

# WATER MANAGEMENT SYSTEM OF THE RIO DE JANEIRO CITY

This document aims to present the general characteristics of the Water Management System of the Rio de Janeiro City. This subject is very complex, but can be better comprehended if viewed under many layers of analysis. So, It will be used a method of description that considers different ways of approach that are complementaries.

The first aspect to be considered is related to the levels of authority (local, state and federal). The second is related to the interconnection of responsibilities between the areas of expertise (environmental, water sources, drainage, sewage, works and maintenance of the infrastructure). And a third is the description of the different ways of approach: legislative, regulatory, managerial and consultancy.

Hereafter will be introduced the different government agencies that are related to the abovementioned topic, adopting the perspective of authority levels.

## **LOCAL LEVEL** **RIOÁGUAS WATER MANAGEMENT AND** **SANITATION AUTHORITY**



The Water Management and Sanitation Authority of the Rio de Janeiro City (Fundação Instituto das Águas Municipais - RioÁguas) is the technical reference body for the management of urban rainwater in the city of Rio de Janeiro, with the skills to plan, manage and supervise preventive and corrective actions against floods. The agency operates in the management of river basins in the municipality, which covers a wide area of expertise.

Nowadays is attached to the City Department of Sanitation and Water Resources (Secretaria Municipal de Saneamento e Recursos Hídricos - SMAR).

The institution works in the maintenance of water bodies of the city, carrying out conservation and clearing works of channels and rivers. Moreover, it is responsible for the planning agency, supervision and operation, directly or indirectly, of the sewage system related to the 5<sup>th</sup> region of planning (Área de Planejamento 5 - A.P.5) in west zone of the city (Zona Oeste) which comprises many districts as Santa Cruz, Guaratiba and others.

- Área de Planejamento 1 (Centro, São Cristóvão, outros)
- Área de Planejamento 2 (Tijuca, Botafogo, outros)
- Área de Planejamento 3 (Pavuna, Ramos, outros)
- Área de Planejamento 4 (Jacarepaguá, Barra da Tijuca, outros)
- Área de Planejamento 5 (Santa Cruz, Guaratiba, outros)



Área de Planejamento (A.P.) = Region of Planning  
 Zona Oeste = West Zone  
 Zona Norte = North Zone  
 Centro = Center  
 Zona Sul = South Zone

From 9th May, 2011, with the restoration of the foundation status, it was emphasized the regulatory and supervisory role of the institution, as it provides collection and sewage treatment services in A.P.5 in 21 districts of the west zone, as stated in decree number 33767.

Some of the main activities developed by the organization will be described below.

#### MANAGEMENT OF URBAN RAINWATER IN THE CITY OF RIO DE JANEIRO

The institution is the technical reference body for the management of urban rainwater in the city of Rio de Janeiro, with the skills to plan, manage and supervise preventive and corrective actions against floods. The agency operates in the management of river basins in the municipality, which covers a wide area of expertise.

- City area: 1200 km<sup>2</sup>
- Main Drainage Network
  - Macrodrainage (237 waterways) - 660 km long,
  - Mesodrainage galleries with more than 1,20m in diameter and ditches - 840 km long,
  - Total length of macro and mesodrainage - 1500 km long,
  - Total length of the drainage network: 7000 km long (including microdrainage or galleries).

## REGULATION OF THE CONCESSION OF SEWAGE SERVICES IN A.P.5

The Water Management and Sanitation Authority of the Rio de Janeiro also acts as regulator and supervisor of concession of sewage services in 21 districts of the West Zone, comprising the 5<sup>th</sup> region of planning.

## DRAINAGE WORKS AND FLOOD CONTROL

Major drainage works are being held with interventions in the Canal do Mangue Basin, aimed to prevent floods in Tijuca district, which includes the most critical point of drainage: Praça da Bandeira region; Jacarepaguá Basin where interventions occur in 14 rivers of the region, through the Environmental Recovery Program, which was set out in the Specifications for the 2016 Olympics; and Rio Acari Basin, controlling floods in the vicinity of the river benefiting more than a million residents of the North Zone.

## CONSERVATION DRAINAGE CHANNELS AND PROJECTS

To prevent flooding the agency operates in the maintenance and conservation of municipal water streams, which are points of outflow of rainwater. The institution also prepares studies and drainage projects to eliminate critical spots of flooding, as well as the issue of license for private drainage works.

## WATER MANAGEMENT MASTER PLAN

An important milestone for the city that is being developed by the institution is the Water Management Master Plan, which should be completed in 2013 and consists of mapping and diagnosis of the watershed of the city, collecting data and carrying out studies of alternatives to provide information to guide projects and management of works of urban rainwater.

## MONITORING OF RIVER BASINS IN REAL TIME

The river basins of the city are monitored in real time from hydrological stations that measure precipitation, level and water quality. The equipment was deployed in major waterways of the city, totaling 25 stations, of which 18 measure precipitation and level (PN) and seven measuring water quality and level (QN). The stations send information in real time to the Rio Operational Center, which is fundamental to the management of watersheds and flood control.

## RODRIGO DE FREITAS LAGOON

The monitoring work of the Rodrigo de Freitas Lagoon is done in conjunction with the Municipal Secretary of Environment (SMAC). The RioÁguas institution acts to control the pond level, operating the floodgates on the channels placed at Jardim de Allah, Visconde de Albuquerque and Av. General Garzon avenues, in the South Region of the city, to contribute to the environment and the shore water quality of Ipanema and Leblon beaches.

## TREATMENT UNITS RIVERS AND THE GREAT POOL OF RAMOS

It is also in charge of the RioÁguas the operation and handling of the River Treatment Units (UTR's), taking into consideration five operational equipments. They are: UTR of Arroyo Fund, UTR of the Carioca River, UTR of São Conrado, Palm UTR (Great Pool of Ramos) and UTR of Barra de Guaratiba. On Ramos, besides acting in the operation and maintenance of UTR, which ensures the quality of water, the river-waters also periodically performs maintenance of the lake.

## SANTA CRUZ SEWING SANITATION PROGRAM

Important works of sewage are ongoing in the West Zone, held by Santa Cruz Sanitation Program, being conducted by RioÁguas. It will benefit more than 150,000 residents of the region with the construction of a new sewage treatment plant in Santa Cruz and the deployment of about 250 km of sewer networks. These works counts with investments from the federal government and the municipality.

## REGULATION AND SUPERVISION OF SANITATION IN AP5

RioÁguas is ruled under a special regime of autarchy and, among the duties performed, are regulation, controlling and supervision of the sewage service in the 5<sup>th</sup> region of planning (A.P.5), also including the power and prerogatives related to drainage and quality control of the urban water in the area.

## **STATE LEVEL**

### **STATE SECRETARY OF THE ENVIRONMENT**



The State Secretary of the Environment (SEA) is the first hierarchical level of the state administration body and its mission is to formulate and coordinate the state policy of protection and conservation of the environment and management of water resources, aiming at sustainable development of the state of Rio de Janeiro.

Public environmental management in the State of Rio de Janeiro rests in the state system of environment, coordinated by the Secretariat that consists of:

The State Environmental Institute (INEA) - Created by law No. 5.1010, from October 4, 2007, the INEA's mission is to protect, conserve and restore the environment to promote sustainable development. The new institute, installed on January 12, 2009, unifies and enhances the action of the three environmental agencies linked to the State Secretary of the Environment (SEA): the State Engineering and Environment Foundation (Feema), the State Superintendency of Rivers and Ponds (SERLA) and the State Forestry Institute (IEF).

State Commission for Environmental Control (CECA), a collegiate body directly linked to the Secretary, who is responsible, among other things, to define environmental standards and other complementary acts necessary for the functioning of the environmental licensing; apply the appropriate penalties on violators of environmental control legislation by examining the documents issued by the inspectors; and give final solution to the environmental licensing processes;

State Environmental Council (CONEMA), deliberative and normative department which is responsible for establishing the guidelines of the State Environmental Control Policy;

State Environmental Control Fund (FECAM) a fund of accounting nature which aims to develop projects to support the implementation of the State Environmental Policy. The funds come mainly from the collection of fines and damages for violation of state environmental legislation and oil royalties.

## **STATE LEVEL**

### **STATE SUPERINTENDENCE OF RIVERS AND PONDS (SERLA)**



The state policy of defense and protection of lakes and waterways, as well as the marginal lands of the state domain water collections, aims at the establishment of standards of protection, conservation and monitoring of lakes, estuaries, canals and watercourses 'water under state jurisdiction, aimed at preserving the environment and the rational use of natural state resources.

The achievement of these objectives comprises the set of administrative and technical guidelines aimed at securing government action:

I - on interference of the various urban and rural processing of land occupation;

II - to control erosion and solid transport in rivers, lakes and their basins, estuaries and coastal equal stakeholders;

III - the conservation of rivers, canals, tunnels, lakes and ponds and its estuaries;

IV - in water conservation policy in nature, involving the protection of surface water and underground water sources,

For these purposes belongs to SERLA the police power and technical and administrative measures to protect marginal lands and courses, or state domain water collections on the marginal strips of public servitude, and on alveoli of water courses, ponds and its estuary, as well as their river basins and lake, and its watershed.

**STATE LEVEL**  
**ENVIRONMENTAL INSTITUTE OF RIO DE**  
**JANEIRO STATE**



The INEA, through its Directorate of Water Management and Land, has a mission to advance the agenda on water management, in a coordinated and integrated approach to coastal management and land management.

The State has an extensive coastline with tourist potential, coupled with the oil industry pressure, altering the dynamics of use and occupation of the territory. The demands for water for human consumption and for expanding service industry are a constant concern, since the state's largest spring, the Paraíba do Sul River, is shared with two other Brazilian states: São Paulo and Minas Gerais.

To ensure water quality and quantity appropriate to the population and economic development predicted in government plans, the state has shown commitment to strengthening their State System of Water Resources Management. Since the enactment of Law establishing the water policy in the State in 1999, to date, much has improved in terms of legislation and application of the relevant instruments.

In 1999, Rio de Janeiro had a weakened management body, with inadequate infrastructure and technical staff with qualifications below the required for the performance of new functions such as executing agency of the State Water Resources Policy. The need for capacity building and renovation of workforce to carry out new functions as well as the structuring of other agencies of the State System of Water Resources Management - Basin Committees and State Water Resources Council - were urgent steps to advance the management of water in the state.

The regulation of charging for the use of state domain of water in 2004 (Law 4,247 / 03 and subsequent regulations) boosted the progress of implementation of the Water Resources Policy in the State, with the structuring and functioning of the State Fund of Water Resources (FUNDRHI).

The creation and installation of the Basin Committees in the nine hydrographical regions of the state promoted the mobilization of segments that were active in the defense and preservation of the environment and aquatic systems, characteristic of the different regions of Rio de Janeiro, consisting of its initial agenda of works approval, their investment plans and the resolution on the implementation of the resources of charging for the use of water in their area. The partnership with the federal agency manager - National Water Agency ANA - and with neighboring states is strategic for management in shared basins, particularly the basin of the Paraíba do Sul River, the Union domain river that bathes the states of São Paulo and Minas Gerais, in addition to Rio de Janeiro, whose catchment area covers about 2/3 of its territory and

supplies more than 10 million inhabitants residing in the state. The National Water Resources Council is responsible for regulating the harmonious action of the organs active in river basin union domain rivers.

The INEA was structured to operate in a decentralized manner in the territory, respecting the state hydrographical division. Thus, the Regional Superintendents of INEA, which operates in the nine river basin districts, are closest to the Basin Committees.

The State Water Resources Council counts nowadays with an strengthened Executive Secretariat, played by INEA, and has been conducting meetings regularly, acting on structural issues system and endorsing decisions of basin committees and the application of the state fund resources for water resources.

Recent legislation allowing the INEA sign management contracts with delegated bodies of water agency functions (Law 5,639 / 10), indicated by the respective Basin Committees, is intended to enable more rapid application of FUNDRHI resources and strengthen organizations collegiate with the structuring of executive secretaries and technical support for the selection of beneficial projects for the watershed.

Finally, planning instruments - Water Resources Plans and guidelines on water bodies into classes according to the predominant uses - are being put on the agenda of the governing body, and collective bodies involved in water management, in order to complement command and control instruments - grants, environmental permit, inspection - towards a more efficient management of water and land in the state of Rio de Janeiro.

#### Water Resources Management Instruments

Water is a natural resource used in many ways, for food, feed, irrigation, industrial input, dilution of wastes and pollutants, transport. as well as for the maintenance of life and biodiversity, and even as a quality indicator.

The multiple uses of water and the dependence that it has turned it into a scarce commodity. To ensure proper use of this resource the National Policy and State Water Resources introduced mechanisms to enable its objectives: the management tools.

The management tools are strongly interdependent and complementary from a conceptual point of view, and share the common objective of promoting the protection and recovery of water from one river basin. The implementation of these instruments demand technical, political and institutional capacities, also requiring the participation and acceptance of all stakeholders.

The following objectives are considered for each management tool:

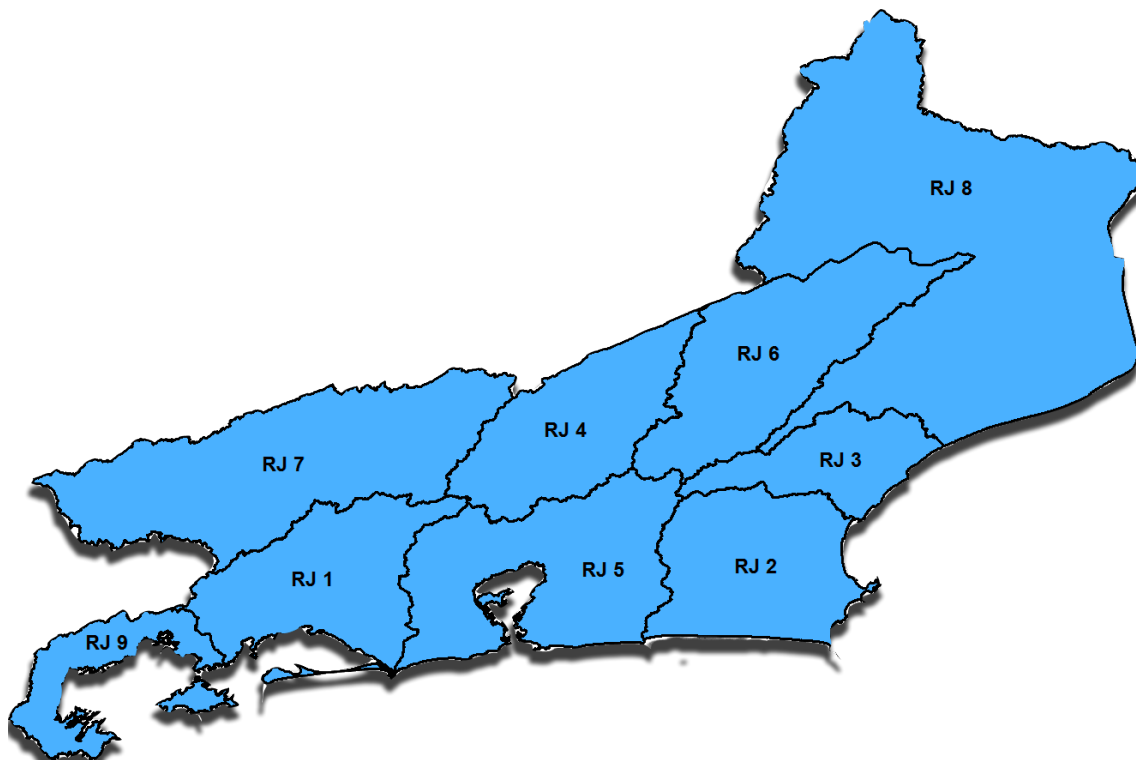
- State Water Resources Plan: establishment of guidelines for multiple and rational use of water resources at the state level;
- Plan Watershed: define structural and non-structural actions to multiple and rational use of water resources;



- Framework for bodies of water: allow maintenance or a gradual and continuous improvement of water quality in river basins;
- Granting the right to use water resources: to ensure the quantitative and qualitative control of water use and the effective exercise of rights of access to water;
- Charging for water use: encourage the rational use of water and obtain financial resources for the implementation of the actions envisaged in the plans of water resources;
- Information system on water resources: to provide provision of information and demand of water resources for use in planning and water management; and
- State Program of Conservation and Revitalization of Water Resources (PROHIDRO): provide the revitalization and conservation of water resources through management of the elements of physical and biotic resources of a watershed.

## STATE LEVEL

### WATERSHED COMMITTEE



Code	Comitee	Approximate área (Km <sup>2</sup> )	Population	Number of cities
RJ1	<a href="#">CBH do Rio Guandu</a>	3.800	990.000	15
RJ2	<a href="#">CBH Lagos São João</a>	3.800	520.000	12
RJ3	<a href="#">CBH do Rio Macaé</a>	2.000	240.000	4
RJ4	<a href="#">CBH do Rio Piabanha</a>	3.400	540.000	10
RJ5	<a href="#">CBH do Leste da Baía de Guanabara</a>	4.800	11.200.000	17
RJ6	<a href="#">CBH Rio Dois Rios</a>	4.800	340.000	11
RJ7	<a href="#">CBH Médio Paraíba do Sul</a>	6.600	1.020.000	19
RJ8	<a href="#">CBH Baixo Paraíba do Sul</a>	11.300	810.000	22
RJ9	<a href="#">CBH da Baía da Ilha Grande</a>	1.750	210.000	3

**STATE LEVEL**  
**WATER AND SEWAGE COMPANY OF RIO**  
**DE JANEIRO STATE**



Formed officially on August 1, 1975, the State Company for Water and Sewage (CEDAE) comes from the merger of the Company Guanabara State Waters (CEDAG), the Guanabara Sanitation Company (ESAG) and the Sanitation Company of State of Rio de Janeiro (SANERJ).

CEDAE operates and maintains the collection, treatment, adduction, distribution of water networks, as well as collection, transportation, treatment and disposal of sewage generated by the insured municipalities in the state of Rio de Janeiro. It has a monthly turnover of around R \$ 300.000.000,00. Between the years 2007 and 2009 were renovated 32 agreements with state municipalities, all signed in accordance with the rules established by Federal Law No. 11,445 / 07 establishing national guidelines for the segment.

CEDAE conducts various projects to ensure water quality, health and comfort to their consumer market. The pre-operation of the secondary treatment system of Alegria Station sewage in the Caju neighborhood, already reduced by 98% impurities sewage arriving at Guanabara Bay. It expanded the capacity of the collection system for 2500 liters of sewage per second, which allows increasing the amount of treated sewage of the Rio city from 40% to 60%, which is the largest and most important work of the Guanabara Bay Pollution Remediation Program (PDBG).

With the Barra da Tijuca Station, the sewers are launched in the outfall of the Barra da Tijuca neighborhood. Today the station processes 1400 liters of sewage per second, but has capacity to treat up to end 5300, which is sufficient to meet the urban development of the region for decades. The conclusion of the ETE Barra is a major breakthrough for the Sanitation Program of the Barra da Tijuca, Recreio and Jacarepaguá (PSBJ), which is investing about R\$ 600 million from the State Fund for Environmental Conservation (FECAM), a program aligned the infrastructure required for the Olympic Games Rio 2016.

For the first time in the last 10 years, the waters of the Lagoa Rodrigo de Freitas are suitable for the practice of sports, with second health security analysis of the State Environmental Institute (INEA). CEDAE is extremely active in sewage lift the reform program which form the collection belt of Rodrigo de Freitas Lagoon and solves several illegal connections of sewage that pollute this important business card of Rio. This improvement in the quality of pond water already meets the requirements of the Olympic Committee International (IOC) to host competitions of the 2016 Olympic Games.

Regarding the relationship with customers, CEDAE implements constant improvements in commercial service agencies to provide greater comfort and speed, with renovations and construction of new spaces. Quality survey conducted by service agencies indicated a satisfaction above 80% among customers.

The Corporate University (UniverCEDAE) has permanent capacity to train up to 500 employees-students / day and houses a Cultural Space, with permanent exhibition on the history of supplies to Rio de Janeiro.

In December 2009 the quotas were distributed Real Estate Fund for the construction of the new headquarters of the company. The shares were sold in less than 15 days totaling R\$ 68 million. The works were completed in May 2011 and since the 2nd half of 2011 all the company management (formerly installed in three separate buildings) is centered on Building New CEDAE, in the New Town.

CEDAE is increasingly inserted in the Brazilian Capital Markets. In December 2011 was established Investment Fund in Credit Rights - FIDC CEDAE, whose goal was to raise funds to settle an overdue debt with the National Treasury. The amount raised by the fund was R\$ 1,140 million for which demand exceeded 2.3 times oversubscribed. Noteworthy is also the realization of the 2nd issue of non-convertible debentures of the company in February 2012. The issue allowed the inflow of R\$ 100 million for working capital financing.

CEDAE also performs various actions in the social sphere and the environment in order to promote a better quality of life for society. Projects such as the production of biofuels, "Replanting Life" and the "CEDAE Environmental Education" have been recognized throughout the national scene, and international, with the entry of the Water Treatment Plant of Guandu (ETA Guandu) to the Guinness Book of Records

## **FEDERAL LEVEL**

### **NATIONAL AGENCY OF WATERS**



The National Water Agency (ANA) has institutional and operational characteristics somewhat different from other regulatory agencies. The law gave the Federal Executive Branch the task of implementing the National System of Water Resources Management (SINGREH) and the National Water Resources Policy. In addition, it created an authority responsible for issuing grants for the right to use water resources in rivers under the control of the Union, in other words, those who cross more than one state, cross-border and reservoirs built with federal funds.

At ANA fits discipline the implementation, operation, control and evaluation of management tools created by the National Water Resources Policy. Thus, its regulatory spectrum exceeds the limits of the river basins, involving domain rivers, since reaching institutional aspects related to the regulation of water resources at the national level.

All management tools are the foundation for the smooth functioning of SINGREH and represent the basis for good regulation. Therefore, the ANA plays regulatory actions, support for management of water resources, monitoring of rivers and reservoirs, water resources planning, and develop programs and projects and provide a set of information in order to encourage proper management and the rational and sustainable use of water resources.

The plans of water resources and whose construction is supported by ANA, show how to apply the other instruments. They focus, for example, the priorities for the grant and the guidelines and criteria for charging for water use. First, however, we must have a diagnosis and direct the plan to be consistent with the present and the future, considering how and when to issue the grants, implement the collection, conduct inspections and establish framework standards for water bodies with respect the types of use. For this, information is collected through continuous qualitative and quantitative monitoring of water resources. Therefore, the National Water Resources Information (SNIRH) is not just a tool to support the management, but also a regulatory tool.

Other ANA's activities are to stimulate the creation of watershed committees. Composed of representatives of civil society, water users and public authorities. These committees play an important role in regulating actions, as approve the appropriate application of management tools in the basin. These entities provide to be fulfilled in a decentralized manner, the efficient regulation.

These boards, especially those related to river basins of the Union, are increasingly prepared to fulfill the role assigned to them by the law of waters.

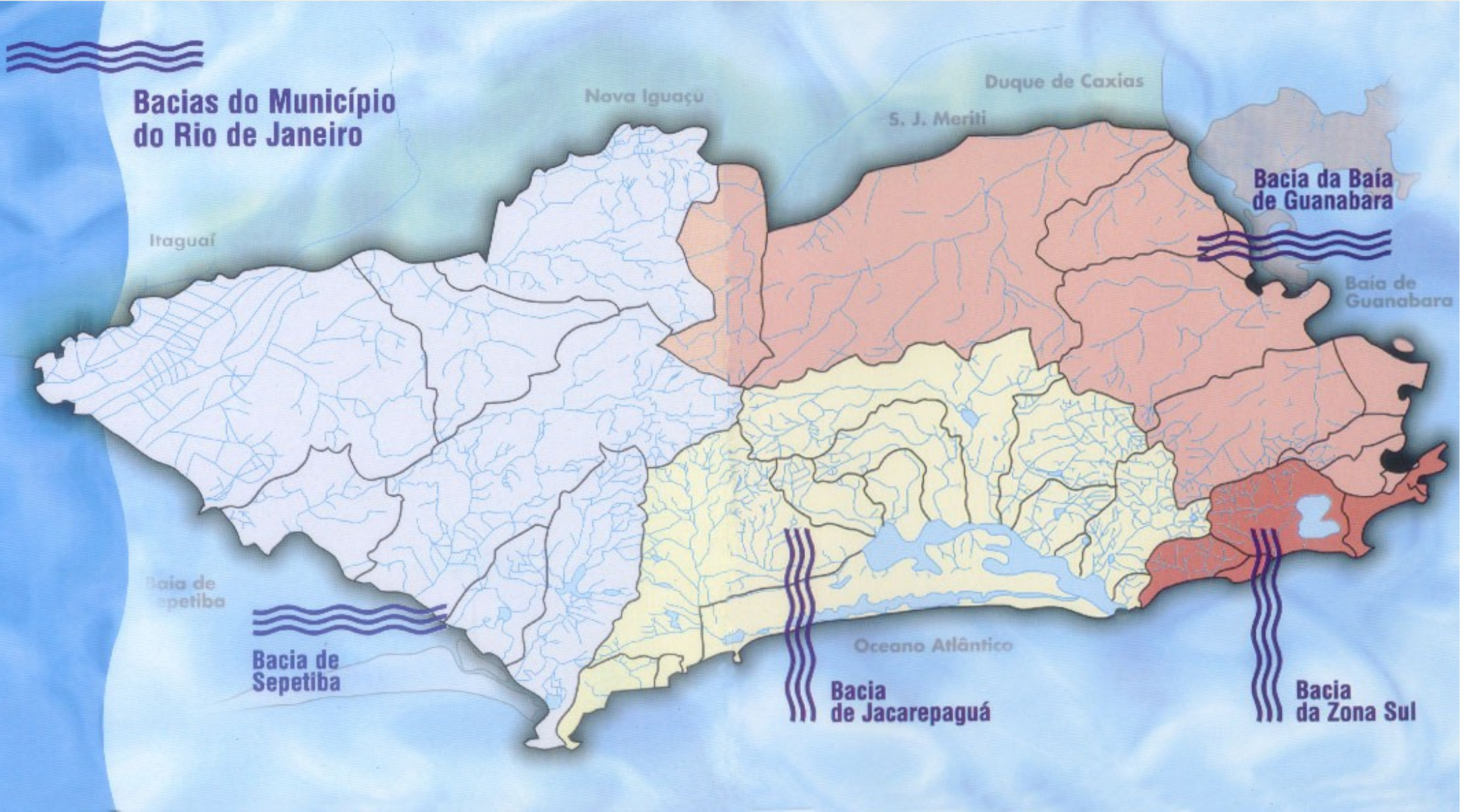
Also as a regulatory agency, the ANA's expertise to define the reservoir operating conditions, public or private, cannot be forgotten. It's necessary to ensure the multiple uses of water resources and assess the sustainability of water works with a share of federal funds.

ANA reconciles implementing powers of the National Water Resources Policy and regulatory, aware of the beneficial synergy to the environment and the Brazilian society due to its institutional mission.

Throughout its first decade, ANA has been incorporating new functions and also began to regulate irrigation services under concession and gross water supply in water bodies of the Union. In addition, with the approval of Law No. 12334, of 20 September 2010 establishing the National Policy on Dam Safety, ANA becomes responsible for monitoring the safety of dams by it granted generally to uses buses multiple, and the creation and constitution of the National System for Dam Safety Information.

# LOCAL LEVEL

## RIO DE JANEIRO HYDROGRAPHICAL BASINS



Bacia = Basin

