O BOLETIM (SCORE CARD) DA SAÚDE AMBIENTAL BAÍA DE GUANABARA

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29 de Abril, 2016

Innovation for a better future
University of Maryland
Center for Environmental Science

ian

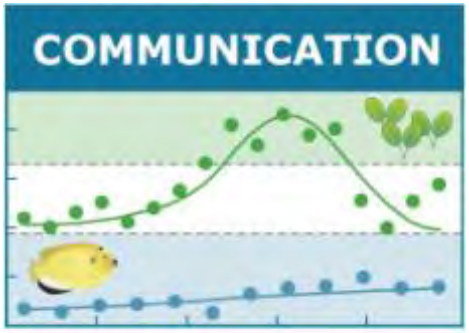
CENTRO DE CIÊNCIAS AMBIENTAIS DA UNIVERSIDADE DE MARYLAND (UMCES) E A REDE DE INTEGRAÇÃO E APLICAÇÃO (IAN)

- UMCES se formou em 1925 para fornecer conselhos ambientais práticos
- UMCES define realizações acadêmicas como descoberta, integração, aplicação, e ensino
- IAN foi criado em 2002 para promover integração e aplicação

QUEM NÓS SOMOS?

O objetivo do IAN é permitir uma melhor comunicação para capacitar mudanças.

O IAN POSSUI TRÊS ÁREAS DE FOCO



Desenvolver produtos para comunicação científica

Boletins ambientais

Treinamento em Comunicação da Ciência

SOLUCIONAR, E NÃO SÓ ESTUDAR OS PROBLEMAS AMBIENTAIS

ESTUDO

- Imparcialiadade
- Envolve a complexidade
- Publicação e financiamento através de peer review
- Fazer direito

SOLUÇÃO

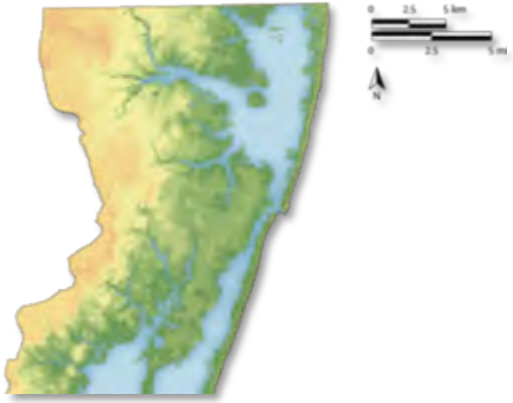
- Parcialidade
- Simplificar
- Publicação e financiamento através de stakeholders
- Fazer acontecer

SINTETIZAR INFORMAÇÕES PARA AUDIÊNCIAS NÃO TÉCNICAS

Síntese

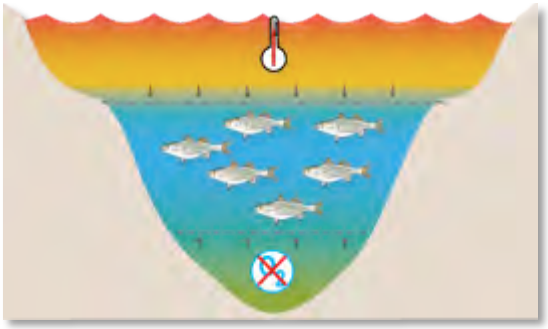
Sintetizar dados

Visualização



Ilustrar pontos chave

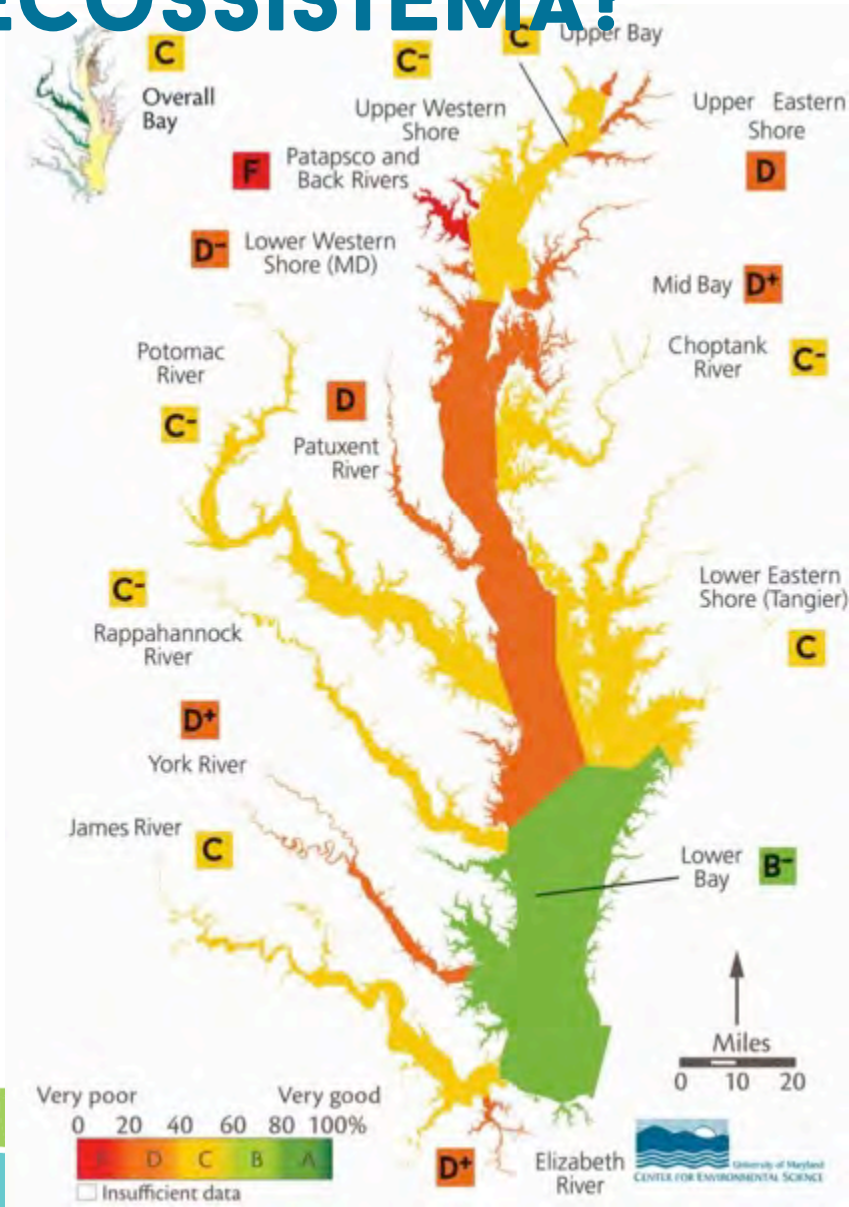
Contexto



E então?

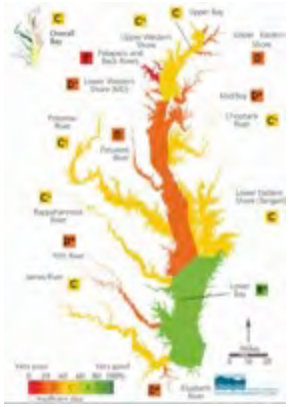
O QUE É UM BOLETIM DE SAÚDE AMBIENTAL DE UM ECOSSISTEMA?

- Avaliações em ampla escala de uma região ou sistema
- Comunica informações complexas
- Baseado em dados reais: transparente e defensável
- Fornece credibilidade
- Engaja comunidades



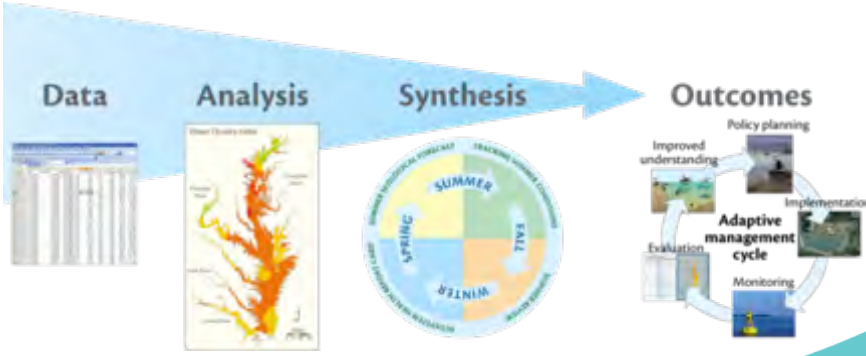
BOLETINS DE SAÚDE AMBIENTAL SÃO FERRAMENTAS EFETIVAS PARA A COMUNICAÇÃO

- A pressão social é um poderoso motivador humano



- Boletins educacionais são uma experiência comum

- Boletins sintetizam grandes quantidades de dados



RESULTADOS DOS BOLETINS DE SAÚDE AMBIENTAL

- Influentes e bem recebidos
- Pacote abrangente – vai além da simples classificação
- Visualmente atraentes
- São locais – senso de propriedade
- Educacionais

BOLETINS DE SAÚDE AMBIENTAL SÃO UMA FERRAMENTA PARA MUITAS AUDIÊNCIAS

- Topo = Boletim (Score Card)
- 2ª Camada = Newsletter, website
- 3ª Camada = Relatórios técnicos, literatura científica
- Base = Dados

NÓS DESENVOLVEMOS BOLETINS DE SAÚDE AMBIENTAL EM DIVERSAS REGIÕES ICÔNICAS DO MUNDO

PROCESSO DE CRIAÇÃO DE BOLETINS ENVOLVE CINCO PASSOS

1 Criar uma estrutura conceptual

Criar uma estrutura com as definições dos objetivos e os principais aspectos de cada meta que devem ser avaliadas ao longo do tempo.

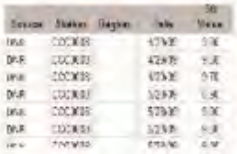
2 Escolher os indicadores

Selecionar indicadores que transmitam informações significativas e que possam ser medidos com segurança.

3 Definir limites

Definir categorias de status, regiões a serem monitoradas e método de medição de fronteiras.

4 Calcular as pontuações



Calcular os indicadores de pontuações e combinar na forma de notas.

5 Comunicar os resultados

A version for America's Watershed Report Card

Comunicar os resultados usando elementos visuais, como fotos, mapas e diagramas conceituais.

NÓS USAMOS UMA ABORDAGEM DE PARCERIA E GOSTAMOS DE ENGAJAR A TODOS NO PROCESSO

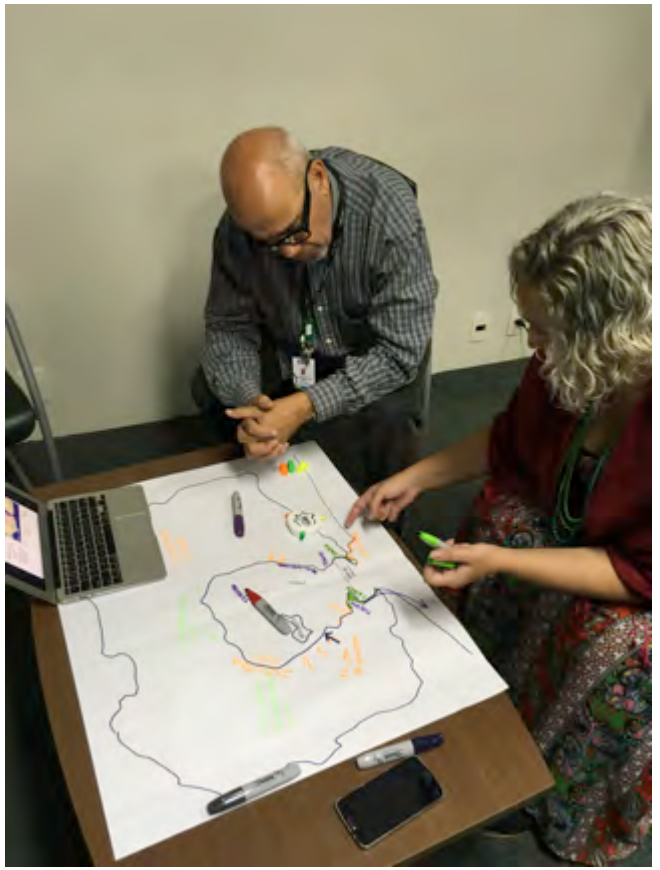
O workshop foi organizado pela KCI, University of Maryland Center for Environmental Science e o PSAM, com suporte do Banco Interamericano de Desenvolvimento. Os participantes incluíram Izidro Paes Leme Arthou, José Paulo Azevedo, Guido Gelli, Marcos Santanna Lacerda, Nair Palhano, Marco Pessoa, Stella Procópio da Rocha, Marcio Santarosa, Mariana Correa dos Santos, Klinton Senra, José Alfredo Sertã, Leonardo Daemon Doliveira Silva, Fátima de Freitas Lopes Soares, Rony Sutter, Luciana Ventura, e Victor Zveibil.

Alguns participantes do workshop no Instituto Estadual do Ambiente (INEA) no dia 25 de abril de 2016.

KCI · ABES · CBH-BG · ICMBio MMA · PSAM · inea instituto estadual do ambiente · BID · Secretaria do Ambiente · INSTITUTO terrazul · COPPE UFRJ · UERJ Universidade do Estado do Rio de Janeiro · GOVERNO DO Rio de Janeiro · Innovation for a better future University of Maryland Center for Environmental Science · Masterplan · ian.umces.edu

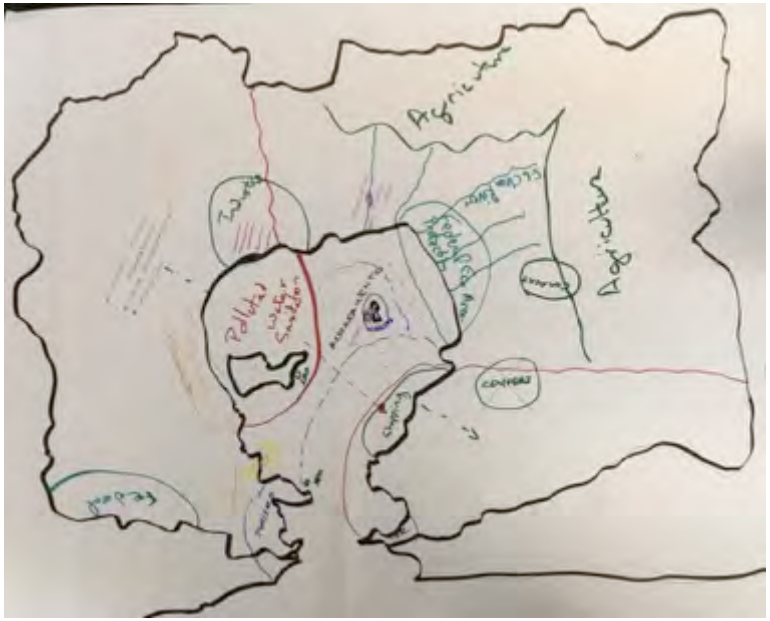
1 Criar uma estrutura conceptual

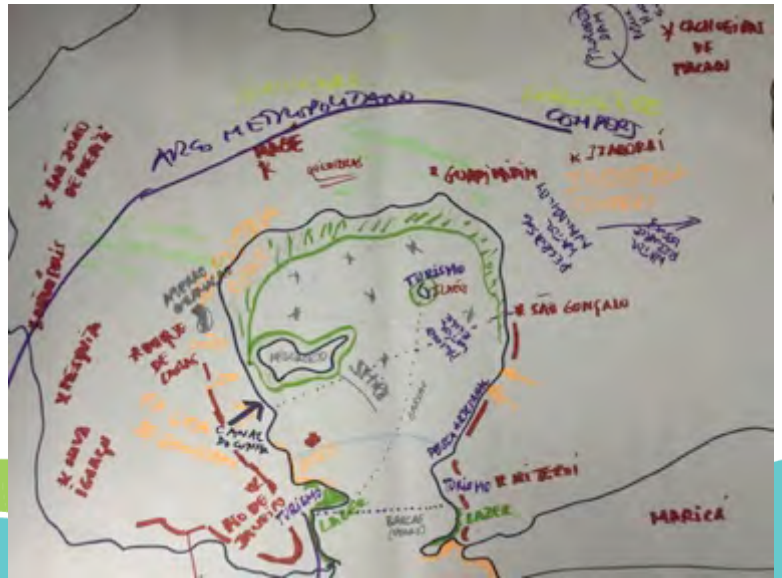
EXERCÍCIO DE MAPEAMENTO CONCEITUAL



1 Criar uma estrutura conceptual

MAPAS CONCEITUAIS INICIAIS





1 Criar uma estrutura conceptual

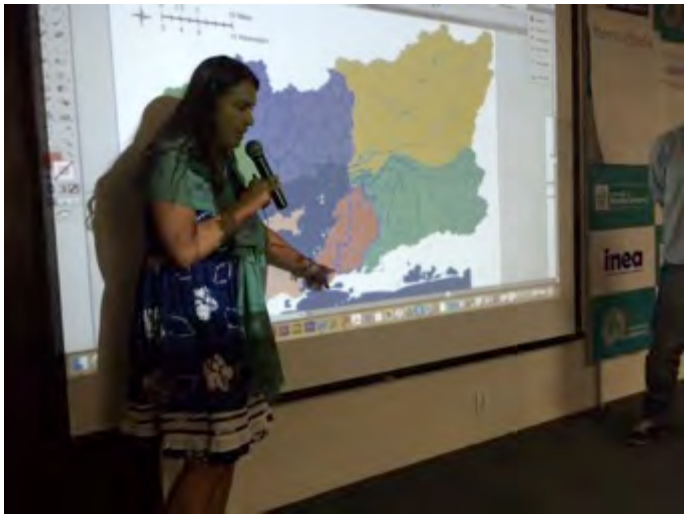
BAÍA DE GUANABARA
VALORES CRÍTICOS & MAIORES AMEAÇAS

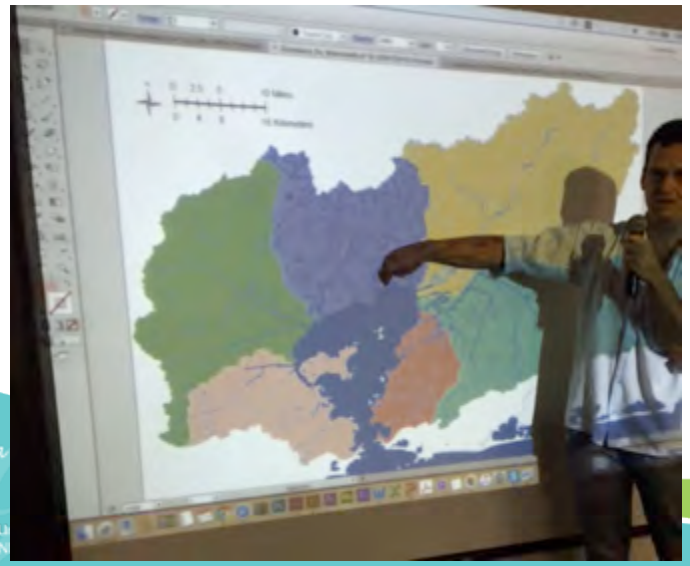
Ameaças críticas
Lixo
Esgoto
Patógenos
Toxinas

Diagrama conceitual da Baía de Guanabara e sua Bacia Hidrográfica.

1 Criar uma estrutura conceptual

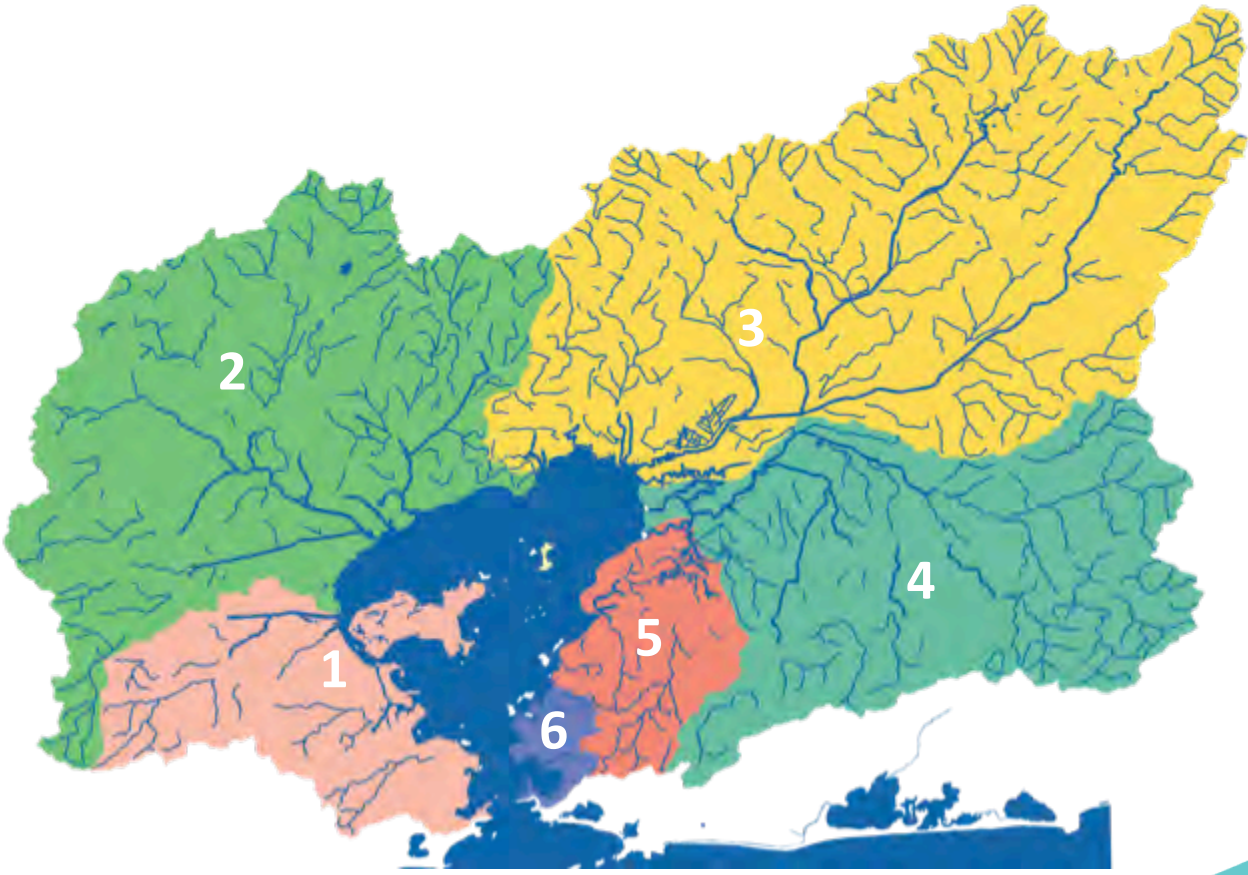
DISCUSSÃO SOBRE AS REGIÕES A SEREM REPORTADAS





1 Criar uma estrutura conceptual

REGIÕES A SEREM REPORTADAS NA BAÍA DE GUANABARA E SUA BACIA HIDROGRÁFICA



2 Escolher os indicadores

POTENCIAIS INDICADORES PARA A BAÍA DE GUANABARA

- DO — Oxigênio dissolvido
- P — Fósforo
- NO_3 — Nitratos
- NH_4^+ — Amônia
- Coliformes
- Clorofila
- Fitoplâncton
- Mamíferos aquáticos
- Peixes
- Áreas de manguezal
- Transparência da água
- Contaminação de caranguejos
- Cavalos-marinhos

2 Escolher os indicadores

POTENCIAIS INDICADORES PARA A BACIA DA BAÍA DE GUANABARA

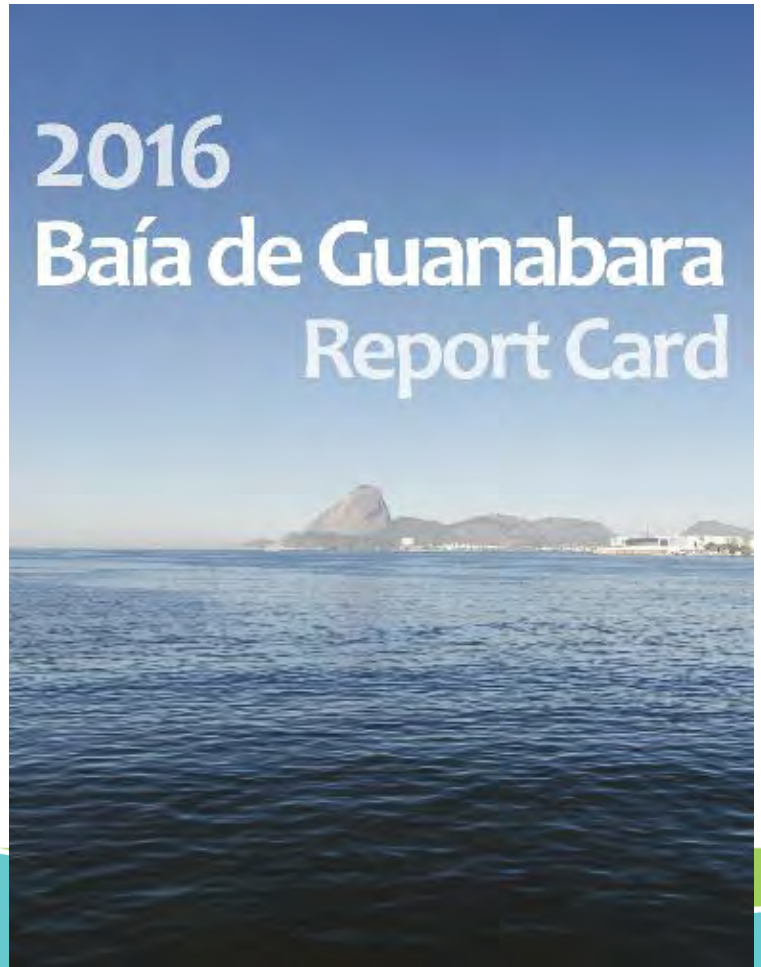
- DO — Oxigênio dissolvido
- BOD — Demanda biológica de oxigênio
- P — Fósforo
- NO_3 — Nitratos
- Turbidez
- TDS — Sólidos dissolvidos totais
- Temperatura do ar/água
- Coliformes
- pH — pH

NEWSLETTER DO WORKSHOP INICIAL SERÁ DISCUTIDA APÓS O ALMOÇO

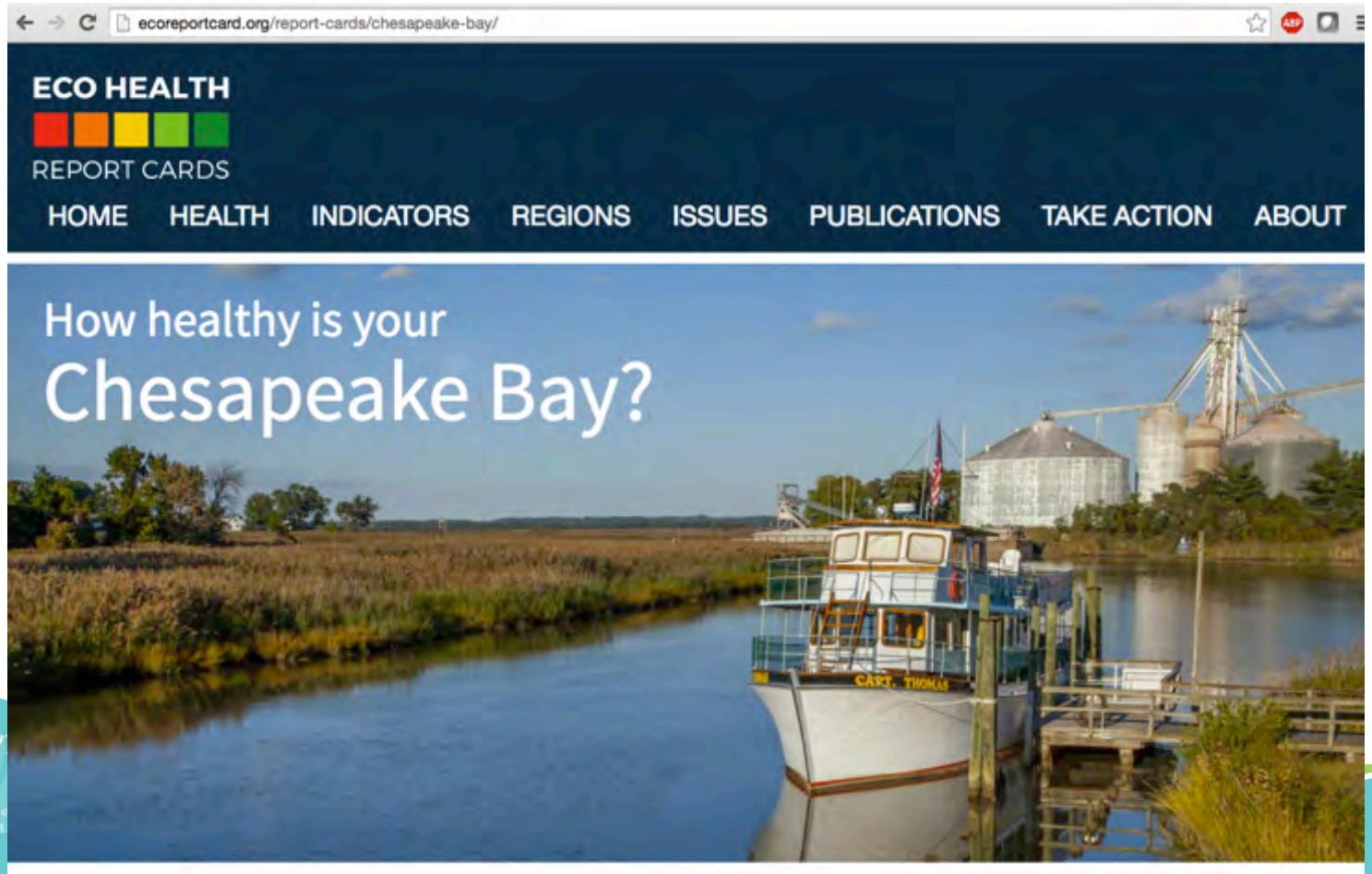
- Local globalmente icônico
- Pressões dos problemas ambientais
- Necessidade de avaliações científicas e rigorosas para monitorar o progresso da recuperação

NÓS IREMOS PRODUZIR UM BOLETIM DE SAÚDE AMBIENTAL IMPRESSO PARA A BAÍA DE GUANABARA

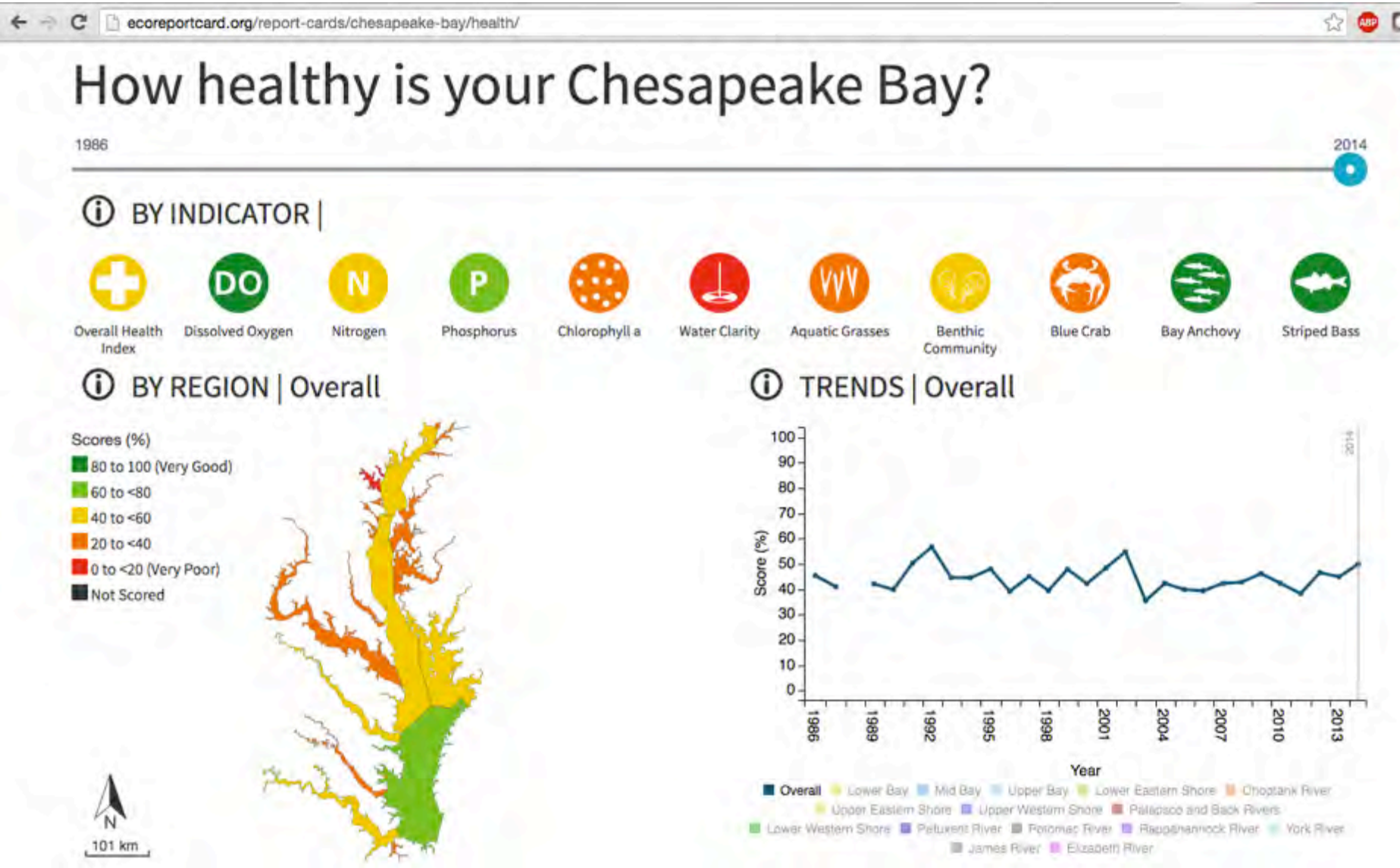
(IGUAL AO DA BAÍA DE CHESAPEAKE)



NÓS TAMBÉM IREMOS ADICIONAR O BOLETIM DE SAÚDE DA BAÍA DE GUANABARA PARA O ECOREPORTCARD.ORG



O WEBSITE PERMITE AO PÚBLICO INVESTIGAR OS DADOS



O WEBSITE FORNECE EXPLICAÇÕES DETALHADAS

ecoreportcard.org/report-cards/chesapeake-bay/health/

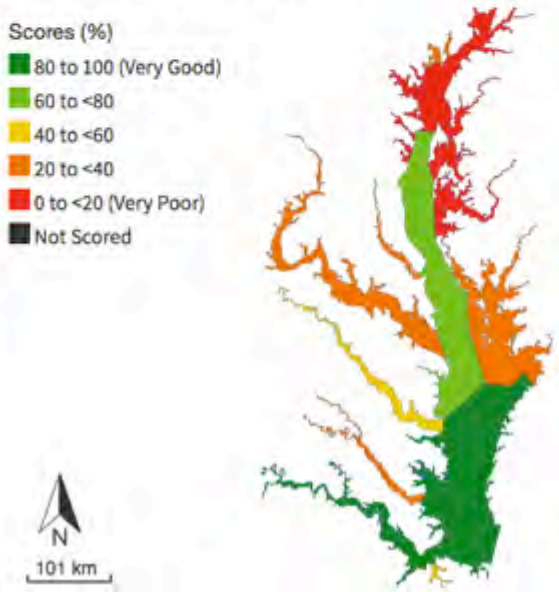
How healthy is your Chesapeake Bay?

1986 — 2014

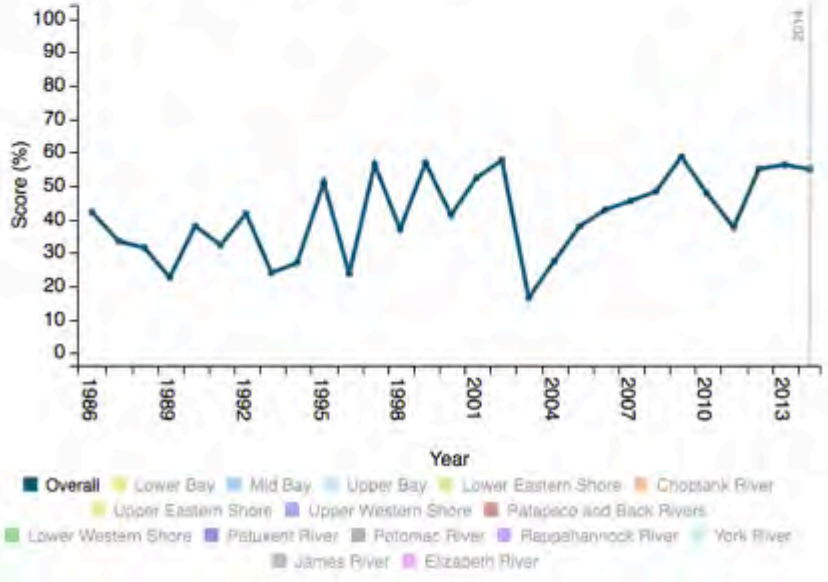
BY INDICATOR | Nitrogen

Overall Health Index | Dissolved Oxygen | Nitrogen | Phosphorus | Chlorophyll a | Water Clarity | Aquatic Grasses | Benthic Community | Blue Crab | Bay Anchovy | Striped Bass

BY REGION |



TRENDS | Nitrogen



O WEBSITE EXPÕE A METODOLOGIA

ECO HEALTH
REPORT CARDS

HOME HEALTH INDICATORS REGIONS ISSUES PUBLICATIONS TAKE ACTION ABOUT

HOME / REPORT CARDS / CHESAPEAKE BAY / INDICATORS / PHOSPHORUS

P

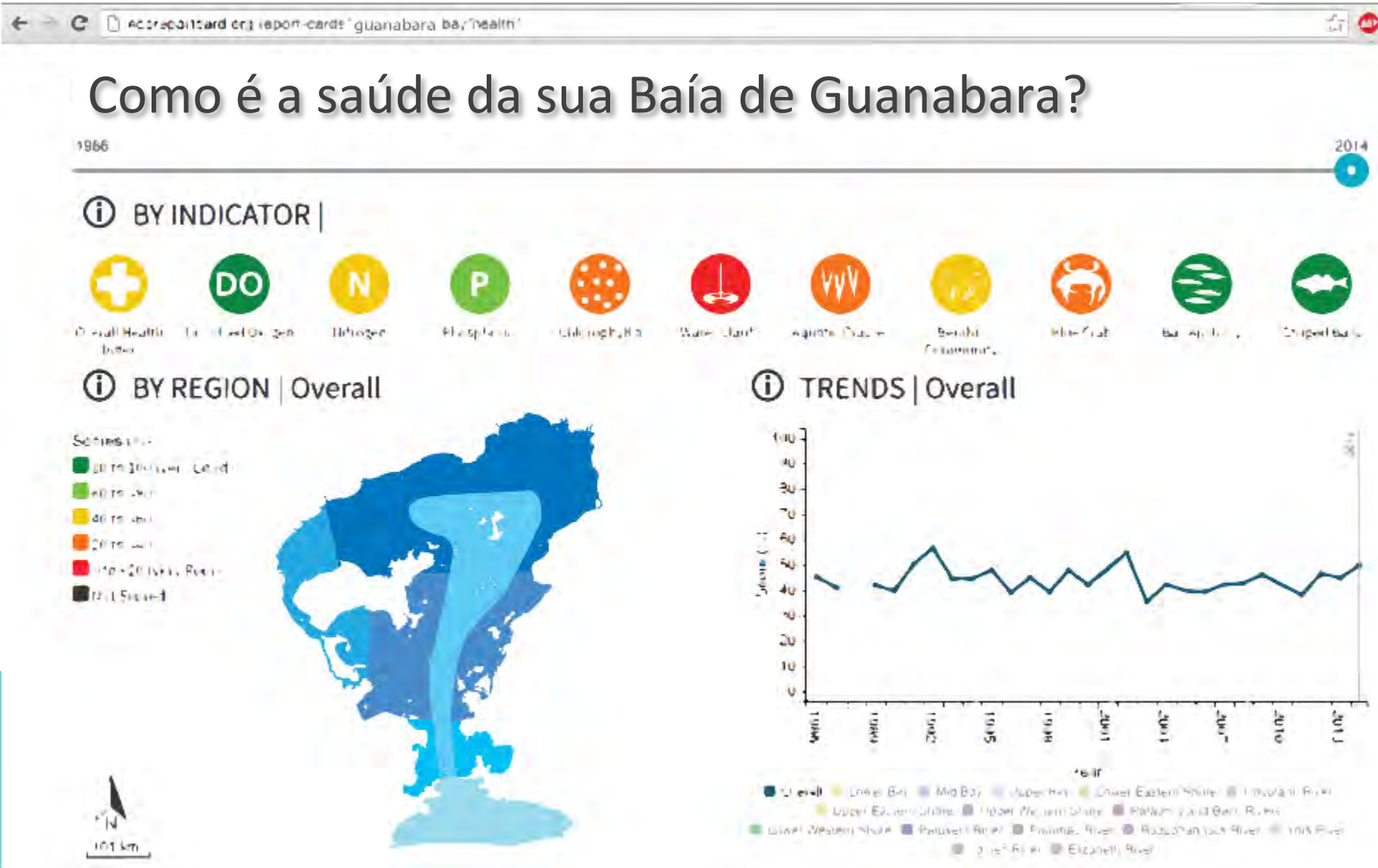
What is the Phosphorus indicator?

Total phosphorus is an indicator of too much phosphorus in the water. Phosphorus attaches to sediment particles, so phosphorus and sediment pollution are linked. Phosphorus is an essential nutrient for all plants and animals. But too much phosphorus in the water causes algae to grow in large, dense algal blooms, which depletes oxygen for fish and other marine organisms.

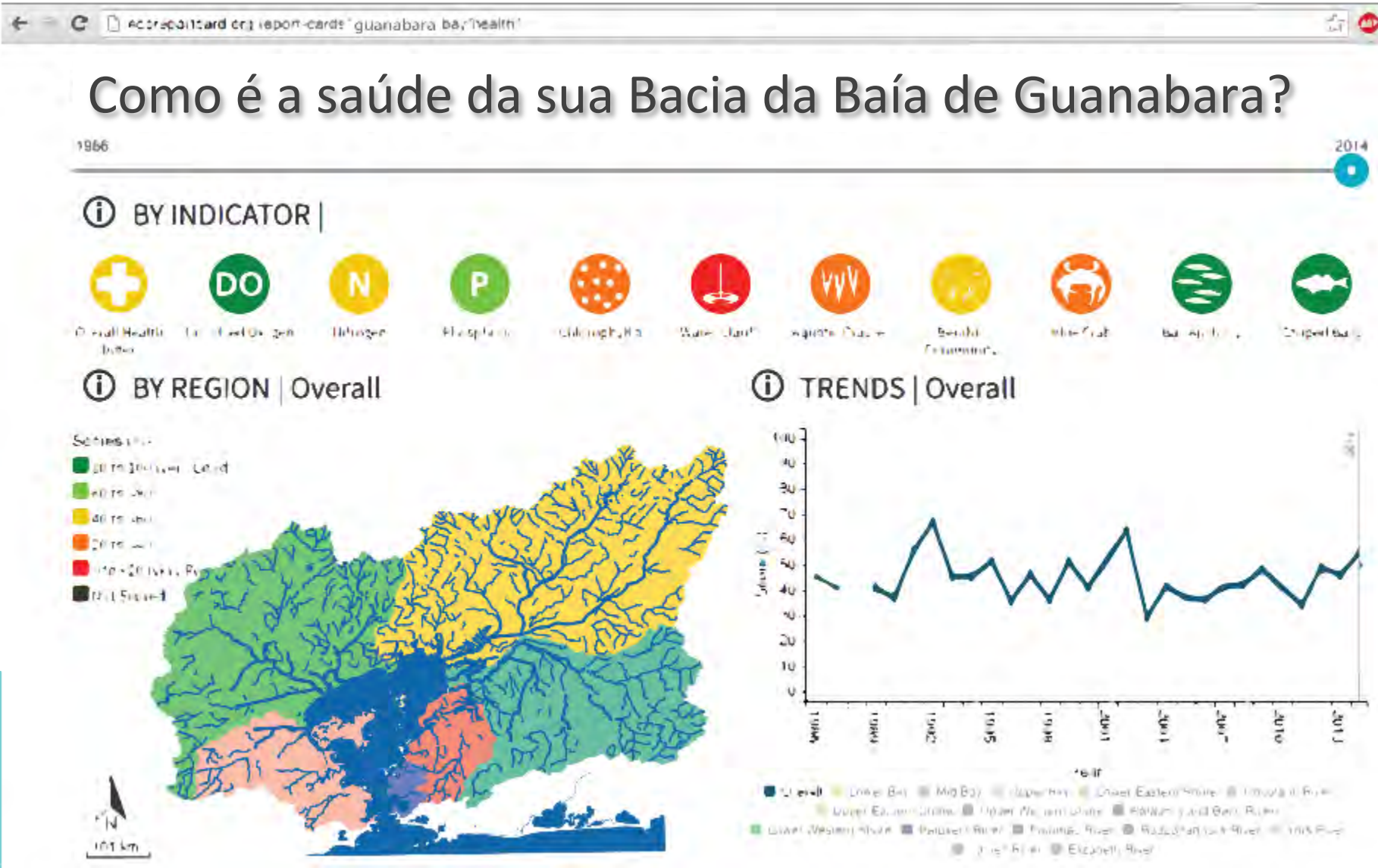
When sediment runs off land, it can carry nutrients like phosphorus into the water.

EXEMPLO PARA A HOME PAGE DO BOLETIM DA BAÍA DE GUANABARA

EXEMPLO DO BOLETIM PARA A BAÍA DE GUANABARA



EXEMPLO DO BOLETIM PARA A BACIA DA BAÍA DE GUANABARA



EXEMPLO DO BOLETIM PARA A BACIA DA BAÍA DE GUANABARA

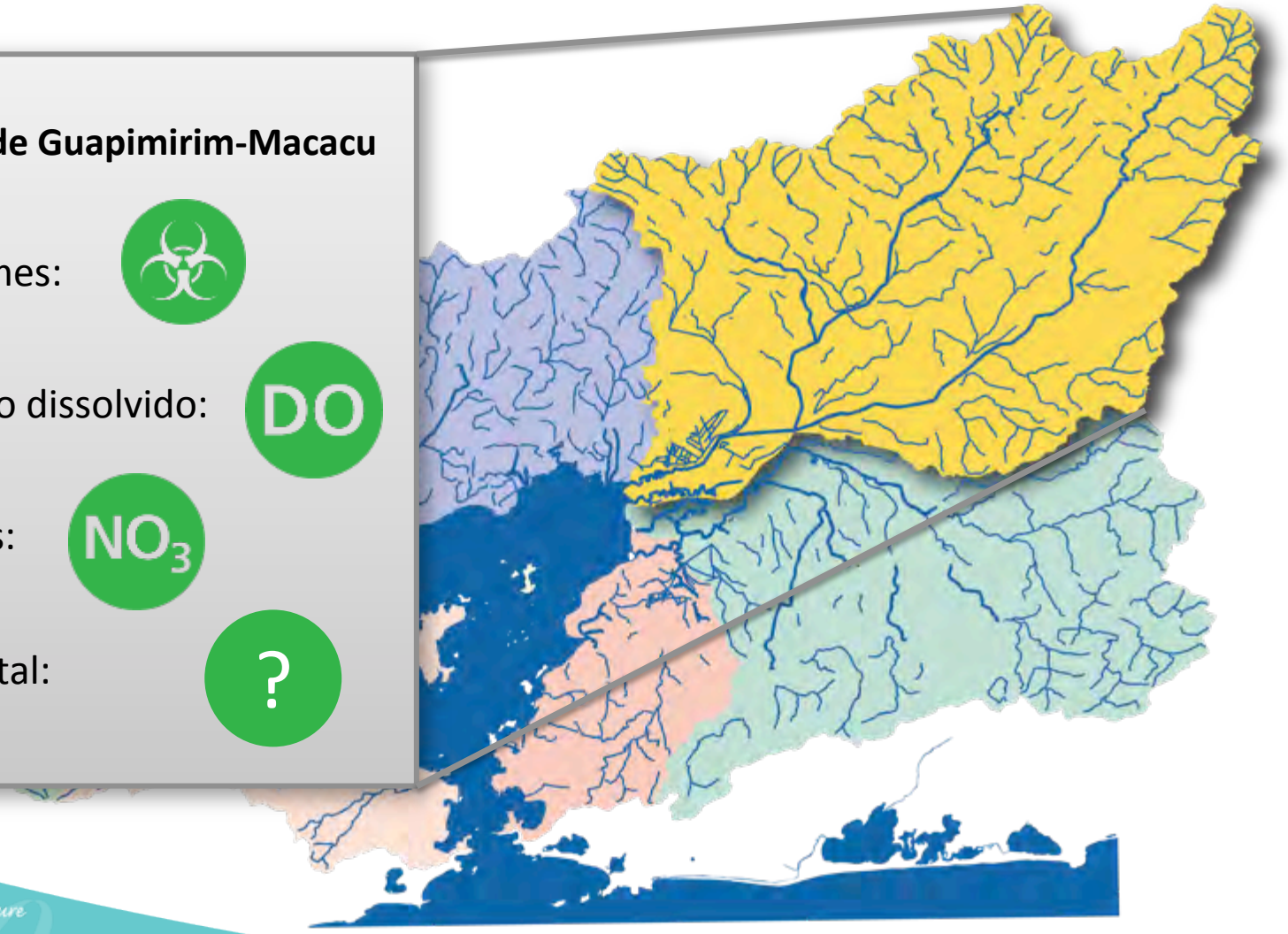
Região de Guapimirim-Macacu

Coliformes:

Oxigênio dissolvido: DO

Nitratos: NO_3

Nota total: ?

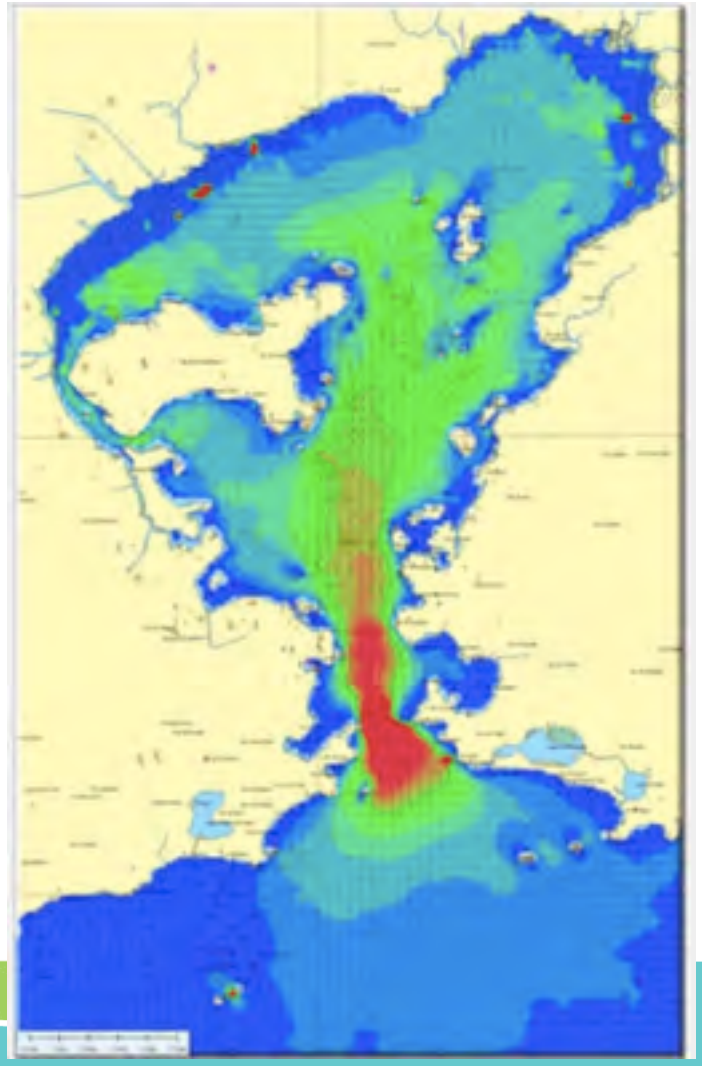


A BAÍA DE GUANABARA É UM LUGAR INCRÍVEL

- Belo porto natural
- Atrai as pessoas para morar, trabalhar e para a recreação

A BAÍA DE GUANABARA É VULNERÁVEL AOS IMPACTOS HUMANOS

- Troca restrita com o oceano
- Contribuições marinhas são precárias nas áreas mais necessitadas



A BAÍA DE GUANABARA SOFRE AS PRESSÕES DE IMPACTOS AMBIENTAIS SIGNIFICANTES

Vísiveis

(ex. lixo flutuante)

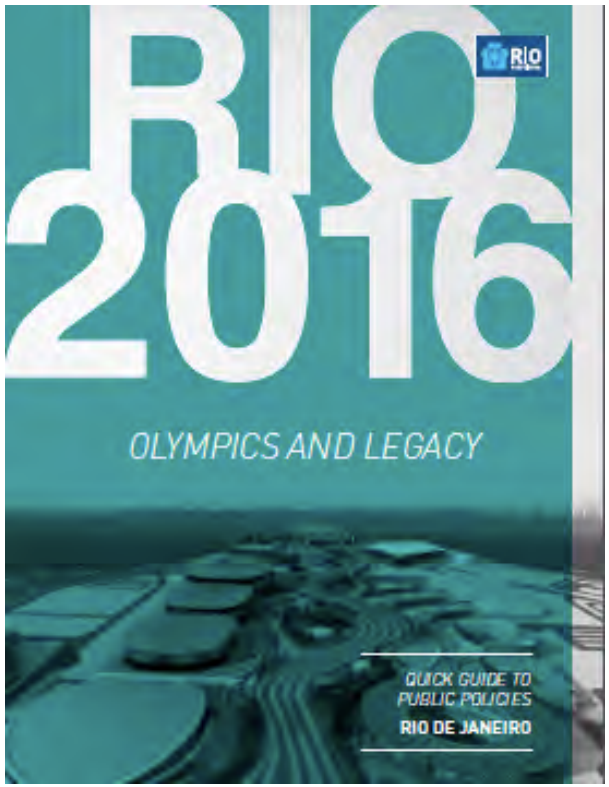
Invisíveis

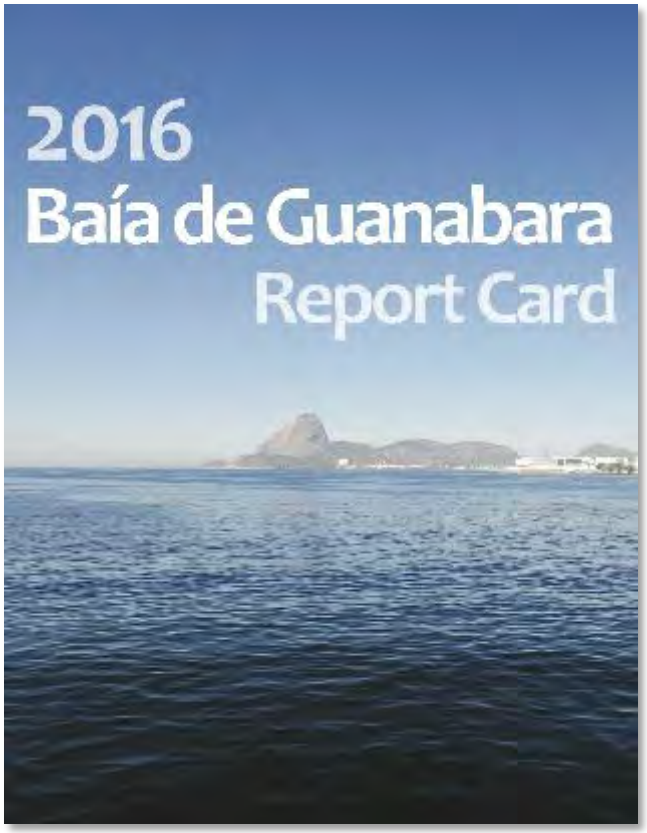
(ex. contaminação bacteriana)

HÁ UM FORTE INTERESSE EM MELHORAR AS CONDIÇÕES DA BAÍA DE GUANABARA

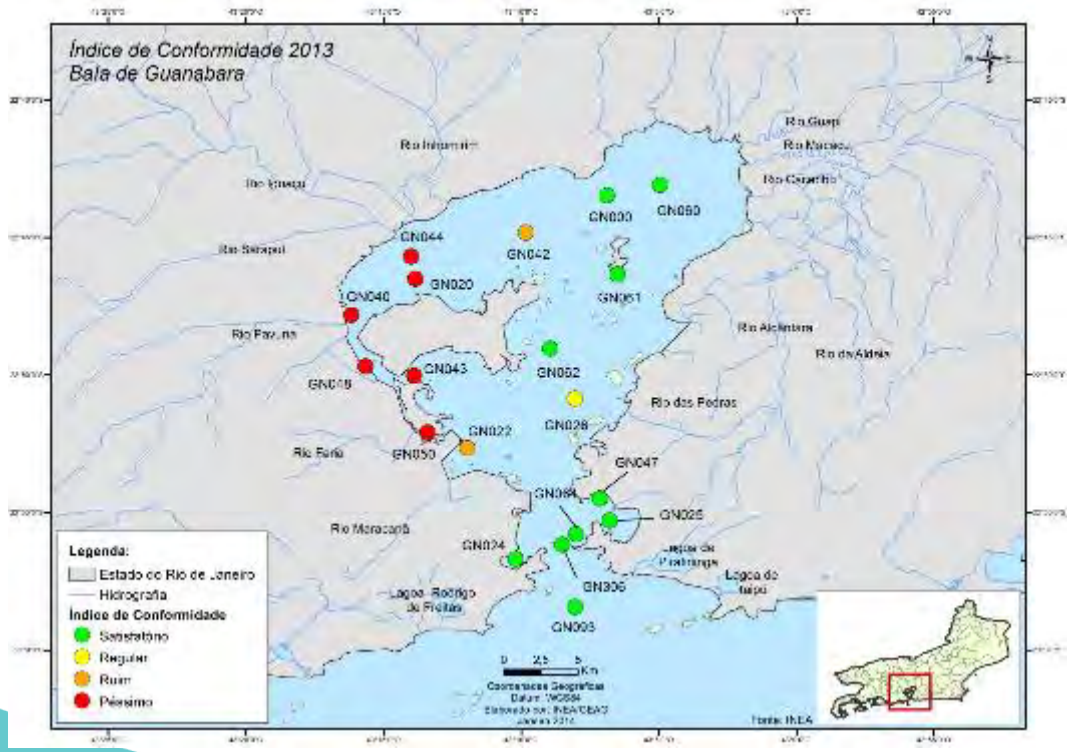
(ESSA É A RAZÃO DE ESTARMOS TODOS AQUI HOJE)

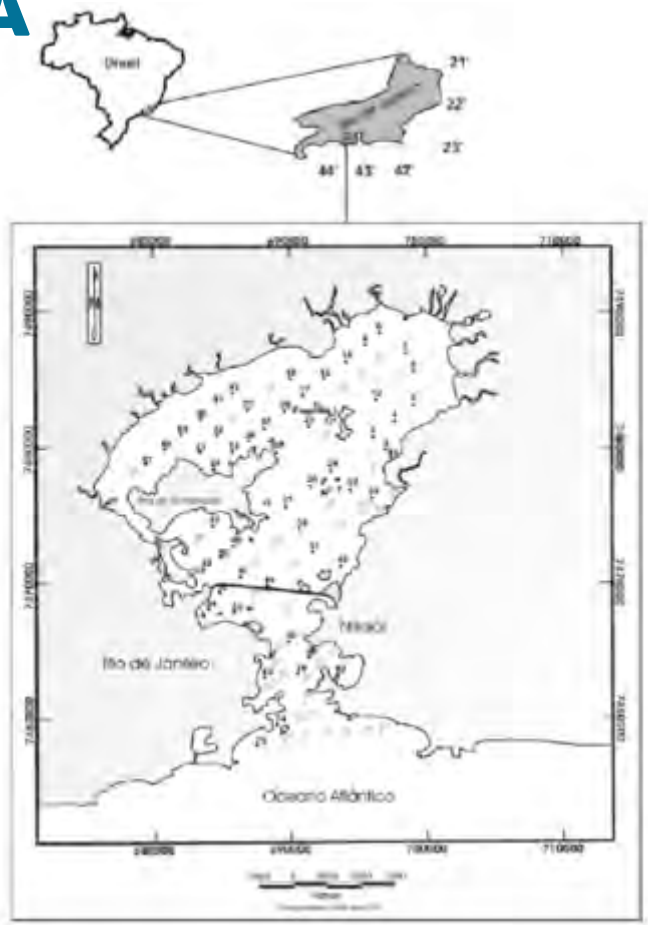
NÓS TEMOS UMA OPORTUNIDADE ÚNICA DE ACELERAR A RECUPERAÇÃO DA BAÍA DE GUANABARA





EXISTE UMA BASE CIENTÍFICA MUITO FORTE EM RELAÇÃO ÀS PESQUISAS E MONITORAMENTO DA BAÍA DE GUANABARA





COM ESSA FORTE BASE CIENTÍFICA NÓS PODEMOS DESENVOLVER UM PROCESSO RIGOROSAMENTE CIENTÍFICO E TRANSPARENTE PARA ACOMPANHARMOS O PROGRESSO DA RECUPERAÇÃO

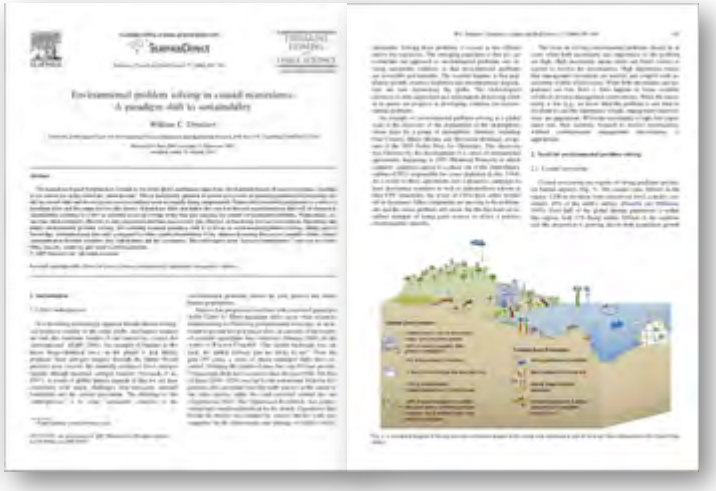
NÓS ESPERAMOS CONTAR COM VOCÊS E QUEREMOS ENGAJÁ-LOS NESSE PROCESSO

OBRIGADO!

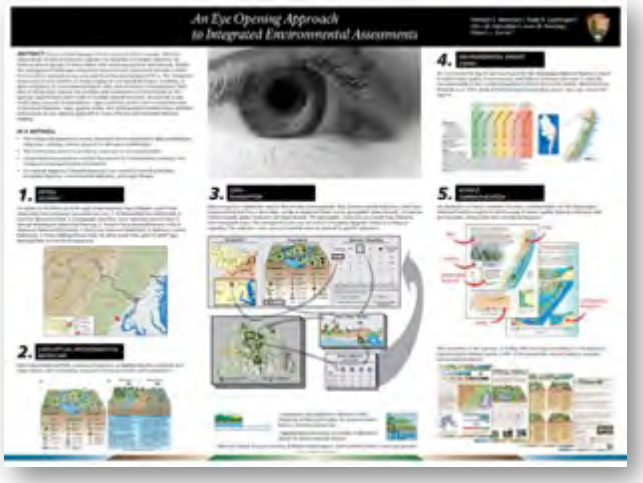
DESENVOLVENDO UMA VARIEDADE DE PRODUTOS PARA A COMUNICAÇÃO DA CIÊNCIA

Newsletters

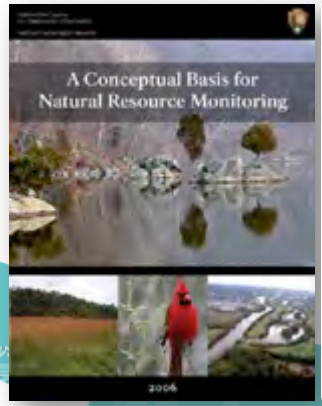
Jornais científicos



Pôsteres

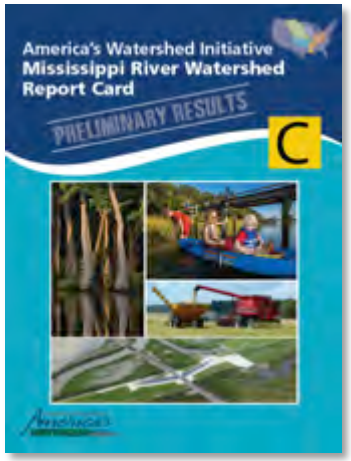


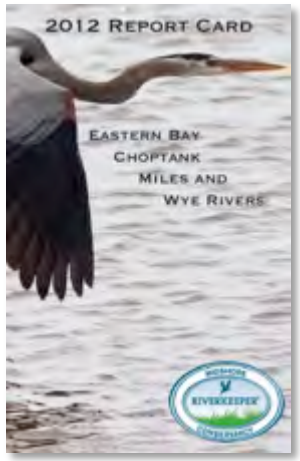
Report cards

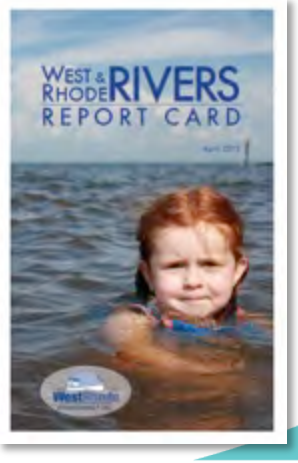


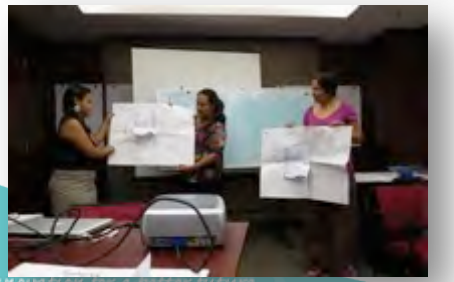
Livros

EXEMPLOS DE BOLETINS





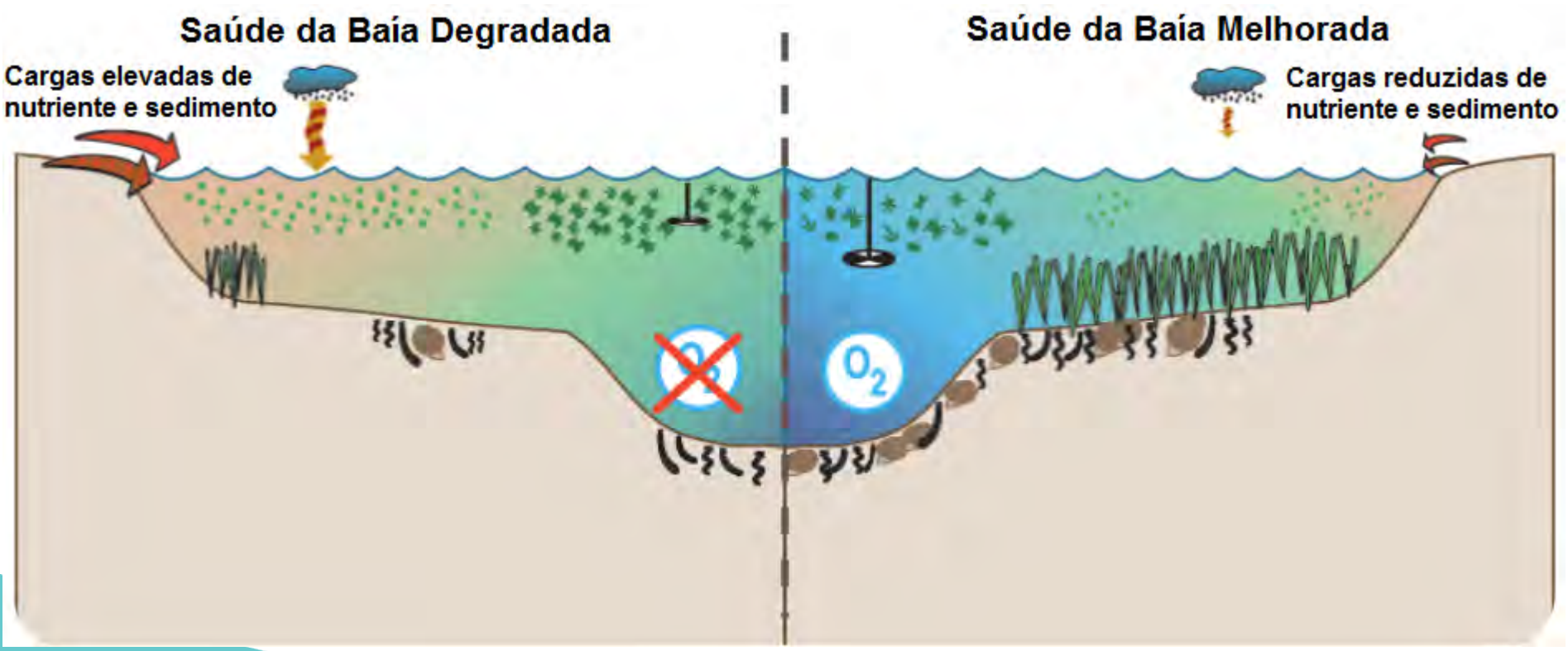




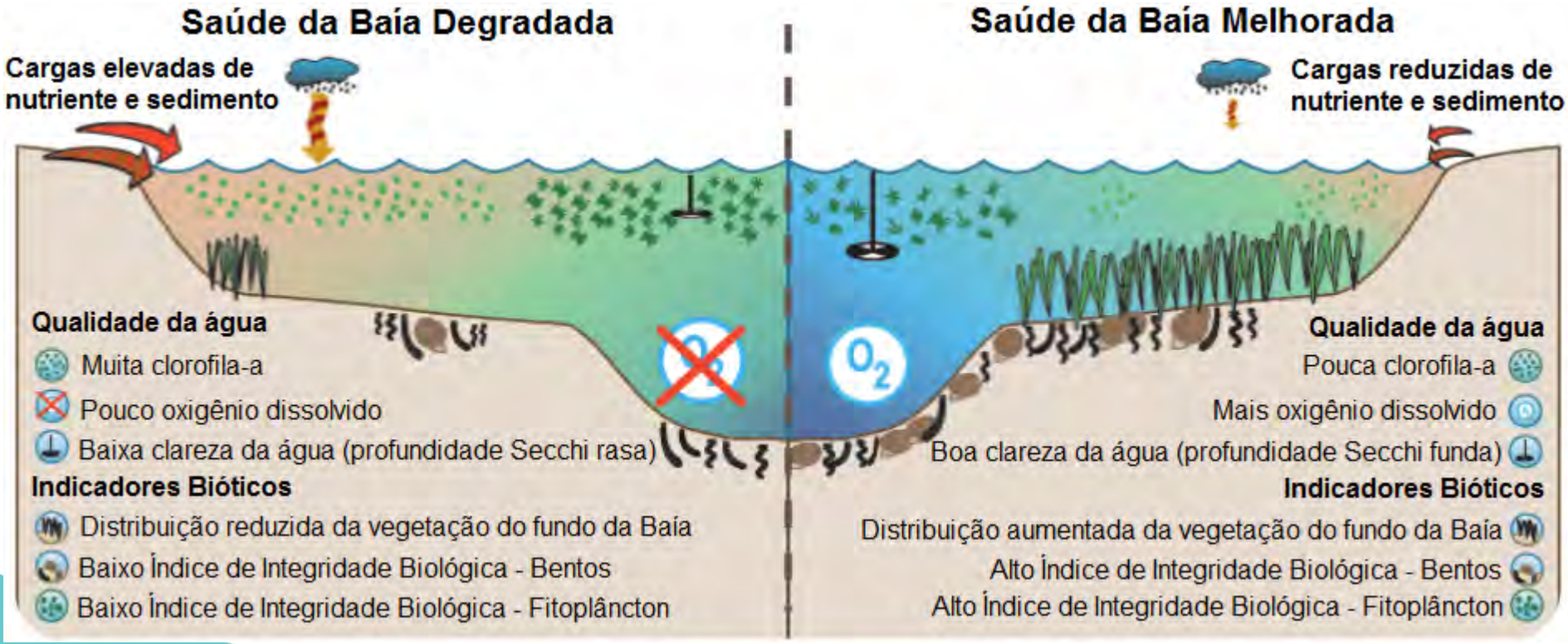
Workshop para identificar valores e ameaças

- Promove encontro de experts e stakeholders relevantes em um único lugar e ao mesmo tempo
- Em conjunto desenvolvem conteúdo e estrutura do boletim
- Constrói consenso entre grupos diferentes
- Iterativo – revisão e edição durante e após o workshop

Baía de Chesapeake – Construir diagramas conceptuais



Baía de Chesapeake – Indicadores, medidas, valores e ameaças



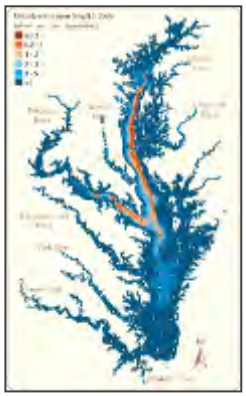
O método de designar limites para cada indicador pode ser baseado em cada, ou em uma combinação, dos seguintes:

- Diretrizes regulatórias (ex: diretrizes locais ou regionais para qualidade da água);
- Limites biológicos (ex: requisito de oxigênio dissolvido para a proteção de uma espécie importante);
- Requisitos sócio/econômicos (ex: estoque mínimo de peixes determinado como requisito para pesca sustentável);
- Condições de referência (ex: linhas de base históricas ou sistemas adjacentes com condições que possam ser equiparadas);
- Julgamento profissional

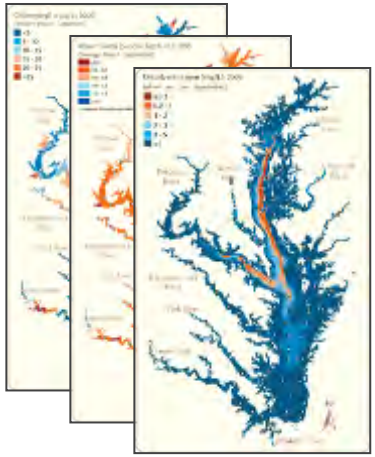
Métodos para cálculo das pontuações

1. Preparar os dados: Calcular a média anual, mediana para cada indicador
2. Avaliar os dados de acordo com os limites
   - % de áreas medidas ou interpoladas que se adequam ou não aos limites

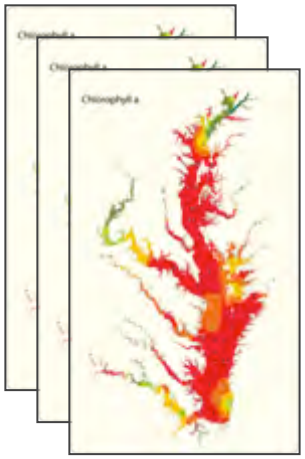
   OU
   - % de áreas que atendem ou não aos limites

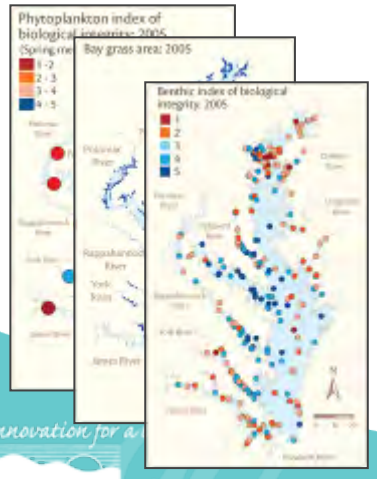


Métodos para a Baía de Chesapeake

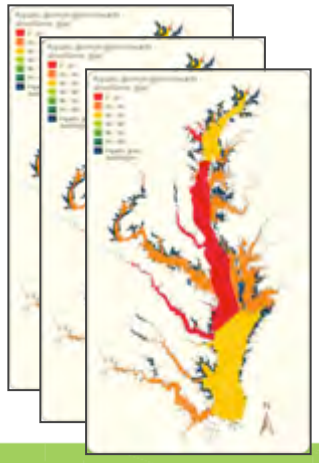


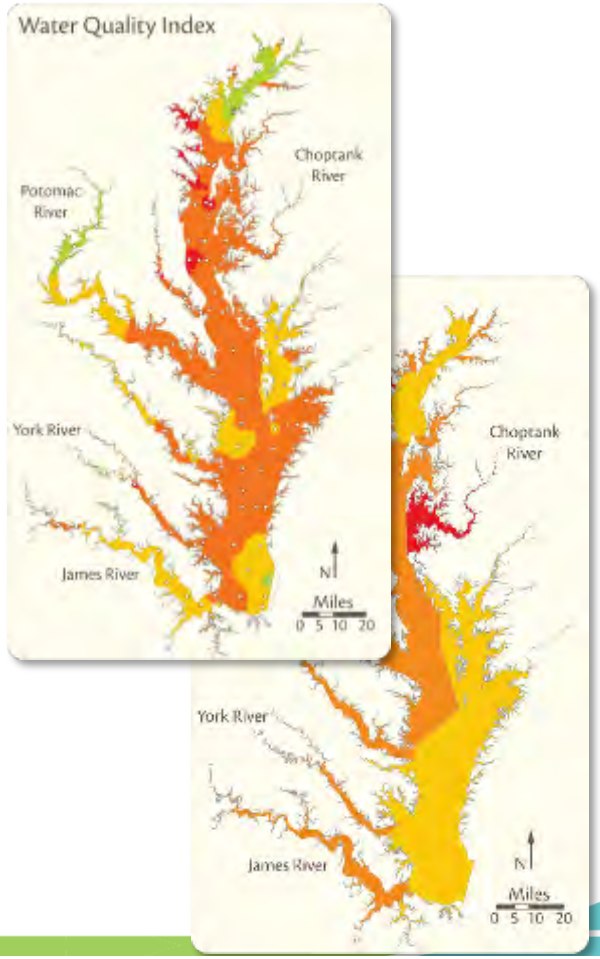
Qualidade da água





Biótico



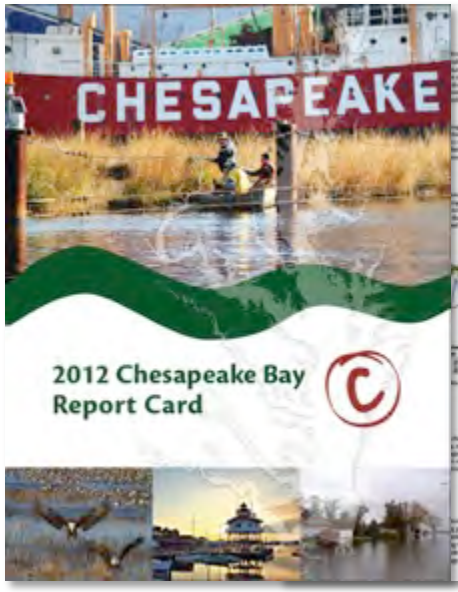


Dados integrados

Comparados com os limites

Combinados em índices

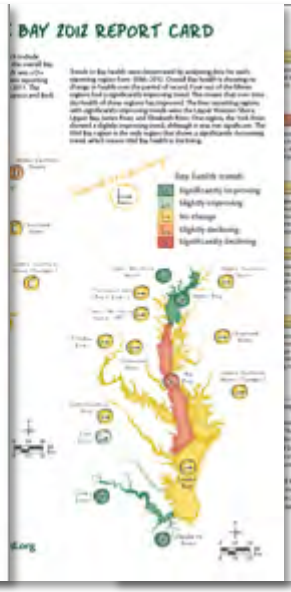
Pontuação	Nota	Explicação
80-100 %		Todos os indicadores de qualidade da água e saúde biológica atendem os níveis desejados.
60-80 %		A maioria dos indicadores de qualidade da água e saúde biológica atendem os níveis desejados.
40-60 %		Há uma mistura de níveis bons e ruins para os indicadores de qualida da água e saúde biológica.
20-40 %		Alguns ou poucos indicadores de qualidade da água e saúde biológica atendem os níveis desejados.
0-20 %		Muito poucos ou nenhum dos indicadores de qualidade da água e saúde biológica atendem os níveis desejados.



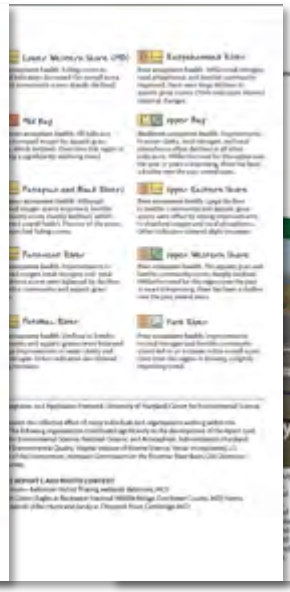
Capa

Valores e ameaças

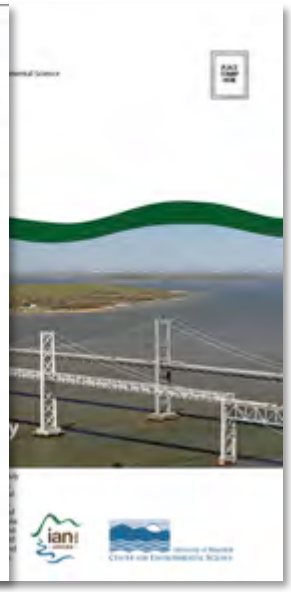
Indicadores e métodos



Pontuações/ Notas



Tendências

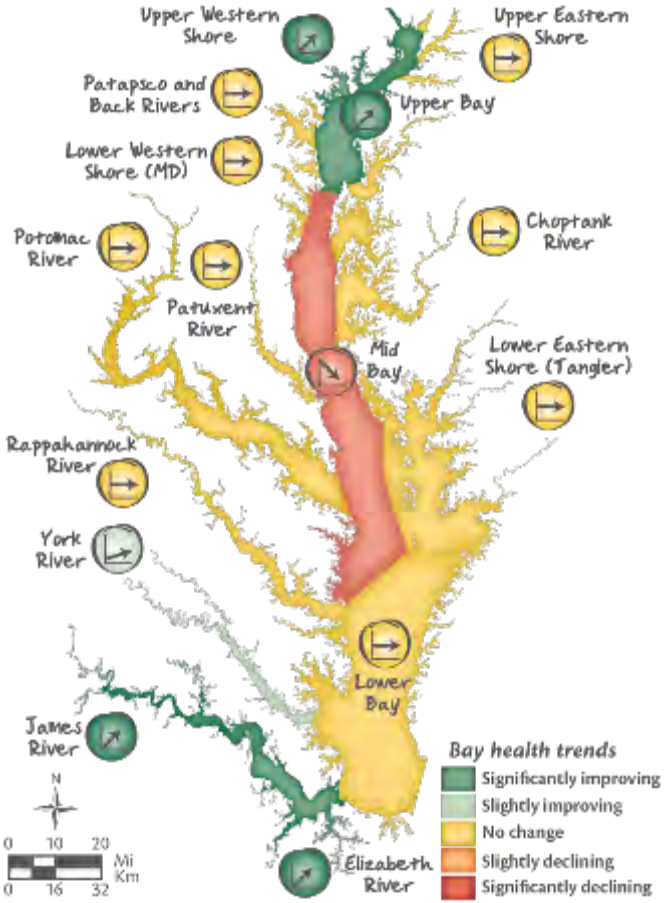


Créditos

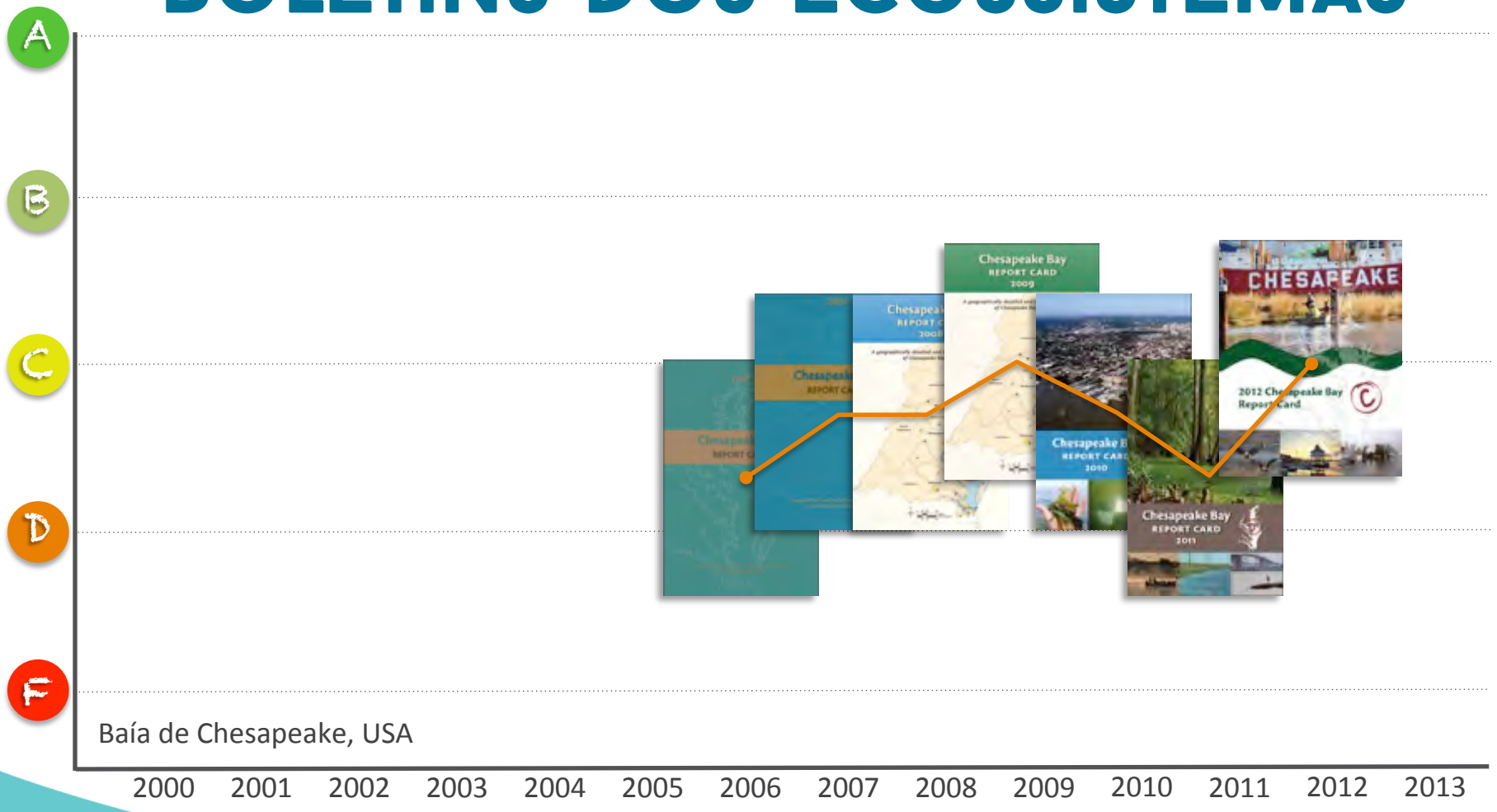
Manter a evolução

Baía de Chesapeake:

- tem novos indicadores
- agora reporta análises de tendência
- Inclui pontuação ponderada de fluxo



RETROSPECTIVA SOBRE OS BOLETINS DOS ECOSSISTEMAS



BOLETIM DE MORETON BAY

A

B

C

D

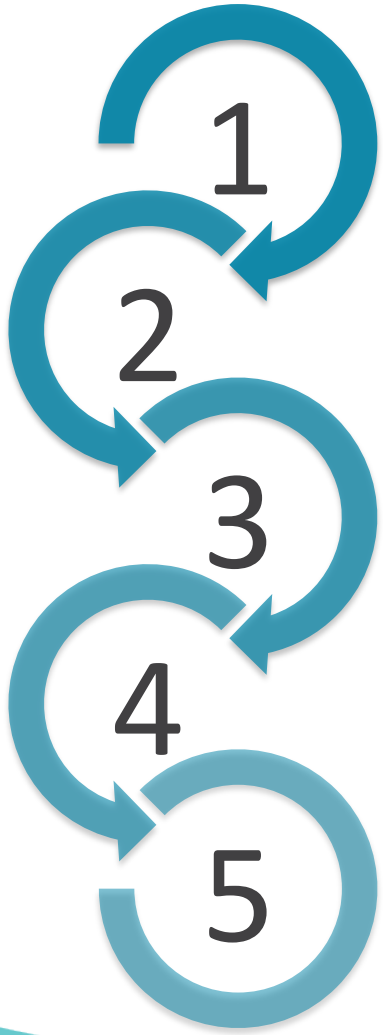
F

- Mudança gradual
- Reticência para mudar indicadores
- Atraso em relatar
- Graduação?

Baía Moreton, Austrália

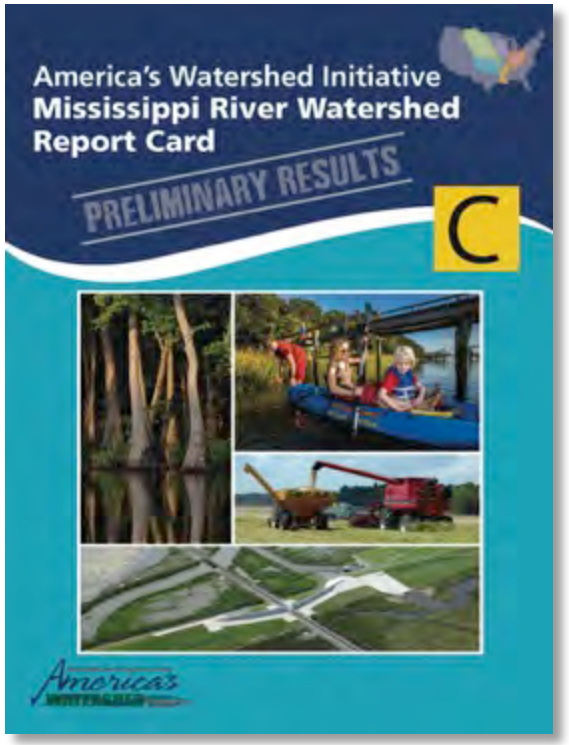
2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013

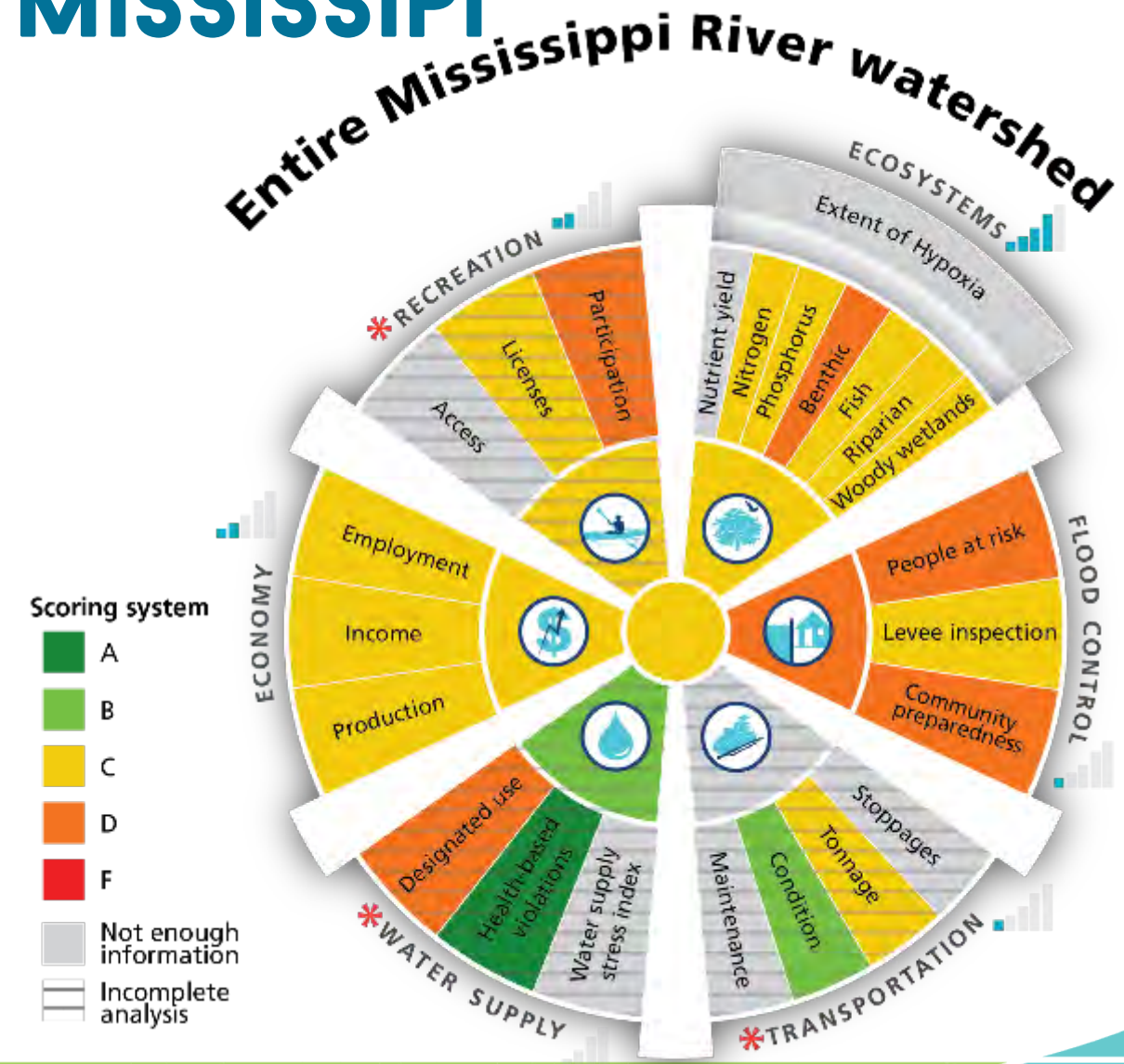
EM SÍNTESE:



1. Identificar valores e ameaças
2. Escolher indicadores
3. Identificar limites
4. Calcular notas e pontuações
5. Comunicar os resultados

BOLETIM DA BACIA DO RIO MISSISSIPI





BOLETIM DA BACIA DO RIO MISSISSIPI

Beautiful, productive, abundant water

The Ohio River Basin is the 200,000 square-mile eastern drainage of the Mississippi River watershed, covering an area from southwestern New York to northern Alabama, including parts of 14 states. The basin is dominated by forests, row crop agriculture, pastureland for livestock, and urban development. Due to its vast resources of coal and water, it is home to 29 million people and produces roughly 20% of the electricity in the United States. At the heart of the basin lies the Ohio River, a 981-mile resource that is one of the major industrialized rivers of the world. With the help of navigation dams, the Ohio hosts the largest inland port in the nation and moves more than 230 million tons of cargo per year. The river provides opportunities for industrial development, power production, commercial navigation, and widespread recreation. The river also serves as the source of drinking water for more than 5 million residents.

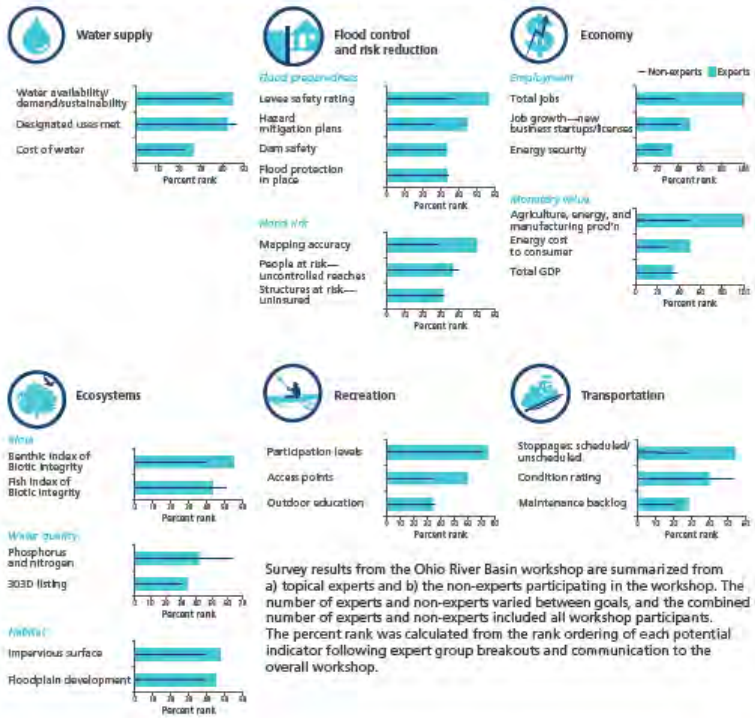
Industrialization and urbanization came at the expense of the river itself, as with most of the great rivers throughout the nation and world. Today, however, due to a conscious effort by state and federal agencies, nonprofit organizations, private businesses, and municipalities, the Ohio River combines economic and development opportunities with recreational and ecosystem goals.

Flow capacity for the Mississippi River in thousands of cubic feet per second, based on the 1956 project design flood. Graphic courtesy US Army Corps of Engineers.

A conceptual diagram illustrates the main threats and key features of the Ohio River Basin.

Potential indicators for the Ohio River Basin

America's Watershed Report Card is designed to report on the status of achieving six broad goals developed at the America's Watershed Summit in September 2012. The goals were developed to reflect the things that people value in the watershed. Potential indicators for each goal were determined at the Ohio River Basin workshop. The final list of indicators will be determined by several factors, including data availability and how well they represent the goals.

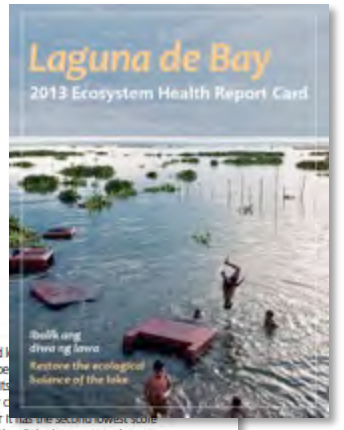


Survey results from the Ohio River Basin workshop are summarized from a) topical experts and b) the non-experts participating in the workshop. The number of experts and non-experts varied between goals, and the combined number of experts and non-experts included all workshop participants. The percent rank was calculated from the rank ordering of each potential indicator following expert group breakouts and communication to the overall workshop.

This list of potential indicators is not intended to be comprehensive, but provide examples from what was generated at the workshop.

AmericasWatershed.org/reportcard

BOLETIM DA LAGUNA DE BAY



2013 Laguna de Bay ecosystem health report card

LAGUNA DE BAY

Laguna de Bay scored a low passing mark, 76%, a C-, in water quality. The Lake consistently is within the Department of Environment and Natural Resources (DENR) guidelines for class C waters in DO, BOD, nitrate, and total coliforms. However, it scored 0% in chlorophyll a and 59% in phosphates. Water quality was affected by high population and industrialization.

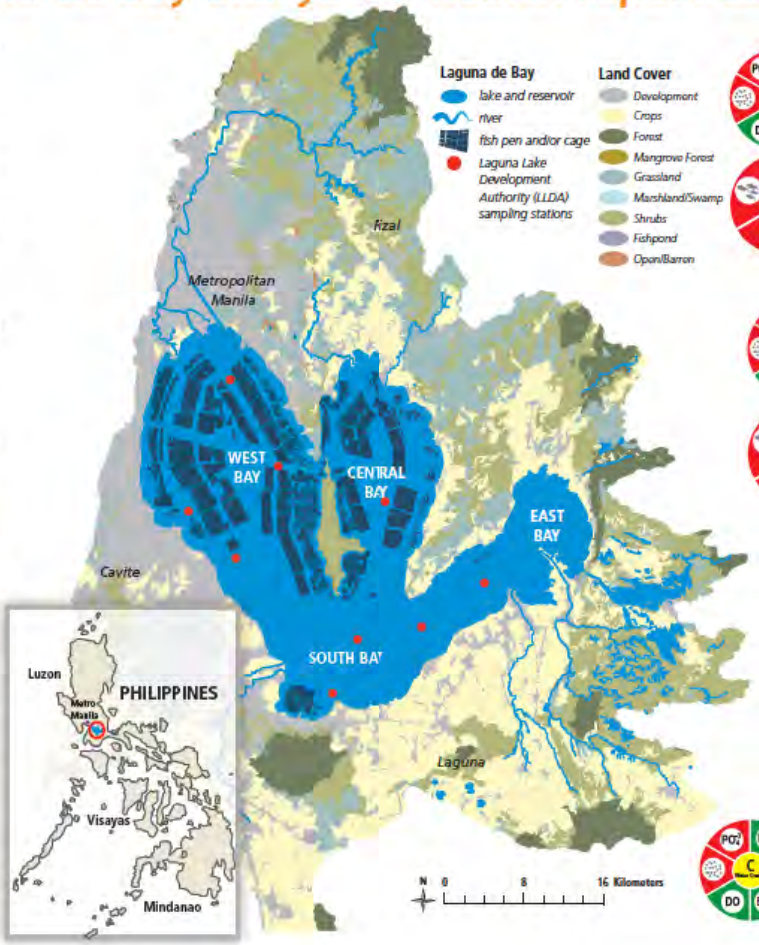
The Lake received an F in Fisheries (48%), with 53%, 68%, and 22% scores in fish native species composition, zooplankton ratio, and catch per unit effort (CPUE), respectively. Invasive fish species and competition among fisherfolk contributed to the low scores.

Even though the DENR guidelines are met in most water quality indicators, the chlorophyll a, phosphates, and zooplankton ratio scores show that the Lake is highly eutrophic. These results have a negative impact on the fisheries of Laguna de Bay. Overall, these scores are not only a cause of concern for fisheries, but the whole community and all the industries supported by the Lake.

How are the scores calculated and what do they mean?

The 2013 Laguna de Bay report card measured indicators for water quality and fisheries for the West, Central, East, and South bays. Six water quality indicators were compared to the Department of Environment and Natural Resources (DENR) guidelines for class C waters (suitable for fisheries and recreation) which were then combined and represented as a percent score for each bay. The three fisheries indicators were calculated as ratios or percentages that are then combined as a percent score for each bay. The grading scale follows the typical scale used in Philippine universities.

- **A** 91–100%: All the indicators meet desired levels. Quality of water in these locations tends to be very good, most often leading to preferred habitat conditions for aquatic life.
- **B** 83–91%: Most indicators meet desired levels. Quality of water in these locations tends to be good, often leading to acceptable habitat conditions for aquatic life.
- **C** 75–83%: There is a mix of good and poor levels of indicators. Quality of water in these locations tends to be fair, leading to sufficient habitat conditions for aquatic life.
- **D** 70–74%: Some or few indicators meet desired levels. Quality of water in these locations tends to be poor, often leading to degraded habitat conditions for aquatic life.
- **F** 0–70%: Very few or no indicators meet desired levels. Quality of water in these locations tends to be very poor, most often leading to unacceptable habitat conditions for aquatic life.



WEST BAY

The West Bay has the second h
It is the most heavily develope
most populated. For 2013, its
within DENR's guideline for c
coliforms at 98%. However it
in phosphates (56%) and like all the bays, received a 0% in chlorophyll a. This scores reflect its high population density and the need to reduce phosphorus runoff into the Lake.

The West Bay has the second highest fisheries score of 55% (F), with a 62% score in zooplankton ratio, CPUE (35%), and the second highest score in native fish species composition at 68%. This region has the highest concentration of commercial fish pens and cages, and an estimated fishing ground allocation of 1 fisher/101 hectares (ha).

CENTRAL BAY

The Central Bay has the lowest water quality score at 71%, however, its 65% score in Fisheries is the highest of all bays. Although it scored 100% in nitrate, DO, BOD, and total coliforms, it had the lowest score in phosphates with 25%, and a 0% in chlorophyll a.

The Central Bay has the highest in percentage of native fish in catch composition and zooplankton ratio, with scores of 69% and 100%, respectively. It has approximately 1 fisher/110 ha of fishing ground allocation.

EAST BAY

The East Bay has the highest water quality score at 81%. It received an A in all water quaity indicators except for chlorophyll a (0%, an F). However, the East Bay scored the lowest in fisheries with 28%, scoring a mere 3% for CPUE.

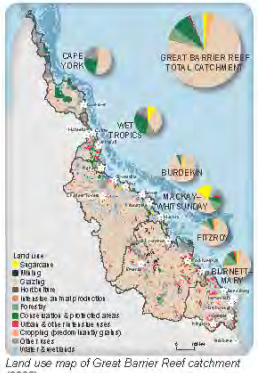
East Bay has a higher number of fishermen operating in a smaller fishing area with a fishing ground allocation of only 1 fisher/28 ha and the highest concentration of the invasive clown knife fish. This species was introduced in the Lake through the East Bay and most likely propagated faster because of the East bay's water quality.

SOUTH BAY

The South Bay has the second highest score in water quality at 77%, with 100% in nitrates, DO, BOD, and total coliforms. Like all the bays, it has a 0% in chlorophyll a and an F in phosphates at 63%. It had the second lowest score in fisheries, 43%, with the lowest score in native fish species composition at 37% even though a designated fish sanctuary is located within the South Bay.

BOLETIM DA GRANDE BARREIRA DE CORAIS

Evolução dos boletins para incluir indicadores de pressão e resposta



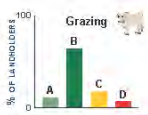
Land use map of Great Barrier Reef catchment (2005)

Great Barrier Reef-wide Paddock to Reef conceptual diagram

The Great Barrier Reef catchments are largely rural and dominated by summer monsoonal rains and occasional cyclones delivering sediments, nutrients, and pesticides to the inshore and sometimes offshore portions of the reef in pulsed flows, which can be affected by water reservoirs and dams. Grazing is the largest single land use, and sugarcane, horticulture, and cropping make up other agricultural land uses. Small urban centres are located on the coastal strip. Habitats include wetlands, reef, seagrass, and mangrove habitats, and continental and coral islands are present.

Average annual rainfall in Great Barrier Reef catchment (1950–2000)

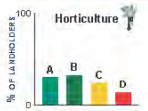
Land practice



Land condition is influenced by a range of factors including climate, land types, and management practices.

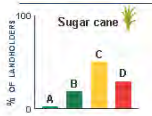
A B C D
good degraded

Seventy-five percent of graziers in the Burdekin and Fitzroy regions had properties in A- or B-class land condition which represented 59% of the grazing land area, while 25% of graziers had properties in C- or D-class land condition which represented 41% of the grazing land area.



The adoption of improved management practices for horticulture and sugar cane is presented using the following framework.
A – Cutting-edge practice
B – Current best practice
C – Common practice
D – Old or unacceptable practices

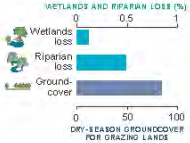
Cutting-edge or best management practices (A or B) have been adopted by 62% of horticultural producers. Practices considered common practice or unacceptable by industry or community standards (C or D) have been used by 38% of horticultural producers.



Cutting-edge or best management practices (A or B) have been adopted by 20% of sugar cane growers. Practices considered common practice (C) have been used by 50% of sugar cane growers, while practices considered unacceptable by industry or community standards (D) have been used by 30% of sugar cane growers.

Land condition is ... Lorem ipsum dolor sit amet, consectetur adipiscing elit. Lorem ipsum dolor sit amet, consectetur adipiscing elit dolor sit amet.

Catchment indicators

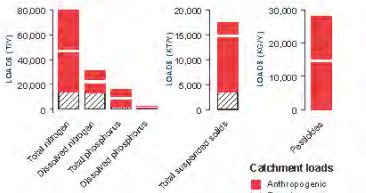


Wetland loss between 2001–2005 was ~0.1% of the total wetland area (720,000ha), although wetland loss prior to that had been extensive.

Riparian vegetation (streamside vegetation within 50m of the stream) is extensive (6 million ha), and the loss between 2004–2008 has been significant (0.5%).

Dry season groundcover for grazing lands was high (84%) in 2009, likely due to high rainfall, well above the 50% target.

Catchment loads



The total pollutant load to the Great Barrier Reef is largely due to anthropogenic (human-induced) activities, although natural nutrient and sediment loads do occur. Annual sediment loads were estimated at 3 million tonnes due to natural processes, but a total of 17 million tonnes were delivered to the reef, largely from grazing lands in the Burdekin (4.7 million tonnes) and Fitzroy (4.1 million tonnes) regions. Fertilised agricultural lands are a key source of nutrient runoff, particularly of various types of nitrogen, with 31,000 tonnes of dissolved nitrogen leaving the Great Barrier Reef catchment each year. All pesticides are of human origin, and the highest annual loads of pesticides entering the Great Barrier Reef (~28,000kg per year)were from the Mackay-Whitsunday and Wet Tropics regions (~10,000kg each per year).

Marine indicators

The effects of river discharge into the Great Barrier Reef are largely concentrated into inshore areas up to 20km from shore. Higher than normal rainfall in the Great Barrier Reef catchment occurred between 2007–2009, particularly in the Burdekin River catchment.

Seagrass: Seagrass abundance in intertidal regions was highly variable and has declined over the last 5–10 years associated with reduced light availability and excess nutrients. Many seagrass meadows have low or variable numbers of reproductive structures, indicating limited resilience to disturbance.

Waters within 20km of the shore are at highest risk for degraded water quality. These waters are only ~8% of the Great Barrier Reef Marine Park, but support significant ecosystems as well as recreation, commercial tourism, and fisheries.

Coral: Most inshore reefs were in good or moderate condition, based on coral cover, macroalgal abundance, settlement of larval corals, and numbers of juvenile corals. Most inshore reefs had either high or increasing coral cover, however the Burdekin region corals were mostly in poor condition.

Water quality: Inshore waters often contain elevated concentrations of chlorophyll a (a measure of nutrient status) and highly elevated concentrations of total suspended sediments.

Pesticides: Monitoring during flood events detected pesticide concentrations above the water quality guidelines over 25km from the coast. Pesticide monitoring shows lorem ipsum dolor sit amet, consect.

BOLETIM DO LAGO CHILIKA

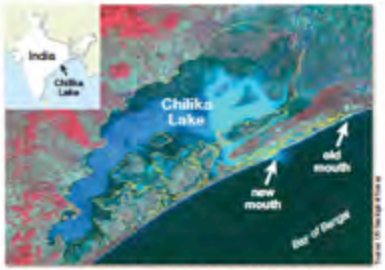
Calculating the ecosystem grade for Chilika Lake

Chilika Lake was divided into four reporting zones, each of which received a report card grade. The grades were calculated from the average of water quality, fisheries, and biodiversity indices, comprised of data collected over the 2011-2012 period. On-going monitoring will allow grades to be updated on a periodic basis, providing a means to track change over time.

What do the grades mean? *

- **A** 80–100%. All water quality and biological health indicators meet desired levels. Quality of water in these locations tends to be very good, most often leading to very good habitat conditions for fish and shellfish.
- **B** 60–80%. Most water quality and biological health indicators meet desired levels. Quality of water in these locations tends to be good, often leading to good habitat conditions for fish and shellfish.
- **C** 40–60%. There is a mix of good and poor levels of water quality and biological health indicators. Quality of water in these locations tends to be fair, leading to fair habitat conditions for fish and shellfish.
- **D** 20–40%. Some or few water quality and biological health indicators meet desired levels. Quality of water in these locations tends to be poor, often leading to poor habitat conditions for fish and shellfish.
- **F** 0–20%. Very few or no water quality and biological health indicators meet desired levels. Quality of water in these locations tends to be very poor, most often leading to very poor habitat conditions for fish and shellfish.

* Grades denoted with a + or - indicate a score that is within 2% of a score's high or low boundary. For example, a B+ is indicative of 78-80%.



Until recently, Chilika Lake suffered from increasing sediment loads and reduced connectivity with the sea. In 2000, a new mouth to the Bay of Bengal was opened. This hydrological intervention helped improve salinity levels, enhance fish landings, decrease in the area of invasive species, as well as improve water quality overall.

Chilika Lake 2012 Report Card

Overall, Chilika Lake scored a B for ecosystem health based on performance of water quality, fisheries, and biodiversity indices.

The Lake as a whole displayed excellent (A) dissolved oxygen concentrations, water clarity, total fishery catch and size, and benthic infauna diversity. The Lake failed, however, for total chlorophyll concentrations (F), based on desired conditions. Of the ten indicators that were assessed within water quality, fisheries, and biodiversity, 79% (B+) in the Central Zone, followed by 76% (B) in the Southern Zone, 71% (B) in the Outer Channel Zone, and 69% (B) in the Northern Zone. A breakdown of these indicators by zone is provided below.

- A 80-60%
- B 60-40%
- C 40-20%
- D 20-0%
- F

Northern Zone B

The Northern Zone displayed excellent results for fisheries, good water quality (with the exception of total chlorophyll), and average biodiversity largely due to an absence of dolphin sightings.

Central Zone B+

The Central Zone displayed excellent results for fisheries, good water quality (with the exception of total chlorophyll), and excellent biodiversity highlighted by bird count and richness, dolphin abundance, and benthic infauna diversity.

Southern Zone B

The Southern Zone displayed excellent results for fisheries, good water quality (with the exception of total chlorophyll), and good biodiversity highlighted by dolphin abundance and benthic infauna diversity.

Outer Channel Zone B

The Outer Channel Zone displayed good results for fisheries and water quality (with the exception of total chlorophyll), and excellent biodiversity highlighted by excellent dolphin abundance and phytoplankton diversity.

There's more to this story: Salinity

The four zones used in this Chilika Lake Report Card are based mostly on salinity variations that occur within the Lake. Salinity in the Lake is driven by freshwater river flow from the north and west, and tidal seawater from the east and south. This results in a variation of salinity in the Lake, from freshwater in the north, brackish waters in the center and south, and full saline waters to the east around the islands and outer channel. The boundaries between these zones shift throughout the year, driven by monsoonal rains and seasonal winds.

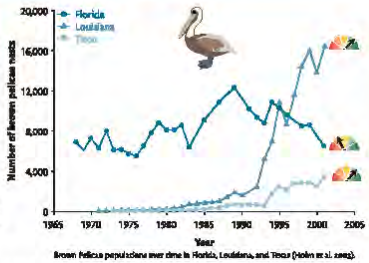
During the 1990s, extensive siltation in the Lake was limiting access to the sea, reducing tidal flushing and decreasing salinity to such an extent that biodiversity declined and invasive aquatic weeds proliferated. This had a highly negative impact on the Lake's habitat for wildlife and fishery resources. In 1992, it was included in the Montreux Record by Ramsar due to change in the ecological character. In 2000, CDA opened a new mouth to restore the lake ecosystem. This new opening increased salinities throughout the Lake, vastly improving water quality, recovering lost habitat for important species, enhancing fish resources, and controlling invasive species. Lake salinity and connectivity to the sea are now closely monitored to ensure that conditions do not return to those experienced prior to 2000. The lake was removed from the Montreux Record due to restoration of the lake ecosystem in 2002.

BOLETIM DO GOLFO DO MÉXICO

- Modelo DPSIR
- Esforço multinacional

Report card prototype

Example component: *Birds*



Brown Pelican population size over time in Florida, Louisiana, and Texas (Nolan et al. 2003).

Gulf of Mexico birds

The Gulf of Mexico is a major flyway for migratory birds that provides essential stopover habitat along three migratory pathways. The Gulf has large, undisturbed, and diverse areas of coastal habitats that provide breeding and wintering habitat for shore birds, marsh birds, forest birds, and waterfowl. These habitats support internationally significant populations of birds including Brown Pelican, American Flamingo, Redhead, Whooping Crane, Sooty Tern, and Snowy Plover. Representative bird species associated with different habitats can be effective indicators of Gulf ecosystem health.

Brown Pelican trends

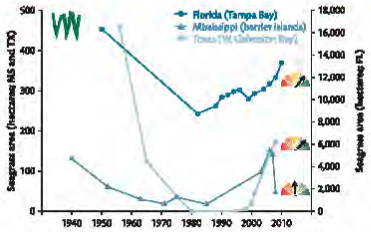
The Brown Pelican is an iconic symbol of the Gulf of Mexico and important indicator of the effects of human activities on Gulf ecosystem health. An estimated 25,000 Brown Pelicans nested along the Gulf Coast in the early 20th Century but populations began declining in the 1900s because of human disturbances. By the end of the 1960s, direct and indirect effects of DDT and dieldrin had resulted in catastrophic population declines, with Florida having the only remaining significant breeding population in the Gulf of Mexico. With the listing as an endangered species (1970); the ban on DDT (1972), and effective management, the number of breeding pairs in the northern Gulf increased to 20,000–25,000 by the end of the 1990s. Brown Pelicans were removed from the endangered species list in Alabama and Florida in 1985, and in Mississippi and Texas in 2009. However, Brown Pelicans continue to be adversely impacted by human activities which have resulted in the decline of the Florida population in since 1989 to levels approaching those seen in the 1960s, although the specific causes are presently unknown. The fully developed Report Card will provide indicators of both the ecological health of the Brown Pelican and the human activities and stressors affecting them. This Brown Pelican example illustrates the importance of the Gulf of Mexico Report Card in characterizing the causal links between human activities and ecological health and thereby informing decisions to achieve sustainability.

Birds as indicators

Population patterns of bird species can be effective indicators of environmental health because they utilize a wide range of habitats within the Gulf of Mexico. With input from the avian science community, we envision developing indicators for key species representing colonial water birds, waterfowl, marsh, beach, shore, wading, and pelagic sea birds. These key species will serve as indicators for health of their particular habitats by reflecting the pressures and stressors acting upon them, such as coastal development and habitat alteration, human disturbance of nests and colonies, food availability, hunting, and contaminants. Metrics describing the health of bird populations will expand upon those described here for the Brown Pelican, and new indicators will be developed. Finally, a key element of the Gulf of Mexico Report Card framework is to develop new, integrative metrics that characterize the pressures and stressors impinging on birds and their habitats.

Contaminants, in particular DDT, reduced Brown Pelican populations prior to the chemical being banned in the USA in 1972. Brown Pelican populations rebounded but habitat alterations continue to be a threat to the population.

Example component: *Seagrass ecosystems*



Seagrass area over time in Mississippi, Texas, and Florida (Handley et al. 2007, Carter et al. 2011, W. Pulich pers comm.).

Gulf of Mexico seagrass ecosystems

Seagrass ecosystems are a dominant habitat in shallow waters throughout the Gulf of Mexico and are essential to its health and integrity. Expansive seagrass meadows provide an important refuge and foraging habitat for many species, supporting recreational and commercial fisheries. Unfortunately, seagrass ecosystems are often threatened by increased nutrient inputs and other stressors, e.g., dredging, coastal development. Thus the health of seagrass ecosystems provides an important indicator of the health of the Gulf of Mexico at both local and Gulf-wide scales.

Seagrass trends

Progressive deterioration of seagrass beds has occurred around the Gulf but notable recoveries exist in some areas (illustrated above). For example, seagrass coverage on the Mississippi barrier islands significantly declined during the 1940s–1970s, but substantially recovered by mid-2000s. This reversal in trends began in 1971 when the Gulf Islands National Seashore was established and development ceased, and protected since 1995 from the destructive impacts of shrimp trawling.

Urban development and agriculture runoff lead to turbidity and nutrient inputs into shallow coastal waters. Various seagrass species are adversely affected by reduced light, reducing seagrass area.

West Galveston Bay, Texas, also experienced seagrass decline and recovery. Declines began in the mid-1950s, particularly along the Galveston Island–Bay margin where most seagrasses occurred, with complete seagrass loss by 1979. This was attributed primarily to water quality degradation, dredging, and shoreline development. After absence for two decades, seagrasses were re-introduced through transplanting. Because dredging and development were moderated and water quality significantly improved, transplanted seagrasses became established and subsequently spread around the Bay.

Similarly, Tampa Bay, Florida, seagrasses experienced a widespread loss in a rapidly urbanized watershed post World War II. The critical stressor was excessive nitrogen inputs from sewage discharges into Tampa Bay but, beginning in the 1970s, major improvements to sewage treatment plants reduced nitrogen inputs by 90%, leading to clearer water and ongoing recovery of seagrasses. At present, nitrogen inputs come from stormwater runoff and air pollution from power plants and automobiles. The Tampa Bay National Estuary Program was established in 1991 to further improve seagrass ecosystem health, focusing not only on nitrogen inputs but also reducing toxic pollutants, restoring and protecting seagrass habitats, and reducing dredging and other physical stressors.

Seagrass ecosystems as indicators

Many features of seagrass ecosystems can serve as indicators in addition to areal coverage. Seagrass species composition can be an indicator, e.g., comparing a single-species meadow like turtle grass to a mixture that includes other Gulf of Mexico species. Animals using seagrasses as a habitat (e.g., shellfish, redfish) or food source (e.g., manatees, waterfowl) can be indicators. Because seagrasses are closely linked to water quality, particularly the underwater light regime, water quality metrics like chlorophyll and turbidity can be appropriate indicators. Seagrass ecosystems provide important services that also could be indicators, including primary and secondary production, carbon and nutrient sequestration, erosion protection, and recreational fishing.

Baía de Chesapeake (Acordo Chesapeake em 2000)

- Valores para proteger
  - *Pescados (peixes, ostras e caranguejos)*
  - *Recreação*
  - *Turismo*
- Ameaças
  - *Esgoto*
  - *Escoamento urbano e agrícola*
  - *Pesca predatória*
  - *Perda de habitats*

Indicadores nos boletins em outros lugares

Boletim	Indicadores
Baía de Chesapeake	**Pré 2012** = B-IBI, P-IBI, vegetação aquática, OD, clorofila, claridade da água, **Atuais** = B-IBI, vegetação aquática, OD, clorofila, claridade da água, NT, FT, Caranguejos Azuis, Anchovas
Lago Chilika	**Qualidade da água** = Clorofila, OD, claridade da água, **Biodiversidade =** Riqueza e abundância de aves, abundância golfinhos, bentos, diversidade da infauna, **Pescados** =total fish catch, fish diversity and fish size
Baía Moreton	**Baía** = **Rios** =
Laguna de Bay	????

Limites na Baía de Chesapeake (podem ser por temporadas e variarem geograficamente)


Clorofila-a: ≤ 2,8 a ≤ 20,9 µg L^{-1}


Oxigênio dissolvido: ≥ 1,0 a ≥ 5,0 mg L^{-1}


Transparência: ≥ 0,65 a ≥ 2,0 profundidade Secchi


Vegetação de fundo: hectares


Comunidade bentônica: ≥ 3 B-IBI


Fitoplâncton: ≥ 3 P-IBI