessto safe drinking water
clean up other polluted bodies of water

Rio de Janeiro

## GOAL #3
**Cultivate green, cool, safe and flexible urban spaces**

**#A**: Implement LED Street Lighting

**#B**: Stimulate Arbored - Squares

**#C**: Improve Resilience in Mobility

**#D**: Equal Access to Culture

**#E**: Carioca Forests

**#F**: Rio Always Olympic

## GOAL #4
**Provide high quality basic services to all citizens, through sustainable and resilient use of resources**

**#A**: Develop a Water Strategy

**#B**: Implement a Solar Energy Strategy

**#C**: Realize Energy and Water Efficiency in Public Buildings

**#D**: Universal Access to Sanitation

**#E**: Access to Safe Housing

**#F**: Public Authority for the Guanabara Bay

notify authorities of traffic conditions, neighborhood microclimate, saturation of road infrastruture, and criminal activity

rapid transit and bike paths

50,000 trees
A green space for every 15 minute walk , fountaion- reduce heat
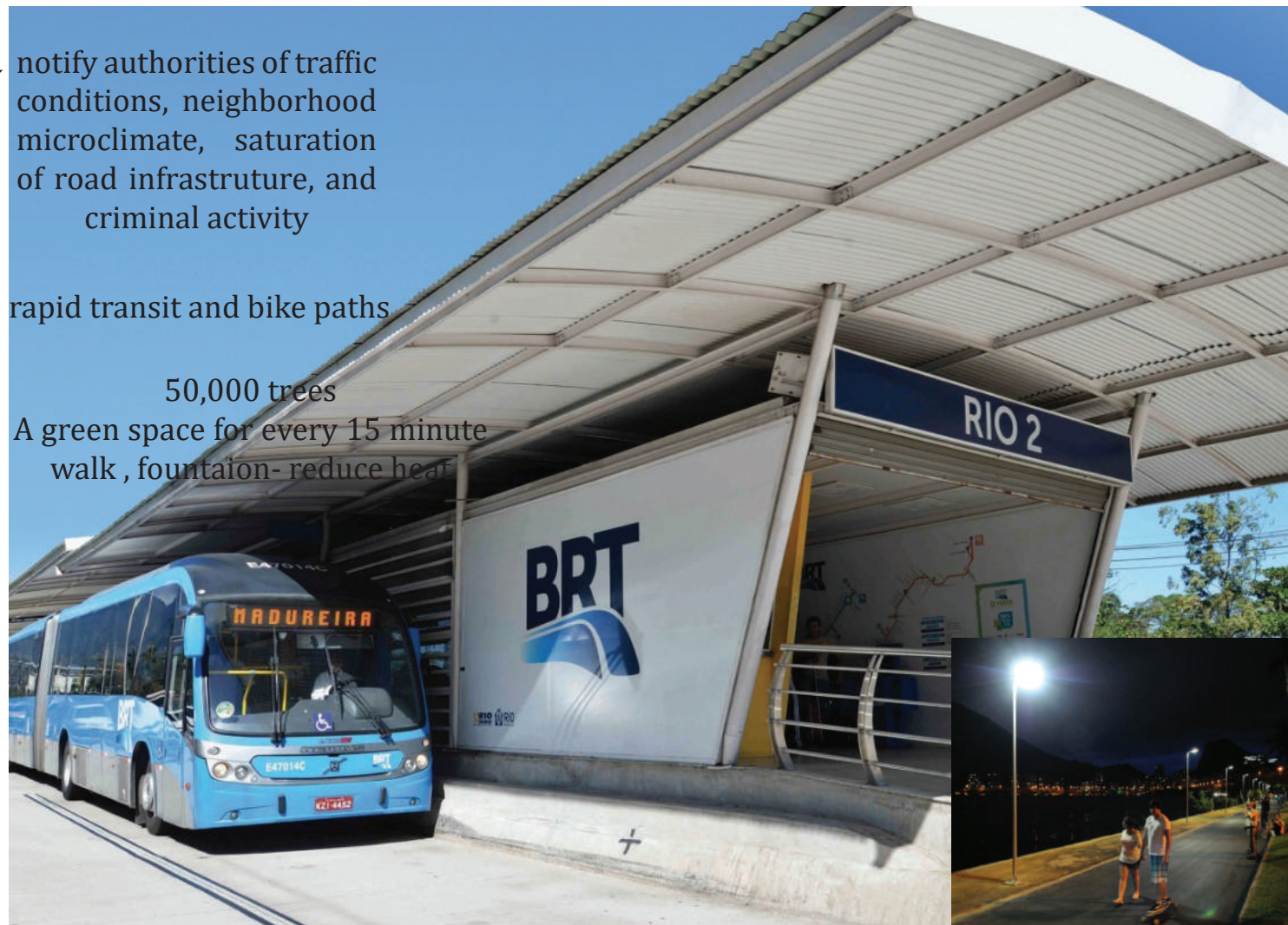
Rio de Janeiro

## GOAL #5
**Promote an inclusive, diversified, circular and low-carbon economy**

**#A**: Create an Agency for the Promotion of Circular Economy

**#B**: Valorization of Solid and Organic Waste

**#C**: Realize Rio + B

**#D**: Promote a Culture of Entrepreneurship

**#E**: Evaluate Social and Environmental Impacts of Investments

## GOAL #6
**Increase resilience of the population and promote social cohesion**

**#A** Educate the Youth for Resilience

**#B** Create a MOOC for Urban Resilience

**#C** Develop Individual Resilience Indicators

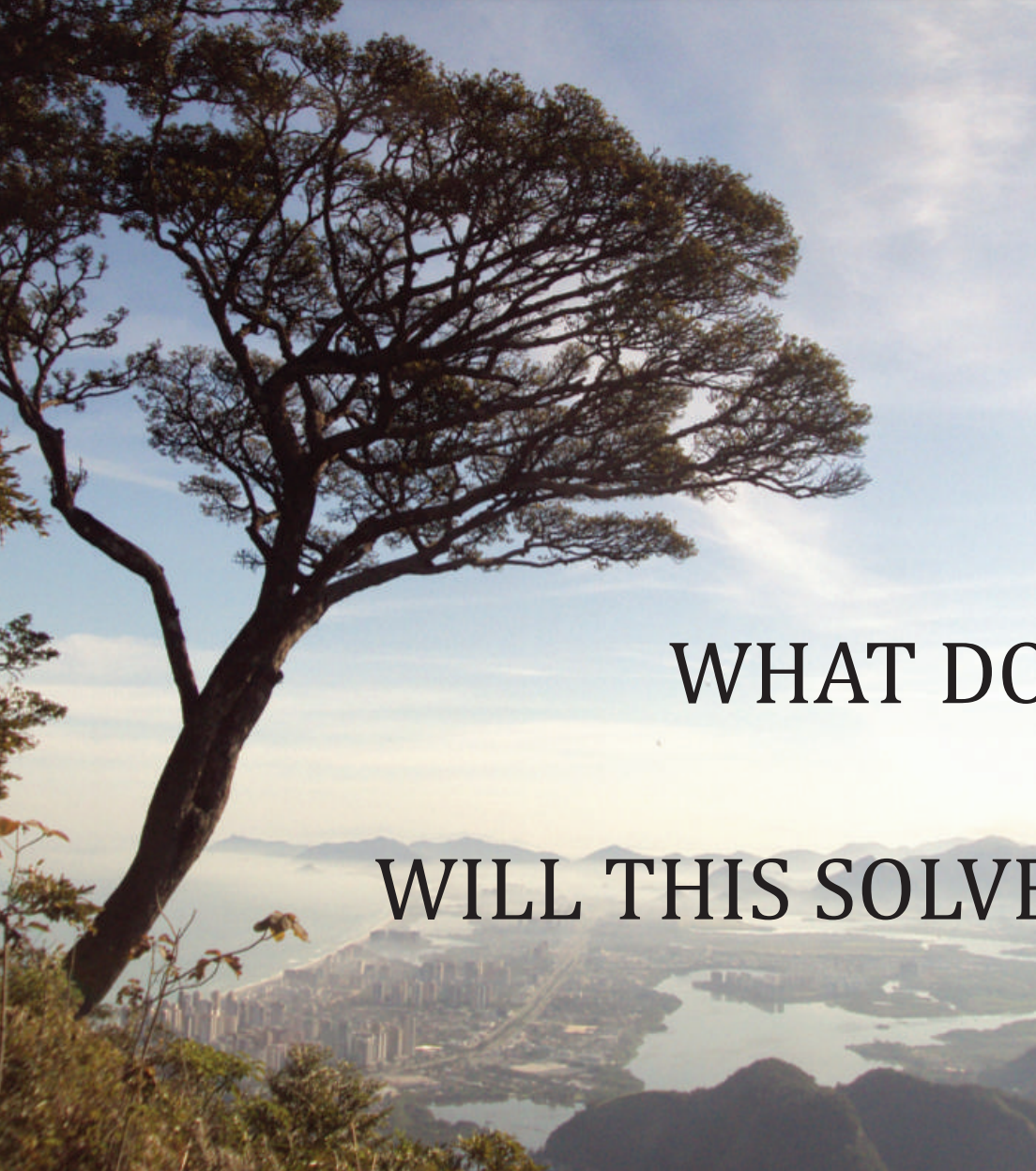**#D** Primary Health Care

**#E** Social Regions

**#F** Right to the City

But when will it be completed?

2065

Rio de Janeiro

WHAT DO YOU THINK?

WILL THIS SOLVE THE ISSUES IN RIO?

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