RIO**RESILIENTE**

Resilience Strategy of the City of Rio de Janeiro

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PIONEERED BY THE ROCKEFELLER FOUNDATION

100 RESILIENT CITIES

100 Resilient Cities - Pioneered by The Rockefeller Foundation (100RC) helps cities around the world become more resilient to the physical, social, and economic challenges that are a growing part of the 21st century. 100RC provides this assistance through: funding for a Chief Resilience Officer in each member city who will lead the resilience efforts; resources for drafting a resilience strategy; access to private sector, public sector, academic, and NGO resilience tools; and membership in a global network of peer cities to share best practices and challenges. Rio Resiliente was completed in partnership with 100 Resilience Cities.

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EDUARDO PAES,

Mayor of the City of Rio de Janeiro

Rio de Janeiro is today a city with many ambitions. In 2016, we released Vision Rio 500, the result of an exciting and inclusive process that enabled thousands of Rio residents to share their aspirations for the future of our city. Our residents collectively agree that Rio should be a gentle city, one that appreciates and pushes for creativity, one focused on celebrating and preserving its natural beauty, and one that is a source of opportunity and distinguished living for everyone.

One of Vision Rio 500's goals is to have Rio serve as a global reference for city resilience. Rio de Janeiro's Resilience Strategy is an important step towards achieving that goal, in that it defines priorities, guidelines and specific targets for developing a resilient model to share globally.

In January 2015, the city released "Rio Resiliente: Diagnostic and Focus Areas," which identified Rio's main shocks and stresses. This critical work continued to be developed by the city and our citizens, thanks in large part to the energetic support of 100 Resilient Cities, pioneered by the Rockefeller Foundation; the culmination of which is the publication of this strategy book. Our journey to become a more resilient city was made possible by the combined guidance and effort of hundreds of thoughtful individuals within our community and experts from across Rio and around the globe. I am truly thankful to all of you and the plan you have helped us define.

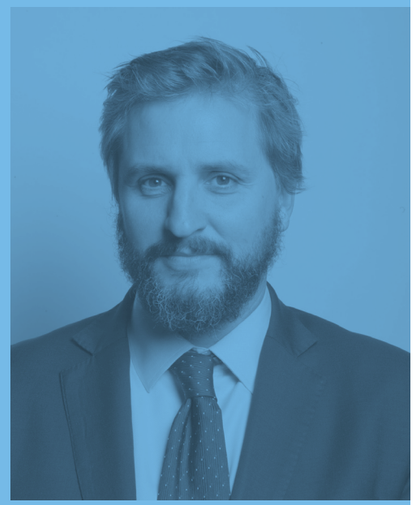
A city becomes more resilient when it is further prepared to face its challenges, be it social, environmental or economic. Resilience does not mean having an answer to every possible challenge, as nature continues to evolve. However, having a resilient Rio strategy enables us to build expertise and have processes in place to continue developing a city ready to support our citizens and decrease future risks to all.

As we look at immediate applications of resilience, one only has to look at our exciting upcoming 2016 Olympic and Paralympic Games. We are already defining a legacy of resilience through important investments in city mobility, the creation of public spaces and opening new public venues.

But another kind of legacy can be incorporated, adding to what already exists at the Center of Operations Rio: an operational legacy. The Olympic Games involve complex matters related to mobility, logistics, and security, and require the extensive coordination and partnership of several governmental departments working in an integrated manner. All our efforts feed into new experiences for future traffic operations, contingency plans and first responder activities to address crises and disasters. All that we are going to learn during the Games will not disappear after the closing ceremony, and it will work to make Rio more resilient.

In sum, the pursuit of resilience across the globe offers an extraordinary opportunity for Rio to support our peers based on what we have and continue to learn. We envision enabling cities to develop their own integrated resilience strategies to make them more capable of dealing with their shocks and chronic stresses and, above all, to prosper. I am therefore proud to share our Rio de Janeiro Resilience Strategy with all of you and thank all of our residents and visitors for helping us embrace resilience in our lives.

Mayor Eduardo Paes



MICHAEL BERKOWITZ,

CEO of 100 Resilient Cities

100 Resilient Cities is honored to partner with the city of Rio de Janeiro to release its first ever resilience strategy, Rio Resiliente. The resilience roadmap outlined in this strategy is the culmination of more than two years of research, analysis, outreach, and hard work by the entire Rio Resiliente team.

First and foremost, I would like to thank Mayor Eduardo Paes and congratulate him on the release of this strategy. None of this could have happened without his commitment to creating a better future for all of Rio de Janeiro, and his unwavering support for the resilience work. Additional thanks must be given to the entire Rio Resiliente team, including Chief Resilience Officer Pedro Junqueira, and Luciana Nery, Deputy CRO. Their dedication to producing a plan of this quality is already inspiring colleagues in cities all around the world. This strategy establishes Rio de Janeiro as being on the cutting edge of innovative urban solutions and sends a strong message to cities globally to join the coming urban resilience revolution along with the 100 Resilient Cities network.

The initiatives in Rio Resiliente not only apply a resilience lens to the short-term challenges of the city but also support long-term city planning. The resilience office research created inputs and insights that informed Rio Vision 500 and the Strategic Plan 2017-2020. The resilience strategy achieves an important alignment of these three city documents.

There is no doubt that the release of this strategy comes at a critical time for Rio. The challenges and pressures of climate change, urban density, social cohesion and demands on infrastructure, will continue to confront the city and its leadership.

But what resilience thinking allows us to do is to consider these challenges together in an integrated way. It demands that we ask ourselves how can we solve for the environmental challenges – around climate change, floods and heat islands – at the same time as we think about how to plan for and create an economically prosperous and inclusive city for all the citizens of Rio de Janeiro. It is then that we can begin to realize the full benefits of building urban resilience.

Going forward, we could not be more excited to continue working with Rio de Janeiro to support the implementation of key initiatives and solutions for the city and its citizens. Though today is only the beginning, this strategy gives me confidence that Rio de Janeiro will continue to be a pioneer of resilience thinking, and a leader on the world stage in executing on its strategic priorities. Congratulations once again, and let the great work ahead begin!

Sincerely,
Michael Berkowitz
President, 100 Resilient Cities

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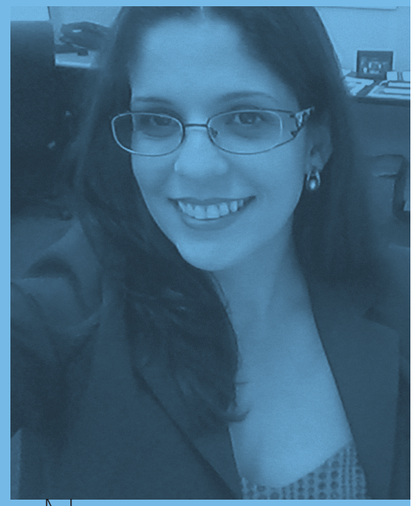
Pedro Junqueira

Chief of Resilience and Operations

“The resilience strategy of Rio de Janeiro proposes a set of guidelines and policies intended to bring the city and the metropolitan area the conditions to meet the challenges ahead. The ability to look to the future and recognize both the prospects and needs for the scientific, urban and social development was the most valuable experience that we in Rio Resiliente had in the sense of dreaming, proposing and organizing this set of urgent measures.”

Pedro is Chief Resilience and Operations Officer of the municipality of Rio de Janeiro. Head of the Center of Operations since 2013, he is responsible for coordinating integrated actions for operational agencies. His performance aims at reducing the government’s response time to any incident that impacts the routine of the population. In addition, he manages the exploration and implementation of new technologies and the development of science for operations of the city. Graduated in business administration, Pedro has expertise in marketing and over 15 years of experience in Project and People Management. In the public sector, he worked in the dialogue between the public administration and the interests of civil society as a special advisor of the Municipal Departments of Transportation and Conservation and Public Services.



Luciana Nery

Deputy Chief Resilience Officer

“Building resilience is to think of alternatives, it is to identify co-benefits in projects and public policies. The best way to do this is by integrating various points of view, always applying a resilience lens. Our thanks to the Resilience Champions and to the many collaborators who have supported us, it was because of their cooperation that the Resilience Strategy became more innovative and robust.”

Luciana Nery is the Deputy Chief Resilience Officer of the City of Rio de Janeiro and has over 10 years experience in the public sector in the areas of resilience, sustainability and project management. Worked as advisor to Mayor Eduardo Paes and also served as a special advisor for strategic projects to the CEO of Furnas Centrais Elétricas S.A. In 2014 she decided to dedicate herself to the theme of resilience full time. Was editor and co-author of the book “Rio Resiliente: Diagnostic and Focus Areas”. She holds a master’s degree in management of international businesses (PUC-Rio / Université de Grenoble) and a degree in Literature (UERJ).

Photo credit: Alexandre Macieira, Riotur

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Resilience Strategy of the City of Rio de Janeiro

CONTENTS

EXECUTIVE SUMMARY

The Resilience Strategy of the City of Rio de Janeiro aims to tackle the city's main vulnerabilities and to make it more resilient. Rio's Resilience Strategy is the culmination of a multi-year partnership of the City of Rio de Janeiro with 100 Resilient Cities, pioneered by the Rockefeller Foundation.

Urban resilience is defined as the capacity of individuals, communities, institutions, businesses and systems within a city to survive, adapt, and grow, no matter the chronic stresses and acute shocks they experience.

Rio strives to become a global reference for resilience by 2035. This ambition is a core tenet of the Vision Rio 500, a pioneering citizen engagement project released in 2016 that focuses on the development of a long-term vision for the city. The creation of Vision Rio 500 provided Rio's citizens, of all ages and social background, a unique opportunity to share their aspirations for what Rio de Janeiro should become by 2065, the city's 500th anniversary.

Our vision for a more resilient Rio is based on developing a better relationship between the city and its water, infrastructure, and most importantly, its citizens. A resilient Rio is one that embraces its water, builds for the future and empowers its citizens.

Rio de Janeiro's Resilience Strategy is an intermediary step between the Strategic Plan 2017-2020, which targets the near future, and Vision Rio 500, which involves aspirations for the longer term. The Resilience Strategy establishes goals focused on resilience issues identified through the 100 Resilient Cities Preliminary Risk Assessment, a process that involved more than 300 people between 2014 and 2016, resulting in the discovery of the main shocks and stresses affecting Rio.

Rio's Resilience Strategy helps define new projects with longer-term results and clear benefits aimed at diminishing the city's vulnerabilities while increasing its resilience. The strategic proposal recommends multiple programs including the creation of the Rio Panel of Climate Change; the development of a disaster recovery plan for the metropolitan area; an agency for the promotion of circular economy; and a course on Urban Resilience, to reach 100,000 school children until 2020. All the projects also entirely aligned with Vision 500 and aim at achieving the aspirations of the citizens of Rio.

The Resilience Strategy also features a selection of projects from the Strategic Plan 2017-2020, many of which were proposed by Rio Resiliente, the Rio de Janeiro's Resilience Office, including LED public lighting, individual resilience indicators, an urban solar strategy, and an open, large-scale online course on urban resilience to train school teachers, public servants and the general population.

All the initiatives in the Resilience Strategy involve concepts, projects and specific actions that are transversal, multidisciplinary and aim at reducing the shocks and chronic stresses of the city. Connection, collaboration and the identification of co-benefits comprise the basis of the Resilience Strategy and constitute the main values of Rio Resiliente.

Thus, the City of Rio has developed the following goals based on its resilience vision:

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

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

#3: Cultivate green, cool, safe and flexible urban spaces

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

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

#6: Increase the overall resilience of citizens and promote social cohesion

Photo credit: Alexandre Macieira, Riotur

01/

Introduction

Urban resilience is defined as the capacity of individuals, communities, institutions, businesses and systems within a city to survive, adapt, and grow, no matter the chronic stresses and acute shocks they experience.

This publication outlines the Strategy of Resilience of the City of Rio de Janeiro. It is the result of more than two years of work and the start of a new phase: the implementation of projects with clear benefits to increase the city's resilience from an integrated point of view, and fully aligned to the city's most recent strategy documents: the Strategic Plan 2017-2020 and Vision Rio 500.

The Resilience Strategy is being released in a key moment of the city's transformation: 451 years of history, the 2016 Olympic and Paralympic Games, and a vision for the next 50 years, named Vision Rio 500. The Resilience Strategy was developed from 2014 through 2016 by the City of Rio de Janeiro, with the direct participation of 300 people, and more than 800 people engaged, from various backgrounds, with the support of 100 Resilient Cities[1], pioneered by the Rockefeller Foundation, which aims to support resilience in cities around the world.

The development of the Resilience Strategy is led by Rio Resiliente, a multidisciplinary team linked to the Center of Operations Rio (COR). The incorporation of the resilience theme by the COR took place primarily due to its integrative and horizontal nature, which favors transversal analyses of city challenges. Furthermore, the COR has access to a multitude of data regarding the daily routine of the city and many tools for the mobilization of resources and communication with society. The COR therefore fosters an ideal environment for long-term urban planning that incorporates the management of recurrent city risks.

The development of the Resilience Strategy involved two phases. The first identified the main risks to city resilience, its vulnerabilities. The end of this first phase was marked by the January 2015 release of "Rio Resilient: Diagnostic and Focus Areas", a book that included a preface by the former Vice-President of the United States, Al Gore. This document identifies Rio's main shocks and chronic stresses, features a classification of city's risks and an analysis of city projects related to resilience and what they represent in terms of prevention, monitoring, mobilization, communication and constant learning.

Once the city's resilience priorities were mapped, the city began the second phase of the 100 Resilient Cities program aimed at defining a core resilience strategy. Members of the Rio Resiliente team consulted multiple expert working groups throughout 2015, with the goals of establishing top priorities for public action and capturing stakeholder perceptions surrounding the perceived positive impacts of these actions for the city.

In June 2015 the City of Rio began a discovery process to identify what citizens wished for the city over the next 50 years. It was named Vision Rio 500 in reference to the city's 500th anniversary in 2065 and involved thousands of citizens in various sessions, meetings, debates and online consultation. Soon after, the city started to develop its Strategic Plan 2017-2020, using an innovative approach of ample consultation and transversely of themes, unlike the former ones. Furthermore, this Strategic Plan is fully aligned to Vision Rio 500, establishing goals, timeframes and budgets that, together, constitute a first step towards achieving the aspirations for the next 50 years. Those two plans, for 2020 and 2065 were released in March 1, 2016 during a ceremony at the Museum of Tomorrow, marking a new phase in Rio de Janeiro's history; one in which Rio's own citizens helped develop an ambition of what they wanted in their city and how they intend to achieve that vision.

The Resilience Strategy points to initiatives that constitute an intermediary step between Plan 2017-2020, which targets the near future; and Vision Rio 500, which is about longer-term aspirations. This Strategy also features a small selection of projects from the Strategic Plan 2017-2020, because of their relevance in increasing overall city resilience.

1. http://www.100resilientcities.org.

02/
Shocks and Chronic Stresses of Rio

During 2014 through 2015, Rio Resiliente involved more than 300 people in a series of workshops and interviews focused on identifying the city's main threats to resilience. With the support of the 100 Resilient Cities' methodology, public managers, service company representatives (e.g. trash collection, electricity and water utilities), academics, community leaders and other members of civil society were interviewed.

The Rio Resiliente team assessed resilience across socioeconomic, behavioral, management and climate issues. The team's findings informed the identification of Rio's key shocks and stresses:

I - INTENSE RAINS

Strong rains cause flooding and landslides, damage buildings, provoke economic losses and spread diseases through contamination of sewage and solid waste in the rainwater, such as leptospirosis and diarrhea. They can also prompt energy black-outs, lower public safety, toppling of trees and traffic accidents.

In 2010, between April 6 and 7, 13 inches of rain in 24 hours caused the death of 66 people, mostly due to landslides. Climate models indicate that rains in the Southeast of Brazil might become less frequent, but that rainfall can be concentrated in a shorter period of time, which increases potential to cause damages.

II - STRONG WINDS

The strongest winds registered in Rio de Janeiro reach the speed of 100Km/h. Many climate models indicate the possibility of increase in frequency and intensity of winds in Brazil. In Rio, strong winds can cause damage to rooftops, power lines and trees, with the blockage of streets, closure of bridges, paralysation of waterways and threaten human lives.

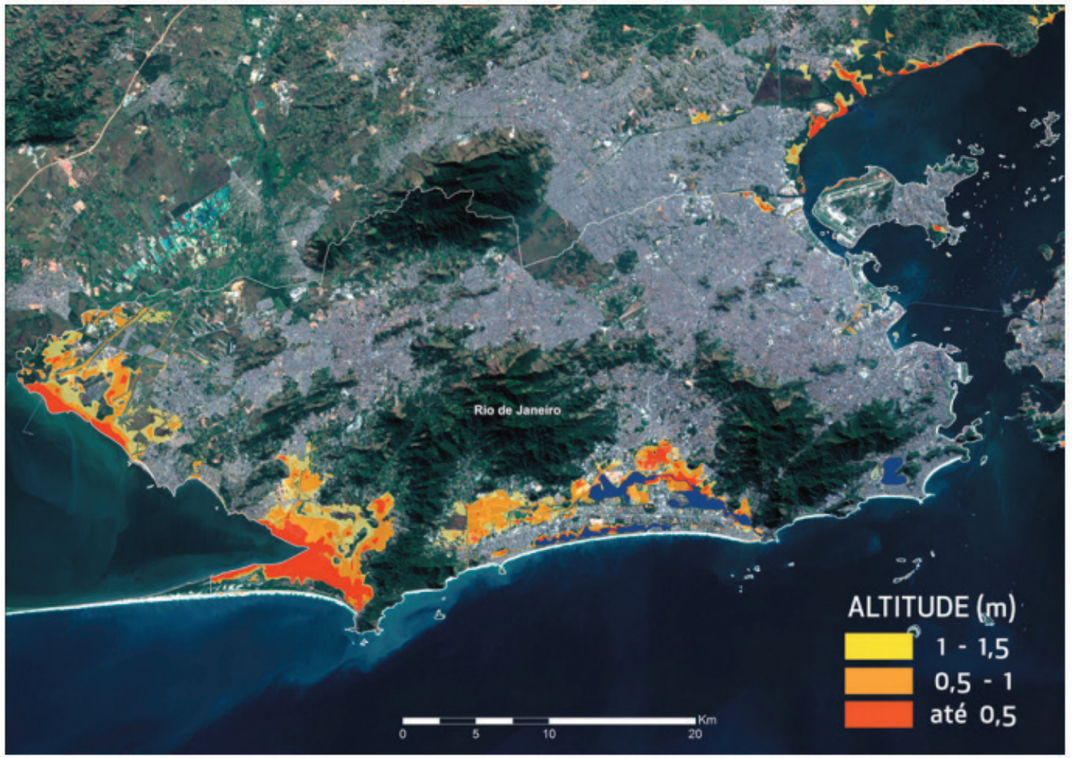
III - HEAT ISLANDS AND HEAT WAVES

Heat waves are extreme climate events with high mortality potential. Heat waves occur when temperatures remain high for multiple days (above the 98th percentile in Rio's case). With climate change, it is estimated that heat waves will become even more extreme. Besides death, heat waves generate thermal discomfort, increase in respiratory and cardiovascular diseases, increase in stress and loss of productivity, mainly when people work under sun exposure. High temperature also causes an increase in the consumption of electric energy, with possibility of black-outs due to excessive demand; and also more dry days which, increase the chance of fires in slopes.

Heat islands happen in areas which, due to geography and urbanization patterns, tend to accumulate more hot air in comparison to surrounding areas. Rio has had a significant increase in its heat islands since 1980. Examples from around the world indicate that neighborhoods, which are exceedingly hot have lower economic development and quality of life.

IV - SEA LEVEL RISE

A study developed in 2010 indicates that if the sea level rises by half a meter, then approximately 30 km^2 of Rio de Janeiro would be at risk of being submerged by sea water[2]. For example, one at-risk area surrounds the Baixada de Jacarepaguá lake system, whose water-covered area can



Areas susceptible to redefinition of coastal line due to sea level rise in the city of Rio de Janeiro.
Source: IPP/Prefeitura do Rio de Janeiro

expand and reach inhabited districts including Itanhangá, Rio das Pedras, Vargem Pequena and Vargem Grande, which are already susceptible to storm surges.

The rise in the average level and reach of storm surges may also affect coastal ecosystems, cause the salinization of potable water, damage streets infrastructure, and overburden rainwater retention drainage system, increasing the number of floods. Rio de Janeiro's identity is closely intertwined with its beaches. Sea level rise poses a serious threat to Rio's iconic beaches and their key economic pull from tourism.

Sea level rise can also affect neighboring cities located around the Guanabara Bay, with negative consequences to the economy, mobility and population health.

2. Sea Level Rise Vulnerability for the City of Rio de Janeiro. Source: Coleção Estudos Cariocas. Felipe Cerbella Mandarino, Luiz Roberto Arueira - IPP/Prefeitura da Cidade do Rio de Janeiro, 2012.

V - EPIDEMICS AND PANDEMICS

The mosquito Aedes aegypti, endemic in Rio since 1982, is a vector of Dengue, Chikungunya and Zika. The presence of these mosquitoes may increase through climate change-driven outcomes such as increase in urban heat islands that accelerate reproduction and extend the months that reproduction occurs throughout the year. Prevention systems and victim epidemic treatment are applied irregularly in the metropolitan region, which constitutes a vulnerability for Rio.

VI - DROUGHTS

Droughts driven by insufficient rain throughout the southeastern regions of Brazil after the summer of 2011 caused considerable water scarcity for citizens. Additionally, given Brazil's reliance on hydroelectric power, the lack of water caused electricity prices to increase, making it less affordable for the majority of users. In the City of Rio, 92% of residences

depend on water supplied from the River Guandu Treatment Station located outside the city limits in Nova Iguaçu. This constitutes a vulnerability, as Rio is heavily dependent on a sole source of water, with limited alternatives actively used to date.

VII - SATURATION OF THE ROAD INFRASTRUCTURE

Between 2004 and 2014, one million new vehicles were added to the existing fleet of 1.5 million cars[3]. Despite recent gains in average city commuting times following the implementation of Bus Rapid Transit, Bus Rapid System and better traffic operations, traffic jams are still a major chronic stress of the city, causing the following negative impacts:

- Worsened air quality, affecting human health, such as asthma
- Increased sound pollution and diminishing "walkability" in the city
- Increased traffic accidents with fatalities
- Increased greenhouse gas emissions
- Decreased productivity and increased economic losses to companies and citizens
- Increased transit delays for emergency vehicles
- Decreased quality of life, because increased commuting diminishes free time for leisure, study and family.

VIII - ACCIDENTS WITH URBAN INFRASTRUCTURE

In 1900, Rio had little more than 800,000 inhabitants; in 1950, 2,377,451; and in 2015, the Brazilian Institute for Statistics and Geography estimates Rio is home to more than 6,500,000 residents. This population growth has occurred without concurrent expansions and modernizations of urban infrastructure, causing increases in infrastructure-associated accidents. The main consequences of accidents in the urban infrastructure are:

- Increases in traffic delays due to accidents with trains, buses and subways
- Gas explosions and leaks
- Regular and long-term power outages associated with underground electric reactor explosions and/or damage to aerial power lines
- Water supply disruption due to increased bursting of high-pressure water and sewage pipes

In general, the challenges to be tackled regarding urban infrastructure are related to their predicted asset life time, such as the adequate service time and related maintenance for bridges, overpasses, antennas, canopies, rooftops, seaside kiosks, windows, and others.

IX - AGGLOMERATION OF PEOPLE WITH IMPACT IN NORMALCY

The presence of a large number of people in the same place can pose risks to those involved and take a city out of its normality. Rio's street Carnival parades move millions of people and events such as New Year's Eve gather around 2 million people to watch the fireworks in Copacabana. Music festivals, the World Cup and the Olympic Games also affect the normal movements of the city. Besides these, some events happen with little or no previous warning, like demonstrations and protests. Public manifestations are a valid tool for democracy, whose main purpose is to show the dissatisfaction of segments and groups in society. More specifically, the agglomeration of people, depending on how it develops, may cause the following impacts:

- Obstruction of streets without previous warning, resulting in traffic jams.
- Attacks and depredation of the private and public property in case of extreme violence
- Sound pollution and disturbance of resident living
- Interruption of essential services, due to strikes or demonstrations
- Decrease in the perception of personal safety.

X - CRIMINAL ACTS IN URBAN SPACES

The actsion of criminal groups can affect the resilience of the city in many ways, causing abrupt shocks, like crime waves; but also chronic stresses, like increasing the sensation of insecurity, which affects negatively real estate prices, tourism and the psychological health of citizens. The main consequences are:

- Depredation and vandalism
- Difficulty in the provision of public services and resulting offer of clandestine services
- Threats to the civil society, like murders, thefts, abuses, etc.
- Depreciation of property values and economic depression.

Safety and public order are key elements to the resilience of a city, because they are linked directly to the preservation of life, property and the physical and psychological well-being of citizens.

XI - INSUFFICIENT SANITATION[4]

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.

Insufficient sanitation causes environmental and economic degradation of the areas surrounding all types of bodies of water, reaching mainly the ecosystems of the Guanabara and Sepetiba bays, lakes, rivers and beaches, with various negative impacts to human health, tourism and the city's branding. The metropolitan governance for sanitation is in its early stages, similar to infrastructural investments and the connections of the sewage lines to treatment stations. Illegal sewer plumbing pollutes nascent rivers that could be utilized for water consumption. It also mixes with the city's rainwater system, lowering the city's capacity to absorb intense rains, resulting in flooding in case of heavy rains.

3. There were 1,548,393 vehicles in Rio in August 2004, and 2,533,504 in August 2014. Source: Denatran.

4. This last item, Insufficient Sanitation, was mapped as important to the resilience of the city after consultation with many stakeholders during the development of the Second Phase of the project, and for this reason it is not featured in the book "Rio Resiliente: Diagnostic and Focus Area".

03/

Context of the City

The city of Rio de Janeiro was founded 451 years ago, and today it is the second largest city in Brazil in terms of population and GDP. It is a large city with 6,5 million people, in a metropolitan area with more than 10 million inhabitants.

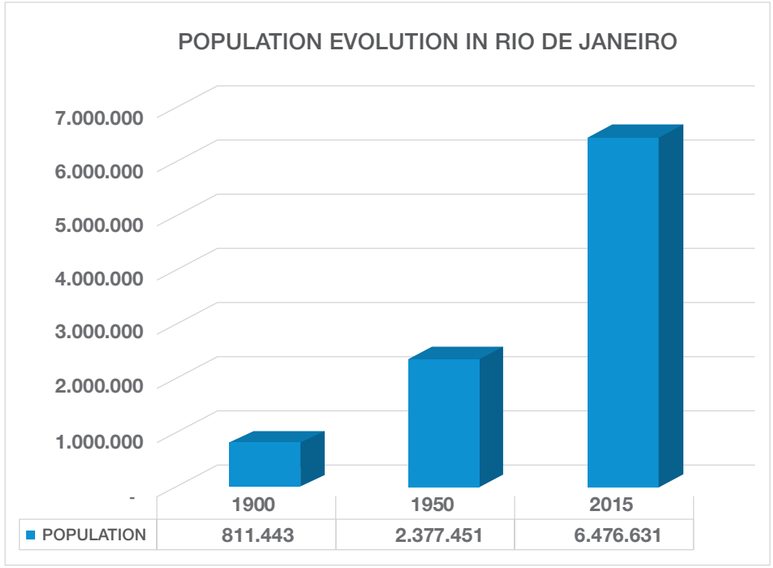
The city developed between the sea and the mountains. It is surrounded by the Atlantic Ocean, the Guanabara Bay and the Sepetiba Bay and hosts three urban forests, the Forest of Tijuca, the Pedra Branca Massif and the Geriçinó Massif. Together, they form a unique scenery, which makes Rio famous worldwide for its natural beauty. It is also known as the Wonderful City and is the main tourist destiny in Brazil, visited by two million international tourists every year.

Beyond the natural wealth, politics and culture have always been present in the city. Capital of Brazil between 1763 and 1960, Rio de Janeiro harbored many important political and historical events, and recently hosted major events, such as the World Cup in 2014 and, soon, the Olympic and Paralympic Games in 2016.

The economy of the city is mainly based on services - 86%. The rest is largely comprised by the industrial sector, with intense participation of Brazilian multinationals like Petrobras and Vale, in the fields of oil and minerals, respectively. Only a small portion is related to agriculture - less than 1%.

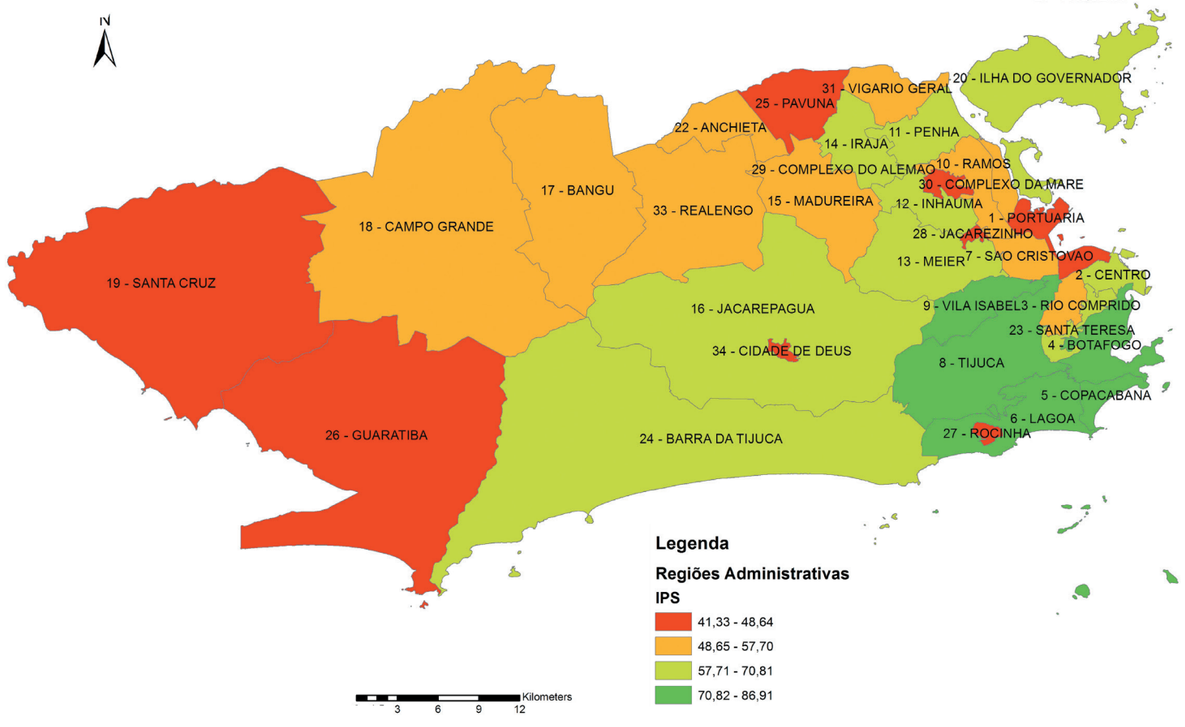
The Human Development Index of the city, in 2010, is 0.799, and it varies from a high to 0.970 in the most prosperous neighborhood, to 0.700 in the poorest. This disparity in development can also be perceived in the map showing the Social Progress Index of Rio de Janeiro on p. 25.

Rio's commitment towards resilience is demonstrated through many initiatives, such as the creation of the Center of Operations Rio, the acquisition of a weather radar, heavy investments on slope contention and flood control, installation of early warning systems in favelas and evacuation drills in areas prone to landslides. In 2014 the city created Rio Resiliente, a strategic office that acts as an interlocutor between other city departments, private sector, NGOs and international institutions, next to planning and developing its own projects aimed at increasing the resilience of Rio.



Demographic data from the Brazilian Institute of Geography and Statistics

SOCIAL PROGRESS INDEX



The map shows the development level across the administrative regions of the City of Rio de Janeiro. Based on the Social Progress Index of Rio de Janeiro, the results compound 36 variables forming 12 parameters. It includes nutrition, primary medical care, access to water and housing, personal safety, basic and higher education, health and well-being, freedom and civil rights, tolerance and social inclusion. The regions in dark green have the best overall results, according to the Index, while those in red feature the worst conditions. Source: Instituto Pereira Passos (IPP), April 2016.

04/

Vision Rio 500 and Strategic Plan 2017- 2020

In June 2015 the city of Rio started an ample process of public consultation for the formulation of a vision for the next 50 years, named Vision Rio 500, because in 2015 Rio celebrated the 450º anniversary of its foundation. The objective was to engage the population and answer the following question: What Do We Want for the Future of our City?

More than one million people dreamed, liked, shared and helped write what we want for the future of our city

- **1,400** citizens participating in polls
- **400** participants through the collaborative platform
- **4,500** inputs through the collaborative platform
- More than **1,000** posts in social media
- **30** days of events with dialogues
- **1,300** essays sent by school children ages 8 and 9
- **210,000** visualizations in www.visãorio500.rio
- **300,000** internet users reached
- **32,000**

Starting from the priorities and insights identified at the development of Vision Rio 500, a process for engagement began for the development of Strategic Plan 2017-2020, which defines specific goals, indicators and budget. Those are first steps towards achieving the objectives of Vision 500.

High human value: equity of opportunites and citizenship

Rio de Janeiro: source of well-being, quality and honorable life

Green, sustainable and resilient city

Democratic, integrated and connected territory

Competitive and Innovative city, with oppportunities

Governance and sustainable reinvention of the public administration

Rio Resiliente contributed actively to Vision Rio 500 and the Strategic Plan 2017-2020, by identifying transversal impacts and co-benefits of resilience to proposed goals and projects.

05/
Values of Rio Resiliente

CONNECT

We recognize that excellent practices and initiatives exist in the public, private and academic sectors and in the civil society, and that connections between these parties can increase the resilience of our City significantly. Rio Resiliente holds as a main principle the connection between parties with common objectives in order to profit more from the co-benefits of collaboration.

COLLABORATE

Collaboration is at the core of resilience projects. Collaboration means even more success for all parties, and therefore we promote and foster with great care our strategic relationships within the City Hall, with civil society, NGOs and the private sector, always looking to openly share information, ideas and bring people together in our projects and initiatives.

CO-BENEFITS

This is our *raison d'être*, as the transversal analysis of impacts and identification of co-benefits can add quality to already existing projects and make a difference in evaluating and comparing business cases. By looking through the resilience lens, Rio Resiliente can help the city tackle more challenges with the same initiative, the result of ample and intersectorial analyses of impacts.

RESILIENCE CHAMPION

Sérgio Besserman is president of the Municipal Institute Pereira Passos and the Sustainable Development Technical Chamber of the City of Rio de Janeiro. He is a Professor of Economics and Environmental Engineering at PUC-RJ. He is advisor to various organizations such as Fundação Roberto Marinho, WWF, CI-Brazil, ITDP, Funbio, Bolsa Verde, and Rio Clima. He writes regularly for the newspaper O Globo. He was planning director of BNDES between 1996 and 1999 and president of the Brazilian Institute of Geography and Statistics. One of the pioneers on the theme resilience in Brazil, he is part of the Steering Committee of Rio Resiliente since its inception in 2014.

IDENTIFIED SHOCKS AND CHRONIC STRESSES

Heavy rains, strong winds, waves and heat islands, sea level rising, epidemics and pandemics, prolonged drought, saturation of road infrastructure, accidents with urban infrastructure, overcrowding impacting normality, insufficient sanitation.

FOCUS AREAS

Climate Change, Socioeconomic Resilience, Resilient Behavior, and Resilient Management.

The City Resilience Framework

Developed by Arup with support from the Rockefeller Foundation, The City Resilience Framework (CRF) provides a lens to understand the complexity of cities and the drivers that contribute to their resilience, and a common language that enables cities to share knowledge and experiences. Rio Resiliente uses this tool to evaluate the scope and quality of the City's initiatives and projects.

The CRF is built on four essential dimensions of urban resilience: Health & Wellbeing; Economy & Society; Infrastructure & Environment; and Leadership & Strategy.

RESILIENCE INDICATORS

LEADERSHIP AND STRATEGY
- Promotes leadership and effective management
- Strengthens a wide range of stakeholders
- Encourages long-term and integrated planning

HEALTH AND WELLNESS
- Meets basic needs
- Supports livelihood and means of employment
- Ensures public health services

ECONOMY AND SOCIETY
- Promotes economic prosperity,
- Ensure social stability security and justice
- Promotes cohesive and committed communities

INFRASTRUCTURE AND ENVIRONMENT
- Ensures continuity of critical services
- Provides and increases the protection of natural and artificial resources
- Provides reliable communication and mobility

RESILIENCE QUALITIES

REFLECTIVE
Uses past experience to inform future decisions.

RESOURCEFUL
Recognizes alternative ways to use resources.

INCLUSIVE
Prioritizes broad consultation to create a sense of shared ownership in decision making.

INTEGRATED
Bring together a range of systems and institutions.

ROBUST
Well-conceived, constructed and managed systems.

REDUNDANT
Spare capacity purposively created to accommodate disruption.

FLEXIBLE
Willingness and ability to adopt alternative strategies in response to changing circumstances.

06/

Resilience Challenges

Community of São Carlos, North zone of Rio de Janeiro. Photo credit: Raphael Lima

Rio de Janeiro, like many cities, has a complicated ecosystem of natural and built environments that require an integrated resilience strategy. The greatest challenges come from three primary areas - water, infrastructure, and social vulnerability. Water can be both abundant or scarce, life provider or disease vector, and thus needs to be better managed. Infrastructure must be permanently and sustainably improved to meet the needs, protections and expectations of citizens. Social vulnerability must be reduced, because citizens with insufficient access to basic services are the most exposed and take longer to recover from shocks and chronic stresses. Climate change and economic instability are multipliers that can worsen or exacerbate these challenges.

A. RELATIONSHIP OF THE CITY WITH WATER

"Rio" means "river", and Rio de Janeiro is all about water: it is in the name, in the images that attract visitors and in the self-identity of Cariocas. However, mismanagement, wasteful practices, over-reliance on a single source of potable water and disorganized urbanization also mean that water constitutes a major challenge to the resilience of Rio.

Water seems to be abundant in the lakes, mountains, beaches and in the thousands of rivers that cross the city. But, as the Southeast of Brazil experienced from 2011 onwards, water scarcity is a real threat, due to the increased irregularity of rain patterns in the region, which unpredictably intersperse intense rainfall with longer periods of drought.

The production of energy from water also disrupts the flow of the river and lowers the amount of water available to the Guandu system, which supplies water to 92% of the people living in Rio and is located in the neighboring city of Nova Iguaçu. This over-reliance on a single source of water makes the city fragile to any irregularity of supply or upstream disturbances not in the hands the Rio municipality.

Polluted bodies of water affect the integrity of ecosystems and contribute to an array of health problems, ranging from vector-borne diseases to increased infant mortality. Insufficient sanitation, poor waste management, industrial pollutants and lack of metropolitan governance translate into increased pollution of the Guanabara Bay and the river systems of the West Zone, among other affected areas. The pollution of beaches also negatively affects the image of the city and the economic potential of the coastal area.

The strong rains during summer cause flooding and landslides in the city, causing significant economic losses and fatalities, mainly in the vulnerable communities in the mountain slopes. In April of 2010, 66 people died in the favelas after record-breaking storm, and the city's infrastructure was heavily damaged.

The global tendency to sea level rise, estimated to range from 28 to 98cm in 2100, according to IPCC 2013, may cause the salinization of rivers and aquifers, thus reducing availability of water for industries and for human consumption.

Photo credit: Pedro Peracio / Mayor's Office

B. RELATIONSHIP OF THE CITY WITH ITS INFRASTRUCTURE

The city of Rio was founded 450 years ago in a beautiful and yet challenging natural environment. There was an intense population growth in the 20th century, and now 6.8 million people must live and thrive in this expanding and densifying urban space.

Due to fast and disorganized growth, urban spaces are often poorly equipped to deal with the needs of citizens. Some areas of the city lack adequate access to basic services, like sanitation and legal access to water and energy. Macro drainage of rainwater is often insufficient, thus contributing to flooding. The expansion of the city towards the West put pressure on the creation of new infrastructure for the new demands. In favelas, many houses were built in areas prone to landslides, often without proper design and materials, and investments on social housing has been insufficient to reach demand.

The quality of the urban spaces varies within the city, with many neighborhoods lacking green and recreational areas, artistic expressions and enough businesses to employ residents and diminish need for commuting for employment.

Poor sanitation and inadequate disposal of solid waste in the city and metropolitan area are the greatest contributors to water pollution.

The coverage of primary health care has increased in the past years, but still must be expanded to reach even more people.

As the number of cars increase and people live farther away from jobs, mobility has become less efficient and traffic is often congested. The investments in mobility tend to be reactive and often do not anticipate future needs.

Strong winds are acute shocks that cause many disruptions in the city, such as damaged power lines, toppled trees and various other accidents.

Energy, water and waste are resources whose potential is underutilized. The city does not produce its own energy, despite the immense potential for solar energy production. Water is wasted as it flows along outdated infrastructure and is spent unwisely[5]. Solid waste, which carries the potential to be reused, recycled and transformed, is mostly buried in landfills, not generating value and causing negative environmental impact.

The sea level rise and the intensification of storm surges put at risk the coastal infrastructure and the income from tourism.

Even though the city has made significant advances in mobilization for shocks and disasters with the implementation of the Center of Operations, mobilization of resources at city and metropolitan levels should be better integrated, so that the region is ready to respond adequately to recurrent or rare shocks.

Expansion works in the sanitation of the West zone. Photo credit: Cidade Olímpica

5. It is estimated that more than 30% of the water treated in the Guandu System is lost during distribution, which is wasteful and causes leaked pipes, damaging city infrastructure. (Source: "O Rio do Amanhã, Vision 500 and Strategic Plan 2017-2020", 2016.)

C. RELATIONSHIP BETWEEN EACH CITIZEN WITH THE CITY

Social inequality means that there are different cities for different citizens. Favelas and the "formal" city are in close proximity throughout Rio de Janeiro, and yet the experience of living in one or the other varies immensely. The provision of services and economic opportunities are unequal, with insufficient access to sanitation, transportation, health services, culture, sports, education and employment.

Citizens must be aware of how their behavior impacts their everyday life in the city. The conscientious use of water and energy not only conserves natural resources, but also means lower bills and taxes, and guarantees safer and steadier supply. The proper disposal of solid waste lowers the risk of flooding due to clogged pipes. Protecting trees not only helps carbon sequestration and biodiversity but, more tangibly to citizens, reduces temperature and air and noise pollution while improving access to green space. Using public instead of private transportation reduces air pollution, carbon emissions and diminishes traffic congestions. To support the reuse and recycling of materials is to lower demand on natural resources and create a market for composting and solid waste, both of which have immense potential for job creation, as is the case in cities worldwide.

Criminality lowers trust in the public spaces, damages social cohesion and cause psychological and economic losses to citizens.

It is recognized around the world that the most socially vulnerable populations are the ones who suffer the most impact from natural disasters and economic downturns. They also take longer to recover and rebound from shocks. Efforts to make the city more resilient, therefore, must acknowledge the increased vulnerability of those with little economic resources or social safety nets and act upon it with special attention.

Few schools in the city, public or private, teach children resilience to the shocks and stresses of the city, what impacts of climate change they may experience or what constitutes sustainable consumption of resources. Consequently, few citizens know how to act in the course of a disaster and what risks they face in their neighborhoods and everyday lives, let alone how to prevent and prepare for those.

Climate change is increasing the intensity and number of extreme weather events and also destabilizing provision of resources like water, energy and food. Brazilians cannot anymore count on the abundance of resources, and the risk of scarcity must be incorporated in public policies and individual behavior. Those risks, for their potential impacts, cannot be addressed separately by different spheres of government, city departments or discrete projects. Citizens and city administration must collaborate to prevent and monitor those risks, to incorporate new knowledge and, moreover, to find opportunities to thrive despite challenges posed by shocks and chronic stresses.

> Urban heat islands are worsening due to increasing urbanization and warming climate. As demonstrated in cities worldwide, increased temperatures pose a threat to human health, reduce productivity, cause thermal stress and reduce walkability in a city.

Photo credit: George Soares / Center of Operations Rio

07/

Resilience Vision

Our vision of a resilient Rio is more than just a city that protects itself and its Cariocas from a wide range of shocks and stresses - it is a city that supports a fulfilling life for citizens of all ages and backgrounds in the coming decades by embracing our social, environmental and infrastructure issues head on. We see a future Rio that is safe, beautiful and gentle, as well as economically prosperous and just. In order to tackle our challenges, we must make all aspects of the city and our people more resilient, specifically we will…

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.

Photo credit Alexandre Macieira / Riotur

08/

Goals and Initiatives

1. BETTER UNDERSTAND AND MITIGATE IMPACTS OF SEVERE WEATHER AND CLIMATE CHANGE

#1.A:Establish Rio de Janeiro Climate Change Panel
#1.B: Implement Portfolio of Climate Mitigation and Adaptation
#1.C: Monitor Climate Trends and Impacts
#1.D: Integrate Multi-hazard Risk Maps

2. MOBILIZE RIO TO BE PREPARED TO RESPOND TO EXTREME WEATHER EVENTS AND OTHER SHOCKS.

#2.A: Create a Disaster Recovery Plan for the Metropolitan Region
#2.B: Develop an Operational Olympic Legacy
#2.C: Execute Simulations for Crisis Response
#2.D: Expand the Program Resilient Communities

3. CULTIVATE GREEN, COOL, SAFE AND FLEXIBLE URBAN SPACES

#3.A: Implement LED Street Lighting
#3.B: Stimulate Arbored-Squares
#3.C: Improve Resilience in Mobility*
#3.D: Equal Access to Culture*
#3.E: Carioca Forests*
#3.F: Rio Always Olympic*

4. PROVIDE HIGH QUALITY BASIC SERVICES TO ALL CITIZENS, THROUGH SUSTAINABLE AND RESILIENT USE OF RESOURCES

#4.A: Develop a Water Strategy
#4.B: Implement a Solar Energy Strategy
#4.C: Realize Energy and Water Efficiency in Public Buildings
#4.D: S Universal Access to Sanitation*
#4.E: Access to Safe Housing*
#4.F: Public Authority for the Guanabara Bay*

5. PROMOTE AN INCLUSIVE, DIVERSIFIED, CIRCULAR AND LOW-CARBON ECONOMY

#5.A: Create an Agency for the Promotion of Circular Economy
#5.B: Valorization of Solid and Organic Waste
#5.C: Realize Rio + B
#5.D: Promote a Culture of Entrepreneurship
#5.E: Evaluate Social and Environmental Impacts of Investments

6. INCREASE RESILIENCE OF THE POPULATION AND PROMOTE SOCIAL COHESION

#6.A: Educate Youth for Resilience
#6.B: Create a MOOC for Urban Resilience
#6.C: Develop Resilience Indicators
#6.D: Primary Health Care*
#6.E: Social Regions*
#6.F: Right to the City*
#6.G: Listen to Govern*

*Initiatives of the Strategic Plan 2017-2020 with Resilience co-benefits.

GOAL #1

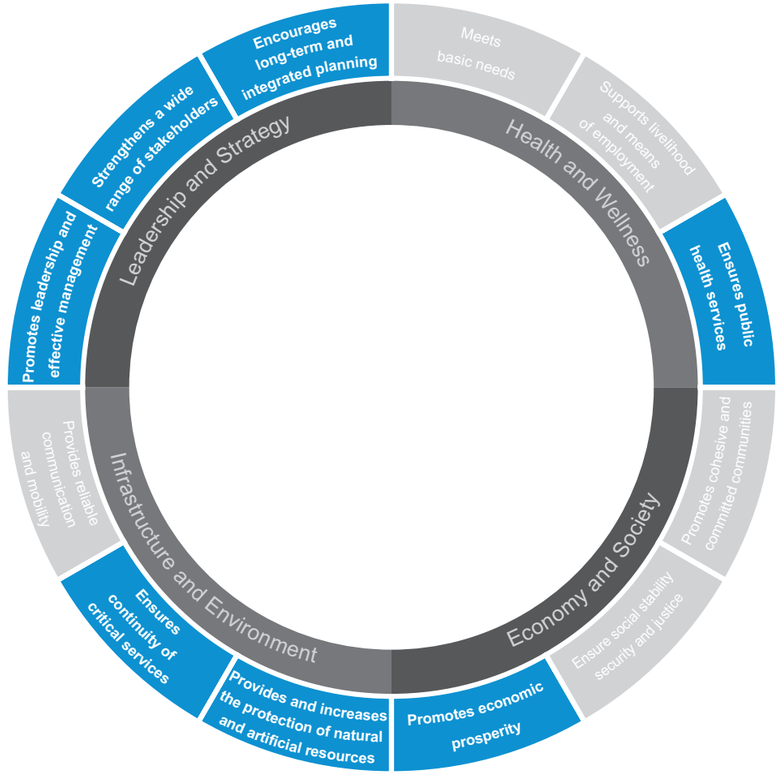
Better understand and mitigate impacts of severe weather and climate change

#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



City Resilience Framework: in blue, aspects of resilience targeted in the initiatives of Goal #1
Credit: The Rockefeller Foundation/ Arup, 2014.

FLAGSHIP INITIATIVE #1.A:

Establish Rio de Janeiro Panel on Climate Change

DESCRIPTION AND OBJECTIVE:

Set up a Climate Change Panel for the city of Rio de Janeiro involving experts from various scientific fields to study climate trends with the Panel of Climate Change (IPCC 2013) and future iterations as basis. This panel, pioneer in Latin America, is inspired by a similar initiative in New York City, and its mission will be to investigate, publish and communicate results of climate change research and its impacts on the city of Rio, as well as provide support for decision-making on urban planning and inform other fields of knowledge and the civil society.

The Panel aims to incorporate state of the art scientific knowledge on climate, at global and national levels, in order to indicate possible climate change scenarios and its impacts specifically to Rio de Janeiro and its metropolitan region. The reports released should foster scientific research on the effects of climate change at city level and foster conversation on the related environmental, social and economic aspects.

Furthermore, the Panel encourages a connection between climate change and other disciplines, with focus on transversal analyses of impacts, for example: a) analysis of how extreme temperatures impact vector-borne diseases such as Dengue, Chikungunya and Zika, b) economic valuation of various scenario-based impacts of sea level rise. The knowledge generated will support public policies for the mitigation and adaptation of climate change in Rio, specifically those related to strong rains and winds, sea level rise, heat islands and waves, droughts and epidemics.

The initiative to create a Panel on Climate Change for Rio was proposed by Rio Resiliente and the Mayor's Office and is in its planning stage.

VISION RIO 500

Aspiration (III.2.b): The City will be ready and adapted to face climate change and its impacts, having mapped and planned for its main threats; Aspiration (II.2.a). No family in the city will live in high-risk areas; Aspiration (III.2.c): All citizens will be informed, prepared and engaged to deal with climate change impacts.

STRATEGIC PLAN 2017-2020

Initiative 3.12 – Increase the resilience of the city doubling the number of climate risk under monitoring and quadrupling the number of simulations for emergency response with at least 15 departments until 2020.

VALUE AND CO-BENEFITS

Insertion of Rio in the forefront of climate change knowledge, so that urban spaces, zoning laws, public buildings and services can face the challenge of more intense and frequent extreme weather events, minimizing damage and saving lives. Stimulation of fundamental transversal knowledge building to improve the resilience of the city through cross-functional research combining climate change and socioeconomic data to inform urban decision makers.

INDICATORS

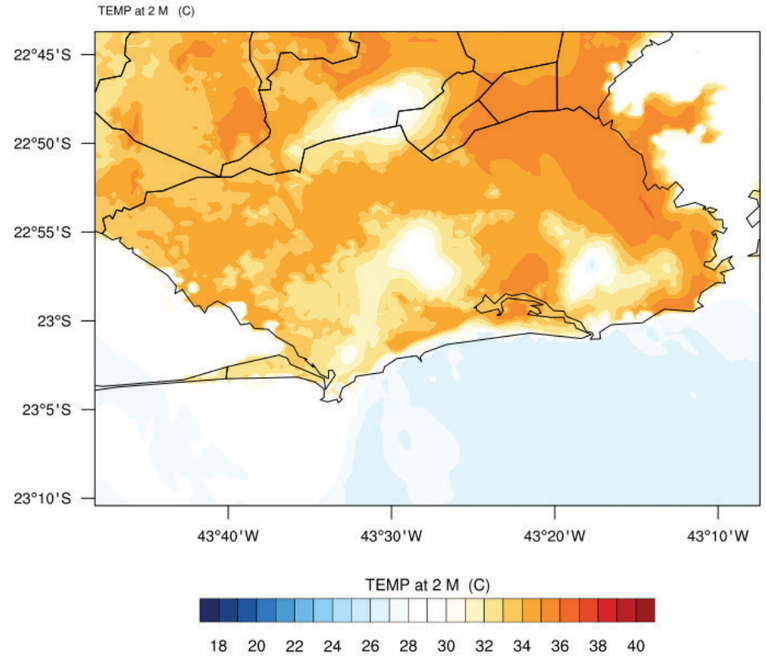
Annual meeting and report with conclusions and suggestions for future research.

FOCAL POINTS

Rio Resiliente, Mayor's Office and IPP.

POTENTIAL PARTNERS

NASA, INPE, C40, UCCRN.



Real time modeling of heat islands in the Center of Operations Rio. Source: Alerta Rio and Rio Resiliente

RESILIENCE QUALITIES

REFLECTIVE
Uses past experience to inform future decisions

INTEGRATED
Bring together a range of systems and institutions

ROBUST
Well-conceived, constructed and managed systems

FLEXIBLE
Willingness and ability to adopt alternative strategies in response to changing circumstances.

RESILIENCE CHAMPIONS

Dra. Dalia Kirschbaum and Dr. Douglas Morton are scientists at NASA's Goddard Space Flight Center. In 2016, NASA and the City of Rio signed a bilateral cooperation agreement for data exchange. Dra. Kirschbaum has been helping the city of Rio improve its use of satellites for city monitoring and environmental management purposes. Her current research focuses on the development of a regional system for prediction and risk management of landslides.

Dr. Douglas Morton who speaks Portuguese fluently, works since 2000 with the Brazilian Amazon forest in collaboration with scientists from both INPE (Brazilian Institute of Space Research) and Imazon (Human and Environment Institute). He's member of the Global Fire Emissions Database (GFED), an initiative that aims to combine several satellite's data in order to understand the correlation between fire and the greenhouse effect and the changes on tropical savannas and forests caused by fire.

FLAGSHIP INITIATIVE #1.B:
Implement portfolio of climate mitigation and adaptation

DESCRIPTION AND OBJECTIVE
Develop a portfolio of projects for mitigation and reduction of GHG emissions, and also adaptation projects to reduce the existing and future effects of climate change, suited for public, private and international financing. This portfolio must incorporate the conclusions related to climate in the local level, as informed by the Rio de Janeiro Panel on Climate Change (initiative 1A).

Having as a basis the citywide GHG emission inventories and the Climate Change Adaptation Municipal Plan, led by the Secretary of Environment, the city of Rio will develop a portfolio of actionable projects focused on targeting the greatest emitters, with the establishment of goals, and fostering better management of resources though the promotion of a circular economy (initiatives 5A and 5B). The plan for mitigation and reduction of GHG emissions will involve projects related to renewable energy, low-carbon economy and sectors, and transportation.

The Portfolio of Climate Mitigation and Adaptation will aim to provide guidelines for urban interventions of Rio de Janeiro, so that urban planning, public works and maintenance internalize concepts and practices that make Rio more resilient to climate change. Those projects will be related to rainfall harvesting, permeable paving, tree planting, green roofs, among others (see Goal #3, "Cultivate green, cool, safe and flexible urban spaces"), and must be formulated already considering available and innovative financial options.

The portfolio's objective it to foster the development of projects to tackle the vulnerabilities of the city to strong rains and winds, heat islands and waves, sea level rise, epidemics and accidents with urban infrastructure.

The first stages for the implementation of a portfolio of climate mitigation and adaptation is featured in the Strategic Plan 2017-2020 and Rio Resiliente supports its development on an amplified scope.

VISION RIO 500
Aspiration (III.2.b): The City will be ready and adapted to face climate change and its impacts, having mapped and planned for its main threats; Aspiration (III.2.a): No family in the city will live in risk areas.

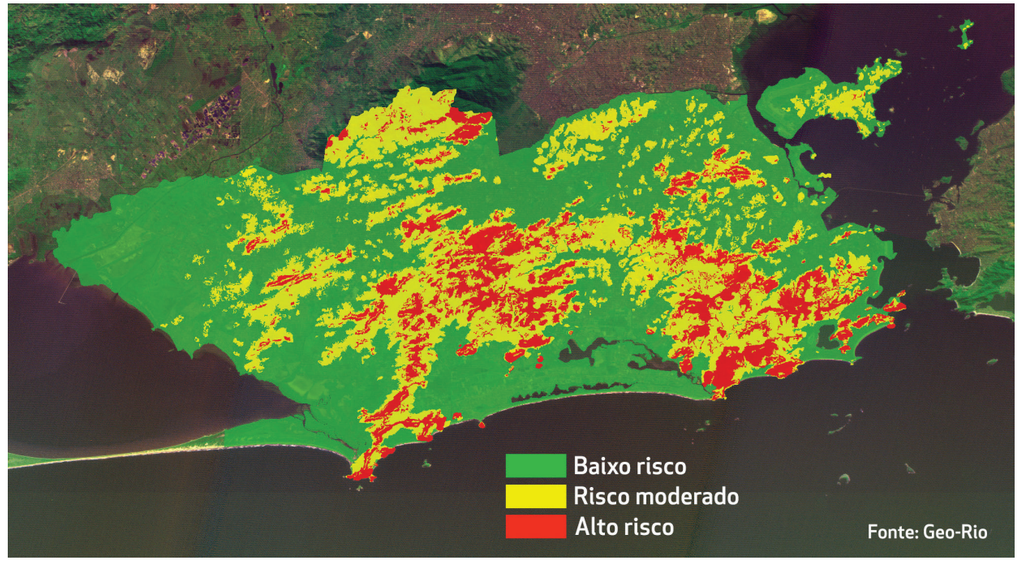
STRATEGIC PLAN 2017-2020
Initiative 3.12 – Expected Results: Better knowledge about GEE emissions, climate interactions and air quality, for mitigation, disaster prevention, health policies and increased quality of life. Initiative 4.10 – Urban renewal in neighborhoods with precarious or nonexistent infrastructure, focusing on regions AP 3 and AP 5. Initiative 4.11 – Urban planning of the Vargens neighborhood.

VALUE AND CO-BENEFITS
Promotion of wider utility and durability of urban infrastructure, planning for areas vulnerable to climate change, including the neighborhood of Vargens and its susceptibility to sea level rise; capacity to attract more investments and generate better quality of life; less GHG emissions; investment for crisis and disasters, especially those related to climate risks.

INDICATORS
Projects developed; projects implemented; attraction of private national and international investments; lower carbon emissions; preservation of human life.

FOCAL POINTS
Rio Resiliente and departments for urban planning and finance.

POTENTIAL PARTNERS
C40, World Bank, Rio de Janeiro Panel on Climate Change, departments of conservation, environment, private sector and universities.



Landslide susceptibility map, developed by Geo-Rio in 2010. Source: Geo-Rio

RESILIENCE QUALITIES

REFLECTIVE
Uses past experience to inform future decisions

RESOURCEFUL
Recognizes alternative ways to use resources

INTEGRATED
Bring together a range of systems and institutions

ROBUST
Well-conceived, constructed and managed systems

REDUNDANT
Spare capacity purposively created to accommodate disruption

FLEXIBLE
Willingness and ability to adopt alternative strategies in response to changing circum-stances

RESILIENCE CHAMPIONS

Camila Pontual is an associate in Rio's Mayor's Office, specialized in public policies for sustainable development and resilience. She holds a master degree from the universities of Sorbonne (France), KULeuven (Belgium) and Padova (Italy) in Sustainable Development of Lands. Camila is the one of the main links between Rio Resiliente and an international network that acts on mitigating climate changes impacts, such as the C40 and the Bloomberg Associates. "Rio Resiliente is about making city and citizens readier to face their daily challenges".

Cristina Mendonça works in Rio as advisor to the Chair of C40 Cities, currently Mayor Eduardo Paes, and to the C40's Steering Committee. In this role she advises and supports city leaders to develop and implement mitigation strategies against greenhouse emissions and climate risks. She also works in close collaboration with Rio Resiliente.

INITIATIVE #1.C:

Monitor Climate Trends and Impacts

ESCRIPTION AND OBJECTIVE

Monitor and support research on climate trends and impacts, analyzing socioeconomic data in order to generate crosscutting analyses of costs and benefits of projects and public policies for climate. The risk modelling will be developed with the support of georeferenced risk mapping (initiative 1D), involving shocks and chronic stresses such as strong rains and winds, heat islands, air quality, flooding and landslides, high tides and storm surges, and epidemics.

The aim of this initiative is to establish permanent, integrated and multidisciplinary climate monitoring, with the involvement of city departments, other spheres of government, NGOs and citizens. To this continuous and evolving monitoring, other analyses will be added, for example, such as the social and economic impacts of sea level rise in the next decades. This initiative also entails the monitoring of the winds in the city, for the development of historical data and support for academic research on the theme, adding to the existing knowledge about rains. Finally, this project supports research on the interactions of heat waves and heat islands with the air quality of Rio.

Furthermore, the monitoring of climate trends and impacts involves the active participation of citizens, through the voluntary and collaborative collection of climate data with the use of simple homemade sensors, thus supporting actions of Citizen Science.

This initiative, including the monitoring and Citizen Science, was proposed by Rio Resiliente and incorporated by the Strategic Plan 2017-2020. Itis currently partly being implemented, as the Center of Operations is stating to monitor heat waves and incorporate wind data already, and partly in the planning phase, for example for the sea level rise studies.

VISION RIO 500

Aspiration (III.2.b): The City will be prepared and adapted to face climate change and its impacts, having mapped and planned for its main threats; Aspiration (III.2.a): No family in the city will live in risk areas; Aspiration (III.2.c): All citizens will be informed, prepared and engaged to deal with climate change impacts. Aspiration (III.3.a): Rio will have enough water for its supply, having mapped all the risks and defined strategies; Aspiration (IV.2.b): All cariocas will have access to safe, legal and adequate housing.

STRATEGIC PLAN 2017-2020

Initiative 3.12 – Increase the resilience of the city doubling the number of climate risk under monitoring and quadrupling the number of simulations for emergency response with at least 15 departments until 2020; Initiative 4.11 – Urban planning of the Vargens neighborhood.

VALUE AND CO-BENEFITS

Amplification of the climate data being monitored in the Operations Center Rio and with that allowing for the deep analyses of climate interactions, currently little integrated; more comprehensive knowledge about risks, support for public policies and more information to citizens about risks.

INDICATORS

In the Strategic Plan 2017-2020: Climate change mapped and incorporated in the monitoring of the Center of Operations Rio. Number of public policies formulated and scientific research published using data from the integrated risk mapping of climate interactions and air quality.

Timeframe: Heat islands monitored until 12/2017; Interactions between climate and air quality until 12/2018; Strong winds until 12/2019; Droughts until 12/2020.

FOCAL POINTS

Rio Resiliente, COR and IPP.

POTENTIAL PARTNERS

CSIRO, INPE, UCCRN, CEMADEN, Museum of Tomorrow, universities.

RESILIENCE CHAMPION

Juliana Hermsdorff is a meteorologist of Rio's Alert System since 2012 and currently, she leads a team of technicians executing the weather forecast and monitoring for the city. Together with her team she collected, modeled and studied temperature data from Rio Alert and other similar institutions, aiming to improve the descriptions of such variable. "After this work, we increased our comprehension about heat waves, which is a first step towards building a set of measures to minimize the negative impacts of extreme heat to the population of Rio".

INITIATIVE #1.D:

Integrate Multi-hazard Risk Maps

DESCRIPTION AND OBJECTIVE

Develop multi-hazard assessment mapping, with the use of computational models, real-time sensoring and Big Data, for better integration of the main risks that affect the urban space of Rio. These maps aim to support analyses about possible interactions of risks in the urban space, mainly but not limited to those related to intense rains and winds, heat islands and waves, air quality, flooding and landslides, high tides and storm surges, epidemics and accidents with urban infrastructure.

The aim is to identify the interactions between climate-related challenges and other types of risks in the city, in order to form a solid knowledge basis for public managers, academia and cities. It must allow for a comprehensive visualization of risks and their impacts in the region, to help identify priorities for intervention. For example, it is known that excessive heat and pollution can diminish the lifespan of concrete structures, with implications in the durability of urban infrastructure. Moreover, rain flooding and overflowing of rivers can affect mobility. Therefore a map with storm flooding patterns is supported by Strategic Plan 2017-2020 (Initiative 3.10, Flood Control). The Center of Operations Rio monitors in real time the heat waves of the city. These two types of maps constitute examples of risks that will be present in the multi-hazard assessment maps, which will allow for studies on cascading effects.

With the support of Big Data, historic data from sensors and climate scenarios, these integrated climate risk maps become sophisticated tools for urban planning and, in case of crises, for the deployment of sufficient and adequate first response. This initiative promotes the collaboration between public departments and public concessions.

This initiative is currently being implemented by Rio Resiliente in its early stages and was fully incorporated by Strategic Plan 2017-2020.

VISION RIO 500

Aspiration (III.2.b): The City will be ready and adapted to face climate change and its impacts, having mapped and planned for its main threats; Aspiration (II.2.a). No family in the city will live in high-risk areas; Aspiration (III.2.c): All citizens will be informed, prepared and engaged to deal with climate change impacts. Aspiration (III.3.a) Rio will have enough water for its supply, having mapped all the risks and defined strategies Aspiration (IV.2.b): All cariocas will have access to safe, legal and adequate housing.

STRATEGIC PLAN 2017-2020

Initiative 3.12 – Implement computational modelling to learn more about heat waves, winds and droughts, and a predictive system to determine the effects of meteorological interactions and air quality.

VALUE AND CO-BENEFITS

The knowledge acquired supports operations of services in the city during crises and provides information for real-life and tabletop simulations, supporting Goal #2 to be prepared and adequately respond to extreme climate events or other shocks. Besides, it informs the initiatives in Goal #3 for the development of more green, cool, secure and flexible urban spaces

INDICATORS

Development of multi-hazard risk assessment mapping, with analyses of cascading impacts.

FOCAL POINTS

Rio Resiliente, COR, Alerta Rio, RioÁguas.

POTENTIAL PARTNERS

CCRN, CEMADEN, INPE, C40, UFRJ, Rio de Janeiro Panel on Climate Change, departments of urban planning, transport, environment, utilities and public services.

RESILIENCE CHAMPIONS

Dra. Martha Macedo de Lima Barata is a professor and researcher at Oswaldo Cruz Foundation (Fiocruz), where she leads and develops research works in economics and mental health fields. She has developed a post-doctoral paper entitled "Convergence of the city's climate changes evaluation with mitigation and risk prevention" at the Center for Climate Systems Research, Earth Institute, Columbia University. Her post-doctorate research aims to contribute with the planning and management of more resilient cities in Brazil. With Rio Resiliente, she is developing studies related to heat islands and impacts on health.

Cristina Lemos is a nurse and works for the Municipal Secretary of Health since 1986. Currently, she is the Superintendent of Sanitary Health and working hard to combat Dengue, Chikungunya and Zika. She also coordinates the implementation of the Immunization Program, and has been helping Rio Resiliente with information and new insights since 2013. "I am very proud of this job, because it is possible to follow, over time, the control of diseases that could be prevented by vaccines and were causing the death of many children".

Valéria Saraceni also works for the Municipal Secretary of Health, and she graduated in Medicine 25 years ago. Vanessa has witnessed several improvements on public health and the subsequent actions from Rio's city administration. "What currently draws my attention is the influence of environmental changes, especially the climate ones, in the population. To be in a position where I can work on studying how to mitigate these impacts, together with Rio Resiliente, has been very eye-opening".

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

City Resilience Framework: in blue, aspects of resilience targeted in the initiatives of Goal #2
Credit: The Rockefeller Foundation/ Arup, 2014.

FLAGSHIP INITIATIVE #2.A:

Create a Disaster Recovery Plan for the Metropolitan Region

DESCRIPTION AND OBJECTIVE

Develop a Disaster Recovery Plan for the metropolitan region of Rio de Janeiro, promoting integration of actions for first response and post-disaster humanitarian logistics.

The Plan must include an inventory of intellectual and physical resources of all the areas of Rio de Janeiro and its metropolitan region, with direct involvement of the departments related to post-disaster assistance, like fire brigade, civil defense, social services, health, among others, in all spheres of government. The aim is to make the metropolitan region more efficient, agile and cooperative in the response to all shocks, including those related to resource scarcity, such as water and energy, but mainly the shocks related to strong rains and winds, epidemics and accidents with urban infrastructure.

The plan must involve the population, providing guidance on how to act in the prevention and recovery after disasters, and indicate opportunities for improvement in actions, based on the best practices from all over the world.

Rio Resiliente proposed a disaster recovery plan for the city of Rio and the Project was incorporated in the Strategic Plan 2017-2020. However, the initiative is more ambitious, in the fact that it also incorporates the metropolitan region. This initiative is in the planning stage.

RIO VISION 500

Aspiration (III.2.b): The City will be ready and adapted to face climate change and its impacts, having mapped and planned for its main threats.

STRATEGIC PLAN 2017-2020

Initiative 3.12 – Develop disaster recovery plan that includes inventory of resources, improvements for first response and post-disaster humanitarian logistics, to be released by 06/2018.

VALUE AND CO-BENEFITS

Integration of actions through multiple spheres of government; support in the identification of weak points in first response to disasters, minimization of economic losses and protection of human lives.

INDICATORS

Number of inventoried departments, frequency in the updating of inventories, number of recommendations implemented

FOCAL POINTS

Civil Defense, COR and the Metropolitan Chamber of the State of Rio

POTENTIAL PARTNERS

UNISDR, CEMADEN, World Bank, Civil Defense, and departments of first response of the other cities in the metropolitan area, department of metropolitan integration, and other national and international institutions specialized in crisis and disaster management.

RESILIENCE QUALITIES

REFLECTIVE Uses past experience to inform future decisions	**RESOURCEFUL** Recognizes alternative ways to use resources	**INCLUSIVE** Prioritizes broad consultation to create a sense of shared owner-ship in decision making	**INTEGRATED** Bring together a range of systems and institutions
ROBUST Well-conceived, constructed and managed systems	**REDUNDANT** Spare capacity purposively created to accommodate disruption	**FLEXIBLE** Willingness and ability to adopt alternative strategies in response to changing circumstances.	

INITIATIVE #2B:

Develop an Operational Olympic Legacy

DESCRIPTION AND OBJECTIVE

Incorporate the operational and logistics legacy of the Olympics and Paralympic Games of 2016, internalizing protocols and processes practiced before and during the Games. The Olympic Games constitute a unique opportunity for the integration of various operational forces of all governmental spheres, for an extended period, with common objectives. During the Games the city is submitted to high stress situations, related to the mobility of workers, athletes and public; public safety and antiterrorism measures; and intense exposure in the international media.

The preparation for the operations of the Olympics starts more than one year earlier, and it involves trainings and simulations of low, medium and high impact scenarios, involving shocks and stresses related to extreme weather events, accidents with urban infrastructure, agglomeration of people with impact in normalcy and criminal acts in the urban space.

The lessons learned during the operations of the city in high alert situations and crises management must generate reports at the Center of Operations Rio and be integrated to the routine procedures of Rio de Janeiro, so that this newly acquired knowledge becomes one more Olympic legacy for the City.

The proposal to develop an operational Olympic legacy was made by Rio Resiliente and fully incorporated by the Strategic Plan 2017-2020. The initiative is being implemented and dozens of general and regional simulations for the Olympics have already taken place at the Center of Operations Rio.

RIO VISION 500

Aspiration (III.2.b): The City will be ready and adapted to face climate change and its impacts, having mapped and planned for its main threats;

Aspiration (VI.1.a): The city will be recognized for its quality on planning, execution, maintenance, auditing and intersectoral coordination.

STRATEGIC PLAN 2017-2020

Initiative 3.12 – Capacity of Mobilization and Response: incorporate the logistics and operational knowledge acquired during large events (e.g. the Olympics 2016) in the routine of operations; Initiative 6.10 – Management strategies maximizing the efficiency of departments involved in city planning, improving information, control, auditing and monitoring systems, focused on developing limited growth areas.

VALUE AND CO-BENEFITS

Supports long-term planning and integrated actions; improves knowledge on preparation for crises and disasters; increases mobilization capacity for efficient, agile and coordinated response in crisis situations.

INDICATORS

Report of lessons learned during the Olympics.

FOCAL POINTS

Center of Operations Rio.

POTENTIAL PARTNERS

Olympic Municipal Company.

IMPLEMENTATION

until March 2017.

INITIATIVE #2C:

Execute Simulations for Crisis Response

DESCRIPTION AND OBJECTIVE

Execute simulations for crisis response four times a year, involving federal, state and municipal operational departments. These simulations, led by the Center of Operations Rio, should incorporate the lessons learned during the Olympics and test the resilience of the city to different types of crises, focused on the main vulnerabilities of the city, as identified in the chapter "Shocks and Chronic Stresses of Rio", in the multi-hazard risk assessment maps of initiative 1D, and in the reports produced by the Rio de Janeiro Panel on Climate Change, initiative 1A.

The simulations aim to practice the first response capabilities of different public departments and private concessions for highly complex problems with significant negative impacts, thus increasing the effectiveness in real life situations and the practical knowledge of public operators and managers. The simulations provide opportunity for the self-evaluation of departments and the identification of weak points or insufficiency of resources for crisis response. The simulations should involve as much as possible the metropolitan departments and support the execution of initiative 2A, for the creation of a disaster recovery plan for the metro region.

The proposal for the execution of simulations was advanced by Rio Resiliente and adopted by the Strategic Plan 2017-2020. The initiative is in its planning stage.

RIO VISION 500

Aspiration (III.2.b): The City will be prepared and adapted to face climate change and its impacts, having mapped and planned for its main threats.

STRATEGIC PLAN 2017-2020

Initiative 3.12 – Execute simulations for extreme situations at the Center of Operations Rio; Initiative 6.10 – Management strategies maximizing the efficiency of departments involved in city planning, improving information, control, auditing and monitoring systems, focused on developing limited growth areas.

VALUE AND CO-BENEFITS

Integration of actions through multiple spheres of government; support in the identification of weak points in first response to disasters; minimization of economic losses and protection of lives.

INDICATORS

Number of departments and public utility concessions involved in the simulations; qualitative analyses of lessons learned; and actions developed inside departments fostered by the participation in the simulations.

FOCAL POINTS

COR and subprefectures.

POTENTIAL PARTNERS

CICC, Civil Defense, Municipal Guard, Fire Fighting Department, Federal, Military and Civil Police, universities.

IMPLEMENTATION

Starting March 2017.

Operational simulations for the Olympics– Photo credit: Marcus Carmo - COR

INITIATIVE #2D:

Expand the Program Resilient Communities

DESCRIPTION AND OBJECTIVE

Expand the program of training of community leaders in resilience, and the issuing of certificates to engage communities in the theme of resilience, with knowledge about risk, ability to take preventive measures and act during and after crises.

The project Resilient Communities began in 2015, led by the Civil Defense of the City of Rio, and has as basis the Project "Creating Resilient Cities: my city is getting ready", of the United Nations International Strategy for Disaster Reduction (UNISDR). In 2015, leaders of 17 vulnerable communities signed a certificate declaring their commitment to resilience. It is an opportunity to spread basic notions of civil defense and increase awareness about the recurrent risks within those communities.

The objective of this initiative is to involve more communities in the signing of this commitment, which is the last step in a process of engagement that involves information about shocks and chronic stresses, regular drills for evacuation of buildings and assessment of local risks.

This initiative aims to lower the vulnerability of citizens to strong rains and winds, and in particular impacts related to landslides and flooding. It is integrated with initiative 2.C, which provides multi-hazard maps through which communities gain knowledge about their own exposure to risk.

VISION RIO 500

Aspiration (III.2.c) All citizens will be informed, prepared and engaged to respond to the impacts of climate change.

VALUE AND CO-BENEFITS

Increases social cohesion in and between communities; empowers citizens; fosters a culture of prevention and preparation.

INDICATORS

Number of leaders trained, number of communities involved.

FOCAL POINTS

Civil Defense and Rio Resiliente.

POTENTIAL PARTNERS

UNISDR, NGOs located in the communities.

Buildind Resilient Communities – Photo credit: Nelson Duarte

RESILIENCE CHAMPION

Marcio Moura Motta, Lieutenant Colonel of the Military Fire Brigade for the state of Rio de Janeiro, Marcio Moura Motta is undersecretary of the municipal Civil Defense. He is a member of United Nations International Strategy for Disaster Reduction committee since 2103. Col. Motta leads the Civil Defense in Schools project, the main inspiration for Initiative 6.3 of our Resilience Strategy, Resilient Youth. Finally, he also actively participates in the Steering Committee of Rio Resiliente since its beginning in 2014.

GOAL #3

Cultivate green, cool, safe and flexible urban spaces

#A: Implement LED Street Lighting

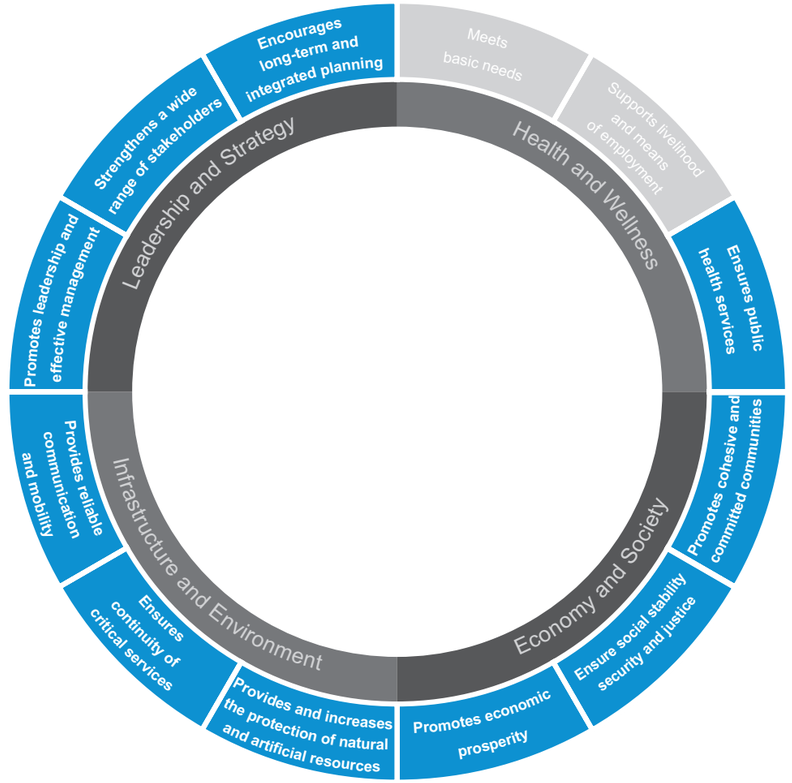
#B: Stimulate Arbored - Squares

#C: Improve Resilience in Mobility

#D: Equal Access to Culture

#E: Carioca Forests

#F: Rio Always Olympic



City Resilience Framework: in blue, aspects of resilience targeted in the initiatives of Goal #3
Credit: The Rockefeller Foundation/ Arup, 2014.

FLAGSHIP INITIATIVE #3.A
Implement LED Street Lighting

DESCRIPTION AND OBJECTIVE

LED lighting has superior quality, better luminosity at a lower cost (on average, 50% of the cost of technologies currently installed, benchmarked by many cities worldwide), longer durability, spends less time for starting up and increases the feeling of safety, because it improves facial recognition.

Electric energy in Brazil is highly dependent on the rain patterns and water scarcity in the Southeast of Brazil in the summers of 2014 and 2015 significantly increased the costs of energy.

The installation of smart grid allows for remote detection of defects, adjustable dimming and the use of flickering as alert in the case of emergency. Besides, smart grids are a platform of the addition of various kinds of sensors, for present and future technologies related to traffic, security, microclimate, flooding detection, etc. The project of LED lighting can support the city to increase the resilience for all climate related shocks and stresses, as well as those related to accidents with urban infrastructure, saturation of the road infrastructure and criminal acts on the urban space.

This initiative was developed by Rio Resiliente and fully incorporated by the Strategic Plan 2017-2020. It is in the planning phase.

RIO VISION 500

Aspiration (III.1.a) The City will ensure a low-carbon energy matrix; Aspiration (IV.3.a) All regions of the city will have access to high quality public infrastructure; Aspiration (IV.2.c) All public spaces will be planned and its streets and elevations will be active and safe; Aspiration (IV.3.b): The city will be completely accessible and pleasant to cyclists, pedestrians, people with disabilities, seniors and children; Aspiration (VI.3.b) Public resources will be used rationally, with proper management from public and private partnerships and social civic organizations to ensure high-quality services to all citizens.

STRATEGIC PLAN 2017-2020

Initiative 3.09 – Covert public regular illumination lamps for LED lightning; Initiative 4.10 – Urban renewal in neighborhoods with precarious or nonexistent infrastructure, focusing on regions AP 3 and AP 5; Initiative 6.06 – Engage PPPs and other external resources to address high priority issues of the city.

VALUE AND CO-BENEFITS

Lowers carbon emissions and increases the resilience of the city to water and energy scarcity. Its implementation can prioritize areas that increase the safety of pedestrians and, therefore, minimize criminal acts on urban spaces. Moreover, smart grid could enhance our local knowledge and provide even more details to the multi-hazard risk maps (see initiatives 1C and 1D), offering relevant inputs to both the climate changes impacts mitigation portfolio of projects (initiative 1B) and other projects related to green, safe, fresh and flexible urban spaces creation (Goal 3).

INDICATORS

Less consumption of energy; percentage of existing luminaires substituted for LED technology.

FOCAL POINTS

Rioluz and Rio Resiliente.

POTENTIAL PARTNERS

World Bank and departments of public safety.

FUNDING

Included at the Strategic Plan 2017-2020 BRL432,9 million to substitute 60% of luminaires until 2020, of which BRL 69,2 million of own resources and BRL 363,7 million of external resources.

Public LED lighting at the margins of Lagoa Rodrigo de Freitas. Photo credit: JP Engelbrecht

RESILIENCE QUALITIES

REFLECTIVE
Uses past experience to inform future decisions

RESOURCEFUL
Recognizes alternative ways to use resources

INTEGRATED
Bring together a range of systems and institutions

ROBUST
Well-conceived, constructed and managed systems

FLEXIBLE
Willingness and ability to adopt alternative strategies in response to changing circum-stances.

INITIATIVE #3B:
Stimulate Arbored-Squares

DESCRIPTION AND OBJECTIVE

The project Arbored-Squares aims to revitalize and increase the tree density of 78 public squares, by planting a total of 50,000 trees, thus allowing the greatest part of the population to have access to a green area within a 15-minute walking distance from its residence. The project will focus on the North and West zone, which nowadays have sparse tree coverage.

The squares selected will have a minimum area of 20,000 square feet, and will have dense tree coverage to increase shading and support the microclimate. If the project Arbored-Squares incorporates more resilient items, it can decrease the vulnerabilities of the city to strong rains and winds, heat islands and waves, droughts, epidemics and accidents with urban infrastructure.

This project is featured in the Strategic Plan 2017-202, and can be expanded in its scope to add a few benefits of resilience, such as:

– Installation of water fountains, to increase thermal comfort to the population and decrease internments and obits related to extreme high temperatures.

– Installation of mini-centers of recycling and composting, for utilization of citizens and local generation of income.
– Raise awareness for the installation of green roofs around the squares.
– Utilization of greywater in the maintenance of parks, preferably from local rainwater harvesting.
– Pavement and other surfaces with high permeability, to help protect the area from flooding, to lower absorption of solar irradiation and mitigate urban heat islands.

This project was developed by the Strategic Plan 2017-2020 and incorporated with a resilience lens in this strategy.

RIO VISION 500

Aspiration (II.1.d) The city environment will benefit cariocas in a way that everyone will cultivate healthy habits for life and have access to resources and information needed for a longer and better life; Aspiration (II.3.c) Ageing population of Rio will be dynamic and productive; Aspiration (II.4.a) Everyone will live close to a green area; Aspiration (III.4.b) The green areas of the city will be protected and expanded, then environmental preservation will become a city asset.

Melbourne, Australia: Yarra Gardens – Source: Creative Commons

STRATEGIC PLAN 2017-2020

Initiative 2.06 – City evolution towards a friendly ambience to elderly people; Initiative 4.02 – Development of other central areas in the North and West zones; Initiative 4.03 – Strengthen city parks by enlarging its green areas and applying sustainable management models; Initiative 4.10 – Urban renewal in neighborhoods with precarious or nonexistent infrastructure, focusing on regions AP 3 and AP 5.

VALUE AND CO-BENEFITS

Guarantee heat mitigation for the population; creation of a new centrality in neighborhoods, promoting open-air physical activities, sports, cultural events and social cohesion; promotion of action for the valuation of waste; water efficiency.

INDICATORS

Number of trees planted in public streets, square feet of revitalized squares, number of public water fountains, and mini-centers for recycling and composting, percentage of use of grey water, square feet of less heat-absorbing and more permeable pavements.

FOCAL POINTS

Comlurb, FPJ, departments of urban planning, maintenance

and environment.

POTENTIAL PARTNERS

C40, Rio Resiliente, resilience offices from cities worldwide, recycling associations, urban farmers, private sector.

FUNDING

BRL 60 million of own funds and BRL 11,6 million of external funds until 2020.

RESILIENCE CHAMPION

Pedro Ribeiro joined Rio Resiliente as a volunteer in early 2015, and is now part of the Resilience Team, with focus on water resources, urban ecology and urban heat islands. He carried out a diagnostic on the rainwater harvesting potential as an alternative for the supply from the Guandu River. He has worked with environmental licensing for energy production projects and supported socioeconomic initiatives in Wales, UK. He has a degree on Environmental Sciences by the Federal University of Rio de Janeiro and is co-founder of a socioenvironmental consultancy.

INITIATIVE #3.C

Improve Resilience in Mobility

DESCRIPTION AND OBJECTIVE

The mobility projects planned for Rio involve initiatives that can contribute to increase the resilience of the city. All those projects – new Bus Rapid Transit lines, such as Transbrasil, which will move approximately 450,000 people daily; the segregated lines of the Bus Rapid System; Light Rail Vehicle; and many miles of bike lanes – involve interventions in the urban space that can contribute to minimize many shocks and chronic stresses of the city.

Projects for mobility must be aligned with the Portfolio of Climate Change Mitigation and Adaptation, initiative 1B, and must involve in their planning analysis of impact of microclimates in neighborhoods, effects on "walkability", exposure to climate shocks, such as strong rains and winds (including those related to drainage and coastal protection against sea level rise); and also adequate public lighting and impacts in the sensation of security. The utilization of low emission fuels is essential to the development of a resilient mobility. The integration of different transportation modals cannot be regarded solely as a means of reducing commuting time, but also for its ability to increase flexibility and generate redundancy, so that eventual interruption of a modal can be mitigated by the use of others.

An ample analysis of the co-benefits of resilience in mobility projects constitute opportunity for better access to finance options, considering the global movement towards the financing of climate-smart projects, whose longer utility is ensured by considering climate scenarios. The application of a resilience lens in mobility supports the city to deal with shocks and stresses like strong rains and winds, heat islands and waves, sea level rise, accidents with urban infrastructure, agglomeration of people with impact in normalcy, criminal acts in the urban space, and saturation of road infrastructure.

RIO VISION 500

Aspiration (III.1.d): City mobility will be sustainable, supported by green technologies and intelligent urban planning; Aspiration (IV.1.a) The city will be more compact and densified in tandem with the existing infrastructure; Aspiration (IV.1.b) Everyone will be able to ride all over the city using high quality and integrated public transportation.

STRATEGIC PLAN 2017-2020

Initiative 4.05 – Improvements on the roads and on the quality of buses travel; Initiative 4.06 – Implementation of exclusive lanes for public transportation.

VALUE AND CO-BENEFITS

Increase in the flexibility and robustness of the transport system; support for the development of green, safe, and walkable urban spaces; positive impact in the microclimate of neighborhoods; increased attraction for climate-related finance options; reduction in air pollution; and reduction of GHG emissions.

INDICATORS

Percentage of the population that commutes daily via high capacity transportation; amount of funding attracted by climate-smart mobility projects; lower concentration of transport-related air pollution; lower GHG emissions.

FOCAL POINTS

Rio Resiliente and departments of transportation and planning.

POTENTIAL PARTNERS

FPJ, ITDP-Brasil, C40, departments of public construction works and cultural heritage, universities, private sector.

Bus Rapid Transit, Transcarioca - Photo credit: Ary Kaye

INITIATIVE #3.D

Equal access to Culture

Description and objective	With the aim of encouraging the symbolic, economic and social mobility of carioca cultural agents, this initiative consists in the expansion of investments in actions with a territorial impact, ensuring capillarity, coverage and geographic scope of public funding for culture.
Vision Rio 500	Aspiration (I.3.b) Valued territorial culture and equitably distributed cultural goods.
Values and co-benefits of resilience	Public investments supporting local culture, with broad participation of the community; increasing social cohesion
Indicators	Number of agents with community profile trained for territorial impact per year. Proportion of projects with community profile and territorial impact followed through in the period. Percentage of districts covered in the West and North zones
Expected results	Reduce inequality of access to public funding of culture and allow active agents in Rio territories to live strengthening, development and growth processes. Artists, producers and the public with access to a network of modern cultural facilities capable of operating as bases for creation, training and dissemination of artistic and cultural diversity
Budget 2017-2020	BRL 73.5 million

Initiatives of the Strategic Plan 2017-2020 with Resilience Co-Benefits.

INITIATIVE #3.E

Carioca Forests

Description and objective	Protection and restoration program of the Atlantic Forest biome, via development of appropriate legislation, maintenance and enrichment of the reforested areas and implementation of green corridors for interconnection of the biome fragments. The initiative involves the formulation of legislation for protection for 4,800 hectares of areas in the Atlantic Forest biome that are still without legal protection, connect large fragments of the Atlantic Forest biome, through the implementation of green corridors Bosque da Barra - Marapendi - Chico Mendes and Prainha - Guaratiba.
Vision Rio 500	Aspiration (III.4.a) The entire population will live near a green area, since it will be prioritized the occupation of public spaces that meet social and ecological roles; Aspiration (III.4.b) The green areas of the city will be protected and expanded, and the culture of environmental preservation will be an asset; Aspiration (IV.3.c). Rio will value and protect its landscape as an asset of the City.
Values and co-benefits of resilience	Protection of water production within the municipality; Reduction of heat waves and islands; Greater resilience of new reforested areas due to the greater number of species and better management; increased biodiversity; decreased risk of fire in slopes; expand education for environment and resilience.
Indicators	Percentage of Atlantic Forest Biome area protected by new legislation in the period. Index of adequate maintenance of the reforestation area. Percentage of selected tree specimens managed in the enriched forested areas. School units involved in the Forest in Schools Program.
Expected results	Ensure that the Atlantic Forest biome present in the city has sustainable conditions to maintain its diversity and extension, awakening in the population higher levels of interest and participation in its protection and recovery.
Budget 2017-2020	BRL 127.1 million

Initiatives of the Strategic Plan 2017-2020 with Resilience Co-Benefits.

INITIATIVE #3.F

Rio Always Olympic

Description and objective	The post-Olympic utilization of Olympic equipment were taken in consideration since the planning phase, to avoid building sites that would later be abandoned or underused. In order to allocate the new areas built for the 2016 Olympic Games to the enjoyment of Rio's population, creating a true Olympic legacy for the city, the initiative aim to plan for educational, sports, social and leisure activities.
Vision Rio 500	Aspiration (I.3.a) Children and young people will have access to the cultural heritage of the city for the development of values such as respect and citizenship; Aspiration (II.4.a) Rio will be a reference as a senior-friendly city, benefiting all residents.
Values and co-benefits of resilience	The Olympic legacy resilience benefits can be enhanced by integration with the neighborhood, with the development of new spaces that are green, cool, safe and flexible. Maintaining a positive legacy is related to a future management that is attentive, responsive and inclusive.
Indicators	Number of new venues being used by the population.
Expected results	Promotion of sports as a tool to improve the quality of life with the availability of facilities as venues for training, encouraging amateur sports and also the use for the practice of recreational sports by citizens and within full-time schools.
Budget 2017-2020	BRL 229.4 million

Initiatives of the Strategic Plan 2017-2020 with Resilience Co-Benefits.

GOAL #4

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

#A: Develop a Water Strategy

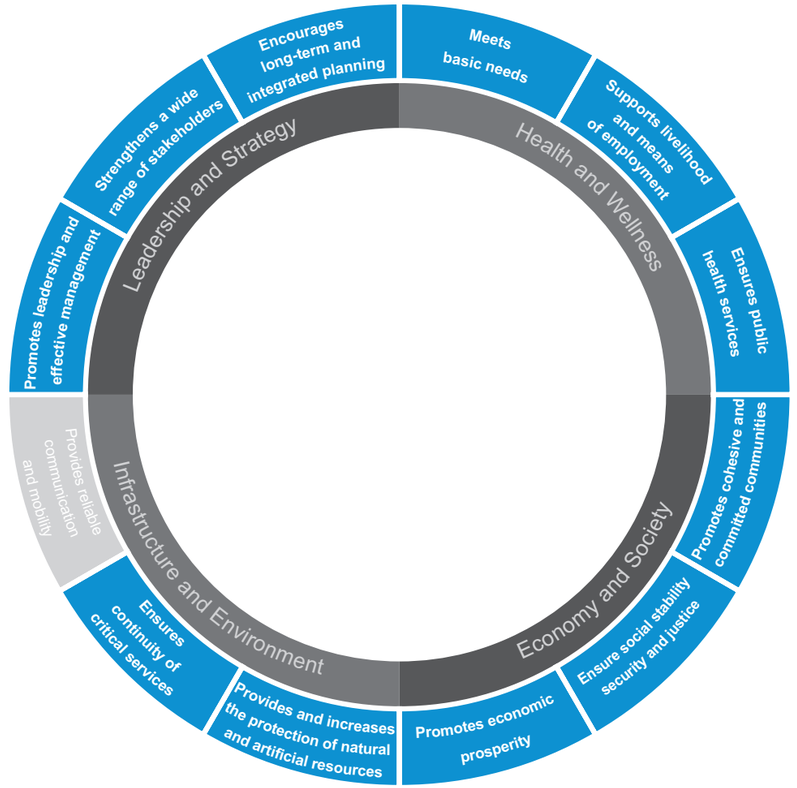
#B: Implement a Solar Energy Strategy

#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



City Resilience Framework: in blue, aspects of resilience targeted in the initiatives of Goal #4
Credit: The Rockefeller Foundation/ Arup, 2014.

FLAGSHIP INITIATIVE #4.A:
Develop a Water Strategy

DESCRIPTION AND OBJECTIVE

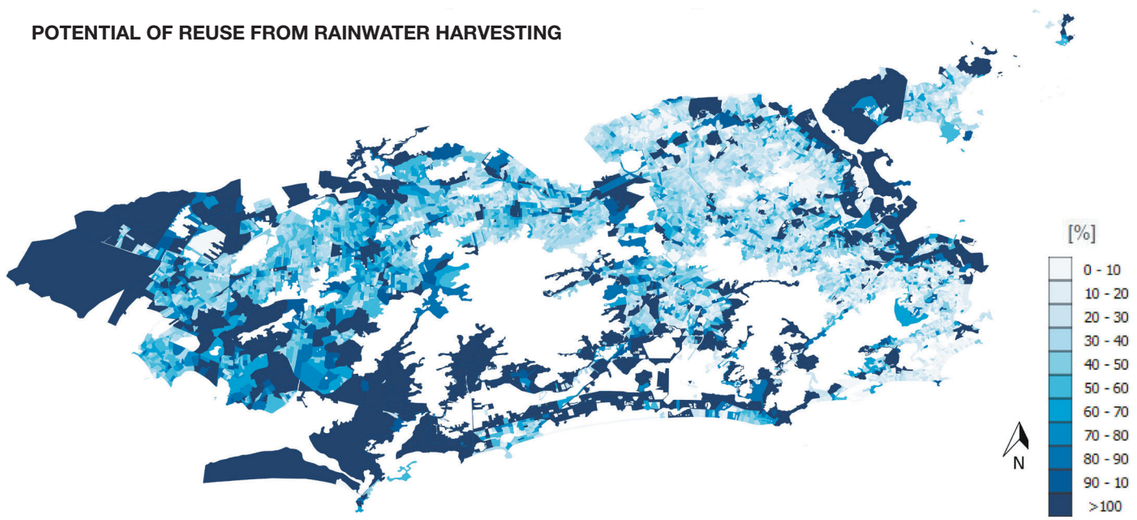
Develop a water strategy, incorporating the metropolitan region and the basin of the Guandu river, involving multiple actors in the public, private, civil, academic and third sectors, with the purpose of fostering the water resilience of the city and state of Rio de Janeiro. In 2014 and 2015 the Southeast of Brazil experienced low rainfall volume. Consequently, the integrated reservoir of Guandu reached 13% of its capacity, a worrying stage considering the fact that this source provides water to 92% of Rio's citizens. The preparation of a water strategy has five objectives; I) Develop a preliminary diagnosis of the water situation in the city of Rio; II) Establish an integrated approach for the urban water; III) Develop projects based on successful cases of water management; IV) Align a strategy specifically for the metropolitan region, with the engagement of actors from the different governmental spheres; V) Develop an implementation roadmap.

The water strategy must indicate alternative means to improve access to water, reduce consumption and deal with the urban water cycle more resiliently. The water supply must be constant to all citizens and less dependent on a single source. Therefore, the water basins of the river Guandu, located outside the limits of the city of Rio de Janeiro, must be revitalized, in order to guarantee steady water flow throughout the year; and universal sanitation network must be implemented, preventing the contamination of water bodies.

The diversification of the water matrix in Rio de Janeiro entails deepening the knowledge about alternative sources, such as watershed in the urban forests (there are three forests located within city limits) and the potential for rainwater harvesting, mainly in rooftops. The harvesting and reserve of water in the city must integrate gray infrastructure to a sustainable and resilient use of ecosystems. The water cycle in the city, little explored and understood yet, should be regarded as a whole, so that future interventions do not impact it negatively, by enhancing flooding or dry periods.

For a resilient management of water, it is essential to utilize this resource more efficiently and, therefore, the water strategy must also include the active development of new habits, practices and technologies which induce the reduction in consumption; and should identify opportunities for the usage of greywater, supporting its widespread adoption in public and private buildings, whether old or new.

POTENTIAL OF REUSE FROM RAINWATER HARVESTING



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.

Rio de Janeiro must be better prepared to face water crises, by dealing with the challenge of pollution and access to sanitation in a structured manner. The strategy should support existing programs such as the Reforestation, Urban Tree Coverage, and Rainwater Drainage. This initiative is at the planning stage, stimulated by Rio Resiliente, and was partially adopted by Strategic Plan 2017-2020, which includes studies for identification of capturing new water sources in the city.

RIO VISION 500

Aspiration 1: Rio will have water security having mapped all risks with their strategic action plans; Aspiration 2: Rio will work within a network of cities in order to promote basic sanitation to the whole metro region; Aspiration 3: The population will not waste usable water and its reuse will be part of people's routine.

STRATEGIC PLAN 2017-2020

Initiative 3.05 – Proper use of water resources with guidelines to reduce water vulnerability aiming to balance its supply and demand; Initiative 3.06 – Better quality of water bodies helping increase the extension beaches which are proper for bathing.

VALUE AND CO-BENEFITS

Less dependency on a single source and better security for the water supply; more resilient and sustainable use of water resources; mitigation of impacts as droughts and flooding; mitigation of water-borne illnesses.

INDICATORS

Improvement in the water quality of rivers and lakes; better water safety in the beaches and in Guanabara Bay; number of installed rainwater capture systems and volume of greywater reused; increase in the micro-production of water in the city – less dependency on the Guandu system.

FOCAL POINTS

Rio Resiliente and water management departments, both city and state.

POTENTIAL PARTNERS

CI, WRI, The Nature Conservancy, CEDAE, FOZ Águas.

RESILIENCE QUALITIES

REFLECTIVE Uses past experience to inform future decisions.	**RESOURCEFUL** Recognizes alternative ways to use resources.	**INCLUSIVE** Prioritizes broad consultation to create a sense of shared ownership in decision making.	**INTEGRATED** Bring together a range of systems and institutions.
ROBUST Well-conceived, constructed and managed systems.	**REDUNDANT** Spare capacity purposively created to accommodate disruption.	**FLEXIBLE** Willingness and ability to adopt alternative strategies in response to changing circumstances.	

RESILIENCE CHAMPION

Paulo Fonseca Civil Engineer, Paulo has worked with Rio Resiliente developing the water strategy of Rio. He has been working for the city City, since 1992 where he has occupied several leadership roles across municipality functions: Research and Technical Support Manager, and General Manager for Pluvial Waters Management Projects, at the Municipal Secretary of Public Works. Paulo also took the position as the Director of Studies and Projects and then Chief Executive Officer of the RioÁguas Foundation. He holds a PhD degree in Civil Engineering and is a member of the City Leadership Group, a team of public servants specially trained for management positions. .

INITIATIVE #4.B:
Implement Solar Energy Strategy

DESCRIPTION AND OBJECTIVE
Promote decentralized generation of solar energy in the city, developing an urban solar energy strategy and starting its implementation on buildings owned by the municipality.

Rio de Janeiro receives sufficient yearly solar irradiation on its available rooftops to power 183% of the energy needed by its residents. Besides, solar energy is equitably available to every citizen throughout the four seasons, and therefore solar energy can promote equal access to this basic service. Furthermore, in Brazil, the generation of electricity is becoming less sustainable in the latest years, due to the intense use of thermal plants (up to 25% of the matrix in 2015). This has had a negative effect in the price of energy and the purchasing power of citizens. This trend is opposed to the vision of the municipality and its citizens, as indicated in the Vision Rio 500, which envisions a low carbon future for the city.

The development of a solar strategy should begin in smaller pilot projects inside city administration. For this reason, a Solar Energy and Energy Efficiency project was initiated in the Center of Operations Rio, to be implemented after the Olympics. Considering the lessons learned in this project, it is possible to develop a wider implementation plan that incorporates large-scale cases from other cities, including innovative finance solutions

The strategy for solar energy was proposed by Rio Resiliente and RioÁguas was incorporated in the Strategic Plan 2017-2020 in two different contexts: development of a strategy in 2018 and support to sustainable buildings.

RIO VISION 500
Aspiration 1: The City will ensure a low-carbon energy matrix; Aspiration 2: All regions of the city will have access to high quality public infrastructure; Aspiration 2: All new buildings will follow ecoefficiency guidelines and existing ones will be encouraged towards modernization; Aspiration 3: The city will remain as the national capital for the energy industry, attracting high value-added activities and fostering renewable energy sources.

STRATEGIC PLAN 2017-2020
Initiative 3.08 – Incentive programs for sustainable constructions in the city of Rio; Initiative 5.01 – Structuring of an area to coordinate economic growth actions and sectorial development new tools.

VALUE AND CO-BENEFITS
Reduction in the consumption of energy and, in Brazil, due to the energy matrix, mostly hydroelectric, also water; lower risk in case of water or energy scarcity; lower carbon emissions, economic development – diversification and development of a more sustainable economy.

INDICATORS
Total KW installed in municipal buildings; amount of MWh produced by decentralized solar energy; total investment in solar energy yearly in municipal buildings, GHG emissions avoided in the generation and use of electricity.

FOCAL POINTS
COR and Rio Resiliente, Casa do Futuro, Solarize, Light.

POTENTIAL PARTNERS
PENSA, EMZINGO, USC.

FUNDING
For solar energy in the Center of Operations Rio (COR): BRL 305,100, in which BRL 267,900 is from the Energy Efficiency program of the National Agency for Electric Energy (ANEEL), and BRL 37,200 from COR and Rio Resiliente. For the solar energy viability study for public buildings, the Strategic Plan 2017-2020 projects investment of BRL 1 million.

RESILIENCE QUALITIES

REFLECTIVE
Uses past experience to inform future decisions.

RESOURCEFUL
Recognizes alternative ways to use resources.

INTEGRATED
Bring together a range of systems and institutions.

ROBUST
Well-conceived, constructed and managed systems.

REDUNDANT
Spare capacity purposively created to accommodate disruption.

FLEXIBLE
Willingness and ability to adopt alternative strategies in response to changing circumstances.

RESILIENCE CHAMPION

Kirsten Kramer supports Rio Resiliente since January 2014. Born Dutch and currently a Carioca, she is an expert in energy and water and leads Rio Resiliente's initiatives in these themes, including the project to install solar energy in the Center of Operations Rio (Initiative 4.B) and the calculation of the potential energy and water efficiency, and solar energy, in the municipal schools of Rio (Initiative 4.C). "It is an honor to be part of Rio Resiliente and strive together so that my adoptive city will be even more marvelous, resilient and sustainable through the promotion of solar energy".

INITIATIVE #4.C:

Realize Energy and Water Efficiency in Public Buildings

DESCRIPTION AND OBJECTIVE

Realize energy and water efficiency in public buildings, with the potential to zero the energy bill of the municipality, implemented in tandem with initiative 4.B, Solar Energy.

Due to water scarcity in the beginning of 2015, decree nº 39848 of 2015 establishes that City departments must keep the same electricity budget as in the previous year, 2014, despite the rising prices of energy. In order to meet that goal, it is essential to investigate the true potential for lower consumption of water and energy. For this reason, Rio Resiliente sought to start this investigation through a department with the highest possible impact, from a technical standpoint but also for co-benefits of education and behavior. Therefore, a study was carried out to calculate the reduction potential in more than 1450 school units in the municipality, the largest school network in Latin America.

In total, schools in Rio use approximately 80GWh of electricity and 4 million m^3 of water per year (reference 2015). The study, which included sight visits to a sample of schools, identified a potential reduction of 39% (31GWh) for electricity and 58% reduction (2,4 million m3) for water. The potential for solar energy in rooftops was also calculated to be able generate 101 GWh/year, sufficient to cover all needs. This represents potential savings of BRL 122 million per year, more than the actual costs: in fact, the electricity bills could be zeroed and still generate income for expansion in the number of schools.

The analysis for the potential of water and energy efficiency in schools was carried out with technical and financial support of the World Bank. Considering the different typologies of buildings and distinct use, new diagnosis for hospital and other public buildings are necessary. The project was initiated by Rio Resiliente, in partnership with the Secretary of Education and Pensa Sala de Ideias, and provides support for the meeting of the energy efficiency goals stated in the Strategic Plan 2017-2020.

RIO VISION 500

Aspiration (III.1.a) The City will ensure a low-carbon energy matrix; Aspiration (IV.2.c): All regions of the city will have access to high quality public infrastructure; Aspiration (III.1.b) All new buildings will follow ecoefficiency guidelines and existing ones will be encouraged towards modernization; Aspiration (V.1.e) The city will remain as the national capital for the energy industries, attracting high value adding activities and fostering renewable energy sources.

STRATEGIC PLAN 2017-2020

Initiative 3.08: Incentive programs for sustainable constructions in the city of Rio; Initiative 5.01: Structuring of an area to coordinate economic growth actions and sectorial development new tools.

VALUE AND CO-BENEFITS

Reduction in the use of water and energy; lower risk of supply shocks; lowers carbon emissions; economic development: diversification and development of a more sustainable economy; education of children about sustainable use of natural resources, among others.

INDICATORS

Reduction in the consumption of water and energy in public buildings: education, health and others; number of buildings in the municipality with water and energy programs; total investment per year on water and energy efficiency.

FOCAL POINTS

Rio Resiliente and PENSA.

POTENTIAL PARTNERS

World Bank, Accenture, Secretary of Education and other city departments such as health, finance and public works.

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

INITIATIVE #4.D:

Universal Access to Sanitation

Description and objective	In order to expand the sewage system to reach 80% of the population in the municipality, this initiative proposes to implement sanitation systems in Barra da Tijuca, Jacarepaguá and the West zone, ensure compliance with the targets of existing concessions in the West zone and track the expansion of sanitation to the center, South and North areas.
Rio Vision 500	Aspiration (III.3.b): Rio will work in a networked manner to universalize sanitation in the city and the metropolitan area, depolluting water bodies in the region; Aspiration (III.4.b): The city's green area will be protected and expanded, and the culture of environmental preservation will be an asset.
Values and co-benefits of resilience	Improved management of water resources of the city by eliminating the exposure of the population and ecosystems to pollution. The proper disposal of sewage treatment will bring to citizens, besides better quality of life and health, the possibility of greater water security through the reuse of wastewater. This initiative focuses on reducing inequality of access to basic services.
Indicators	Percentage of population covered by the sewage disposal system with treatment in the basins of Guanabara and Sepetiba bays. Percentage of population covered by the sewage disposal system with treatment in Jacarepagua basin. Percentage of population covered by the sewage disposal system with treatment in the basin of Guanabara.
Expected results	The initiative aims to reduce inequalities of coverage with sewage treatment in various areas of the city, reducing the incidence of waterborne diseases and economically appreciating the areas with sanitation.
Budget 2017-2020	BRL 1.918 billion

Initiatives of the Strategic Plan 2017-2020 with Resilience Co-Benefits.

Sanitation works in Rio de Janeiro: Source: Arquivo Secretaria Municipal de Recursos Hídricos

INITIATIVE #4.E:

Access to Safe Housing

Description and objective	The Morar Carioca program is part of the Municipal Plan for Social Housing of the Rio de Janeiro City and aims to upgrade favelas.
Rio Vision 500	Aspiration (III.2.a) No family in the city will live in a high physical vulnerability situation; Aspiration (III.3.b) Rio will work in a networked manner to universalize sanitation in the city and the metropolitan area, depolluting water bodies in the region; Aspiration (IV.2.c) All regions of the city will have access to quality urban infrastructure; Aspiration (IV.3.a) All public spaces will be well designed, and the streets and facades will be active and safe; Aspiration (IV.2.d) There will be provision of accessible housing options and more diversity in territorial occupation; Aspiration (V.1.f) The real estate industry will be more developed, valuing the assets of the city and generating jobs and income.
Values and co-benefits of resilience	The upgrading of favelas improves the quality of life of residents, who benefit from basic infrastructure such as sanitation, street lighting and adequate paving. The initiative should incorporate knowledge gained via initiatives 1.1, 1.2 and 1.3, regarding climate risks.
Indicators	Number of upgraded households in favelas.
Expected results	It is expected, with this program, to continue to promote the urban, social, economic and cultural integration of residents of favelas to the city. By 2020, it is expected the integration of public and private spaces located in favelas to the georeferenced base of the city.
Budget 2017-2020	BRL 1.882,2 billion.

Initiatives of the Strategic Plan 2017-2020 with Resilience Co-Benefits.

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

INITIATIVE #4.F:

Public Authority for The Guanabara Bay

Description and objective	Establish new governance for the depollution of Guanabara Bay, including the creation of a Metropolitan Public Authority by 2020 to ensure completion of the remediation project planning of Guanabara Bay and the start of its implementation.
Rio Vision 500	Aspiration (III.3.a) Rio will have water security in its supply, having mapped the risks and prepared coping strategies; Aspiration (III.3.b) Rio will work in a networked manner to universalize sanitation in the city and the metropolitan area, depolluting water bodies in the region; Aspiration (III.3. C) Rivers, lakes and the sea will be recovered and its economic and leisure potential explored, integrating them into the life of Cariocas.
Values and co-benefits of resilience	Metropolitan integration, depollution of an important water body for the city of Rio de Janeiro; improvement of coastal ecosystems. Improvement of the water quality in beaches.
Indicators	Percentage of compliance of the schedule of each initiative. Number of citizens engaged in a communication platform for the metropolitan initiative.
Expected results	Establish new governance for the depollution of the Guanabara Bay.
Budget 2017-2020	BRL 0,9 million

Initiatives of the Strategic Plan 2017-2020 with Resilience Co-Benefits.

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

City Resilience Framework: in blue, aspects of resilience targeted in the initiatives of Goal #5
Credit: The Rockefeller Foundation/ Arup, 2014.

FLAGSHIP INITIATIVE #5.A:

Create an Agency for the Promotion of Circular Economy

DESCRIPTION AND OBJECTIVE

Creation of a department within the City with three main objectives: a) send less waste to landfills, b) generate jobs, through the valuation of waste, c) support the efficiency of resources, such as water, food and materials, with no wasteful practices, in order to develop a circular, diversified, inclusive and low-carbon economy.

Nowadays, the consumption and production patterns follow a linear model of extraction, use and disposal. On the one hand there is more demand for primary products, with the increased of extraction and associated environmental impacts; on the other hand there is a growing generation of residue, which create problems for transportation and disposal. The circular economy proposes that products should be developed already considering the extension of its lifetime, reuse, recycling, upcycling and transformation.

Large cities are, in fact, businesses ecosystems which can act in an integrated manner, so that the waste generated by one industry may become a primary product for another. The recycling and transformation of products has the enormous potential to create jobs related to the reuse of products at artisanal and industrial scales but also for the creative economy.

The jobs created have the potential to insert in the formal economy low-skilled workers and create opportunities for those in the fields of engineering, chemistry and product design. For example, currently exists a nearly 100% collection and recycling of aluminum cans and this happens because there are economically viable industrial processes that allow this closed circuit. One of the objectives of the Agency is to understand the dynamics of the local industries, identify opportunities in the world market for commodities, connect parts and promote new means for the reuse of materials.

The diversification of the Rio's economy is one of the ways to become more resilient to economic shocks of all kinds.

The Agency for the Promotion of Circular Economy will act to:
- identify opportunities and new businesses in the industries related to the reuse of waste and materials;
- promote the reuse of organic waste, by large generators, such as hotels, supermarkets and tree pruning; but also by residents, through composting;
- promote entrepreneurship through reuse, recycling, upcycling and transformation, connecting the many existing initiatives spread around the city, to reach economy of scale.

Currently, selective street collection is eight times more expensive than general street collection. International experiences demonstrate, however, that this cost can be minimized or totally covered by the resale of residue at market prices. There are also solutions in which the citizens are part of the collection chain, that is, actively return materials used in a distributed form. For this reason, it is necessary to identify the barriers that impede sectors to become more resilient, lucrative and sustainable, and act to connect the different needs, pointing out value generation opportunities.

Organic waste comprises 32% of all waste in Rio de Janeiro and is sent primarily to a landfill in the neighboring city of Seropédica. In landfills, organic matter releases methane gas in its decomposition, which is highly pollutant. However, the product of composting, which could be processed inside residences, in public squares, or in large scale, can generate fertilizers to urban gardens and agricultural production inside the city, minimizing costs and emissions from food transport and creating jobs.

This is an initiative proposed by Rio Resiliente and is in its planning stage.

RIO VISION 500

Aspiration (III.1.c) All residential waste will be minimized, reused, transformed and converted into energy; Aspiration (III.4.c) Local and state food production will be fostered, increasing people access to a healthy diet; Aspiration (V.1.a) The city will be an important knowledge hub where research and innovation will attract high value-added partners; Aspiration (V.1.b) Rio will be an international hub for creative economy; Aspiration (V.1.c) Rio will be the main tourism, business and social center of Latin America; Aspiration (V.2.c) Unregulated labor reduced will be drastically, guaranteeing workers' rights and increasing productivity; Aspiration (V.3.b) Rio will have the best entrepreneurship ecosystem of Latin America; Aspiration (VI.1.a): The city will be recognized for its quality on planning, execution, maintenance and controls systems coordination.

STRATEGIC PLAN 2017-2020

Initiative 3.03: Strengthen the agroecology production of Rio, preferably in areas with poor potential for urbanization; Initiative 5.01: Structuring of an area to coordinate economic growth actions and sectorial development new tools; Initiative 5.02: Development of Rio Cidade Criativa program aiming to boost the creative industry of the city; Initiative 5.04: Businesses scenario improvement in order to get both a better impression from entrepreneurs and investors and a higher position on Doing Business ranking; Initiative 6.01: Keep City Hall's investment grade.

VALUE AND CO-BENEFITS

Supports connection between stakeholders for common goals; promotes a more resilient economy, more diversified and inclusive; supports entrepreneurship.

INDICATORS

Volume of business created from the sale of residue, number of direct and indirect jobs created.

FOCAL POINTS

Rio Resiliente and departments for economic development.

POTENTIAL PARTNERS

Pacto do Rio, Rio Negócios, Ellen MacArthur Foundation, ReciclAção, Rio + B, universities.

RESILIENCE QUALITIES

RESOURCEFUL Recognizes alternative ways to use resources.	**INCLUSIVE** Prioritizes broad consultation to create a sense of shared ownership in decision making.	**INTEGRATED** Bring together a range of systems and institutions.
ROBUST Well-conceived, constructed and managed systems.	**REDUNDANT** Spare capacity purposively created to accommodate disruption.	**FLEXIBLE** Willingness and ability to adopt alternative strategies in response to changing circumstances.

RESILIENCE CHAMPIONS

Luísa Santiago was part of Rio Resiiente in its beginning in 2014, as consultant and strategy partner of the CRO in project management and in the relationship with 100 Resilient Cites. In the first phase, she worked in the diagnostic of the shocks and stresses of the city. In the second phase she was responsible for advancing the agenda on socioeconomic resilience, supporting the inclusion of themes related to an inclusive, diversified, circular and low-carbon economy in the Resilience Strategy. Along with Rio Resiliente, she realized the Workshop on New Economy on August 2015 and currently works with the Ellen MacCarthur Foundation, as CE100 Brazil Leader. "There is nothing more gratifying than to be part of an extremely innovative project, with the potential to transform my own city into a better and more resilient place".

Eduarda La Rocque is the founder and President of Pacto of Rio - for a Sustainable Metropolis. She holds a PHD in Economics from PUC-Rio, has worked as advisor for the Brazilian Development Bank (BNDES). While Eduarda worked as Secretary of Treasury between 2009 and 2013, the City of Rio nearly doubled its tax revenue and for the first time in its history achieved investment grade by the main international rating agencies. She has since left the world of finance to dedicate herself to social issues and then become a social entrepreneur, uniting international organisms, institutions, academia, the private and public sectors and the civil society. Eduarda is part of Rio Resiliente's Steering Committee since its beginning, focusing on socioeconomic issues.

INITIATIVE #5.B:

Valorization of solid and organic waste

DESCRIPTION AND OBJECTIVE

This initiative aims to involve the civil society in the valorization of solid and organic waste, with the support of the Agency for the Promotion of Circular Economy, initiative 5.A.

Minicenters of recycling and composting will be established in neighborhoods (see initiative #3B, "Arbored Squares"). Those minicenters, either public or private, will be meeting points for actions for the valorization of solid and organic waste, and can be the end point for formal and informal transactions via cell phone apps. Actions should involve the composting of organic residue for the use of residents and distribution for urban gardening and local agriculture, and can involve many techniques of composting, in various scales. Besides, those minicenters must promote opportunities to increase the useful life of materials, through reuse and exchange. Therefore, it is possible to achieve not only valorization of what otherwise would become waste and sent to landfill, but also prevent its generation in the first place, and thus incentivize a culture of consumption that is less wasteful and more circular.

The initiative involves the engagement of many stakeholders, such as residents and business owners, and also the professionalization of workers already occupied with the collection of recyclable products.

RIO VISION 500

Aspiration (III.1.c) All residential waste will be minimized, reused, transformed and converted into energy; Aspiration (III.4.c) A Local and state food production will be fostered, increasing people access to a healthy diet; (V.3.b) Rio will be the main tourism, business and sociability center of Latin America; Aspiration (V.2.c) Unregulated labor will reduce drastically, guaranteeing workers'rights and increasing productivity; Aspiration (VI.1.a): The city will be recognized for its quality on planning, execution, maintenance and controls systems coordination.

STRATEGIC PLAN 2017-2020

Initiative 3.03: Strengthen the agroecology production of Rio, preferably, in areas with poor potential for urbanization; Initiative 5.04: Businesses scenario improvement in order to get both a better impression from entrepreneurs and investors and a higher position on Doing Business ranking; Initiative 6.06: Engage PPPs and other external resources to address high priority issues of the city.

VALUE AND CO-BENEFITS

The project addresses the livelihood of people in condition of social vulnerability; accumulation of residues in slopes, streets and rivers; and also shocks to the food supply. Furthermore, it reduces the existence of and emissions from landfills, as well as promotion of circularity in the cycle of biological nutrients and materials.

INDICATORS

Number of minicenters, number of participants, volume of composting, volume of distributed composting products to local agriculture and volume of solid waste reintroduced in the production chain.

FOCAL POINTS

Rio Resiliente, Comlurb, departments of food security and agriculture.

POTENTIAL PARTNERS

C40, Ellen MacArthur Foundation, department of environment.

RESILIENCE CHAMPIONS

Daniella G. Bordon, supports Rio Resiliente on a voluntary basis. She currently works in the oil and gas industry, leading initiatives on Environment and Sustainable Development, active in Latin America, United States, Asia and Africa. She graduated in Biological Science at the EFPR and specialized in Sustainable Development Practices at the UFRRJ. "The work of Rio Resiliente consists in an incredible opportunity for the city to stop and think in an integrated manner about its unique potential, and how to become more resilient to the new challenges it faces".

Pedro Braga Miranda, started working in Rio Resiliente as a volunteer in June 2015, and is now part of the Resilience Team, focusing on projects in the areas of socioeconomic resilience, circular economy and individual resilience. Pedro worked with Rio Resiliente in the organization of the Workshop on New Economy, as well as in the development of the individual resilience indicators. He is studying towards a master's degree in Public Policies at the Federal University of Rio de Janeiro, and holds a degree in Economics with the Belmont University, USA, and is cofounder of an socioenvironmental consultancy. "Rio Resiliente always operates in a transparent and horizontal manner, *sine qua non* conditions for public management in the XXI century."

INITIATIVE #5.C:
Realize Rio + B

DESCRIPTION AND OBJECTIVE

The notion of business success in the XXI is being redefined. Companies are not anymore viewed as economic agents responsible for products and services, but as active actors in the construction of a more just society, with direct impact in all areas of life. A successful company should not seek solely to generate profits and reward shareholders, but also to create positive impacts, both social and environmental to its surroundings and society in general.

Rio + B aims to promote collaboration between businesses and industries so that the private sectors improves its own social and environmental impacts, using the principles of circular economy and metrics and guidelines for companies involved in the Corporation B network. With the aim to measure and monitor impact, the program will develop opportunities inside the network of intrapreneurs in order to become champions of Rio + B, so that they can promote good practices and develop projects inside their own companies. What is good for the companies of Rio, should also be good for the city and its citizen.

RIO VISION 500

Aspiration (V.3.b) Rio will have the best entrepreneurship ecosystem of Latin America. Aspiration (V.1.a) The city will be an important knowledge hub where research and innovation will attract high value-added partners.

VALUE AND COBENEFITS

Awareness and engagement of the private sector regarding its co-responsibilities with society; addressing of chronic stresses of the city regarding income disparity, pollution and generation of waste.

INDICATORS

Number of companies involved in Rio +B.

FOCAL POINTS

Rio Resiliente and Corporation B.

POTENTIAL PARTNERS

Ellen MacArthur Foundation, Pacto do Rio, corporations B, EMZINGO, Rio Negócios and departments of economic development.

RESILIENCE CHAMPION

Tomás de Lara is a social entrepreneur and a talented netweaver. He is a co-leader of B System Brazil ('B' companies movement) and a co-founder of both Goma, a social entrepreneurship collaborative ecosystem, and the Global Shapers Hub of Porto Alegre and Rio de Janeiro.

Ana Sarkovas has two bachelor degrees - one in Social Science, at Federal University of São Paulo (USP), and other in Social Communications, at ESPM. She has worked for 5 years at Real Bank, with the insertion of sustainability practices in businesses units and the marketing and communication institutional planning. In March 2015, she joined International B System and there has been taking responsibilities for the social-environmental value chain impacts management program, and also for new businesses development strategies of 'B' companies. She also leads the Marketing and Communication department, as an Executive Director of B System.

INITIATIVE #5.D:

Promote a culture of entrepreneurship

DESCRIPTION AND OBJECTIVE

Promote and incentivize entrepreneurship in the city, through the support of creative economy, artistic centers and co-working spaces, encouraging projects related to reuse, recycling, upcycling and transformation.

Creation of a center for the development of entrepreneurship and innovation in order to promote sustainable and social solutions. Unite, in a single physical space, meeting points for innovative projects and actions for the city, companies and universities and thinking tanks for the city. This initiative has three main objectives: a) develop continuous research, production and publicizing of content about innovation; b) apply new solutions and c) work through networks to leverage projects and create prototypes. It will be located in a building in either the Port area or the historic center, with space for coworking, where entrepreneurs can meet to exchange ideas and work towards developing a new economy.

RIO VISION 500

Aspiration (V.3.a) Rio will be a lead city in terms of attractive scenario for investments; Aspiration (V.3.b) Rio will have the best entrepreneurship ecosystem of Latin America. Aspiration (V.1.b) Rio will be an international hub for creative economy, Aspiration (V.1.a) The city will be an important knowledge hub where research and innovation will attract high value adding partners.

STRATEGIC PLAN 2017-2020

Initiative 5.02: Development of Rio Cidade Criativa program aiming to boost the creative industry of the city; Initiative 5.04: Businesses scenario improvement in order to get both a better impression from entrepreneurs and investors and a higher position on Doing Business ranking;

VALUE AND CO-BENEFITS

Diversification of the economy in Rio; development of businesses with positive socioenvironmental impacts.

INDICATORS

Number of people enrolled in creative economy initiatives; number of companies engaged in the co-working spaces.

FOCAL POINTS

Rio Resiliente and Rio Negócios.

POTENTIAL PARTNERS

Corporation B, SEBRAE, Mayor's Office.

RESILIENCE CHAMPION

Zoraide Gomes, From the Brazilian state of Pernambuco, Zoraide Gomes, better known as 'Cris dos Prazeres', has been living in Rio for 32 years. For the last 20 she has led social projects in the community of Morro dos Prazeres, Santa Tereza neighborhood starting with HIV prevention and sexual education. In April 2010 she founded ReciclAção, a recycling and environment educational project, deployed together with public and private partners and members of the community. Every month, approximately, 3 tons of products are recycled there. Mother of three and grandmother of little Anna Julia, she believes that small and simple gestures can trigger great changes.

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

INITIATIVE #5.E:

Evaluate Social and Environmental Impacts of Investments

DESCRIPTION AND OBJECTIVE

Develop tool to calculate the social and environmental impacts of new investments, public and private, with focus on foreign investments, considering indicators such as carbon emissions, job creation and the potential for circularity.

RIO VISION 500

Aspiration (III.1.a) The city will ensure a low-carbon energy matrix; Aspiration (V.1.e) The city will remain as the national capital for the energy industries, attracting high value adding activities and fostering renewable energy sources; Aspiration (V.3.a) Rio will be a lead city in terms of attractive scenario for investments

STRATEGIC PLAN 2017-2020

Initiative 5.01: Structuring of an area to coordinate economic growth actions and sectorial development new tools; Initiative 5.04: Businesses scenario improvement in order to get both a better impression from entrepreneurs and investors and a higher position on Doing Business ranking; Initiative 6.01: Keep City Hall's investment grade.

VALUE AND CO-BENEFITS

Attraction of more resilient and sustainable businesses to Rio, which contribute to a more diversified and inclusive economy.

INDICATORS

Number of investments that are analyzed through the tool, volume of investment attracted.

FOCAL POINTS

Rio Resiliente and Rio Negócios.

POTENTIAL PARTNERS

Corporation B, Ellen MacArthur Foundation, C40.

RESILIENCE CHAMPION

Bernardo Matoso Tarbes Vianna, rooted in Rio since the age of 14, Bernardo brought from his childhood valuable memories from Carajás, a small town in the middle of Amazon Forest and where he learned to respect the wild fauna and flora. Adapting to the big metropolis' lifestyle was a great resilience lesson, he often recalls. Electrical engineer from PUC-Rio and MBA from the Swiss IMD, he has made his career through the value chain of natural resource industries. "I had the opportunity to engage with Rio Resiliente during the development of the Resilience Strategy, for the city I love and live in. This is legacy I'll always be proud of".

GOAL #6

Increase resilience of the population and promote social cohesion

#A Educate the Youth for Resilience

#B Create a MOOC for Urban Resilience

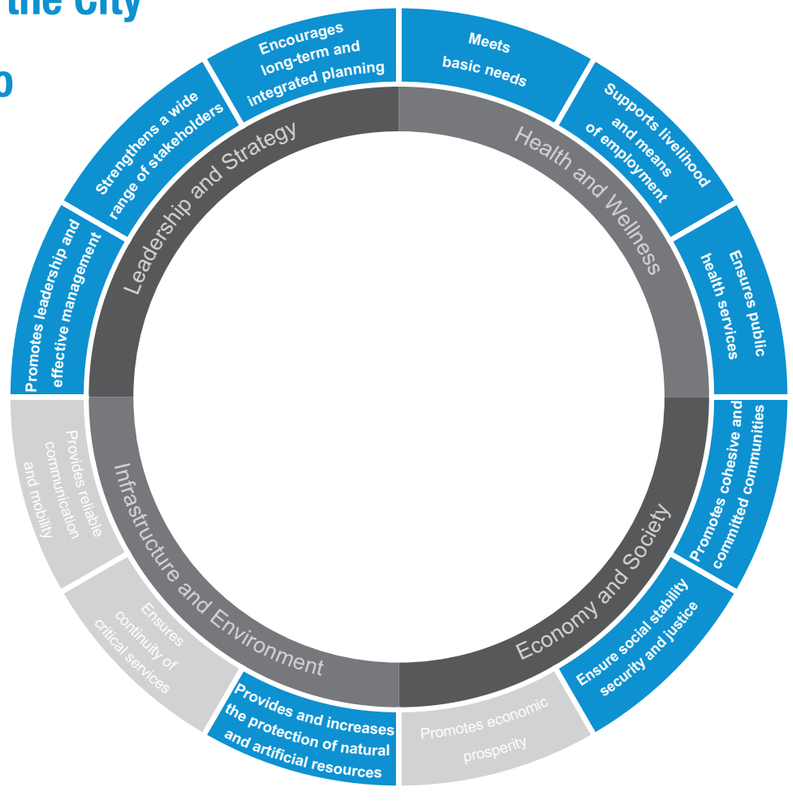
#C Develop Individual Resilience Indicators

#D Primary Health Care

#E Social Regions

#F Right to the City

#G Listen to Govern



City Resilience Framework: in blue, aspects of resilience targeted in the initiatives of Goal #6
Credit: The Rockefeller Foundation/ Arup, 2014.

FLAGSHIP INITIATIVE #6.A:

Educate the Youth for Resilience

DESCRIPTION AND OBJECTIVE

The project Resilient Youth aims to develop and implement a curriculum on Urban Resilience for students of municipals schools, reaching 100,000 children until 2020.

The Resilient Youth program will comprise three main subjects: 1) The impact of climate change in cities and how this affects youth's lives; 2) The basics of civil defense, with notions about disaster preparedness;
3) Sustainable consumption and resource efficiency, mainly that of water and energy, as well as notions of reuse, recycling, upcycling and transformation of materials and products.

The project is based on the premise that children need to be knowledgeable of the risks in their neighborhood and city, and develop a resilient behavior at the start of life.

Resilient Youth consists of a thematic expansion of a successful current Project called Civil Defense in Schools, developed by the Civil Defense of the city since 2013, and implemented primarily on schools close to areas considered being under high and medium geological risk. Nearly five thousand children between 10 and 12 have already attended classes and received a certificate by the Civil Defense in Schools program, which focuses mainly on the basics of civil defense and first aid.

The goal of Resilient Youth is to educate children about the challenges of their city and the world, and thus promote a culture of prevention and risk mitigation, environmental awareness and citizenship.

An adapted version of the Individual Resilience Indicators (initiative 6.B), aimed at school children, can be applied at the start and end of the school year to assess the knowledge acquired and measure how it impacts individual resilience.

This is a project first proposed by Rio Resiliente and incorporated in Strategic Plan 2017-2020, and is currently in a planning stage.

RIO VISION 500

Aspiration (I.2.a) City Schools will become national reference, adding value, being collaborative and connected to the students' reality; Aspiration (III.2.b) The City will be ready and adapted to face climate change and its impacts, having mapped and planned for its main threats; Aspiration (III.2.c) All citizens will be informed, prepared and engaged to deal with climate change impacts.

STRATEGIC PLAN 2017-2020

Initiative 3.12: Increase the resilience of the city doubling the number of climate risk under monitoring and quadrupling the number of simulations for emergency response with at least 15 departments until 2020.

VALUE AND CO-BENEFITS

Increases the knowledge of citizens about risks and vulnerabilities; promotes culture of prevention and disaster preparedness, supports the efficient use of resources.

INDICATORS

Number of schools with classes on Urban Resilience; number of students enrolled; number of students with certificates, satisfaction of the students with the project.

FOCAL POINTS

Rio Resiliente, Civil Defense and education department.

POTENTIAL PARTNERS

Red Cross, Climate Reality Project.

FUNDING

BRL 2,223,000 until 2020.

Civil Defense in Schools – Source: City Civil Defense

RESILIENCE QUALITIES

REFLECTIVE
Uses past experience
to inform future decisions

RESOURCEFUL
Recognizes alternative ways
to use resources.

INCLUSIVE
Prioritizes broad consultation
to create a sense of shared
ownership in decision making.

INTEGRATED
Bring together a range
of systems and institutions.

FLEXIBLE
Willingness and ability
to adopt alternative strategies
in response to changing
circumstances.

RESILIENCE CHAMPION

Valeria Cristina B. Vasques Pereira, the educator, 49, has been a Civil Defense agent for 14 years. Since the end of 2015, she is the voice of Rio's municipality in the favelas that count on the Community Alarm and Alert System. Through the loudspeakers, her voice warns where there is a risk of strong rains and instructs residents to remain alert, in case the alarm rings and there is the need to move to a shelter. "I am very glad to collaborate on this preventive work renowned for its excellency" says Valeria.

INITIATIVE #6.B:
Create a MOOC for Urban Resilience

DESCRIPTION AND OBJECTIVE

Create and implement a Massive Online Open Course (MOOC) on Urban Resilience, comprised of modules for the public in general, public servants (mainly those of the Carioca Leaders team, Center of Operations Rio, Civil Defense, departments of education, urbanism and environment) and city teachers. There is also the possibility that the course becomes part of the yearly performance bonus for civil servants more directly involved with resilience.

Education for resilience is essential not only because it increases awareness in individuals, but because it helps form new practitioners for resilience, bringing in specialists from various disciplines, such as urban planners, environmentalists, public and private managers, entrepreneurs, insurance, finance, health and law professionals. It then becomes possible for them to incorporate the application of the resilience lens in their practices, and also stimulate the exchange of knowledge. The course will be available in a specialized online platform, comprising videos, texts and assessment tests, with certification in the end, preferably through a partnership with a university.

The course will present the concept of urban resilience, the best practices around the world, and deepen the debate through the discussion of the vulnerabilities of Rio de Janeiro and other cities. There will be an emphasis on three main topics: urban climate-related challenges, how to increase the resilience of individuals, and how to develop a sustainable consumptions, related to the production and use of resources such as water, food, materials and energy. One or two of the modules will be exclusive to teachers, and will aim to prepare them to teach the course on Urban Resilience to school children, in the program Resilient Youth (initiate 6.A).

The MOOC on Urban Resilience is an initiative developed by Rio Resiliente that was incorporated into the Strategic Plan 2017-2020. It is an educational initiative that targets all the shocks and chronic stresses of the city.

RIO VISION 500

Aspiration (I.1.c): All civil society will actively participate on children and youth education; Aspiration (III.2.c) All citizens will be informed, prepared and engaged to deal with climate change impacts; Aspiration (VI.1.a): The city will be recognized for its quality on planning, execution, maintenance and controls systems coordination.

STRATEGIC PLAN 2017-2020

Initiative 3.12: Increase the resilience of the city doubling the number of climate risk under monitoring and quadrupling the number of simulations for emergency response with at least 15 departments until 2020; Initiative 6.04: Foster human capital development at the City Hall; Initiative 6.10: Management strategy to maximize the efficiency of urban planning city agents and improve information, control and monitoring systems.

VALUE AND CO-BENEFITS

Promotes the concept of resilience and planning for resilience; supports theoretical and practical knowledge about resilience within public administration; brings in new resilience practitioners; deepens knowledge on the theme; incorporates new ideas and observations from participants in practical projects in Rio and in other cities; stimulate cross-polinization of ideas and collaboration between sectors.

INDICATORS

Percentage of certificates issued; satisfaction rate of students.

FOCAL POINTS

Rio Resiliente, MultiRio.

POTENTIAL PARTNERS

Casa Civil, Universidade Estácio de Sá, education departments, resilience offices of cities around the world.

FUNDING

BRL 880,000 from 2017 until 2020.

RESILIENCE CHAMPION

Bruna Santos is Program Officer at the Columbia Global Center Rio, where she works in the management of multisector projects, focused on innovation in public administration, citizen engagement and sustainability. After six years outside of Brazil, she decided to return to Rio, believe that the city is at the epicenter of a transformation in the way that the government deals with society. “The work of Rio Resiliente is an example of what can be done with evidence-based public policies, centered on people and leveraged by technologies.

INITIATIVE #6.C:
Develop Individual Resilience Indicators

DESCRIPTION AND OBJECTIVE

Apply, improve upon and utilize the resilience individual indicators to learn more about the current state of resilience of citizens and communities, in order to monitor the effectiveness of policies on resilience and support the creation of new public policies at local level.

The Individual Resilience Indicators establish three levels of analysis: social, contextual and individual vulnerability. Citizens are more or less resilient in relation to their social context - it is known that vulnerable populations are always more susceptible to shocks of all kinds, and they also take longer to recover. Unequal access to basic services such as sanitation, water and health also increases exposure to various risks.

The resilience of an individual, as well as of its community, also varies depending on the vulnerabilities specific to their living or working spaces, denominated contextual resilience. For example, some people live in areas more susceptible to risks, such as landslides, river flooding, sea level rise, among others.

The third level of analysis is individual resilience, related to knowledge about risks, disaster preparedness and personal habits, such as eliminating mosquito breeding grounds, or keep at home emergency items, like water, batteries, lanterns, among other items specific to their context.

The scientific literature about crisis and resilience, the basis for the development of the indicators, indicates that a culture of prevention and enhanced knowledge about risks in the everyday life, make citizens more resilient to all kinds of shocks and increases the effectiveness of public policies.

The Individual Resilience Indicators were developed by WRI Brasil/Cidades Sustentáveis in collaboration with Rio Resiliente in 2015, with the input and support of City managers, especially Civil Defense, Instituto Pereira Passos and PENSA, along with the hosting of several workshops with the civil society (academia, NGOs). Many cities around the world have already demonstrated the interest to adopt the indicators, with adaptations related to their specific resilience challenges.

The indicators will be applied in Rio de Janeiro in three different ways: citywide, with the support of research institutes, for an overview of the individual resilience of citizens; inside city schools, before and after the course on Urban Resilience (initiative 1.A), to assess knowledge acquisition at practical level; and at community level, for the identification of strong and weak aspects, and eventual adjustment of public policies.

The application of the Individual Resilience Indicators was proposed by Rio Resiliente and adopted by the Strategic Plan 2017-2020, with goals, milestones and budget. This initiative aims to measure knowledge about vulnerabilities and preparedness to disasters, and therefore tackles all the shocks and stresses of the city.

RIO VISION 500

Aspiration (III.3.b): The city will be ready and adapted to face climate change and its impacts, having mapped and planned for its main threats; Aspiration (VI.1.a): The city will be recognized for its quality on planning, execution, maintenance and controls systems coordination; Aspiration (VI.1.b): Best practices management with processes that are efficient, non-bureaucratic, suited to local needs, digitalized and constantly monitored.

STRATEGIC PLAN 2017-2020

Initiative 6.03: Development of high-performance management system; Initiative 6.07: Structuring of a citizen engagement policy; Initiative 6.10: Management strategy maximizing the efficiency of urban planning city agents and improving information, control and monitoring systems. Focusing on developing regions of the city.

VALUE AND CO-BENEFITS

Increases knowledge on the theme and supports more effective and specific public policies; supports more awareness about preparedness to shocks; monitors the impacts of public policies; supports decision-making for urban planning with the consultation of various actors.

INDICATORS

Variation in the index of individual resilience citywide; variation of the grade on individual resilience in municipal schools with a course on Urban Resilience, both present in Strategic Plan 2017-2020.

FOCAL POINTS

Rio Resiliente, IPP and WRI-Brasil.

POTENTIAL PARTNERS

Civil Defense, PENSA, C40, education department and community leaders.

FUNDING

BRL 1,120,000 until 2020.

RESILIENCE CHAMPION

Lauretta Burke researcher for the World Resources Institute (WRI) leads teams and research on coastal ecosystems since 2001, producing analyses and high quality tools to improve the management and resilience of these ecosystems. Lauretta also oversees risk management projects, analysing climate impacts and the economic value of coral reefs, and is responsible and first author of "Reefs at Risk Revisited", a global investigation of the risks concerning coral reefs.

Magdala Arioli is Urban Mobility and Climate Coordinator at WRI Brasil. Master in Transport Engineering by the Federal University of Rio Grande do Sul, she is currently a PhD student of climate change in relation to the transportation sector. Madgala works on projects in the areas of climate change, atmospheric pollution and urban resilience. t

Katerina Elias-Trostmann is a Research Analyst at WRI Brasil and Master in Environmental Technology by the Imperial College London. Her master's thesis focused on the opportunity for a circular economy in Brazil.

Those three women have been instrumental in the research and development of the Individual Resilience Indicators in partnership with Rio Resiliente, soon to be first tested in Rio.

"We are in a century with interdependent challenges, such as climate change, social inequality, a growing urban population and resource efficiency. Rio Resiliente transcends the isolated dealing with those challenges, increasing dialogue between city departments and the civil society", says Katerina.

INITIATIVE #6.D:

Primary Health Care

Description and objective	Present Health is the primary care strategy of the municipality. The initiative focuses on increasing the quality of primary care in the city after a significant expansion phase lasting 8 years. The added quality will be achieved through several lines of action: - Increase adherence to protocols of primary care - Reduce the gap between city regions - Restructure the School Health Program to assist children and youth in school age, promoting integrated action between the clinics and schools. - Invest in efficient technologies through hired services.
Rio Vision 500	Aspiration (II.1.a) The system of public health policies and primary care in the City will be sufficient, sustainable and of excellence to meet all needs of Cariocas; Aspiration (VI.1.b) Management will be of high performance with efficient and unbureaucratic processes, suited to local needs, online, and with continuous assessment of impact and effectiveness.
Values and co-benefits of resilience	Increased social cohesion; preventive health actions that take into account the reality of the communities; identification of persons with special needs, for specific attention during crises.
Indicators	Percentage of newborns in high vulnerability households who receive visits from health agents within 7 days after discharge. Percentage of proper treatment of gestational syphilis. Percentage of cure for new cases of tuberculosis. Percentage of women following the postpartum oxytocin protocol. Number of schools with an officially designated clinic. Tuberculosis mortality rate.
Expected results	Improving the quality and life expectancy of the population, with a more solution-based service, closer to the population.
Budget 2017-2020	BRL 660,3 million

Initiatives of the Strategic Plan 2017-2020 with Resilience Co-Benefits.

Individual Resilience Indicators - workshops with communities, WRI-Brasil and the Civil Defense of the City of Rio. Photo credit: Sergio Trentini

INITIATIVE #6.E:

Social Regions

Description and objective	Reduce the degree of vulnerability of Carioca families of 180 territories with Social Development Index very low, offering them special attention during a period of 6 months to 1 year and subsequent insertion in the social services already offered by the city.
Rio Vision 500	Aspiration (II.2.b) Youth in Rio will be an example of harmonious coexistence and will not be part of violence statistics; Aspiration (II.3.a) Vulnerable youth in Rio will have full social and economic opportunities for integral development.
Values and co-benefits of resilience	Presents a transversal and multidisciplinary approach; It focuses on the least resilient population and those more susceptible to risks of all kinds.
Indicators	Percentage of children and youth in the program enrolled in schools. Percentage of people with complete personal documentation. Percentage of age appropriate vaccination rate. Percentage of prenatal consultations started in the first trimester of pregnancy. Number of households visited per month by community health agent. Percentage of consultations per semester to diabetic and hypertensive patients.
Expected results	Inclusion of target families of the program in the existing social systems of the municipality, ensuring that they can access the public policies offered for them. Reduction of the social vulnerability of families benefiting from the program.
Budget 2017-2020	BRL 347,2 million

Initiatives of the Strategic Plan 2017-2020 with Resilience Co-Benefits.

INITIATIVE #6.F:

Right to the City

Description and objective	The program Right to the City is a set of public policies for the homeless, which will provide shelter, health care and school acceleration, aimed at self-improvement and the building of new life trajectories, so that the homeless are able to leave the streets.
Rio Vision 500	Aspiration (I.4.a) City known as welcoming and inclusive; citizens will have complete freedom; Aspiration (I.4.c) All cariocas will have their civil and human rights guaranteed and their diversity respected; Aspiration (II.3.B) Rio citizens will have opportunities to qualify professionally and get jobs; Aspiration (IV.2.b) All Rio residents will have housing that is safe, dignified and legal.
Values and co-benefits of resilience	It ensures human rights; It guarantees access to basic services; Decreases social vulnerability; Presents transversal and multidisciplinary approach.
Indicators	Percentage of people hosted in public shelters Percentage of people referred for jobs Percentage of people enrolled in accelerated learning programs promoted by the Secretary of Education. Among other indicators (see p.257 of the Strategic Plan in visaorio500.rio)
Expected results	Restore and preserve the integrity, dignity and autonomy of users, interrupting patterns that violate rights. Strengthen family and community ties, for family and community reintegration.
Budget 2017-2020	BRL 103,5 million

Initiatives of the Strategic Plan 2017-2020 with Resilience Co-Benefits.

INITIATIVE #6.G:

Listen to Govern

Description and objective	i) Public communication efforts to ensure clarity and accessibility of information about public policies. ii) Development of spaces and methodologies for listening and debating, as well as access to information of public policies from the municipality. iii) Development of tools and platforms for collection of opinions and generation of ideas. iv) Incorporation of institutional mechanisms for participation in the formulation and monitoring of public policies. v) Development and maintenance of decision-making tools by the people in their local communities.
Rio Vision 500	Engagement of the population will be ample in the administration of the City, with a municipal government that is prepared to listen, provide information in a transparent, agile and simple manner and carry continuous dialogue with society.
Values and co-benefits of resilience	It involves various stakeholders; Makes public policies and projects more holistic and robust, increasing their usefulness and effectiveness; Increased transparency; Greater citizen involvement in decisions.
Indicators	Number of access to information websites; Number of active citizen advisors; Number of localized meetings; Number of voters in decisions.
Expected results	Greater participation of Rio's population in the decision processes of the city, thus adding quality to public policies and tuning the city's administration actions to the demands of the population, democratizing spaces and public resources.
Budget 2017-2020	BRL 14 million

Initiatives of the Strategic Plan 2017-2020 with Resilience Co-Benefits.

Photo credit: Pedro Junqueira/COR

Abbreviations of the Institutions Cited

C40 Cities – C40 Cities Climate Leadership Group
CEDAE – Companhia Estadual de Águas e Esgotos
CEMADEN – Centro Nacional de Monitoramento e Alertas de Desastres Naturais
CI – Conservation International
CICC – Centro Integrado de Comando e Controle
COR – Center of Operations Rio
CSIRO – Commonwealth Scientific and Industrial Research Organization
FPJ – Fundação Parques e Jardins
INPE – Instituto Nacional de Pesquisas Espaciais
IPP – Instituto Pereira Passos
ITDP - Brasil – The Institute for Transportation and Development Policy
NASA – National Aeronautics Space Agency
PENSA – Escritório de Inteligência de Dados da Prefeitura
PUC-RIO – Pontifícia Universidade Católica do Rio de Janeiro
R20 – Regions of Climate Action do Rio
SEBRAE – Serviço Brasileiro de Apoio às Pequenas e Micro Empresas
UCCRN – Urban Climate Change Research Network, University of Columbia
UFRJ – Universidade Federal do Rio de Janeiro
UNISDR – United Nations Office for Disaster Risk Reduction
USC – University of Southern California
WRI – World Resources Institute

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