

# Despite still plentiful, water resources demand for good management

*Investments in equipments and circuits closure are very often an economically inconvenient move, but sector's companies are convinced they must concern about environment and think on the future, when water might become not so easily available*

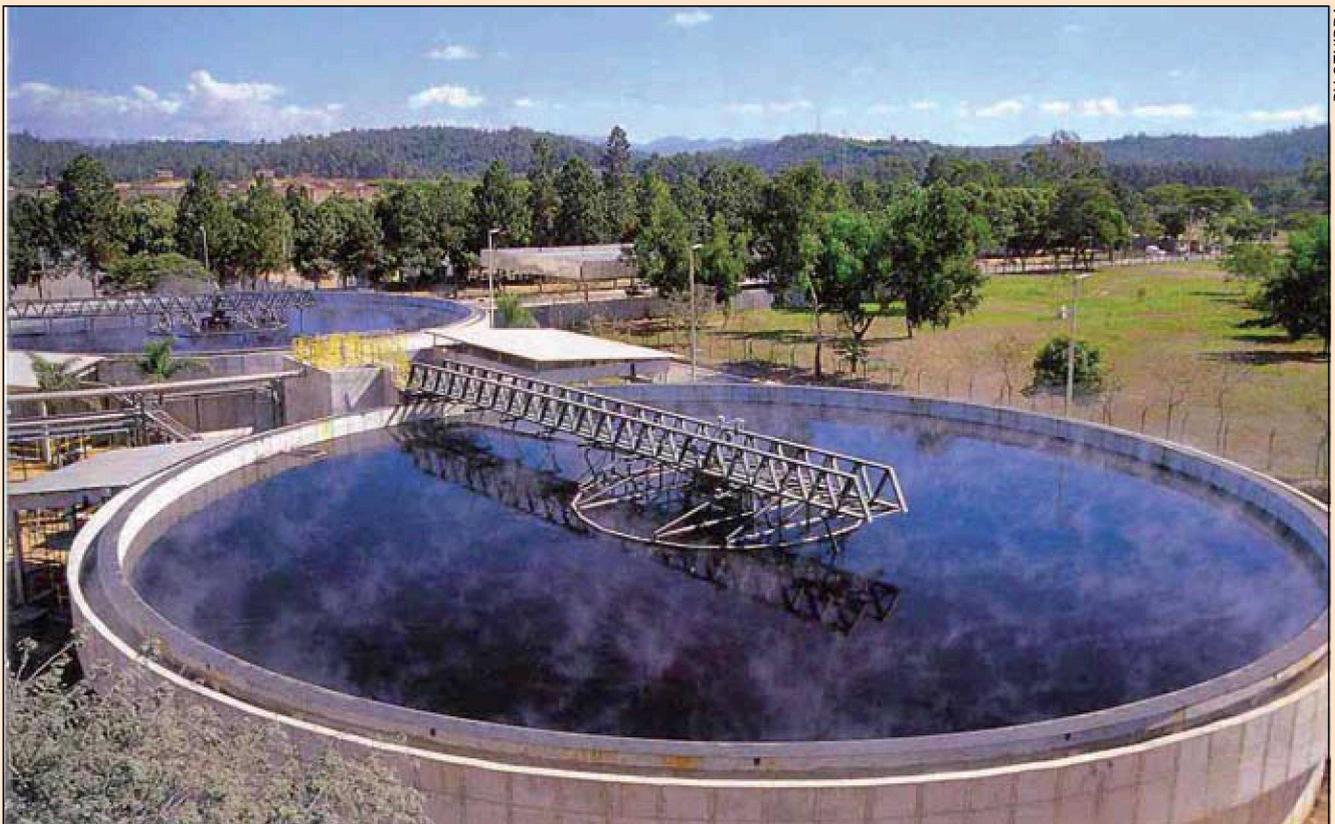
**By Marina Faleiros**

**A**long the entire human history, water has always been a key agent in the development of civilizations. Be that from thousands years ago, when the Nilo River and its floods were considered a gift to Egypt, or even in Brazil's history, roamed all over by the pioneers bandeirantes by following effluents courses flowing to the inland.

Lack of water gives room to starvation, dearth of sanitation, and holds back industries' development. The pulp and paper sector is well aware of this resource significance, and it is a one that needs water as essential supply, utilizing it since the eucalyptus breeding and up to the industrial process.

Conscious of this relevance, the

sector has kept working hard along the past years for reducing its consumption rates, both in new or under erection mills, as well as in plants over twenty years old needing to conform to the modern water utilization standards – which, at present, are much smaller even in countries with profusion in water resources, as is Brazil's condition.



BY CENIBRA



**IP's mill in Mogi Guaçu (SP): ambiental aspects come first**

A case that deserved a countrywide notoriety is one that of the bleached pulp maker Lwarcel, awarded with the 3rd Fiesp's 2008 Prize of Water Conservation and Reuse. Established in the city of Lençóis Paulista (SP), the mill is far-off from any surface water supply, and, even at present, it relies only on underground water and semi-artesian wells. "The difficulty turned out a concept, and the company now exhibits one of the smallest specific water consumption of the sector countrywide, probably one of the smallest of the world", states Pedro Stefanini, Lwarcel Celulose's Industrial Manager.

Data of the company show the following evolution: the mill has emerged from a specific consumption of 44 m<sup>3</sup>/adt (air dry ton) in 2004 to 23 m<sup>3</sup>/adt in 2007, after the implementation of seven projects in its production processes. "As technological target, Lwarcel sought for alternatives by listing the best available practices in the world. Such an example relates to the fiberline investment, where the washing filters technology was replaced with the Andritz DDWashing equipments", explains Stefanini. Andritz's DDwashers run at medium consistency pulp which decidedly assists in reducing water consumption.

The company also met support from its own staff for the rethinking of the process and to drop water consumption rates. "Except Andritz, all others projects related to the water reuse program, which mean 46% of the total achieved reduction, have been the outcome from proposals of the company's technical staff."

At the International Paper company, of Mogi Guaçu (SP), however, the consumption challenges showed up gradually. At the time the mill was erected, in 1960, on the margins of the Iguaçú River basin, there was much more water flowing in the river, and it was therefore quite feasible to be used. With the development of the region, the increased population density, and the need of more water for watering surrounding farms, the company perceived circumstances when the effluent level decreased to very low marks. "Since then, we have realized as imperative to reduce our dependency on this resource", explains Wanderlei Peron, Environment Specialist for IP.

As Wanderlei tells us, the company has worked intensely on the matter since year 2000, and it is now performing an accurate monitoring and control action, because most of what could have be done for the reduction

of water consumption has already been accomplished. "Closure of circuits has been of great contribution, it made possible to return condensates to the process. We have also replaced pulp washers operating under vacuum with pressing type equipments, improving water usage scale", adds Peron. Thereafter, the IP plant has overcome a daily water consumption of about 85 thousand cubic meters, and uses now 55 thousand m<sup>3</sup>/day only, while daily production has jumped from 950 tons to 1.2 thousand tons.

Also at Cenibra, established in Belo Oriente (MG) since year 1975, the technical staff perceived, with the passing of time, a substantial decline in the regime of the river bordering the mill. "We started to invest in demand reduction not only for assuring the mill's supply, but also as a belief that Cenibra had to take some positive action for the contention of its consumption and for supporting the environment's future", asserts Alexandre Etrusco Lanna, Production Department Manager. Lanna tells us that defies are now even more severe because the company's first production line is 20 years outdated when compared to the second line, and the acceptable average of water demand was much higher in the past. "We are well aware we have a fiberline demanding much more than the other one, this is why we have invested mainly on line 1, in which the consumption dropped from 150 m<sup>3</sup> per adt in 1978 to a present rate of 45 m<sup>3</sup> per adt" explains Lanna.

As per Suzano's view, the reuse practice in the pulp and paper industry, in addition of increasing water availability for others activities and even for home purposes, shrinks production costs, avoids final or intermediary product losses, and minimizes the load of pollutants to deal with. "Thereafter, during implementation of the Mucuri project, in Bahia State, there was already plan for al-

most triplicate the pulp output of the mill without the need of an extension of the act of granting for extracting more water from the Mucuri River, a procedure that would impose a new licensing process”, tells us Ricardo Quadros, executive Manager for Quality and Environment.

According to the executive, it would however be useless to just invest in utilization adjustments and reductions if not coupled to a straight behavior devoted to assure perpetuity to the achieved results, and, furthermore, to its improvement whenever possible. “Therefore, Suzano has inserted in the mill’s control panel a screen which continually puts on show water utilization in each stage of the process, giving to this monitoring same status as for production, quality and safety.”

#### **INVESTMENTS IN FAVOR OF WATER**

Brazil is a rich country in hydric resources, a condition that allows many mills to take water straight from

rivers free from any payment. Investing in consumption reduction seems, therefore, something unthinkable, if only considered from the perspective of cost reduction. In most cases, the plea is purely environmental. “Cost of water is still very cheap in Brazil, but there are others aspects to take into account, as is the effluents reduction”, says Peron. Even IP, he relates, acts upon this mentality. In 1980, he typifies, the company set up a water consumption monitoring system which hasn’t paid for itself already. “It has been a political decision to start concerning about the company and the natural resources, for if the company wouldn’t stop for the set up of this investment, it would never know where its great problems and areas of large demand were”, he states.

Peron explains that those projects fitted to stimulate the reuse of water back to process are the ones producing better saving results. “We have got to use the evaporation line condensates as sealing waters and, in some cases, we adopt filtering for the removal of contaminants in residues to allow its devolution to the process”, he adds.

In the paper machine, vacuum pumps sealing water stands for a great demand, therefore, the company’s option has been for a filtering method to remove fibers and minerals pigments as a way to reduce fresh water entering into the system. “Part of the residues are even sent back to the machines as fibers”, stresses Peron. Additionally, the company has invested in hot

water circuits with heat exchange with others liquids of the systems.

However, for a 25.4% water reduction in its fiberline 1, Suzano has invested US\$ 600 thousand. “And in line 2, now already operating with an average of 19 m<sup>3</sup>/t, circuit closure and water cooling are planned as priority for water reutilization.” Peron explains that these technologies are more evident in the drying sector, where the new machine consumption is one of the smallest worldwide in large capacity machines, being about 150 m<sup>3</sup>/h, and, especially, in the recovery of the different process pumps sealing waters.

But the work didn’t stop with the investment. Currently, a target of consumption is attributed to each of the mill’s areas. “When targets are exceeded, a certain period of time is defined for solving the problem, and remaining areas are requested to reduce their consumption so as to sustain the average”, emphasizes Quadros. Whether the problem is not solved within few hours, water supply might even be discontinued to avoid risks of exceeding the licensed amounts of water withdrawal, which could endanger the whole unit.

Within Cenibra, Lanna exposes the target is also to close circuits, i.e., reuse of water in different areas of the plant. “An example is the recirculation of the drying machines white water to the woodyard for the washing of logs, as well as water from the drying sent to pulp bleaching stages, and the recirculation of the evaporation plant condensates to the brown stock washing process”, Lanna points out. The company has also implemented the recovery of water leaving cooling units.

There are however situation, states Lanna, where investments in equipments are necessary. “Two years ago, for example, the brown stock UKP washing, in both lines 1 and 2, has been modified, with the existing atmospheric equipments re-



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placed with pressurized ones, which operate at medium consistency". Thereafter, the company was able to drop from a global consumption average of 53 m<sup>3</sup>/adt in 2006 to 45 m<sup>3</sup>/adt. "We are progressing in reducing our water demand: since last year we have got a 2 m<sup>3</sup>/adt reduction, something that is to be carried on along the time", says Lanna.

At the company winner of the Fiesp's prize, the Lwarcel, Stefanini explains that innovations have been introduced in both, technology and domestic reuse-related programs. "In its majority, they have been simple but ingenious actions, totaling an investment of R\$ 550 thousand, with a 19 months return on investment". According to Stefanini, one major difficulty in water reutilization refers to quantify and qualify the different flows of water demanded by the process. "Each stage asks for water with a specific characteristic as regard to solids, color and saline concentration, among others. On the opposite end we still have the different already processed water flows, also with their specific characteristics. The challenge is to join the ends", says.

According to the executive, a great Lwarcel's defy was how to assess the closure limits, since inorganic and organic scaling formation is easy to happen in case of a system failure, mainly in white water systems. "It's essential to define when the water consumption must be stabilized with view on the process as a whole, progressing in small, but consistent steps."

One of the Lwarcel well succeeded projects has been the reuse of the black liquor evaporation cooling towers purge, and then utilized on the fiber dewatering machine and on the effluent plant filtering thickener. The company is also re-processing reverse osmosis rejected material, water and thermal energy from the digester and the drying machine, and performs the reuse of the

## THE SIGNIFICANCE OF WATER IN PULP

In the pulp production process, chemical transformations and physical effects are accomplished. The majority of them making use of water as a separation, impurities transport and fiber conveyance mean in processes. Consequently, the pulp and paper industry stands out as a great water consumer.

In the beginning, large scale industrial processes practiced washing methods in a simple stage, with water disposal, thus causing quite huge water specific consumptions per ton of produced pulp, and high environmental impacts. Afterwards, multi-stage processes were developed, which allowed the partition of the washing process, but performed in a common flow (water and fibers toward same direction). The liquids disposal persisted, and there was no proficient use of the concentrations differences existing in the washing process. A significant advancement has been the counterflow washing (water and fibers travelling in opposite direction), which allowed to take advantage of the concentration gradients between the washing liquid and the pulp. The process evolved in efficiency, with less water consumption.

With this, operational fiber suspension concentration parameters also progressed, i.e., increased pulp consistency. Rotating drum filters with barometric legs were, at the time, the large capacity equipments, in which pulp suspension with 1,5% to 2% consistency was fed to a vat for the subsequent mat formation, mat some 3 to 5 cm thick formed through dewatering action on the drum fabric assisted by vacuum generated by the barometric leg of the equipment. The mat so formed resulted washed by effect of the water displacement; the original liquid displaced by the liquid added through the showers. The rotating filter combines in its washing process the effect of the pulp dilution to consistency same as the one of the feeding side, and the water displacement effect produced on the drum. The pulp dilution process is of low washing significance, but it is essential for the mat formation and the subsequent displacement process.

These washing methods persisted till the 1990's with its typical high specific water consumption, consumption that has induced the development of the modern pulp washing technologies, strongly favoring operational efficiency and protection of the environment.

Source: Lwarcel



vacuum pumps sealing water of the brown stock washing plant.

The higher investment demanding change, however, has been to replace the rotary drum washers technology with the DDwashers— medium consistency fiberline technology -, in the pulp washing plant, at a cost of R\$ 80 million in 2005. Lwarcel was operating its bleaching plant with a water consumption of about 20 m<sup>3</sup>/adt. Already in 2003, with aim at reducing its specific

water utilization, the company made a start with the adoption of the medium consistency washing, with values of 8% to 14%, much higher than the ones practiced with the vacuum washer technology. In such a way, Lwarcel performed the substitution of 11 vacuum filters with five DDWashers, being thereafter able to drop its water specific utilization to 10 m<sup>3</sup>/adt in the pulp bleaching plant, one half of the original amount.