

Assessing the health of Guanabara Bay and its river basins

The region around Guanabara Bay is an internationally iconic location, including metropolitan areas like Rio de Janeiro, Niteroi and Sao Goncalo, beaches like Copacabana and Ipanema, and sights like Sugarloaf and Corcovado. This place of incredible natural beauty has pressing environmental problems, largely due to activities of the 8.6 million people that live in the Guanabara Bay basin. We have embarked on a program to develop scientifically rigorous, transparent assessments of the health and restoration progress of Guanabara Bay and its river basins, with the ultimate goal of producing a report card for Guanabara Bay and its river basins in 2016. This newsletter summarizes the discussions with environmental and social scientists, engineers, and government officials who developed a first draft of the indicators and reporting regions for the assessment of Guanabara Bay and its river basins.



Guanabara Bay

Regions of the Bay

Five reporting regions for Guanabara Bay were identified in a recent assessment (Fistarol et al., 2015) based on flushing rates, bathymetry and natural features.



1. Central channel. The region with high oceanic flushing which follows the deep central channel of Guanabara Bay, extending from the oceanic entrance to Paqueta.

2. Mouth of Guanabara Bay. Nearshore regions near the mouth of Guanabara Bay on both the west side (Rio de Janeiro) and east side (Niteroi).

3. Central margins of Guanabara Bay. This region includes the harbors of Rio de Janeiro and Niteroi with dredged channels.

Indicators of health

Water quality indicators have been integrated into a water quality index by INEA (conformity index) for marine waters. This index includes five indicators of water quality (dissolved oxygen, total phosphorus, dissolved nitrate, dissolved ammonium and bacterial contamination). These indicators were deemed important but more are needed to characterize the health of Guanabara Bay. Additional indicators will be considered for inclusion based on data availability and quality.

 DO	Dissolved oxygen		Marine mammals
 P	Phosphorus		Fish assemblage
 NO ₃	Nitrate		Mangroves
 NH ₄ ⁺	Ammonium		Water transparency
	Coliforms		Contamination of crabs
	Chlorophyll		Sea horses
	Phytoplankton		

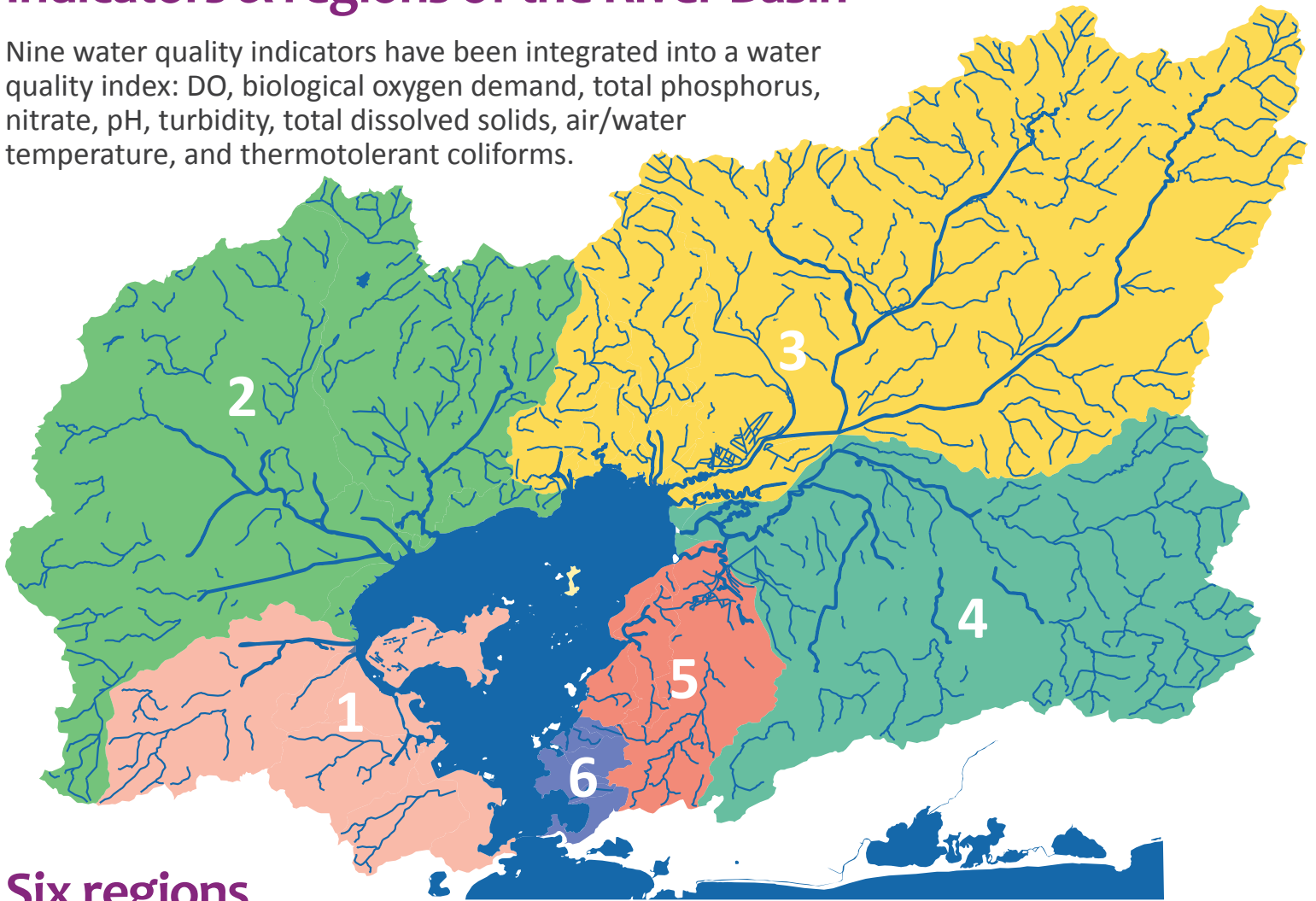
4. Northern Guanabara Bay. This region includes the shallow water habitats and mangrove forests from the Iguacu River mouth to Idaoca.

5. Northwest Guanabara Bay. This region is west of the Iguacu River mouth. It includes channels separating Governador and Fundao Islands.

Guanabara Bay River Basin

Indicators & regions of the River Basin

Nine water quality indicators have been integrated into a water quality index: DO, biological oxygen demand, total phosphorus, nitrate, pH, turbidity, total dissolved solids, air/water temperature, and thermotolerant coliforms.



Six regions

1. Rio de Janeiro region. This is the most urbanized basin, which extends from the mouth of Guanabara Bay to Rio Pavuna and includes Governador Island.

2. Baixada Fluminense region. This basin in the northwest of Guanabara Bay has low lying topography with industrial development, agriculture and low resource communities.

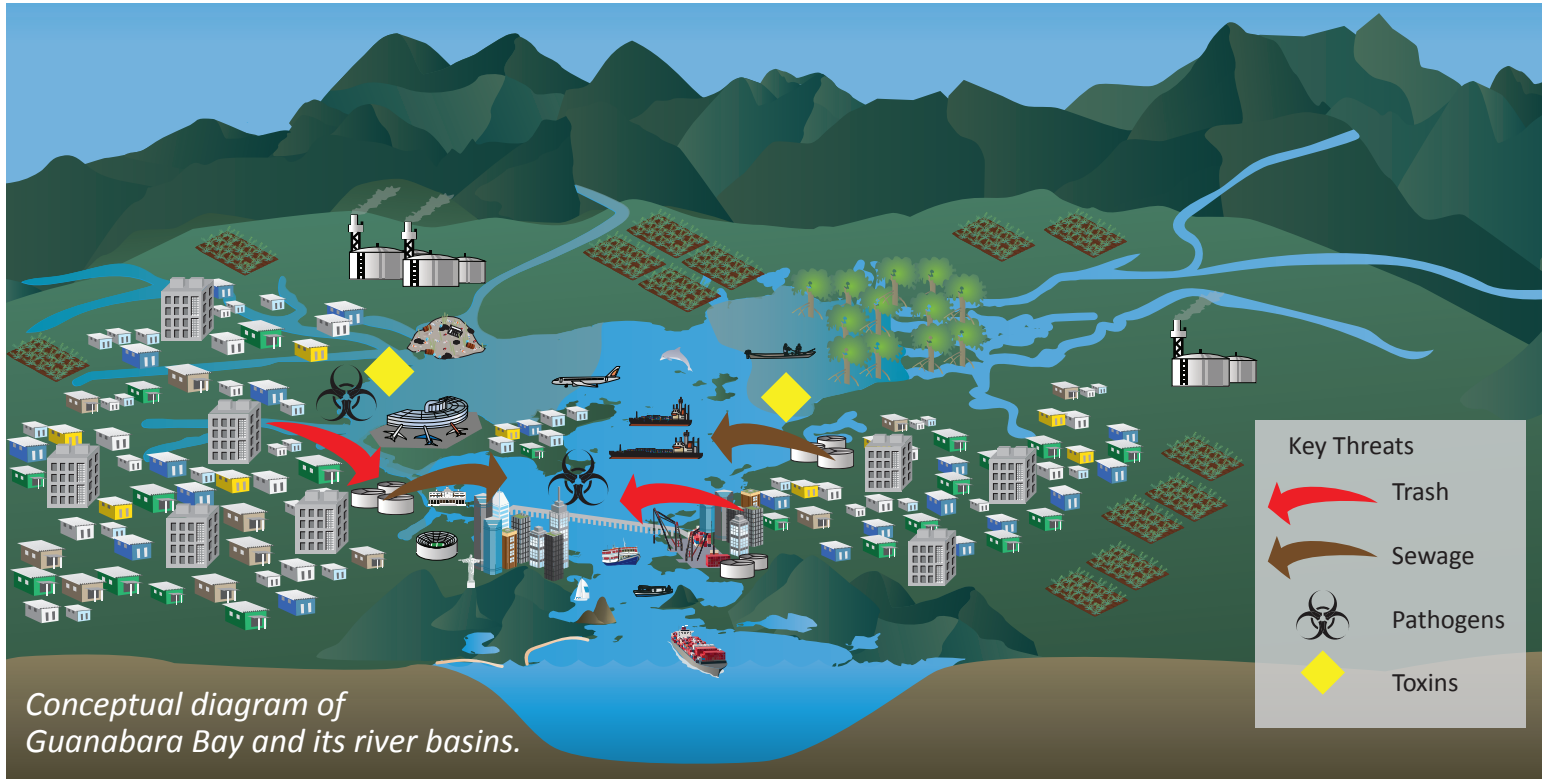
3. Guapimirim-Macacu region. This basin is the least impacted, in the northeast, with extensive mangroves along the coast. Conservation areas, irrigated agriculture, and drinking water sources are in this basin.

4. Caceribu region. This basin supports petrochemical industrial development, some urban development, and extensive agriculture.

5. Alcantara region. This basin extends from the Caceribu River basin to the Rio das Pedras. This river basin supports the second largest city, Sao Gonçalo, which has rapid growth.

6. Niteroi region. This small basin in the southeast is largely urbanized. Niteroi has the highest proportion of treated sewage in the region with discharge into the mouth of Guanabara Bay.

Guanabara Bay values & threats



Guanabara Bay is a beautiful natural harbor that helps form the identity of the Rio de Janeiro region. Guanabara Bay supports the Brazilian economy, through activities like shipping, recreation and tourism. Urban development results in significant impacts including litter and untreated sewage leading to bacterial contamination. In addition, industrial and agricultural development can result in contaminated runoff. These values and threats will inform the selection of report card indicators.

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Some workshop participants at Instituto Estadual do Ambiente (INEA) on 25 April 2016.

