

## Superiority in Sanitation

Since the 1970s, Guaira has been 100% clean in all aspects. This is the result of the public administration giving priority to basic sanitation needs instead of infrastructure works and itinerant health services. The administrative continuity and planning have also contributed to the city achieving a universal provision of services. Guaira had already been pointed out as the municipality with the highest concentration of central irrigation pivots in Latin America. To guarantee water in sufficient quantity and quality for the population, the administration of water resources also controls the sanitation services in the municipality and forms partnerships with private entities and users.

Miguel Alves da Silva, operator of the Water Treatment Plant “Joaquim Manoel de Almeida”, has worked in the Municipal Department of Water and Sewage of Guaira (DEAGUA) for more than 37 years. He is an iconic employee of the first generation of workers of the Autonomous Service and represents the living memory of the organisation of the municipal sanitation services in the interior of the State of Sao Paulo.

In 1978, Guaira achieved universal provision of sanitation services. The sanitation services’ development in the municipality should be credited with the consolidation, over the years, of a basic municipal sanitation policy, even on an informal basis. The policy prioritized sanitation, which is evident through the continuous transfer of resources from the municipality’s budget to sanitation works and projects, over infrastructure works or even itinerant health services.

This sanitation policy endured thanks to the consistency provided by the services administration. The Technical Report presented at the 1st Exposition of Municipal Sanitation Experiences, hosted by ASSEMAE, cited Jair Bernardes da Silva, civil engineer and hygiene specialist, Joao Alberto Rocha, the director of DDEAGUA and Mayor Lelis Santana as saying, “any work was always preceded by a systemic plan, built on technical and economic parameters.

The availability of sewage and water services to the population had an important impact on public health. Within just five years, from 1975 to 1980, the infant mortality rate in the municipality fell from 40 to 18 deaths per thousand live births, according to the study “Infant Mortality in the Guaira Municipality”, produced by Aparecida Ferreira Mendes, technician of the municipal health service.

The institutional history of the Water and Sewage Department of Guaira is similar to the structure of sanitation services in various other Brazilian municipalities of small and medium size.

The resources for the first networks in the 1950s came mostly from the state government of Sao Paulo after requests were made by the municipality. The proposal was analyzed by the State Savings Bank. The technical part of the project was the responsibility of the Department of Sanitary Works of the Transport and Public Works

### Guaira, Sao Paulo

Population estimate, 2005: 36,827 / Number of water connections: 11,105 / Number of sewer connections: 11,776 / Total cost of the service per m<sup>3</sup> invoiced: R\$ 0.93 / Average tariff charged: R\$ 1.06 per m<sup>3</sup> / Index of invoice revenue loss: 20% / Productivity Index: 0.31 workers per thousand water and sewer connections / Gross annual operational revenue (direct and indirect): R\$ 1,603,012.79 / Gross annual expenses with the service: R\$ 1,680,220.22 / Annual utilisation expenses: R\$ 1,241,318.88 /

Source: SNIS 2003, IBGE 2000

Secretary. With the positive contribution of state organisations, the municipal city hall, together with the city council, drafted the law authorising the funding.

In 1954, sewer and water services were installed in the urban area. From 1954 to 1963, the city grew annually by 8.3%. According to IBGE, from 1950 to 1960, the urban population rose from 3,365 to 7,487.

In 1954, the then governor Lucas Nogueira Garcez signed in Guaíra the financing of the works. According to Jair, “these resources allowed the execution of basic projects, such as the drilling of wells, construction of reservoirs, and extension of the water, sewage and exhaust networks. Beyond that, the program secured the minimum human resources required for the installation and maintenance of the services”.

Since the beginning, city hall decided to directly administer the works, thus reducing the cost and qualifying local workers to carry out similar projects at the same time.

The second significant population growth occurred between 1960 and 1970, with the foundation of the Bom Jesus and Nosa Senhora Aparecida districts, relatively far from the city, obliging the municipality to invest heavily in the expansion of services. Besides attending to the new users, the city’s growth illustrated the need to asphalt streets; even though city hall had never paved a public road without previously installing water and sewer networks, as Jair Bernardes da Silva confirmed.

With the conclusion of the official policy of the state government to finance and sustain the municipal districts, Guaíra started suffering from the lack of resources and specialised technical personnel to support the new growth boom.

Somehow, the structure of the services was in good shape: the water and sewage networks were performing well and meeting the technical requirements. Also, to a large extent, the bills were regularly paid by the population. The reform of the National Tax Code in 1966, which was implemented in 1967, increased the transfer of tariff revenues to the municipalities, partly alleviating the lack of investments for sanitation.

The city hall extended water and sewer networks and drilled wells, thus minimizing the problems of water distribution and sewage collection. DEAGUA also installed urban-like water supply and sanitary sewage systems in the rural area of the community Sao Jose do Albertopolis.

## **Sustainability**

The Municipal Autonomous Service of Sanitation was created by Law 699, on February 23 1968, but only became operational in 1970. The creation of DEAGUA was demanded by the programme State Incentive on Basic Sanitation (FESB). According to Jair, “the state government had realised, although late, that the municipalities needed to set up a structure to better administer sanitation services installed with state financing”.

Inspired by the successful model of the Public Health Special Fund (FESP), through the FESB programme, the state government stimulated the institutionalisation of the services, through the Autonomous Service, with administrative and financial autonomy. Several other municipalities of Sao Paulo with larger populations had already adopted the model.

The autonomous administration allowed the separation of sanitation from other sectors of public administration and the adjustment of the cost of service.

DEAGUA’s simple organizational structure, consisting of few employees, was one of the basic factors for the good results. As Joao Alberto Rocha, director of the Autonomous Service observes, “furthermore, since the creation of the Autonomous Service, there was no political interference but rather administrative stability”.

The date of the foundation of the Autonomous Service coincided with the installation of the first surface water receptors of the municipality, which used raw untreated water and transported it for slow filtration treatment. Two years later, DEAGUA constructed the Water Treatment Plant (ETA), with the production capacity of 450,000

litres per hour. The project was financed by the Federal Savings Bank Caixa, then CEESP, which mainly financed public sector projects. As Miguel Silva, employee of DEAGUA for 37 years, remembers, “at the time, drains and trenches were constructed manually. I also worked in the hydraulic facilities of Water Treatment Plant”.

Until 1970, the city was supplied by six deep wells. Since residential consumption was not monitored, the widespread wasting of water deprived all residents of water supply.

According to Joao Alberto Rocha, the director of DEAGUA since 1981, and also responsible for the investment planning of the Autonomous Service, “by monitoring water consumption, the revenues rose enough to contribute to the maintenance of Water Treatment Plant and continued investment in the expansion of water and sewage networks and sewage treatment projects”. At the end of 1978, the city became 100% clean. The treatment and distribution of water and the collection and treatment of domestic sewage passed to be universal.

In the years after the foundation of the Autonomous Service, the federal government’s fiscal policy reduced the resources allocation from 10% to 5% to the Municipalities Participation Fund (with resources from the Income Tax and Industrial Products Tax), thus compromising all municipalities.

At that moment, Guairá assumed the responsibility of creating a self-sustained system of resource mobilisation not dependent on loans from state or federal government. As Joao Alberto Rocha comments, “we have always tried not to depend on financing in order to carry out investments. Even if more slowly, it is worth investing with your own resources. Such financing was achieved thanks to the organisational stability of DEAGUA”.

The last financing obtained from Caixa in order to build the Water Treatment Plant, was repaid before the deadline. DEAGUA managed universal provision by applying a tariff equal to 20% of the tariff applied by the Basic Sanitation Company of the State of Sao Paulo (SABESP), besides not charging for monthly consumption up to 10 cubic meters.

The current challenge of the Autonomous Service is to apply a tariff scheme that will guarantee the sustainability of the system in the future.

## **Control and monitoring**

From 1980 onward, all residences and residential complexes were constructed with built in water supply and sewage collection networks, guaranteeing that the whole population could count on basic sanitation. DEAGUA started executing and supervising infrastructure projects in residences and residential complexes in order to keep the service provision indexes at 100%.

In 1988, with the support of the Department of Water and Electricity of the State of Sao Paulo (DAEE), DEAGUA drilled a 714m well with a flow of 350,000 litres per hour, guaranteeing water supply until today. In 2004, digital leakage monitors were purchased, facilitating remote-monitoring of the system’s losses, which in its turn allowed the implementation of educational projects on saving and rational use of water.

In 1998, DEAGUA set up the Quality Control Laboratory which analyses water samples every two hours, thus assuming quality control, which was previously carried out by CETESB.

## Springs

In the 80s, Guaíra, one of the municipalities with the largest territorial extension in the state of Sao Paulo, was known as the one with the largest area proportionally irrigated by central pivots in Latin America, a technology known to consume lots of water. The irrigated cultures were replaced by extensive sugarcane farms. In Guaíra there are three sugarcane alcohol plants.

The superficial water collection system of the municipality is centralised in Ribeirao Jardim where there is an interesting conflict on water usage. Eight central irrigation pivots and one sugarcane-alcohol plant, besides the public system that supplies the Water Treatment Plant, receive water from the same spring. As chemist Adriana Martins Peres Borba, operational manager of DEAGUA explains, “in order to satisfy all the needs without compromising the quality and amount of water for public supply, the sanitation service ends up administering the water resources”.

“Due to the variable and intense use of Ribeirao Jardim there were some conflicts. We saw little progress when there was rivalry and we struggled to maintain public supply as the main priority. When we started to see each ‘rival’ as a partner, the situation improved”, according to Adriana.

The municipality and the users of Ribeirao Jardim formed an association for its recovery. Now, the municipality expects resources from the State Fund of Water Resources (FEHIDRO) to finance the Water Management Project of Ribeirao Jardim.

The shortage of water in Ribeirao Jardim, whose situation was considered critical by the Committee of the Hydrographical Basin of Sapucaí Mirim/Grande, resulted in the approval of the Water Resources Management Project for the spring supplying Guaíra. That project, which will receive funds from FEHYDRO, foresees the registration of all users and the different uses, the geo-referencing of the basin, and the identification of flow points in the spring, since the current data of DAEE are approximate and not real from FEFIDRO’s 2005 register.

The project also foresees the evaluation of water quality in the spring. “Many people are concerned with the contamination of the stream from pesticides due to neighbouring intensive agricultural activities. Others question the use of water from sewage treatment for irrigation”, he says. For the monitoring and evaluation of water quality, and the efficiency of sewage treatment, eight sampling points will be set, spread from the spring to the mouth of the river.

### Drainage system pending adjustments

In 2005, DEAGUA invested around R\$ 100,000 from its own resources for the management of pluvial waters in the city. These resources came from the surplus of the water and sewage services.

Since 2004, a municipal law attributed to the Autonomous Service the responsibility for urban drainage, but there is no decree regulating the Law, yet. The director of DEAGUA, Joao Rocha, notes that “the legislation did not determine the source of the funds to be directed to drainage”.

Although in favour of the integration of water supply and sanitary sewage services with the pluvial waters management system, the director fears that the incorporation of a new service, without the provision of the necessary resources places at risk the services’ quality. The current biggest challenge is the absence of culverts in the city centre.

The low inclination of the streets, allowed the construction of open channels alongside some avenues of the city for the drainage of pluvial waters.

## DEAGUA installs treatment system for the by-products of the Water Treatment Plant (ETA)

At its Water Treatment Plant, DEAGUA is installing a sludge treatment and disposal system through the use of bed drainage and sedimentation techniques, which guarantees the reduction in volume of sludge in decanters and the clearing up of the filters wash water.

According to Adriana Martins Peres Borba, operational manager of the plant, “currently, our Water Treatment Plant works on average 21 hours per day with a flow rate of around 100 litres per second. The effluents, without prior

treatment of residues and chemical substances, are thrown in the watercourses. The water treatment residues accumulate in decantation tanks for 60 days, are thrown in the stream within a few hours during the decanters cleaning process”.

In 2001, Adriana took a postgraduate course in Basic Sanitation Engineering at UFScar, while the course coordinator, professor and researcher Joao Sergio Cordeiro, developed a prototype of a sludge drainage bed to treat sludge from the Water Treatment Plant. The operational manager of DEAGUA visited the first Water Treatment Plant using this experimental technology of SABESP in the city of Cardoso and started looking for resources to apply this technique in Guaira. The R\$ 14,900.00 project was financed by the State Fund of Water Resources, with matching funds from the Autonomous Service. The total work, of R\$ 343,891.45, was also financed by the Fund.

According to Adriana, the biggest advantage of the project is the environmental benefits derived from the 100% reuse of the water from filters and decanters. The resulting sludge from the drainage and drying processes contain less than 20% humidity, allowing for its final disposal in industrial embankments, or its reuse in ceramics and floors manufacturing. As Adriana states, “we are thinking to use the sludge in the production of bricks, which can be used in social projects throughout the city. But that, for the time being, is just an idea”.

### **Sewage**

The Department of Water and Electricity (DAEE) and the Secretary of Works and Environment of the State Government of Sao Paulo, supported DEAGUA's installation of stabilisation ponds for sewage treatment in the basins of the Santa Quiteria Stream and Ribeirao Jardim. DEAGUA considers it fundamental to evaluate the condition of the stabilisation ponds that have already been operating for 30 years.

The Department has just purchased equipment for the sewage treatment efficiency control laboratory, investing around R\$ 40,000 from its own resources.

### **Solid Waste**

The City Hall of Guaira is responsible for waste collection, cleaning and administration of the embankment. By law, DEAGUA is also responsible for the administration of the hospital waste and in order to comply with Order 31 of the State's Environmental Secretary, which was modified in 2003, the service is outsourced. The subcontracted company collects, transports, sterilises and disposes this waste in sanitary embankments.

The Autonomous Service is responsible for the collection of rubbish throughout the municipality. This is considered an essential component of the protection policy for Ribeirao Jardim. The service is paid by the tariffs for the use of DEAGUA's reservoirs.

Between 2001 and 2003, DEAGUA assumed the Coordination of Urban Cleaning Services and also took over the hospital waste collection service.

With the collaboration of Adriana Martins Peres Borba and Jair Bernardes da Silva