Dealing with dry spells



Chico Santos

THE PERSISTENCE OF THE DROUGHT in the southeast, Brazil's most populous and economically developed region, which began in the second half of 2013, has definitely overthrown the popular myth that Brazil does not have to worry about a lack of water (except in the northeast, where the problem was identified in the 1800s).

According to the National Water Agency (ANA), lack of rainfall in 2014 in the basins of San Francisco, Paraíba do Sul, Rio Grande, and Cantareira—the main source of supply for the São Paulo city area—was the most severe recorded since 1930. ANA believes that this year's drought will replace the drought of the 1950s as a historical reference for planning.



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Water consumption in São Paulo—Brazil's largest city, with 21 million inhabitants—is still seriously affected. The water shortage, which had already pushed up the cost of electricity for industry, has now begun to worry consumers.

Nélson Pereira dos Reis, director of environment for the Federation of São Paulo State Industries (FIESP), says that "the situation is extremely serious, with no prospect of improvement for years to come." He points out that hydrological forecasts are not favorable, and infrastructure works to ensure a better water supply for the main industrial centers will not be ready before 2018. The State of São Paulo generates about half of Brazil's industrial production.

"The industrial sector, which has been facing a serious economic crisis, is being forced to consider the lack of water, an essential input, as another challenge to face, without many alternative solutions in the short term," Reis says. FIESP has been recommending that companies adopt a contingency plan for water. Reuse of water in industrial processes that do not require potable water is today the main strategy during water shortages, but this alternative is as yet little used in Brazil.

Reis said that even before the current crisis, in regions where the water supply is considered most critical, such as metro São Paulo, Campinas, and the Vale do Paraíba , industry has been working for more than 10 years to reduce dependence on both the water utilities, whose tariffs are high, and surface waters (rivers, streams, and ponds), which are drying up and are in any case almost always contaminated by sewage because sanitation infrastructure is poor. According to the 2014 National Household Survey, in 2013 43% of Brazilian households had no access to the sewage system, and the Trata Brazil Institute found that in 2012 only 39% of sewage collected in Brazil was treated before being dumped into rivers.

Unending water shortage

Environmental engineer Marilene Ramos, deputy director of the Center for Studies in Regulation and Infrastructure of the Getulio Vargas Foundation (Ceri / FGV), points to evidence that the water shortage in southeastern Brazil is associated with global warming—it is not accidental and can be expected to recur often in the form of "extreme events": periods of torrential and destructive rains alternating with periods of severe drought, as in 2014.

Ramos agrees that, given the severity of the drought this year, with rainfall barely half the historical minimum, it would have been very difficult for governments and agencies responsible for water supply to be fully prepared to face it. "But it did not need to be as bad as it is," she argues, noting that limited storage capacity and deterioration of water quality have been known, but not addressed, for decades. When the license for the Cantareira Water System was renewed early in the last decade, she points out, ANA warned the state government that it needed to expand capacity and seek new sources of water supply, and "the government spent a lot of time making a plan that was never carried out."



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It is also well known, Ramos added, that the Paraíba do Sul River has been drying up and lost water quality as a result of deforestation, disorderly occupation, and release of sewage into it. Little has been done to reverse the degradation, even though the Paraíba do Sul basin is the main source of water for Rio de Janeiro's metropolitan area.

"We see the degradation, the waste, and we are no longer able to create large water reservoirs because of their environmental impact," Ramos says. Storage limitations also affects the generation of hydroelectric power. New hydropower plants and those under construction operate using "run of the river," meaning that they can generate only what normal river flow allows, turning off turbines during the annual dry season.

Ramos points out that, fortunately, the problems have been identified and technologies are available to resolve them through sewage treatment, waste reduction, and reforestation. However, new public works must be properly managed and maintained to avoid waste. Ramos believes that upgrading will increasingly be the work of public-private partnerships (PPPs). PPPs eliminate red tape that obstructs public works and make the private sector responsible for managing and maintaining water systems, with the public sector responsible for managing tariffs.

To provide a more secure supply of water for industry, Ramos considers water reuse as a most attractive alternative, since other possibilities, such as seawater desalination, require huge investments. As an example, she pointed to the National Steel Company (CSN), which was considered the main polluter of the Paraíba do Sul River in the 1990s. Today its reuse system recycles 87% of the water it uses and closely monitors the 13% it returns to the river to prevent pollution.

CSN's intake from the river today is 14,500 cubic meters per hour, of which 12,000 m^3 /hr are

returned to the river. Of the difference, 1,500 m^3 /hr evaporate and 1,000 are used up in the CSN manufacturing process. The company's goal is to apply the reuse solution to all its new facilities.

The Capuava unit of petrochemical company Braskem (Odebrecht group) in Maua, São Paulo State, also reuses water. The Sanitation Company of the State of São Paulo (Sabesp) and Odebrecht Environmental are partners in the Environmental Aquapolo project, an investment of US$146 million that started operating in 2012.

The Capuava unit consumes 65% of recycled water from Environmental Aquapolo—almost 10 billion liters a year. In its Camaçari unit in Bahia State, Braskem partners with Cetrel, a company dealing with waste and effluents, in the Água Viva project, which reuses both treated wastewater and storm water. According to Braskem, the project saved 3 billion liters of drinking water in 2013. Braskem also reports that water reuse in its 36 industrial units went up from 19% in 2011 to 30% in 2013.

Expanding water reuse

Sabesp, the largest sanitation company in the country, said its current capacity for processing reused water is 600 liters per second. The water is used in industrial processes where water does not have to be potable, such as cooling industrial plant equipment; washing streets, courtyards, and monuments; clearing storm sewers; watering gardens; and reducing dust on construction sites.

Currently, FIESP reports, São Paulo industries use only 2% of the water supplied by Sabesp; their intake of water from rivers and dams is 145 times what they receive from Sabesp—a significant amount that could, Sabesp says, be replaced by recycled water to take the burden off the rivers.

In December 2015 Sabesp plans to open two water reuse plants, one in Marginal Pinheiros,

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south of São Paulo city, that will recycle 2 m^3 per second, and the other in Barueri city, with a capacity of 1 m^3 per second. The water will be sent to the Guarapiranga and Isolina reservoirs to be treated and used for drinking water.

The potential of water reuse is considerable. FIESP's Reis says that between 2008 and 2012, industries in the Piracicaba, Capivari and Jundiaí basis, one of the most vulnerable areas, reduced their demand for surface water from 14 m^3 per second to 8. They did this mainly by reducing consumption and reusing water. A report found that of 853 companies surveyed, 65.7% had adopted some reuse measures, and 75% had targets for reducing water consumption.[1]

Jorge Briard, operations director of the State Company of Water and Sewage of Rio de Janeiro (Cedae), said that "water reuse in Brazil is a solution that is accepted by industry, except for some specific sectors such as pharmaceuticals." Briard wants new industrial plants to have reuse programs. Companies that draw water from rivers should be reusing water by the end of their water-intake licenses, especially where it is difficult to obtain water for human consumption.

The largest water reuse project being built by Cedae will handle about 1 m^3/ second at the Petrochemical Complex of Rio de Janeiro in Itaboraí starting in 2016. Cedae also provides reused water to the Municipal Company of Waste Management (Conlurb), which cleans streets, and to Maravilha Port, a project to revitalize the port area of Rio de Janeiro city.

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Businessman Paulo Ceschin of Paraná State, who has worked for more than a decade on water reuse projects, is disappointed with the slow pace of reuse of water in Brazil, which he blames on lack of a public policy and of regulation to encourage reuse.

Resolution No. 54 of the National Water Resources Council (CNRH), issued in 2005, covers reuse of drinking water but not reuse of water for industrial purposes, except where companies reuse effluents resulting from their own processes. As a step toward regulating reuse of water from external sources, in August the CNRH sponsored a workshop "Rationalization and Reuse of Industrial Sector Water," to support drafting of a resolution on industrial reuse of water.

[1] *Análise Gestão Ambiental*, São Paulo: Análise Editorial, Edition 2013-2014.