FIRST WORKSHOP SUMMARY

Bill Dennison

April 29th, 2016

INITIAL WORKSHOP NEWSLETTER

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.

- Globally iconic location
- Pressing environmental problems
- Need for scientifically rigorous, transparent assessments to track restoration progress

GUANABARA BAY REPORTING REGIONS

IGURE 3 | Map of Guanabara Bay showing different parameters that indicate water quality throughout the sampling points (A-D) cited in the text.

Environmental and Sanitary Conditions of Guanabara Bay, Rio de Janeiro

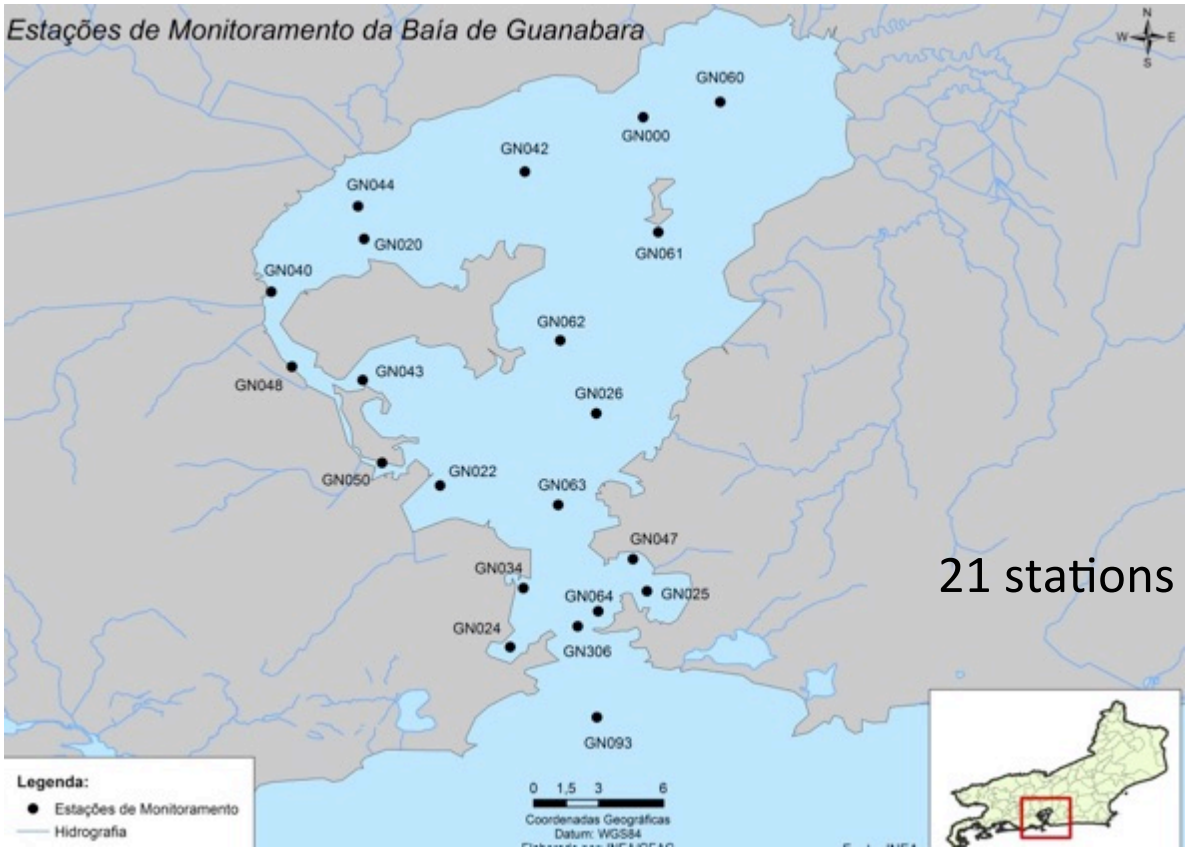
Giovana O. Fistarol[1,2], Felipe H. Coutinho[1,3], Ana Paula B. Moreira[1], Tainá Venas[1], Alba Cánovas[1], Sérgio E. M. de Paula Jr.[1], Ricardo Coutinho[1], Rodrigo L. de Moura[1], Jean Louis Valentin[1], Denise R. Tenenbaum[1], Rodolfo Paranhos[1], Rogério de A. B. do Valle[2], Ana Carolina P. Vicente[2], Gilberto M. Amado Filho[2], Renato Crespo Pereira[2], Ricardo Kruger[4], Carlos E. Rezende[3], Cristiane C. Thompson[1], Paulo S. Salomon[1,2] and Fabiano L. Thompson[1,2]

Mayr, L. M. (1998). *Avaliação Ambiental da Baía de Guanabara Com O Suporte do Geoprocessamento*. Ph.D. thesis, Institute of Geosciences, Jena, 218.

Mayr, L. M., Tenenbaum, D. R., Villac, M. C., Paranhos, R., Nogueira, C. R., Bonecker, S. L. C., et al. (1989). "Hydrological characterization of Guanabara Bay," in *Coastlines of Brazil*, eds O. Maggon and C. Neves (New York, NY: American Society of Civil Engineers), 124–138.

GUANABARA BAY WATER QUALITY INDICATORS

- DO — Dissolved oxygen
- P — Phosphorus
- NO_3 — Nitrate
- NH_4^+ — Ammonium
- Coliforms



21 stations

OTHER POTENTIAL INDICATORS

Chlorophyll

Phytoplankton

Marine mammals

Fish assemblage

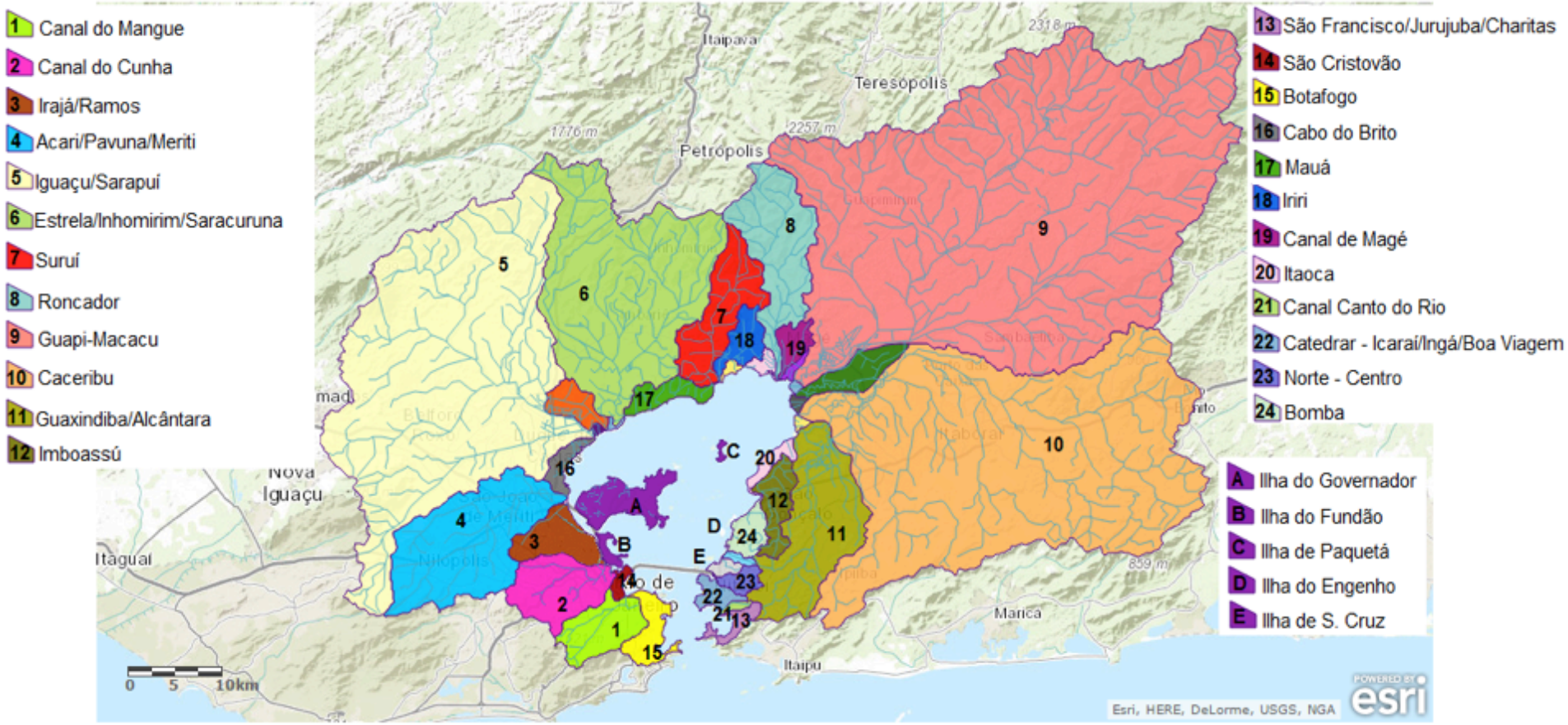
Mangroves

Water transparency

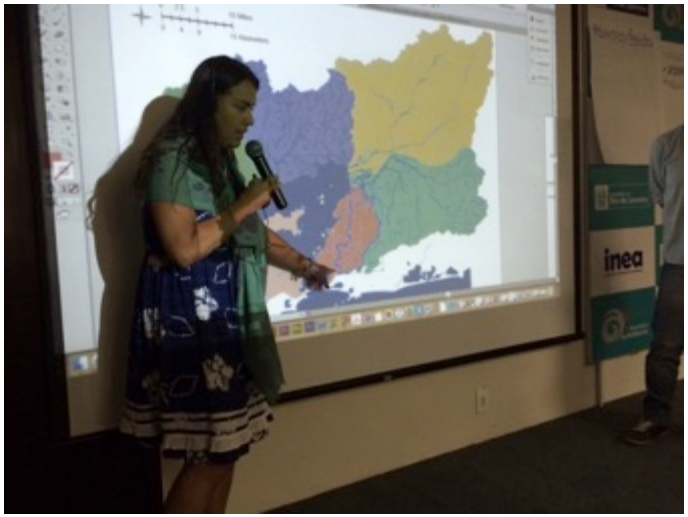
Contamination of crabs

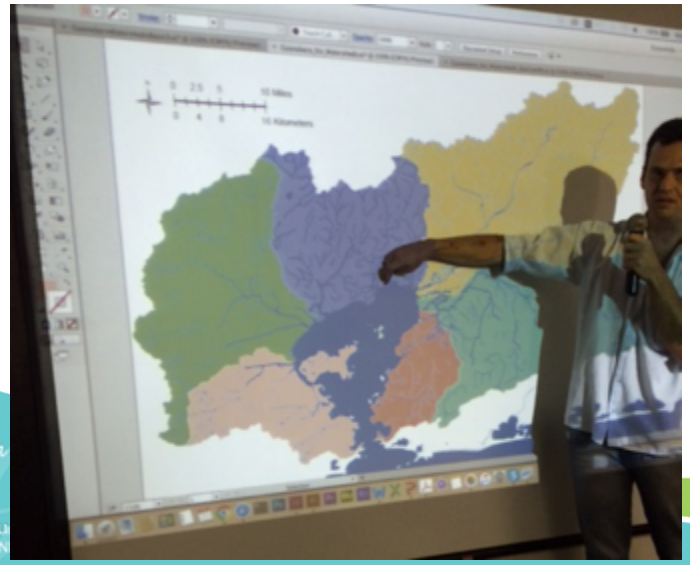
Sea horses

GUANABARA BAY RIVER BASINS

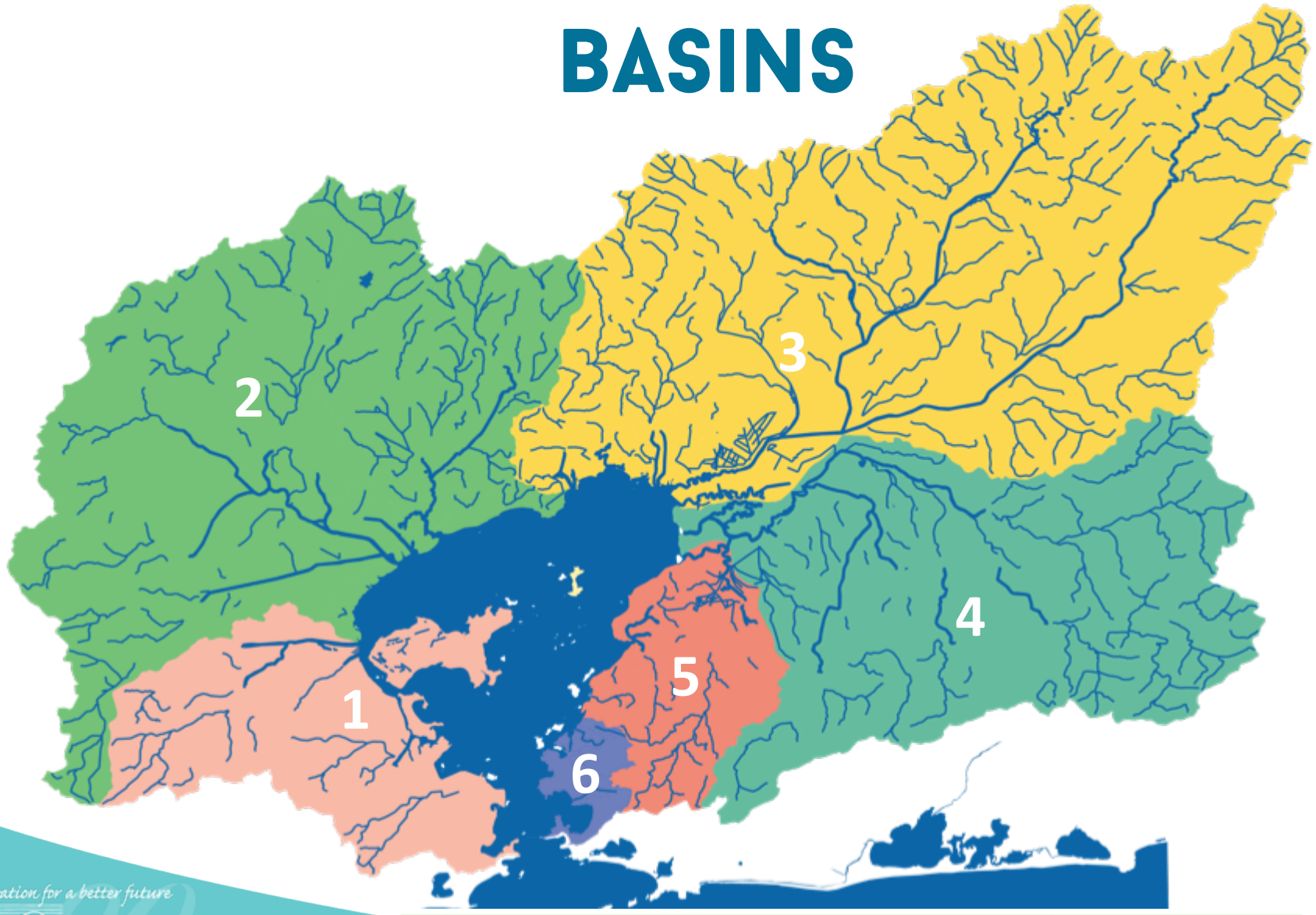


BASIN BOUNDARY DISCUSSION



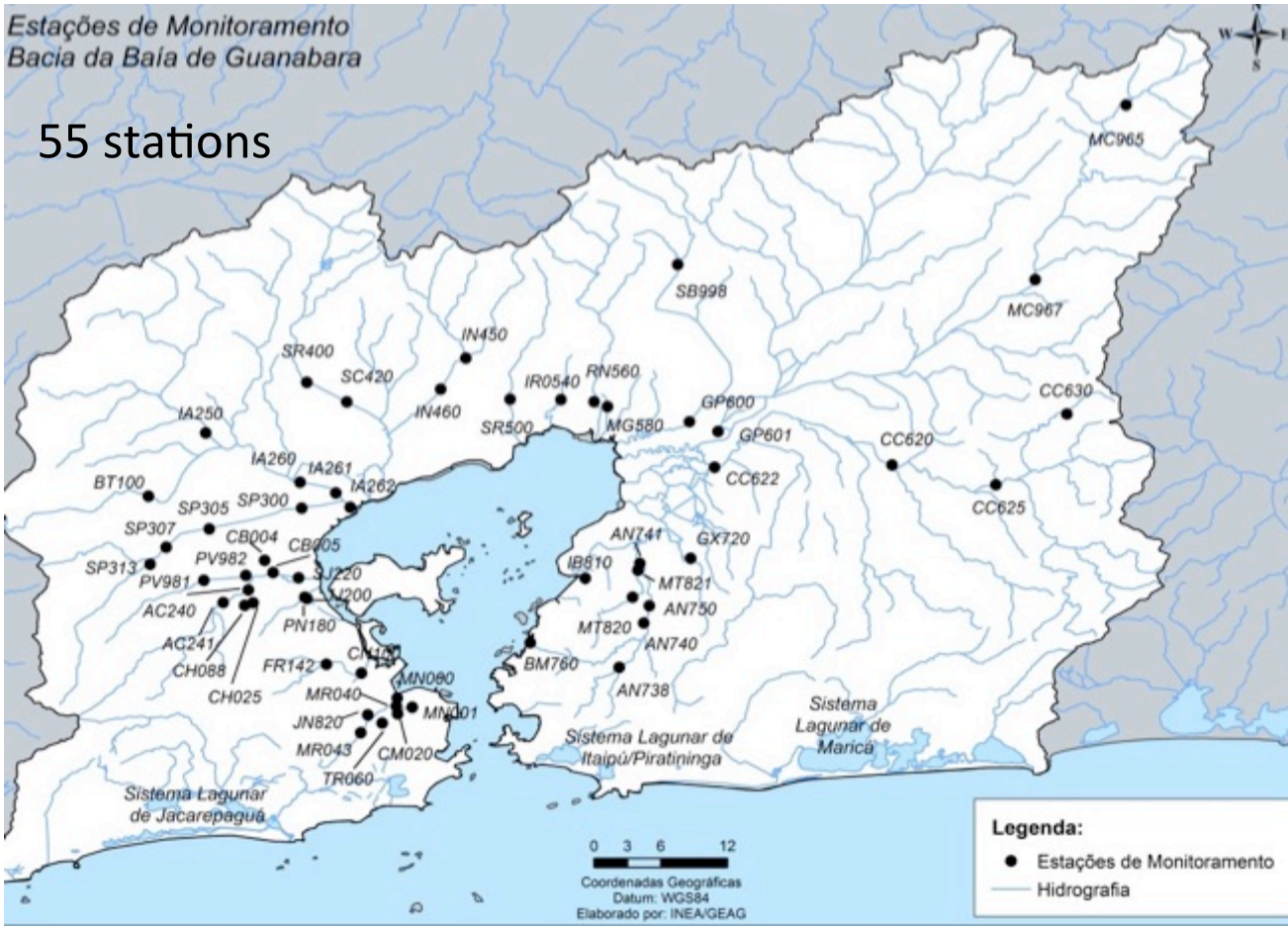


GUANABARA BAY RIVER BASINS



RIVER BASIN WATER QUALITY INDICATORS

- DO — Dissolved oxygen
- BOD — Biological oxygen demand
- P — Total phosphorus
- NO_3 — Nitrate
- pH — pH
- Turbidity
- TDS — Total dissolved solids
- Air/water temperature
- Coliforms



inea instituto estadual do ambiente

ian

WATER QUALITY INDEX (NSF)

Parameter	Weight
DO	0.17
BOD	0.11
Thermotolerant coliforms	0.16
pH	0.11
Temperature	0.10
Total phosphorus	0.10
Nitrates	0.10
Turbidity	0.08
TDS	0.07

National Science Foundation Water Quality Index (WQI_{NSF})	
WQI value	**Rating of Water Quality**
91-100	Excellent
71-90	Good
51-70	Average
26-50	Bad
0-25	Very Bad

WATER QUALITY INDEX: AQA FAL

RBRH *Revista Brasileira de Recursos Hídricos*
Versão On-line ISSN 2318-0331
RBRH vol. 20 nº.4 Porto Alegre out./dez. 2015 p. 905 - 913

Comparing the responses of two water quality indices using simulated and real data

Comparação das respostas de dois índices de qualidade de água usando dados simulados e reais

Marco Antonio Ribeiro Pessoa[1], José Paulo Soares de Azevedo[2] e Patrícia Domingos[3]

[1, 2] Civil Engineering Program, PEC/COPPE/UFRJ- Federal University of Rio de Janeiro, Rio de Janeiro, RJ, Brazil

pessoamarco54@gmail.com; zepaulo@coc.ufrj.br

[3]Department of Plant Biology, UERJ - Rio de Janeiro State University, Rio de Janeiro, RJ, Brazil

patvitesse@gmail.com

Recebido: 06/05/15 - Revisado: 19/06/15 - Aceito: 27/08/15

SEVEN VARIABLES USING FUZZY LOGIC MODEL

Table 2 - Water quality variables used for IQA_{FAL}

Type	Name
Biologic	Shannon-Weaver Diversity Index (SHANNON, 1948)
	Density of Cyanobacteria
Nutrients	Total Phosphorus
	Ammoniacal Nitrogen
Oxygen	Dissolved Oxygen
	Biochemical Oxygen Demand
Bacteriological	Fecal Coliform (Thermo-tolerant)

CALCULATION METHODOLOGY

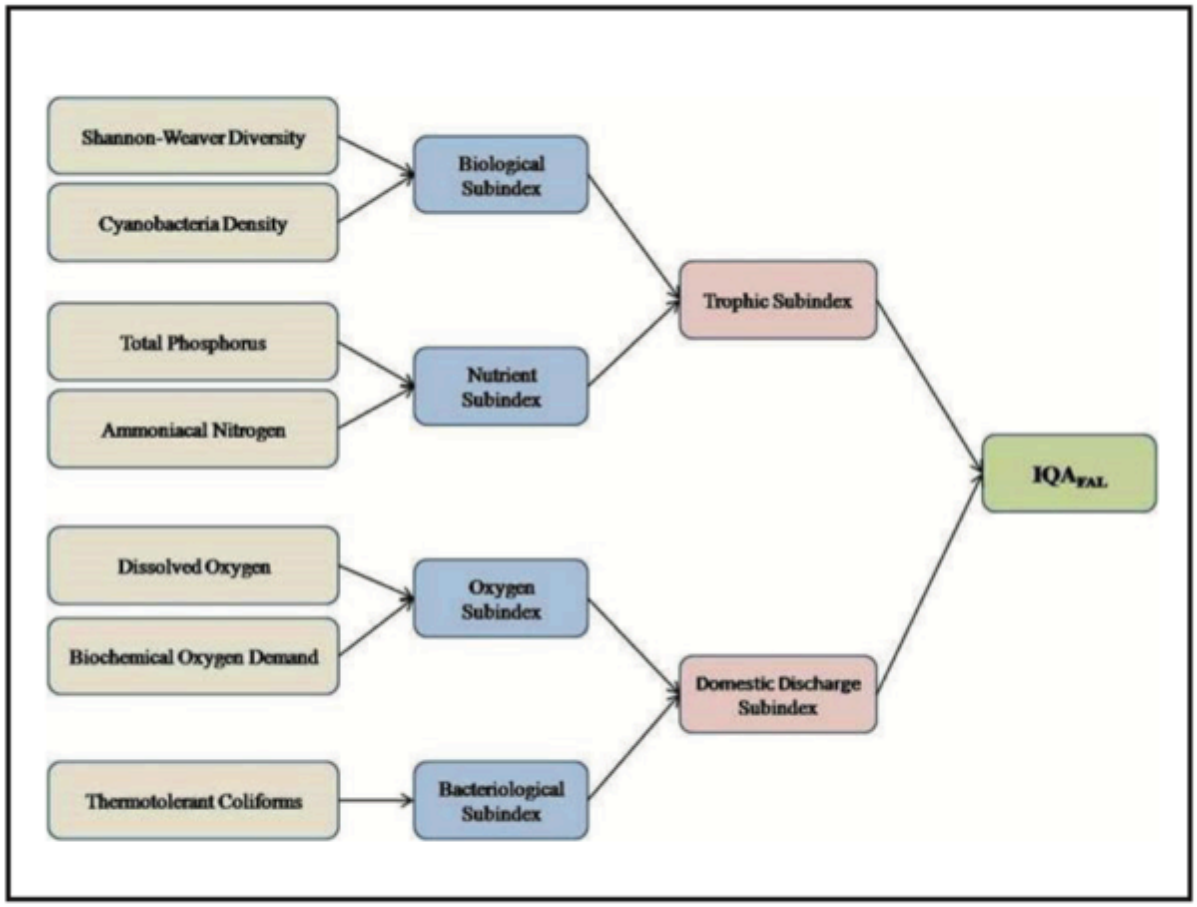
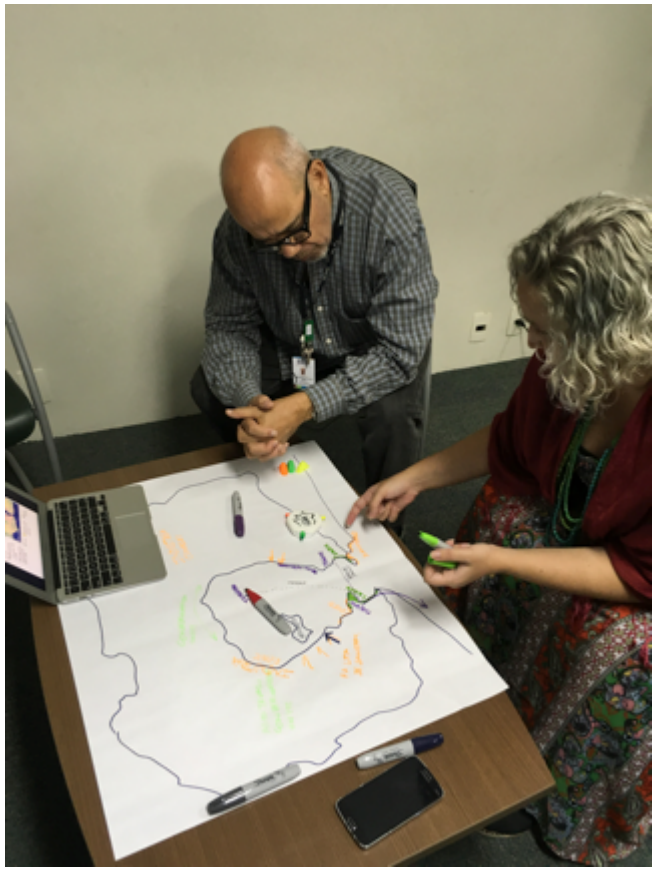
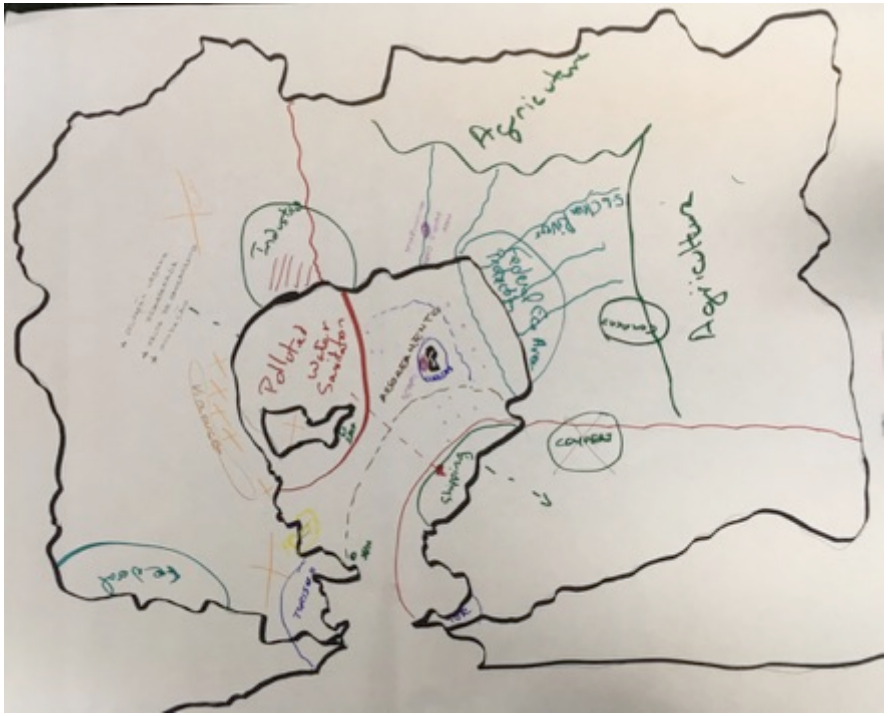


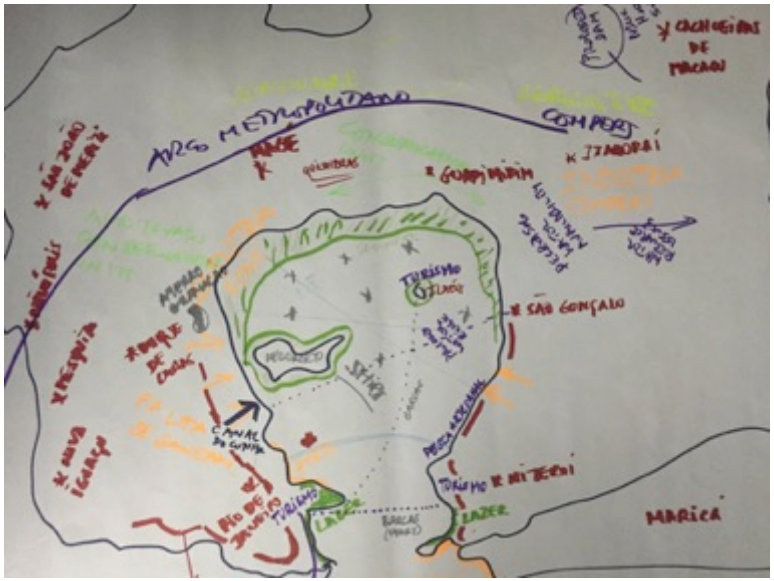
Figure 3. The IQAFAL - System Flow showing the input variables and the sub-index

CONCEPTUAL MAPPING EXERCISE



CONCEPTUAL MAPS





GUANABARA BAY VALUES & THREATS

PARTNERSHIP APPROACH

This workshop was led by KCI, University of Maryland Center for Environmental Science, and PSAM supported by the Inter-American Development Bank. Participants included 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, and Victor Zveibil.

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

KCI · ABES · CBH-BG · ICMBio MMA · PSAM · inea instituto estadual do ambiente · Innovation for a better future — University of Maryland Center for Environmental Science

BID · Secretaria do Ambiente · INSTITUTO terrazul · COPPE UFRJ · UERJ Universidade do Estado do Rio de Janeiro · GOVERNO DO Rio de Janeiro · Masterplan · ian.umces.edu