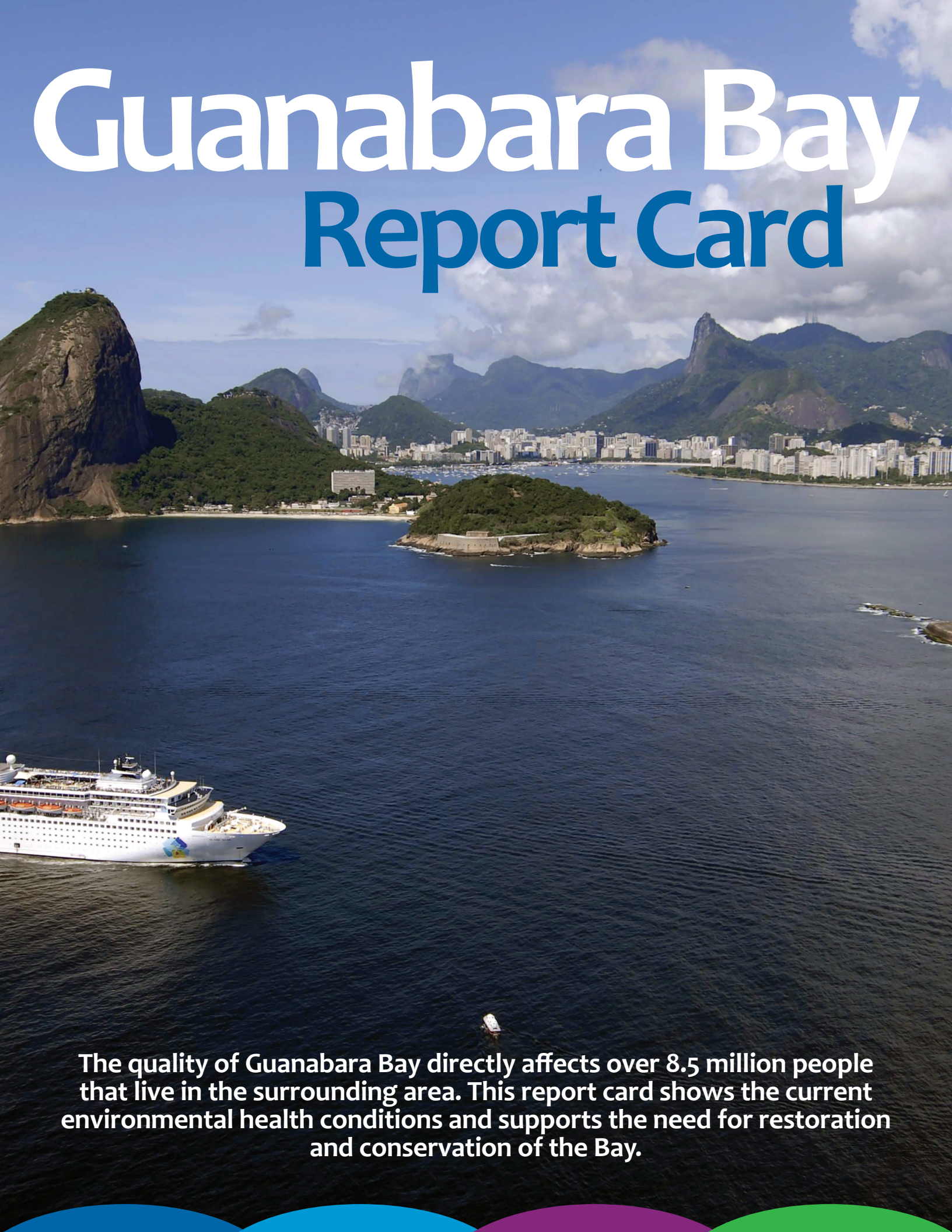
Guanabara Bay Report Card



The quality of Guanabara Bay directly affects over 8.5 million people that live in the surrounding area. This report card shows the current environmental health conditions and supports the need for restoration and conservation of the Bay.

Sanitation & trash are key problems

How was health calculated?

Environmental report cards are used by resource managers to assess and report on the ecosystem health of a region. Developing rigorous, quantitative assessments provides accountability to support environmental protection efforts. A five-step process of developing report cards is used to assess progress: 1) determine values and threats, 2) choose indicators, 3) define thresholds, 4) calculate scores, and 5) communicate results.

This report card provides a transparent, timely, and geographically detailed assessment of health in Guanabara's Bay and Basin using data from 2013-2015. The data was collected by INEA's monitoring program.

Guanabara Bay health and Guanabara Basin health are defined as the progress of five indicators toward scientifically-derived thresholds or goals. The Bay indicators are dissolved inorganic nitrogen, total phosphorus, dissolved oxygen, biological oxygen demand, and fecal coliform. The Basin indicators are dissolved inorganic nitrogen, orthophosphate, dissolved oxygen, biological oxygen demand, and turbidity. The indicators are combined into two water quality scores, one score for the Bay, and one for the Basin, ranging from **A** to **F**.

For more information on methodology and scoring please visit guanabarabay.ecoreportcard.org.

Access to sewage treatment and trash collection greatly needed throughout Guanabara Bay

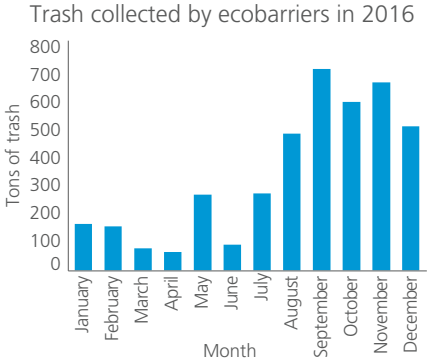
Municipality	Population (thousands)	Sewage treated (%)
Belford Roxo	469	34%
Cachoeira de Macacu	54	0%
Duque de Caxias	855	5%
Guapimirim	51	no data
Itaboraí	218	2%
Magé	227	0%
Mesquita	168	7%
Nilópólis	157	0%
Niterói	**420**	95%
Nova Iguaçu	608	0.05%
Rio Bonito	43	no data
Rio de Janeiro	**4005**	47%
São Gonçalo	1000	10%
São João de Meriti	459	0%
Tanguá	31	0%
TOTAL	**8765**	35%

Population data within the Basin from Brazilian Institute for Geography and Statistics for 2010. Sewage treatment data from 2014, released by the National Sanitation Information System (SNIS).

A lack of sewage collection and treatment surrounding Guanabara Bay has led to a number of problems for both people and the environment. Untreated sewage entering the Bay contributes to high levels of bacteria in the water. This makes the water unsuitable for recreation and fishing.

The city with the highest amount of sewage treatment in the Basin is Niterói, with 95% of its sewage treated by a private company. The next highest amount of sewage treatment was in Rio de Janeiro, with 47% of sewage treated. The total amount of sewage treatment for all municipalities combined was only 35% in 2014. This data was collected by the National Sanitation Information System (SNIS).

Trash collection and disposal is a long-standing problem in Guanabara Bay. Without trash services available, tons of trash end up in the Bay, negatively impacting human health, recreation, tourism, fisheries, and the environment. Ecobarriers have been collecting floating trash over the last two years in the tributaries of Guanabara Bay. By August 2016, a total of 17 ecobarriers were implemented. While they help keep trash out of the Bay, it is still important to dispose of trash properly so it does not reach the rivers.



Trash collected by ecobarriers. Source: INEA, 2017.

Guanabara Bay health

Water quality was good to poor in the Bay

The overall score for Guanabara Bay water quality was a **D**. The highest scoring indicator in the Bay was dissolved inorganic nitrogen, with a **B**. The lowest scoring indicator in the Bay was total phosphorus, with an **F**. When in excess, these nutrients contribute to algal blooms. Dissolved oxygen scored a **B** and biological oxygen demand scored a **D**. In conjunction, these indicators show the availability of oxygen, which is essential to aquatic life. Fecal coliform scored an **F**, which indicates the presence of untreated sewage in the water. For this report card, the Bay was divided into five regions, based on the flow and water circulation patterns.

1. Central channel

This was the second highest scoring region, which had an overall score of **C**. The region has high oceanic flushing in the deep central channel of Guanabara Bay, and it extends from the oceanic entrance of the Bay to Paquetá Island.

2. Mouth of Guanabara Bay

This was the highest scoring region, which had an overall score of **B**. This area includes nearshore regions at the mouth of the Bay on both the west side (Rio de Janeiro) and east side (Niterói).

3. Central margins of Guanabara Bay

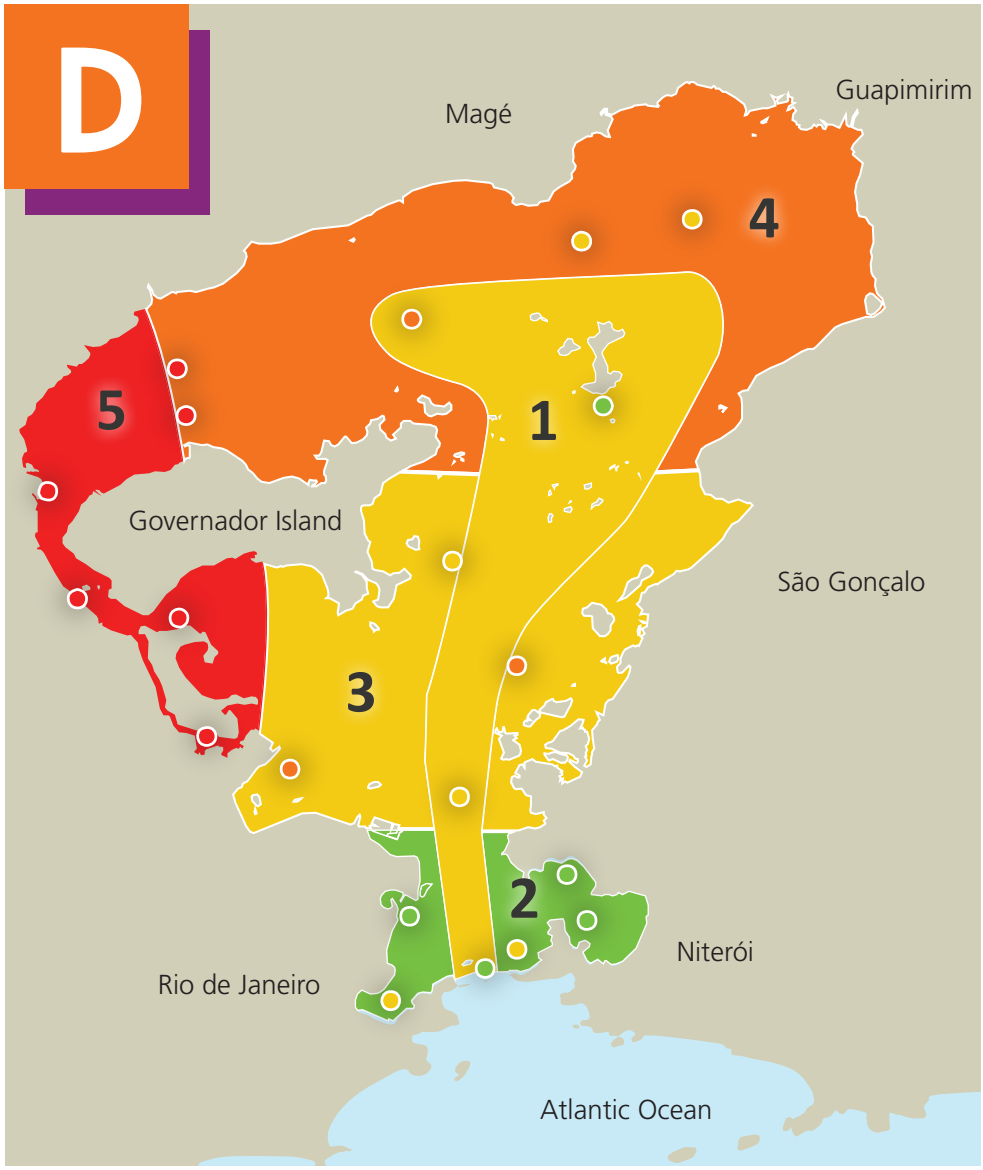
This region had an overall score of **C**. This area includes the harbors of Rio de Janeiro and Niterói with dredged channels and is impacted by the presence of vessels.

4. Northern Guanabara Bay

This was the second lowest scoring region, with an overall score of **D**. This region includes shallow water habitats and mangrove forests from the Iguaçu River mouth to Itaoca.

5. Northwest Guanabara Bay

This was the lowest scoring region, which had an overall score of **F**. This region is west of the Iguaçu River mouth and includes channels separating Governador and Fundao Islands.



The scores for the regions of the Bay and scores for the sampling stations. The Bay was divided into regions based on Mayr et al. 1989. Sampling stations are from INEA.

A	B	C	D	F
85–100%: Water quality in these areas is very good.	70–85%: Water quality in these areas is good.	55–70%: Water quality in these areas is moderate.	40–55%: Water quality in these areas is poor.	0–40%: Water quality in these areas is very poor.

The grades were obtained from the percentage of the samples that met the threshold.

Guanabara Bay: beautiful but polluted

The values of Guanabara Bay are under threat

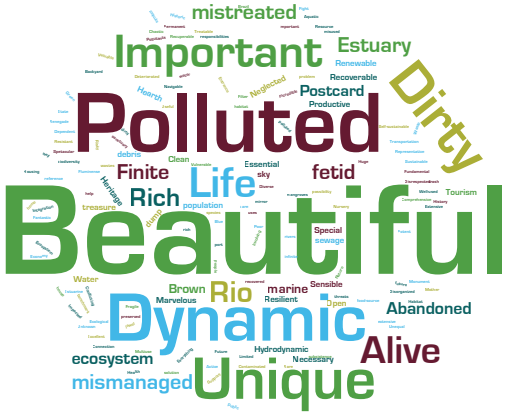
Guanabara Bay is a beautiful natural harbor that forms the identity of the Rio de Janeiro region. The Bay supports the Brazilian economy, through activities like shipping, recreation, and tourism. Urban development results in significant impacts including trash and untreated sewage that pollute the Bay and contaminate its waters. In addition, industrial and agricultural development can result in contaminated runoff.

D

The values, threats, and services in Guanabara Bay.

Workshop stakeholders recognize the need for action

During the development of the report card, participants at workshops gave feedback about Guanabara Bay values, threats, and restoration efforts. Each person was asked to use four words to describe the Bay. The results were compiled into a word cloud where the dominant words were beautiful, polluted, dynamic, unique, dirty, important, and alive. The participants concluded that while the conditions in Guanabara Bay are challenging, they are committed to enhancing, restoring, and protecting the Bay for future generations.

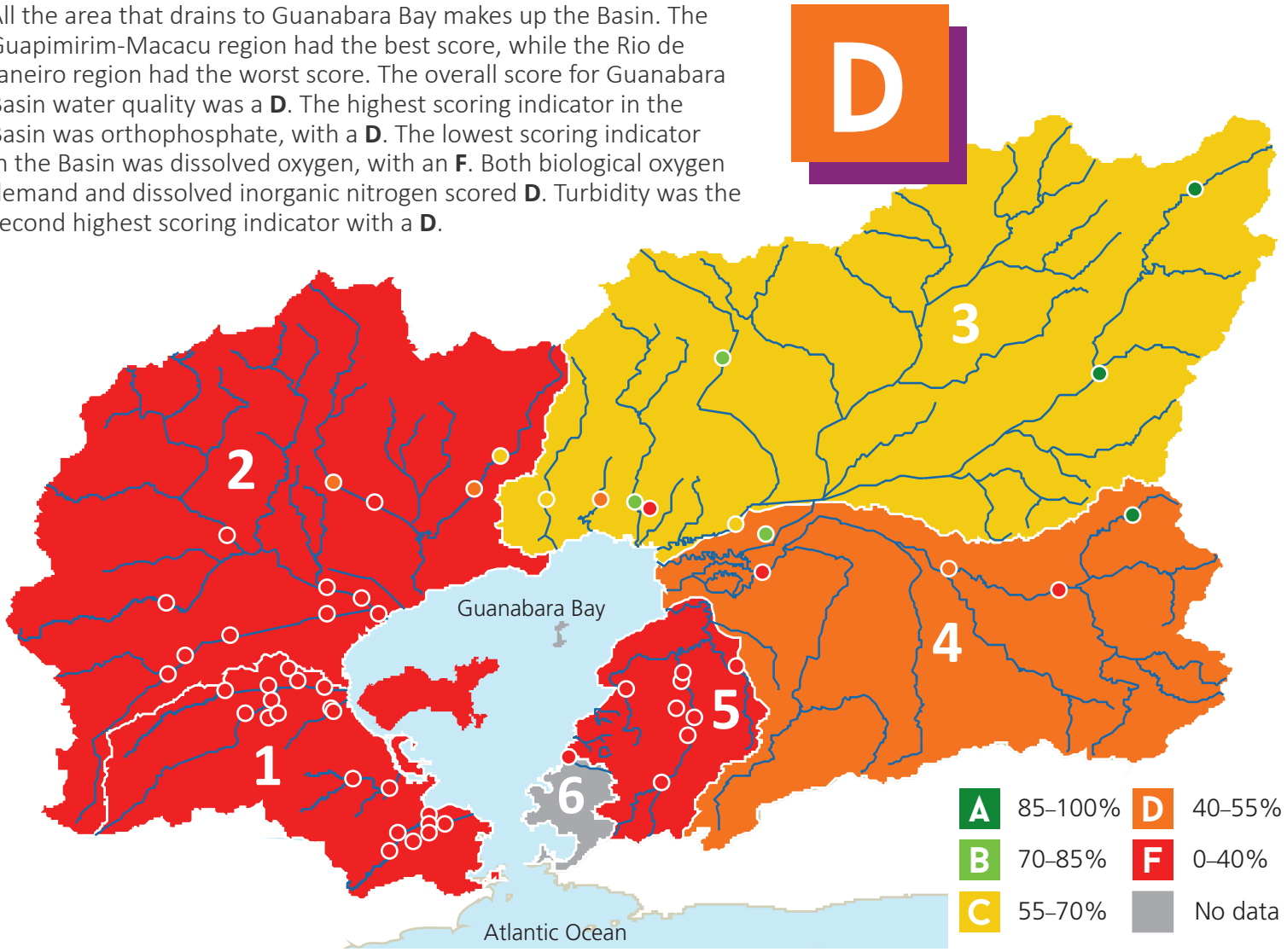


This word cloud describes how participants feel about the state of Guanabara Bay.

Guanabara Basin health

Very poor water quality in the Basin

All the area that drains to Guanabara Bay makes up the Basin. The Guapimirim-Macacu region had the best score, while the Rio de Janeiro region had the worst score. The overall score for Guanabara Basin water quality was a **D**. The highest scoring indicator in the Basin was orthophosphate, with a **D**. The lowest scoring indicator in the Basin was dissolved oxygen, with an **F**. Both biological oxygen demand and dissolved inorganic nitrogen scored **D**. Turbidity was the second highest scoring indicator with a **D**.



The scores for the regions of the Basin and scores for the sampling stations. Sampling stations are from INEA.

1. Rio de Janeiro region. This was the lowest scoring region, with an overall score of **F**. This is the most urbanized basin, which extends from the mouth of Guanabara Bay to the Pavuna River and includes Governador Island.

2. Baixada Fluminense region. This region had an overall score of **F**. It covers the sub-basins in the northwestern part of the watershed and has low lying topography, significant industrial development, and communities without sanitation services.

3. Guapimirim-Macacu region. This was the highest scoring region, with an overall score of **C**. This basin in the northeast is the least impacted. It has extensive mangroves, conservation areas, agriculture, and drinking water sources.

4. Caceribu region. This was the second highest scoring region, with an overall score of **D**. This basin supports petrochemical industrial development, urban development, and agriculture.

5. Alcantara region. This was the second lowest scoring region, with an overall score of **F**. This basin extends from the Caceribu River basin to the Das Pedras River and supports the rapidly growing city of Sao Gonçalo, the second largest city in the region.

6. Niterói region. While Niteroi has data about the sewage treatment in the city, there are no INEA water quality sampling sites within this region. Although this small basin is urbanized, it has the highest proportion of treated sewage.

Next steps: the plan to restore the Bay

Governance, monitoring, and restoration

Strong governance is vital to support multiple uses of the Bay.

The Environmental State Secretary is committed to deliver a governance model and an Environmental Restoration Plan for the Bay. The development of an integrated governance structure for the Bay allows stakeholders within local, state, federal governments, the scientific community, and society to lead the recovery of the Bay. To assess progress, monitoring should be frequent and expand to include more indicators such as trash, fish communities, and sediment contamination. The Environmental Restoration Plan includes stormwater management, sewage treatment, solid waste management, forest and mangrove restoration, and climate resiliency.

Your actions can make a difference!

You can and must, before everything, become a steward of Guanabara Bay. It is yours! Most of the communities surrounding the Bay do not know that they are near one of the most beautiful bays in the world. It is true that the Bay is degraded. However, by working together, we can all help improve the health of this place that enchants visitors from around the globe.

Properly dispose of trash – The trash from your house, if not collected, ends up in rivers which flow into the Bay. You can help by only throwing your trash in authorized places, where it will be collected and disposed of by the City. Help keep your neighborhood clean!

Plant trees – Planting trees and native shrubs helps support the Bay. During storms, runoff from city streets flows into the rivers and the Bay. When there are green spaces in the city the water can be naturally filtered before it reaches the Bay. Green spaces like parks also help make our communities more beautiful and enjoyable.

Become a stakeholder – Get involved by participating in your neighborhood associations, local watershed committees, non-governmental organizations, and volunteer programs. Talk to your neighbors about the Bay and why it is important for everyone.

Protect river banks – River banks are protected by law because they control river volume, water quality, and protect against flood events. Construction near rivers prevents natural ecosystem services the river banks provide. It is illegal to build on or near river banks.

Acknowledgements

Workshops to develop the Guanabara Bay Report Card were held in Rio de Janeiro in April 2016 and in Niterói in June 2016. Over 200 representatives from numerous organizations were engaged in developing the report card. The report card was produced by University of Maryland Center for Environmental Science, KCI Technologies Inc, and PSAM with support by the Inter-American Development Bank. Data was provided by INEA.

Cover photo courtesy of Nilo Lima. All other photos courtesy of Alexandra Fries.

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