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*Trabalho de Bolsista:*

*Ecosystem Services in a Mega Metropolis: Water and Sanitation in São Paulo*



## Editorial

Esta edição especial do boletim Kenshu-in da ABJICA-SP, traz o trabalho desenvolvido pela bolsista Lais Yumi Nitta, que participou de curso de treinamento da JICA no Japão, em 2008. Um trabalho completíssimo sobre os aspectos de saneamento da cidade de São Paulo, com objetivo de reconhecer e valorizar projetos de bolsistas desenvolvidos após seu treinamento no Japão, demonstrar os resultados decorrentes dessas ações, divulgar esses trabalhos e possibilitar a troca de experiências entre técnicos, disseminando conhecimentos. Apresentamos a íntegra do relatório, em inglês, e no próximo número do Kenshu-in, voltaremos com as novidades e eventos relativos à cooperação técnica Brasil-Japão. Assim, continuamos com o nosso propósito de levar aos bolsistas da JICA, todas as informações sobre a cooperação técnica entre o Brasil e o Japão, assim como os eventos organizados pela Associação e pela JICA no Brasil. Lembramos que a ABJICA-SP realiza suas reuniões mensais na primeira terça feira de cada mês, às 19 horas, na sede da JICA. Estas reuniões são abertas a todos os bolsistas, participe.

## Expediente

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## Ecosystem Services in a Mega Metropolis:

### Water and Sanitation in São Paulo

## The Role of Ecosystem Services in Poverty Alleviation and Human Well-being

Lais Yumi Nitta - bolsista da JICA em 2008.

### I. INTRODUCTION

"Water is the true wealth in a dry land; without it, land is worthless or nearly so. And if you control water, you control the land that depends on it".

Stegner, W. Beyond the Hundredth Meridian: John Wesley Powell and the Second Opening of the West, University of Nebraska Press, Lincoln, NB, 1954.

Based on the Millennium Ecosystem Assessment (MA) report, and on some of the Millennium Development Goals, such as poverty eradication, reducing child mortality combating disease and environmental sustainability, this paper aims to identify the role of ecosystem services in poverty alleviation and human well-being in one of the biggest cities in Latin America: São Paulo, Brazil. It is also intended to discuss how the degradation of ecosystem services impact on people's lives, mainly into the low-income parcel of population. The main topics referred in this paper are water and sanitation, two human rights that are strictly correlated. It is known that without water, there is no life. Plants and animals cannot survive and it is no different to human beings. Besides, humans also need water for other purposes, such as agriculture, industry, and domestic purposes. However, due to the population growth in the world and the non-alteration in water quantity on the planet, the demand of water enchain a water crisis, which results in water scarcity in some countries and the unequal water distribution among people. Statistics reveal that nearly 1.1 billion people have no access to improved sources of water. The problem of water scarcity, in Brazil, is not as concerning as in Asian or African countries, since the largest river in the world, the Amazon River, is situated in the country's territory and the sources of fresh water in the rest of the territory are abundant, although unequally distributed. The biggest human concentration resides in the south and southeast part of Brazil, where the water availability is 6 per cent, while the Amazon River basin is located in the north part, with 78 per cent of total water resources and a very low population density. Furthermore, biggest and urban areas receive more attention from politicians and decision makers, which favors an improvement in water distribution, what does not happen in smaller places and rural areas. The situation is worse for sanitation. Without proper sanitation, the freshwater sources can be affected and polluted, restraining even more the quantity of water available for distribution. It also contributes to the spread of diseases, lowering people's well-being and health. Nearly 2.4 billion people worldwide receive no improved sanitation services. This estimative is proportionally similar in Brazilian territory. Concerning drinking water, 97.7 per cent of most Brazilian cities are supplied with the service, according to 2000 census. However, only half of them are provided with sanitation services. Even though 94 per cent of population may have had improved sanitation by 2000 only 56 per cent had connections to sewer systems and nearly half of all municipalities in the nation had no sewerage. Moreover, 80 per cent of residues produced are directly thrown into rivers without any treatment. The poor are the ones who are affected the most by the lack of those services. They tend to live in distant areas, many times in illegal lands where attention is not paid and improvements are not made. Incapable of paying for health care and a proper alimentation, they are also more vulnerable to diseases that could be prevented by proper sanitation services and good quality water. Data collected by IBGE (Brazilian Institute of Geography and Statistics) show that in 2000, 800 thousand cases of dengue, malaria, hepatitis A, leptospirosis, typhoid and yellow fever were registered and 3 thousand children under five years old died of diarrhea. All those diseases are strongly connected to the water quality, to floods and lack



of sewage treatment and garbage collection. São Paulo is the biggest and richest city in the country. Services provided there are more developed than in the majority of Brazil's cities, but even so its population is not supplied by water and sanitation services in its totality. Firstly, explaining the water and sanitation problems in the world contributes to a better comprehension on the context in which São Paulo is inserted.

Secondly, in order to understand why São Paulo is not as developed as it should be, it is needed to know São Paulo's history, how it became as big as it is today and how the overpopulation and uncontrolled growth resulted in a lack of infra-structure to a big part of the population. These reasons are discussed in the second session of the paper. Finally, a detailed analysis on São Paulo's situation nowadays illustrates how the water and sanitation issues impact on poverty alleviation and human well-being.

## II. THE WATER CRISIS IN THE WORLD

The planet earth is known by the abundance of water in its territory. However, 97 per cent of all this water is salty, which is unsuitable for drinking or growing crops. The remaining 3 per cent is fresh water, (or 35 million cubic kilometers volume). Yet almost all of this fresh water is effectively locked away in the ice caps of Antarctica and Greenland and in deep underground aquifers, far from human habitation. Less than 100,000 cubic kilometers - just 0.3 per cent of total fresh water reserves on earth - is found in the rivers and lakes that constitute the bulk of our usable supply (Moss, 1988). Similarly, freshwater bodies are usually small, relatively temporary, once they easily dry up, or freeze, as climate changes. Water is unequally distributed around the world: more than 40 per cent of river waters, reservoirs and lakes are concentrated in six countries: Brazil, Russia, Canada, United States, China and India. The Amazon itself, in Brazil, holds around 15 per cent of the usable water on Earth. All of Europe accounts for only 7 per cent of global runoff; all of Australia produces only 1 per cent. In Africa, 30 per cent of the total runoff comes from a single river basin, the Congo/Zaire. In terms of water availability for individual use, in North-America and Europe, for example, citizens have around 140 liters a day of water for their own use, while in developing countries of Africa there are only 10 liters a day per capita. Estimates inform that 1.5 billion people on this planet have already no access to safe potable water within easy reach of their homes. If no measure is taken to change this situation, it can result in water shortage to two thirds of humanity by the year 2025. Differently from other renewable resources, the total amount of water in the world can not be changed or increased. However, even if there is enough water to meet its demand, because they are not equally distributed, located in places where the access is difficult and its quality is compromised by wrong management, the humanity face a water crisis.

**The use of water** - The water is vital for any human activity: agriculture, industry, and domestic (municipal) purposes. At the same time that population grows, so does the demand for water. In the last decades, the population grew enormously, but the water availability remained the same. The supply of fresh water per capita is one-third lower now than it was as recently as 1970, a direct result of the nearly 2 billion people added to the planet since. Furthermore, as population grows, requirements for basic personal use rise proportionately. In 1996, the world's human population used an estimated 54 percent of all the fresh water contained in rivers, lakes, and aquifers. This percentage is conservatively projected (merely using population growth estimates) to climb to at least 70 percent by 2025. The figure will be more if per capita consumption continues to rise. By the year 2025, when the world is expected to have about 8 billion people, more than 70 percent of all accessible fresh water could be used by humanity (Postel et al., 1996). It is known that every human being needs an average of 1 liter of water a day to stay alive (with an adequate diet), and in order to grow an adequate supply of food for one person in a year, it takes around 300 tones of water.

**Agriculture** - Agriculture dominates global water use, accounting for 69 percent, or two-thirds of all annual withdrawals. Worldwide, irrigated agriculture contributes nearly 40 percent of total food production on 17 percent of the global cultivated area. The increasing growing in urban and rural population will demand a larger food production that, consequently, will require more irrigation. According to the International Water Management Institute (IWMI), 17 percent more water will be needed for

irrigation by 2025 to meet food demand (IWMI, 2000). Agriculture is also the least efficient use of water. During irrigation process, about 70 to 80 percent of water is wasted, lost to the atmosphere or seep into the ground before reaching the fields (Falkenmark and Widstrand, 1992).

**Industry** - Industry accounts for about 23 percent of the water use. From this amount, it consumes only 4 per cent. Some examples of water used for industrial purposes are 100 liters for 1 kilogram of paper and 4500 liters for 1 tone of cement.

Unlike irrigation, where crops consume large volumes of water through evapo-transpiration (evaporation from the soil and transpiration by the growing plants), municipal and industrial uses return 70 percent or more as wastewater. Industries not only require water for the manufacturing process itself but also for cooling or cleaning. It is possible, then, to re-use the water, or use water with less quality. Storm water runoff from the streets also mixes with sewage in some urban settings. Much of this water can be recycled as it moves through the basin, it can be treated to remove harmful wastes. However, over 40 percent of cities with a population over 500,000 are located on coasts (WRI, 1996), which reduces the scope for reuse. Unless these cities take special measures to recycle water (e.g., through industrial recycling or use of treated sewage for peri-urban agriculture), their wastewater is discharged into the sea and lost. (Ruth Meinzen-Dick and Paul P. Appasamy, 2002). An option would be the utilization of sufficiently-treated sewage. Due to the continuously sewage discharge throughout the year, wastewater is an abundant source of water for industry. The need of water is different in agricultural and industry purposes. Much agricultural water use is seasonal while municipal and industrial water demands are year-round. In climates where rainfall or runoffs are seasonal, supplying water in the dry season requires storage, more commonly in groundwater reserves or surface reservoirs. At the same time that stored water is the most valuable (for agriculture as well as domestic and industrial uses), it is also the scarcest. Although industry uses much less water than agriculture, it causes more pollution. While it is used for cooling and cleaning, it is also often polluted with by-products of the manufacturing process and other waste material (Meibeck, 1989).

**Domestic Use** - At its most noble use, water for drinking can be classified as domestic use. It counts only as 8 percent of water consumption. People need water in their everyday life for other purposes such as cooking, showering, washing clothes and dishes, cleaning their homes. Water is also used in a wider way, to supply schools, offices, to street cleaning and for recreational activities. It is estimated that, each person needs at least 50 to 100 liters of water per day for domestic uses (including for food, bathing, laundry, basic hygiene and drinking). But if this quantity is not possible, at least a minimum of 20 liters per day is required in order to be healthy. This quantity must be available within a maximum walking distance of about 400 meters and it should be affordable, not reducing a persons' capacity to buy other essential goods. This means that essential amounts of water must sometimes be provided free (according to Right to the Water Program). Households in high-income groups connected to the water supply may consume more than 300 liters of water per person per day (NEDA).

Hands, food, utensils, floors, cooking surfaces and children are all less likely to be kept clean when water must be carried from any distance or when it needs to be purchased from vendors. Even if the distance is short, in case the water is not piped directly into a house or yard, it needs to be stored in containers. And so does it if the flow is not regular even when water is piped to the house. Both situations can provide a number of opportunities for contamination.

**Quantity X Access X Quality** - Although the human need for water is universal, its distribution is unequal. The differences can be between urban and rural areas, among cities but also among social classes. Megacities receive wider attention, and bigger investment from government and external donors, once they are more likely to exhaust their local water resources and to pollute their surroundings (People and the Planet, 1996). In the Amazon region, household access to water is relatively low. Out of 180 countries and territories in the world, the Amazonian countries rank among the thirty-three most water abundant (UNESCO-WWAP, 2003). In contrast, when it comes to safe access to this water for drinking, according to the UNDP index of human development (UNDP, 2004), the Amazonian countries are ranked between the 67th (Suriname), where sanitation servi-



