



# WASTE MANAGEMENT IN THE CRUISE PORT – A WEB-BASED SYSTEM IN BRAZILIAN PORTS

Prof. Marcos Freitas

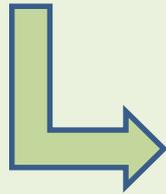
Clarice Neffa Gobbi  
Thiago Duarte Mota  
Carlos Roberto Bastos Araújo Filho  
Pedro Henrique Casimiro  
Vânia Maria Sanches  
Graciela Diniz dos Santos  
Aurélio Lamare Murta  
Mário Nascimento Moraes  
Marcos Aurélio Vasconcelos de Freitas

# INTRODUCTION

- Brazil is one of the countries in the world that features a set of propitious natural conditions for the development of marine tourism:
  - Vast coastline along the Atlantic Ocean (with over seven thousand kilometers);
  - Tropical climate;
  - Diversity of natural resources.
- Favorable area for new investments.

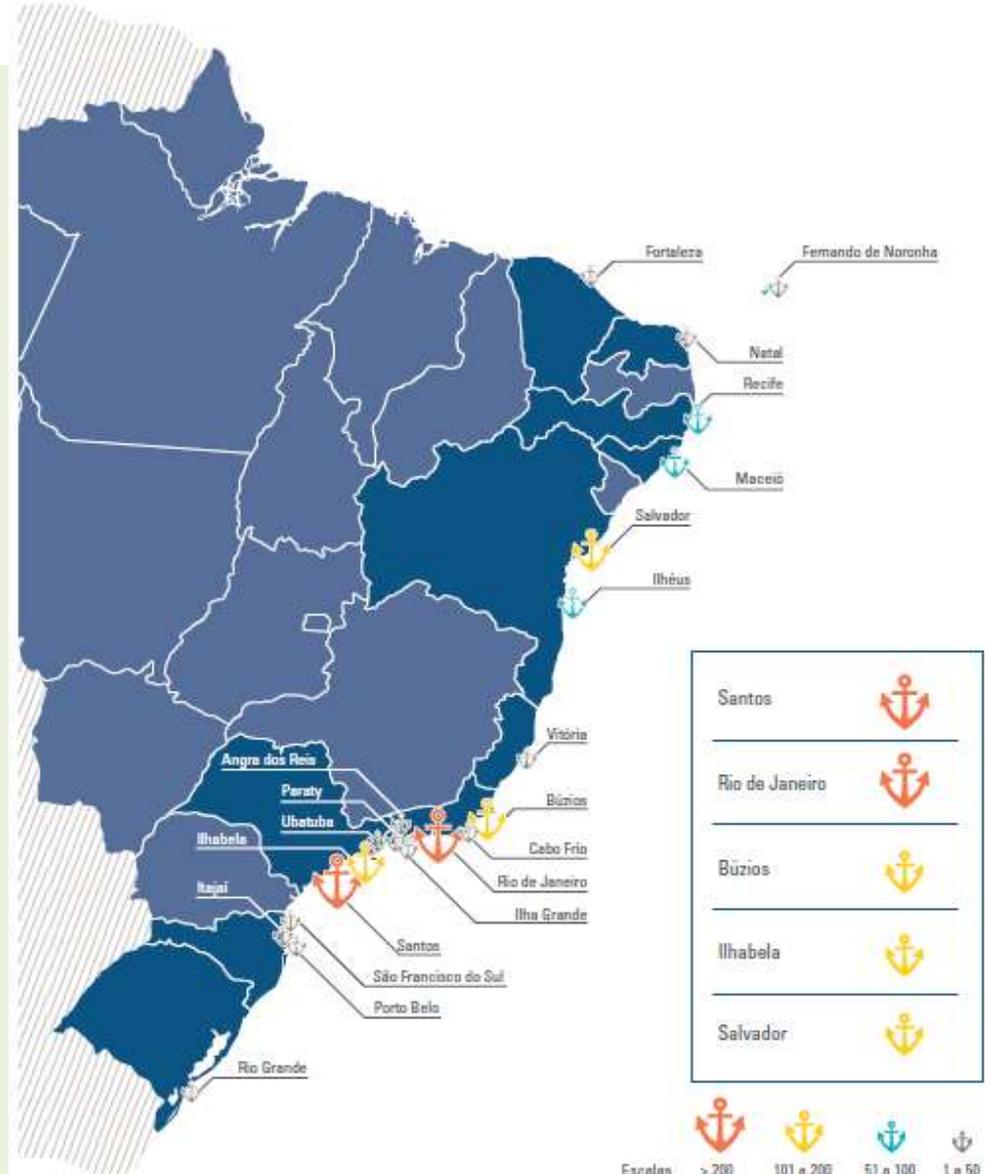
# INTRODUCTION

## Main Brazilian Cruise Ports



Brazil:

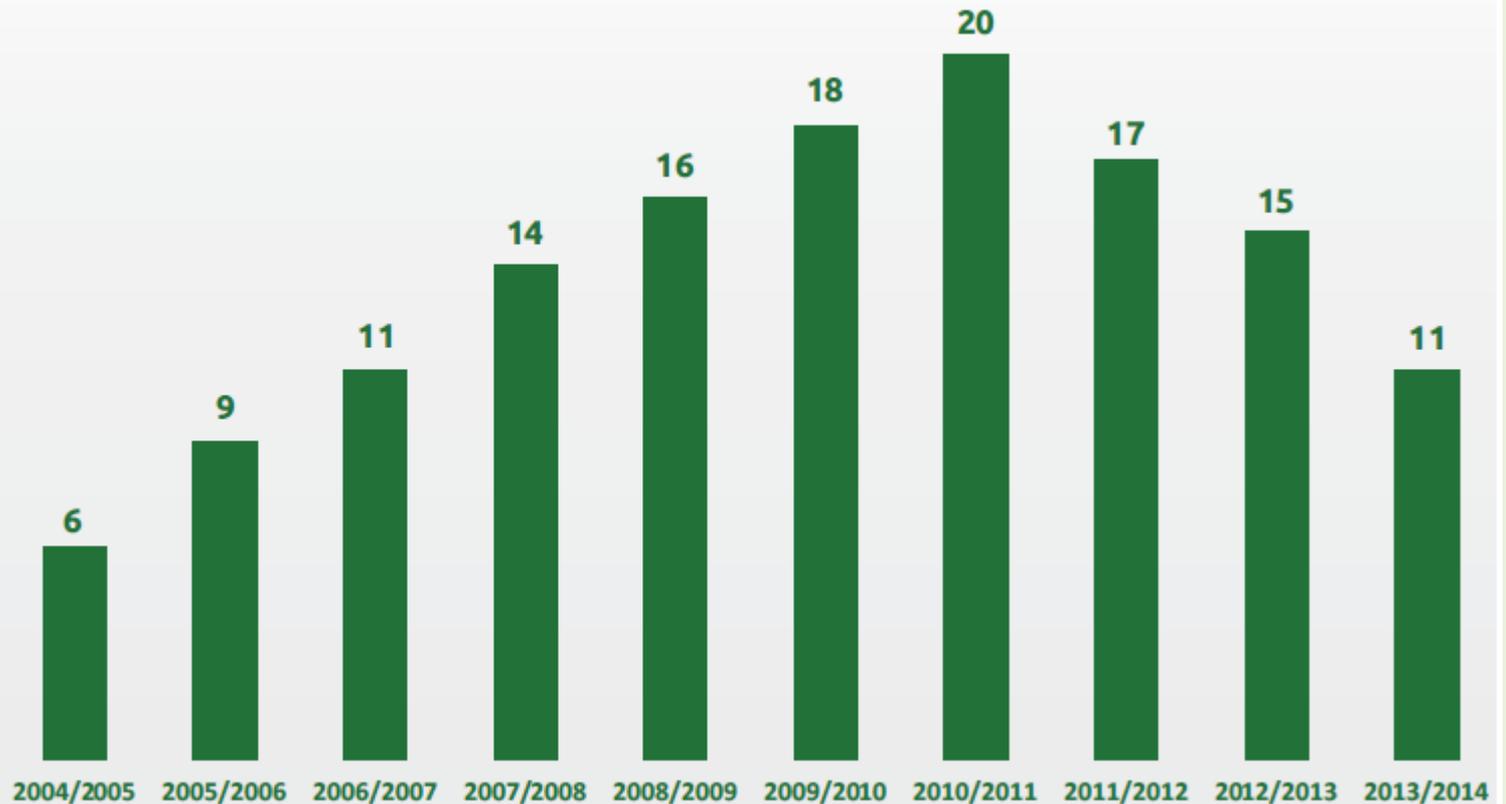
National coastal cruises  
and  
International cruises



(Relatório Cruzeiros Marítimos: ABREMAR/FGV, 2011)

# INTRODUCTION

Number of cruises along the Brazilian coast by season



(Relatório Cruzeiros Marítimos: CLIA ABREMAR BRASIL/FGV, 2014)

# INTRODUCTION

- It is evident that the obstacle to the growth of this activity in Brazil is not the absence of demand, but rather the inadequate port infrastructure:
  - The lack of physical space;
  - The need for construction of new terminals and develop new destinations and new ports to receive the vessels;
  - The issue of sustainability → since it is not only the terminal that should be adequate to receive the ship, but the whole harbor area.

# INTRODUCTION

- An important factor in the sustainability issue is the proper management of port waste.
- In Brazil, the Law N° 12.305/2010 established the National Policy on Solid Waste (*Política Nacional de Resíduos Sólidos - PNRS*):
  - Brings a set of principles, objectives, instruments and guidelines for an integrated solid waste management in the country
  - Must be incorporated by all generators of solid waste, legal entity, public or private.

# INTRODUCTION

- **Research** is needed to **adequate** the management of waste in ports with the legislation, since several **waste management** failures still occur in most **Brazilian ports**.
- The **Compliance Program of Solid Waste and Liquid Effluent Management in Brazilian SeaPorts**:
  - Initiative of the Secretariat of Ports of the Presidency (SEP/PR)
  - Implemented by the International Virtual Global Change Institute (IVIG/COPPE/UFRJ)
  - Started in 2010

# COMPLIANCE PROGRAM OF SOLID WASTE AND LIQUID EFFLUENT MANAGEMENT IN BRAZILIAN SEAPORTS

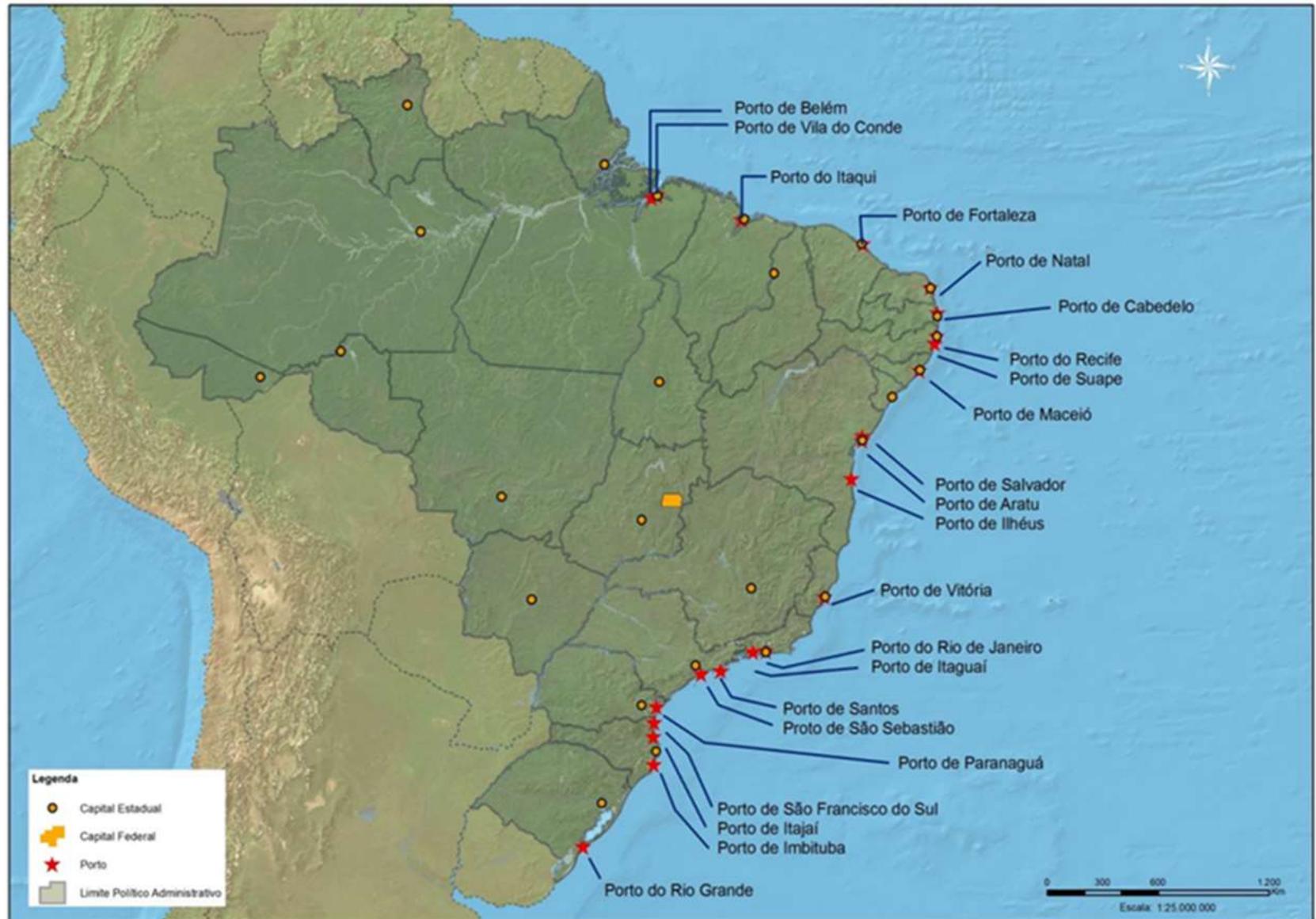
# Objectives of the Program

- ✓ Compliance with the Law nº 12.305/2010 – PNRS
  - no generation, reduction, reuse and processing, proper disposal/destination
- ✓ Development of environmental, economic and technological studies;
- ✓ Organization of a research network;
- ✓ Elaboration of a diagnosis/inventory of solid waste, liquid effluents and harmful synanthropic fauna;
- ✓ Systemization of the informations;
- ✓ Implantation of the management model.

# Scope of the Program

- Solid Waste
- Liquid Effluents
  - Sanitary effluent
  - Industrial\oily effluent
  - Rainwater drainage
- Harmful Synanthropic Fauna
  - Rats
  - Cockroaches
  - Pigeons
  - Mosquitoes

# Scope of the Program: 22 ports



- 
- Among the obstacles found by the Program, the most relevant were the practices related to the control and generation of the information regarding waste management issues.
  - Little information was available for access and fewer can be found in databases. In many cases the information is not recorded in any database, or even studied, in order to manage and publish an evaluation of a port.
  - This scenario is seriously harmful to the management of waste, since the control and the generation of information is fundamental to know the profile of waste in a port and thus, to be possible to elaborate solutions and decision-making relating to an efficient waste management.

# OBJECTIVE OF THIS WORK

- Provide a tool and a database to allow the management and control of solid waste and effluent generated in port areas, as well as harmful synanthropic fauna.
- The system aims to enable an automatically control that can be held with any device instead the use of paper filed records.
- The data regarding waste management of the Brazilian port areas could be recorded in a standardized manner into a single shared database.

# METHODOLOGY

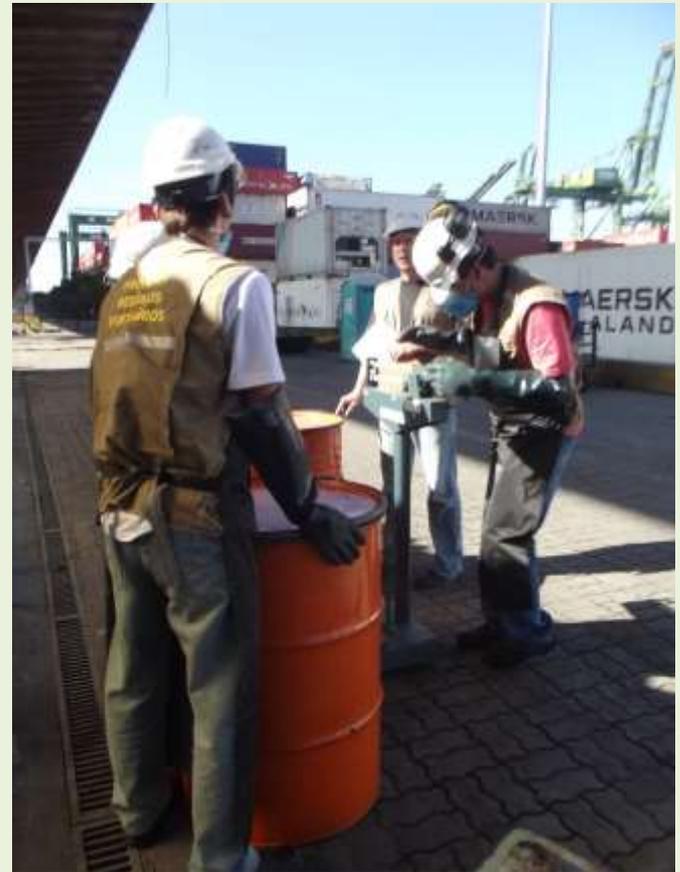
- Registration protocol was set for data collection at Brazilian ports.
- Protocols and data were collected by the professionals of the project. All information was digitally recorded in the documentation and gave rise to the tables and relationships of the system for application in data collection.
- The protocols were separated by large areas: "Solid Waste", "Fauna" and "Effluent".

# METHODOLOGY

- System was generated by programming language C # dot net (Asp net), with Ajax and made available in Hyper Text Markup Language (HTML) format.
- All access can be done by any device that has access to the internet with a web browser.



# Field Activities



# Field Activities



# Field Activities



**AGUA**



**ACCESO**

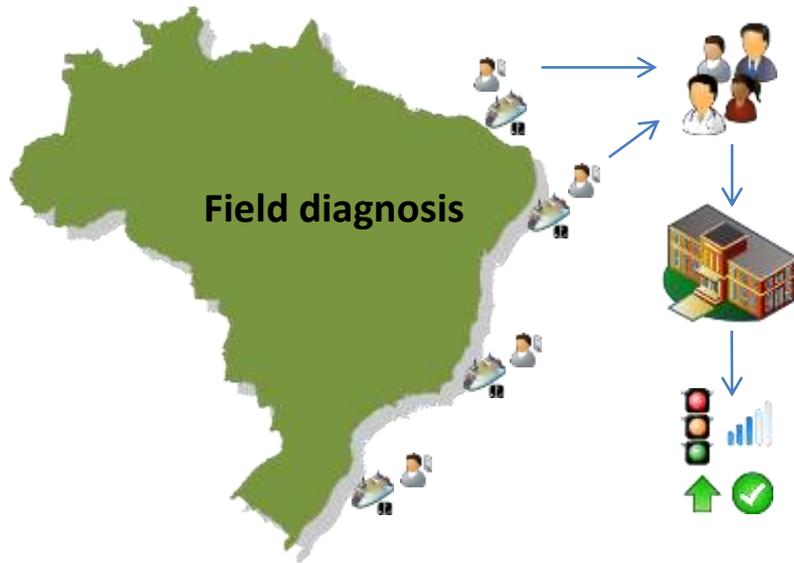


**ALIMENTOS**



**ABRIGO**

# Data Collection



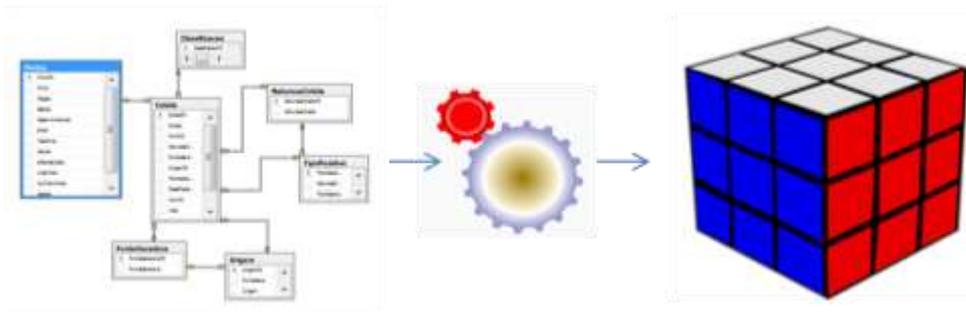
**Database**



**Relational  
database**

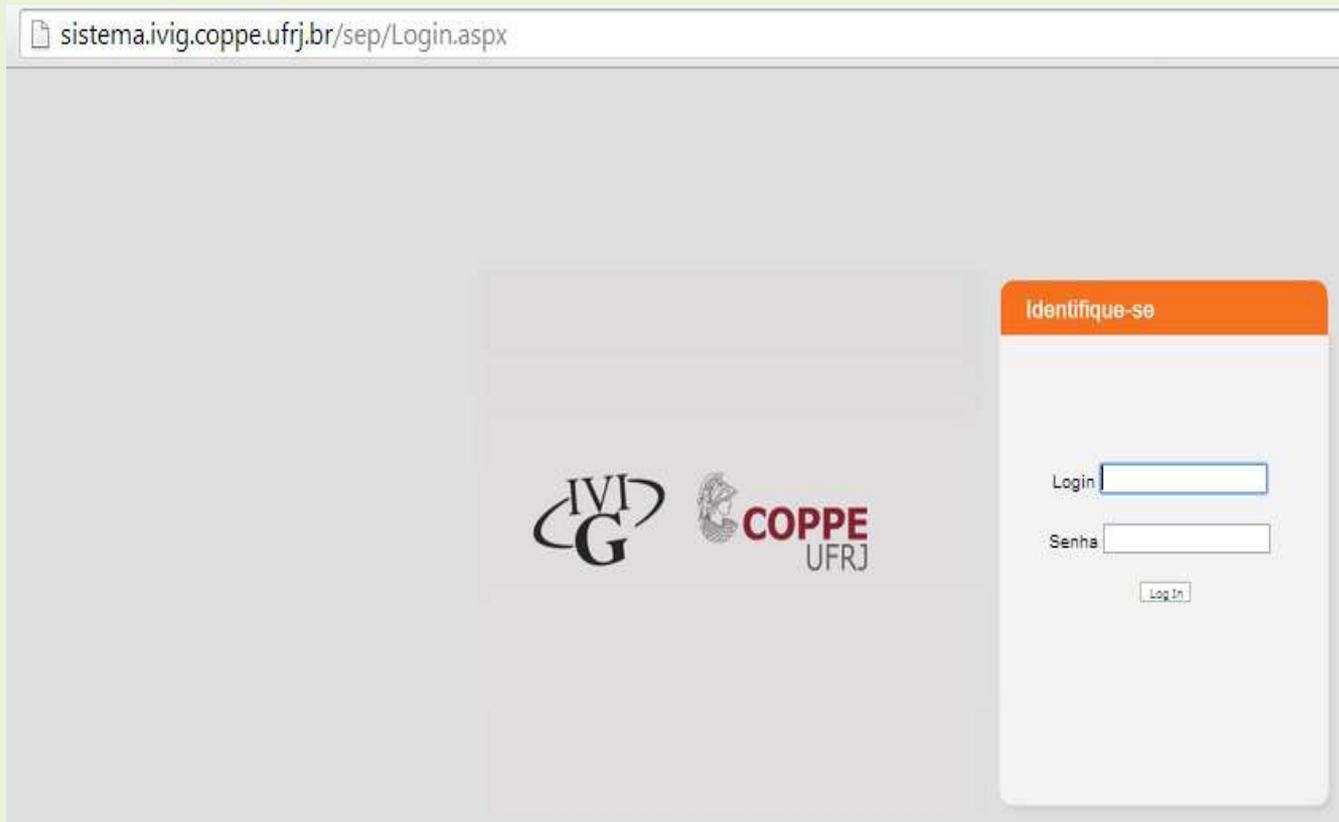
**ETL**

**Multidimensional  
database**



# RESULTS

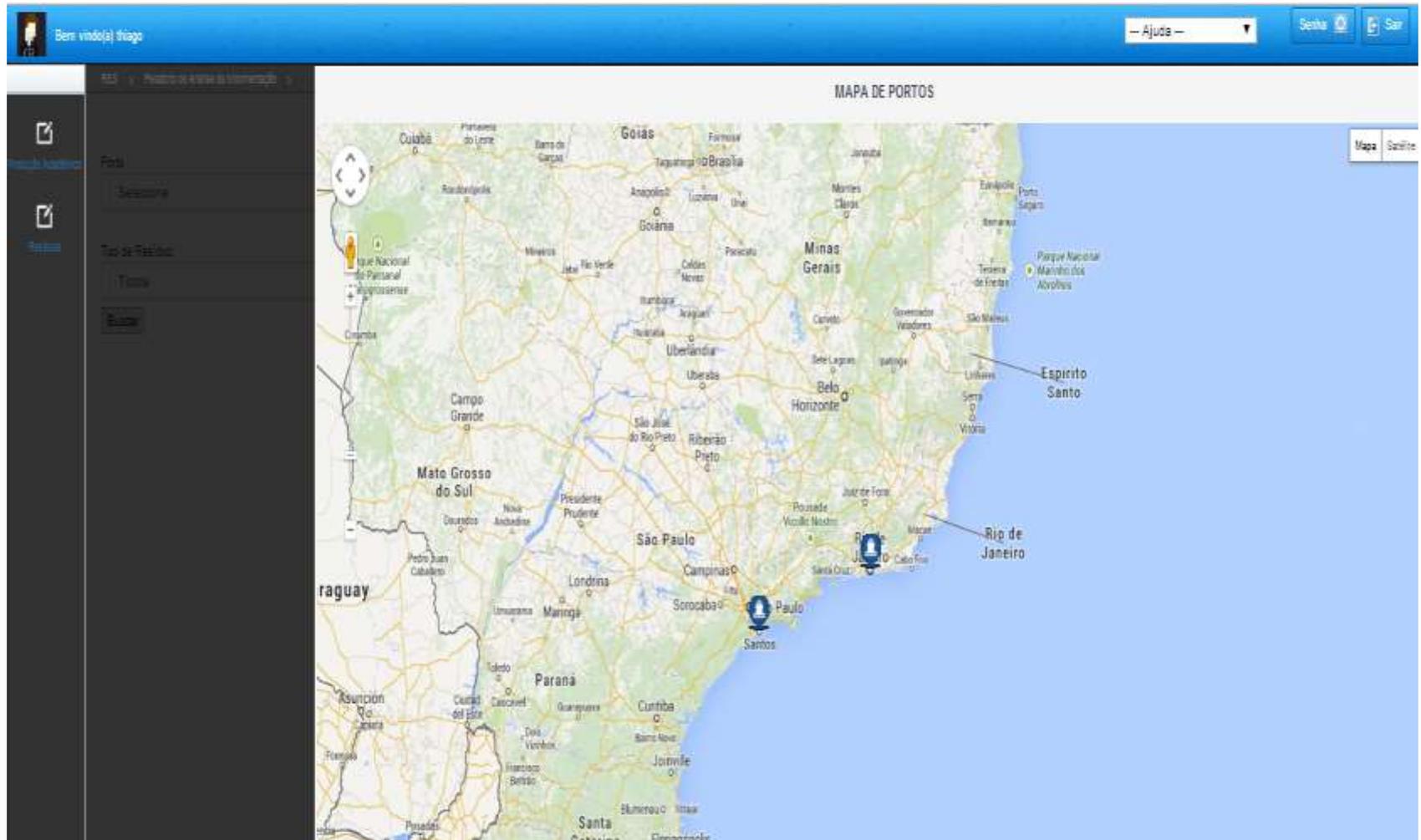
- Data collected included and stored in the database can be accessed (<http://sistema.ivig.coppe.ufrj.br/sep/Login.aspx>), and the user must enter username and password



The screenshot shows a web browser window with the address bar displaying `sistema.ivig.coppe.ufrj.br/sep/Login.aspx`. The main content area is light gray and contains two logos: the IVIG logo (stylized 'IVI' over 'G') and the COPPE UFRJ logo (a circular emblem with 'COPPE' and 'UFRJ' text). To the right, there is a white login box with an orange header labeled 'Identifique-se'. Inside the box, there are two input fields: 'Login' and 'Senha' (Password). Below the fields is a 'Log In' button.

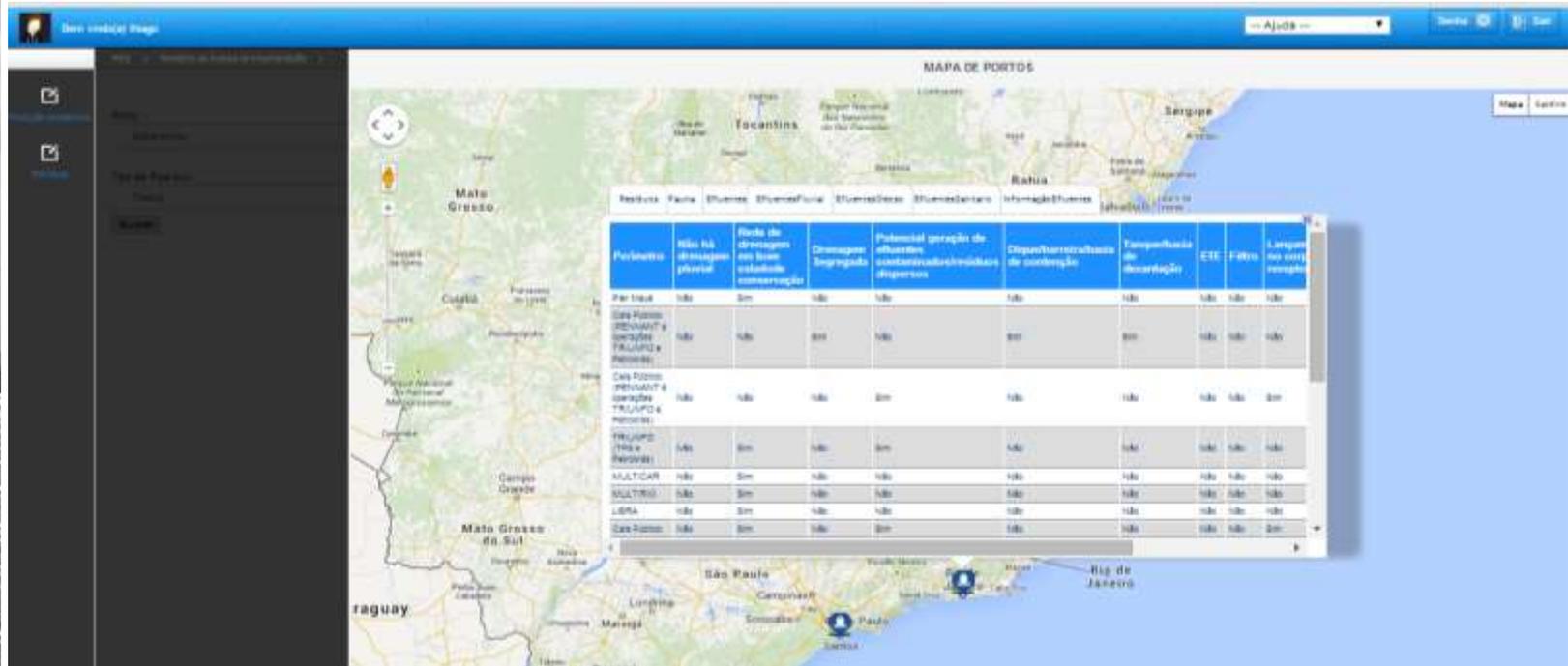
**System login screen**

# RESULTS: Informatized System



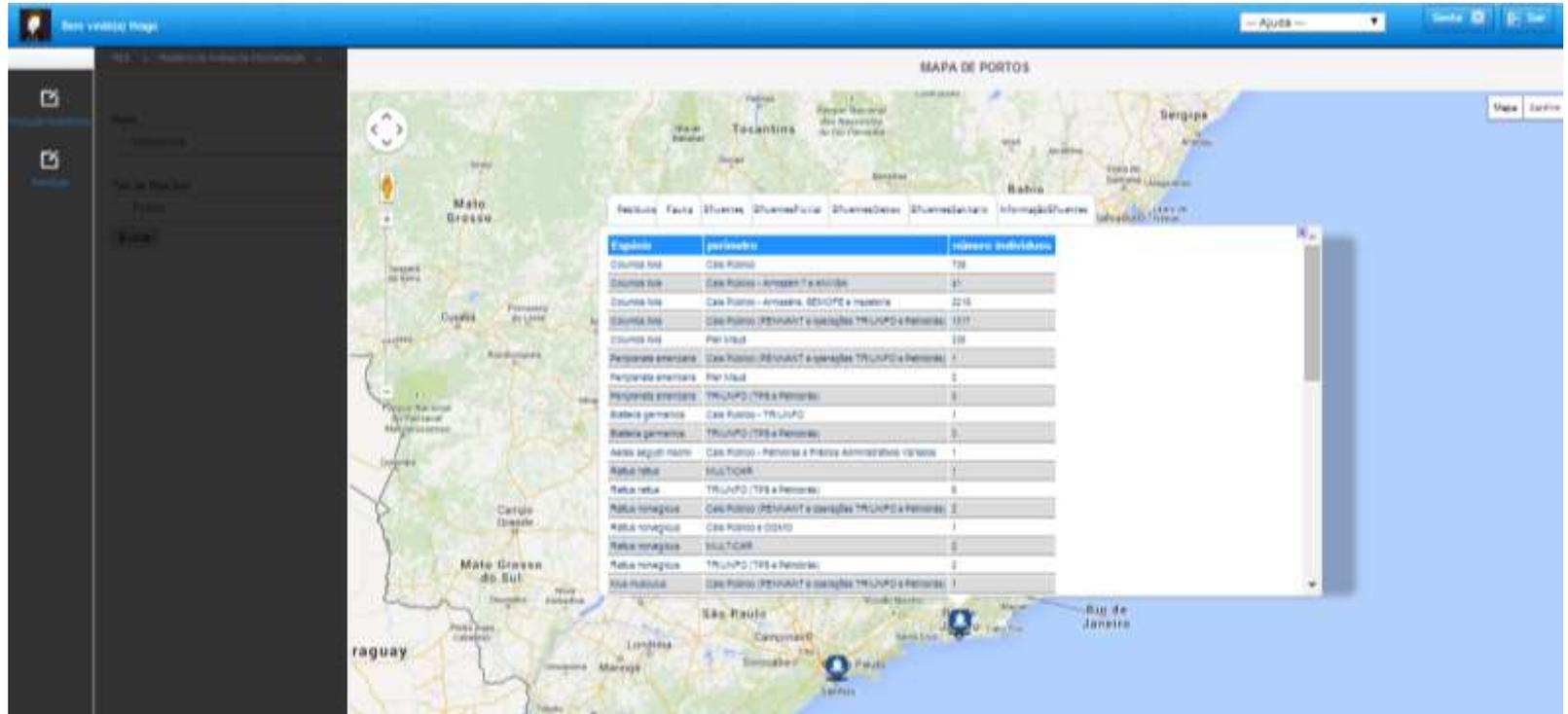
**Geographic location of the ports – Port of Rio de Janeiro e Port of Santos**

# RESULTS: Informatized System



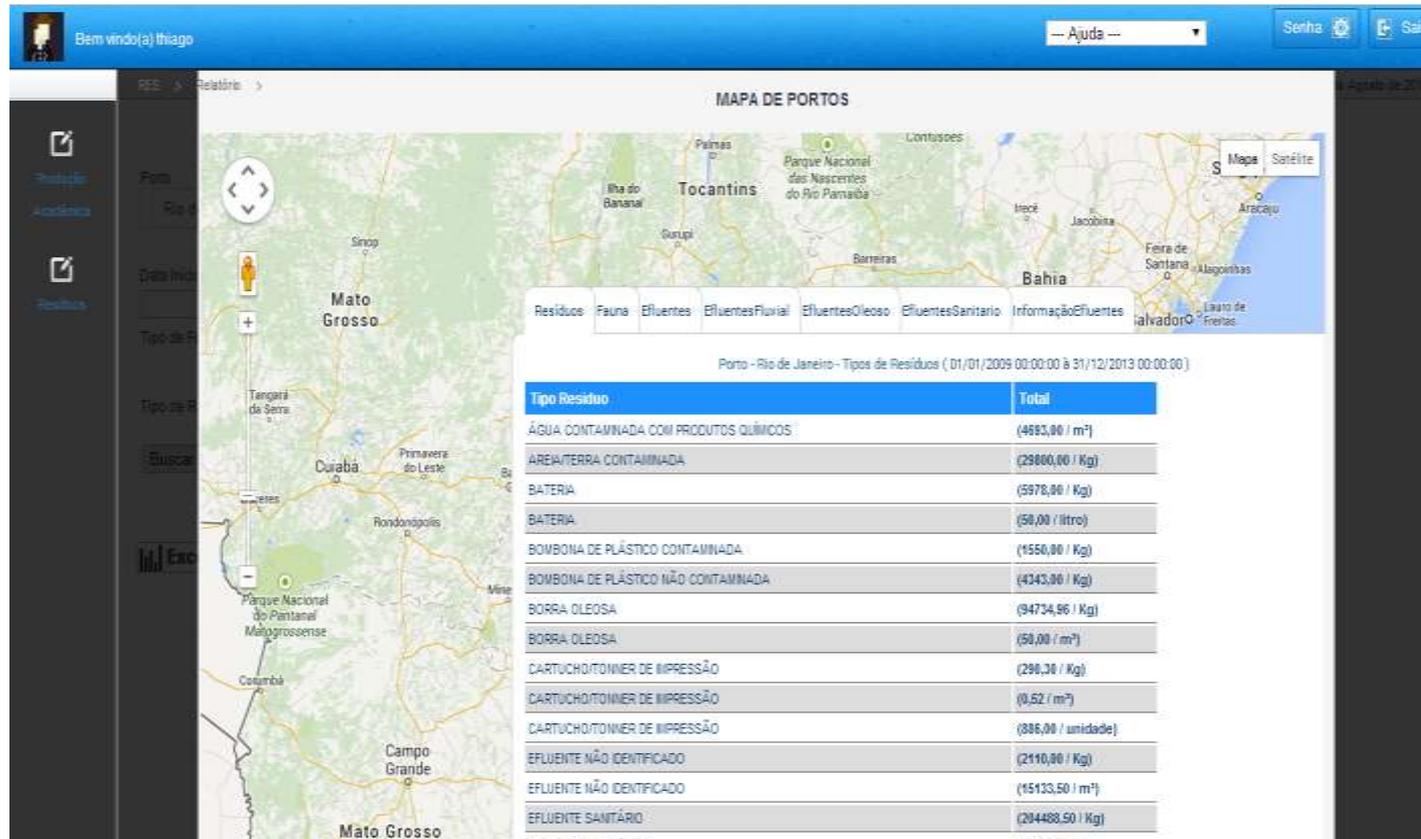
Parameters for effluents

# RESULTS: Informatized System



Parameters for synanthropic fauna

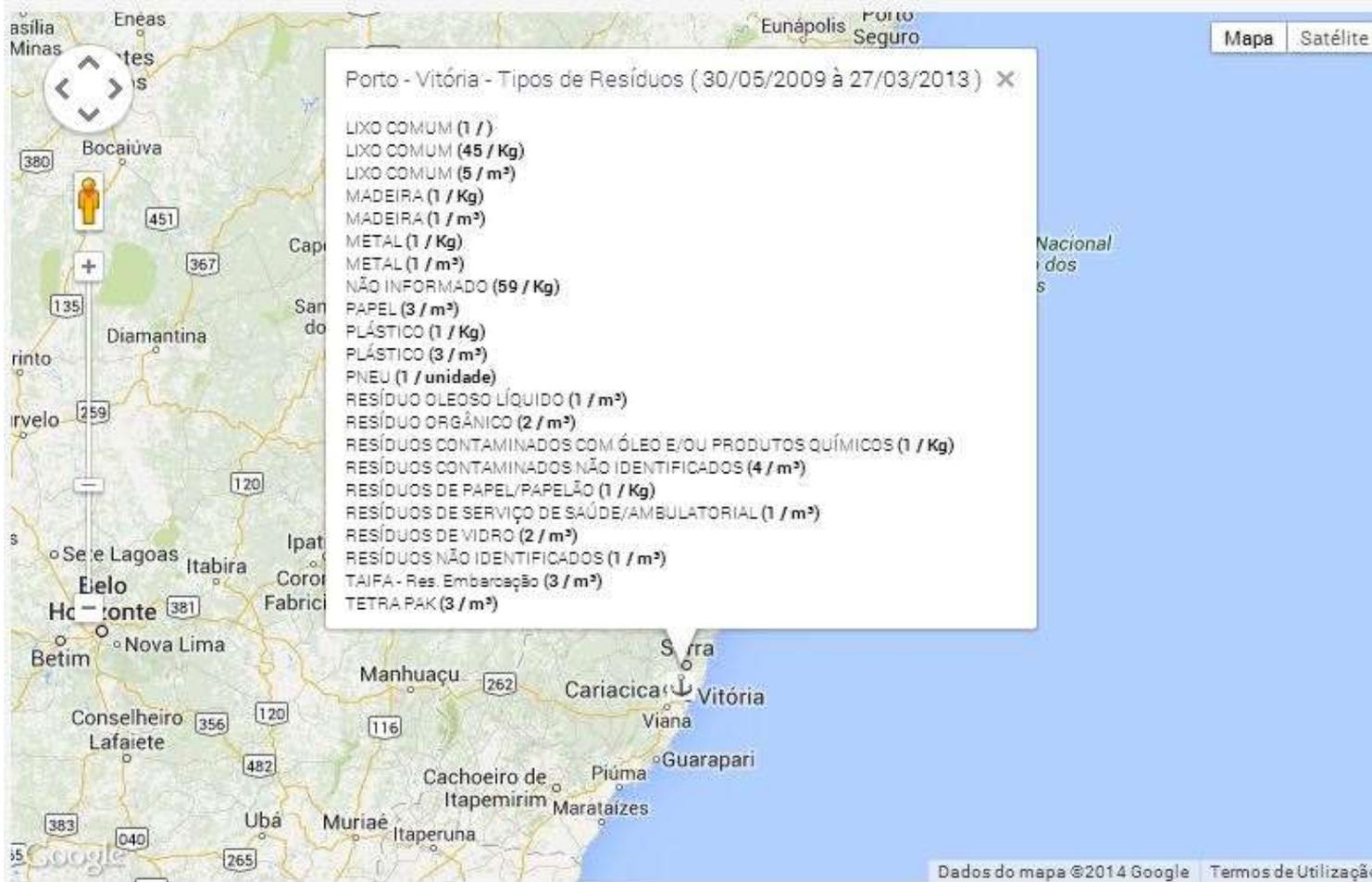
# RESULTS: Informatized System



Parameters for solid waste

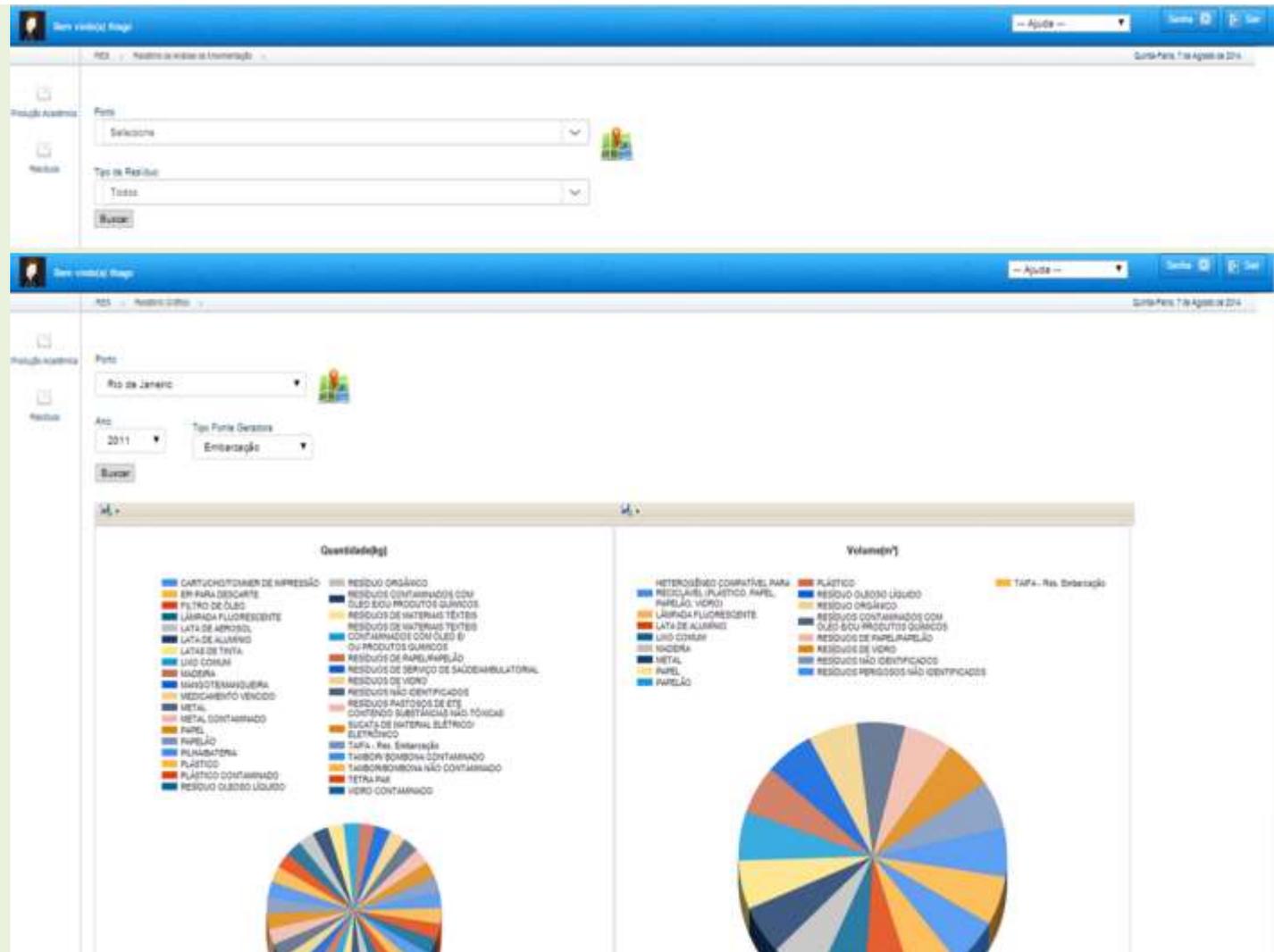
# RESULTS: Informatized System

MAPA DE PORTOS



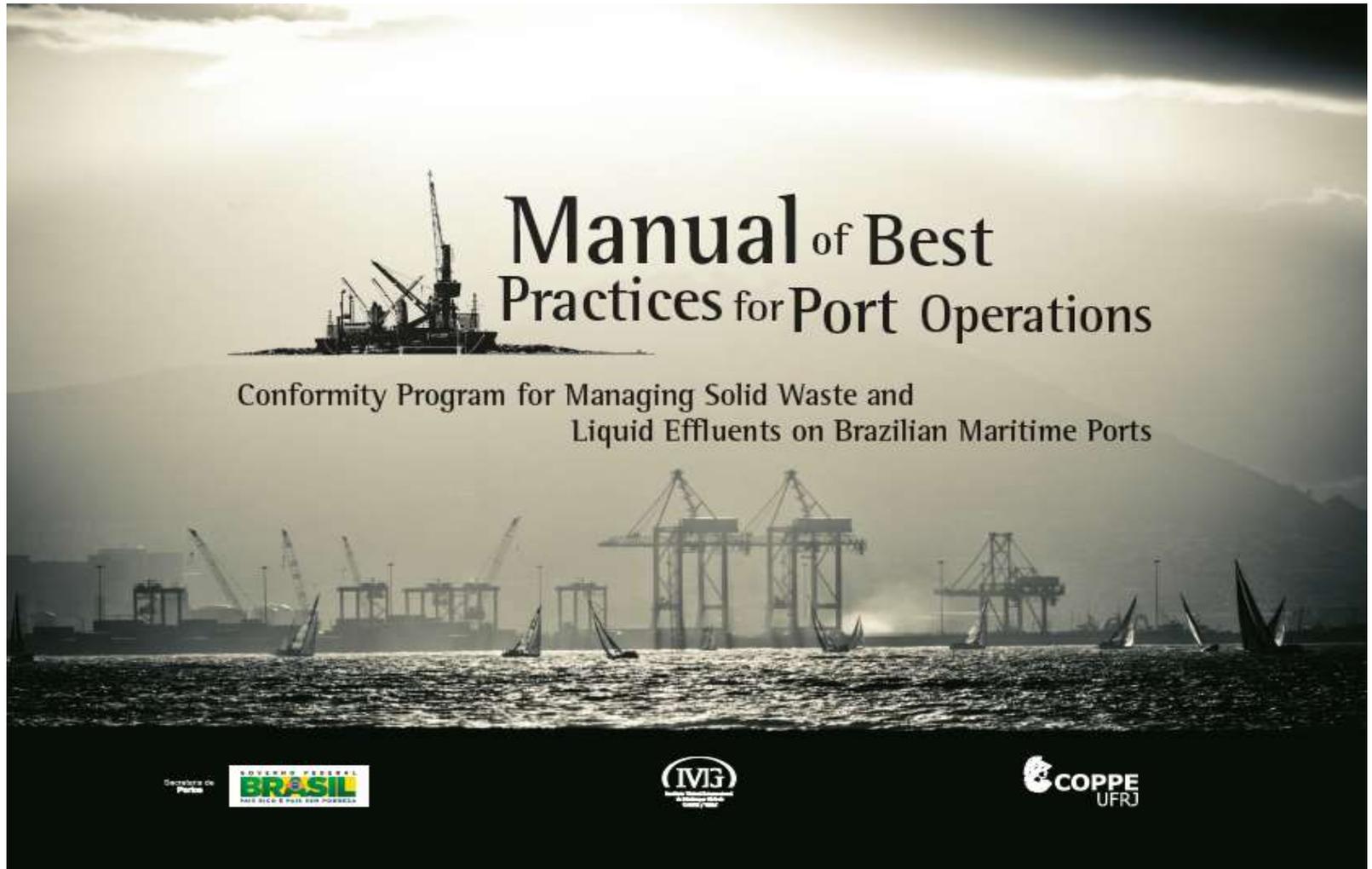
General system overview – Data of each port: Solid Waste

# RESULTS

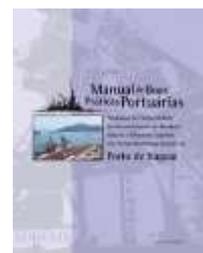
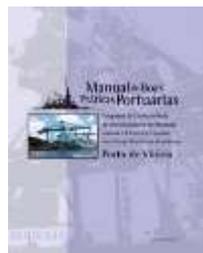
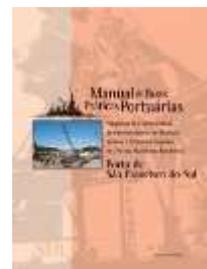
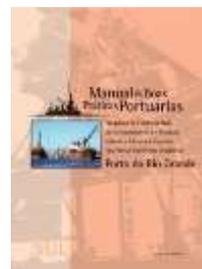
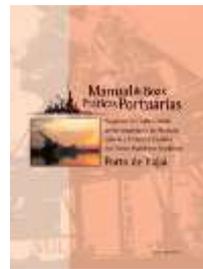
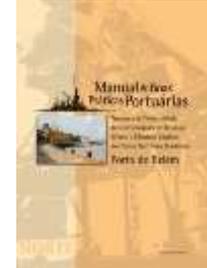
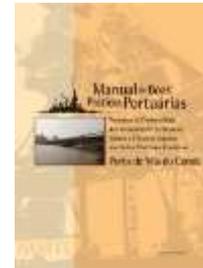


General system overview – Graphic Reports: Solid Waste

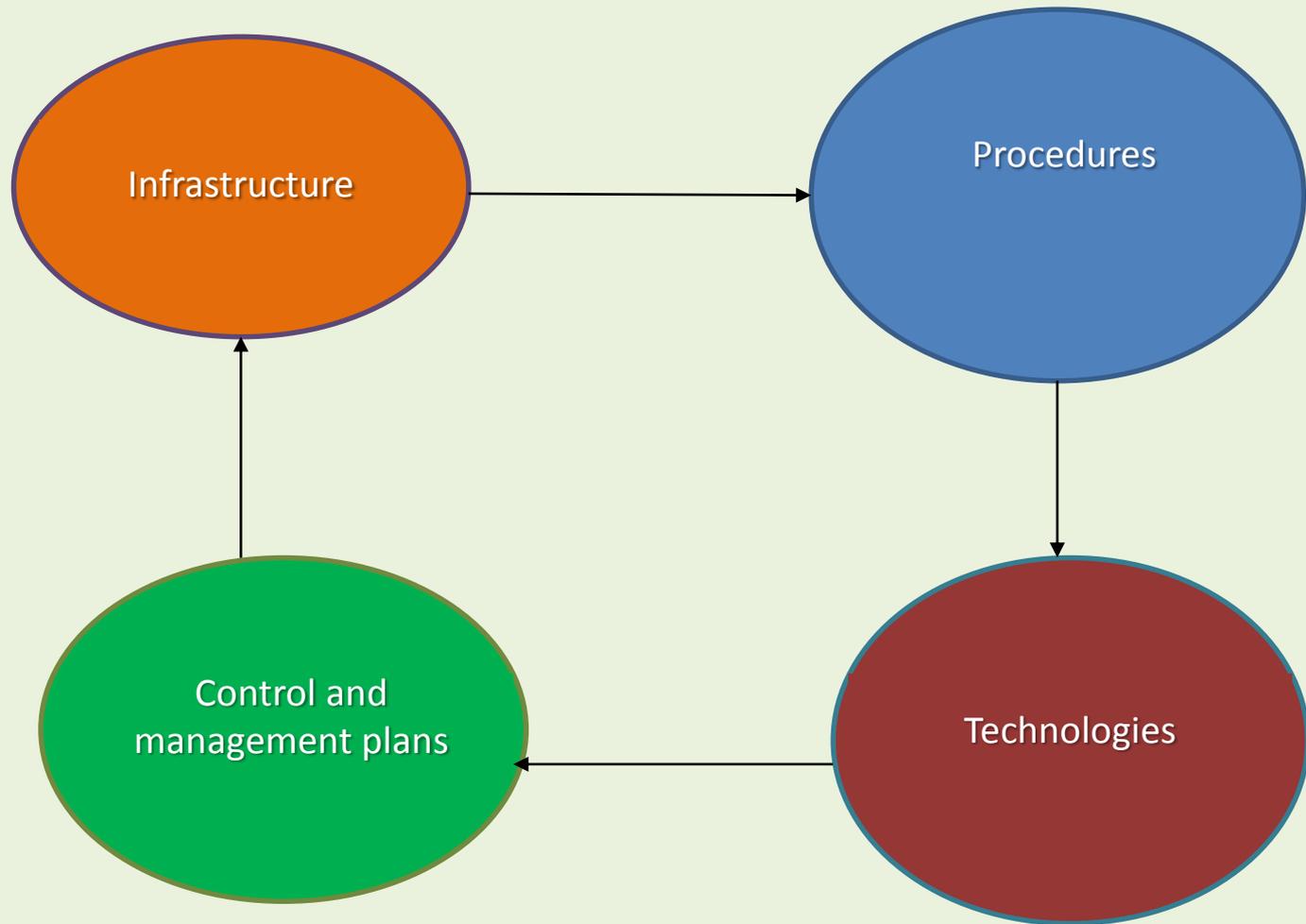
# Manual of Best Practices for Port Operations



# Manuals of Best Practices for each Port specifically



# Integrated Management Plan of Waste, Effluent and Fauna





Thank you  
Obrigada!

[vanciasanches@gmail.com](mailto:vanciasanches@gmail.com)