

## 5. Jaguaré creek restoration



**Type:** multi-stakeholder

**Region:** southeast

**State:** São Paulo

**Biome:** Atlantic Rainforest, cerrado  
(Brazilian savannah)

### City of São Paulo

**Population:** 12 176 866 (estimated 2018)

**Area:** 1528.5 km<sup>2</sup>

**Elevation:** 760 m

**Coordinates:** 23.557386 S / 46.737778 W

**HDI:** 0.805 (2010) <sup>86</sup>

### Context

Located in a central area of São Paulo city, the Jaguaré creek is canalised along its full 25 km length. Some parts are buried underground and others are contained in concrete canals between traffic lanes. The watershed has been deeply modified through the urbanisation process and receives a significant load of domestic and industrial sewage and diffuse pollution. The Jaguaré watershed has a diverse set of landscapes and urban contexts, from its springs to the heavily urbanised area where it flows to the Pinheiros river. The watershed corresponds to 1/10 of the total 270 km<sup>2</sup> drainage area of the Pinheiros river, one of the two main watercourses crossing the metropolitan area of São Paulo.

86. <https://cidades.ibge.gov.br/brasil/sp/sao-paulo/panorama>

## Challenges

Nowadays, most of the 300 named rivers and creeks of the city are invisible and run into channels, and the majority are buried underground. They are contaminated with sewage and receive diffuse pollution from the storm-water run-off of impervious surfaces and solid litter. The city is vulnerable to frequent floods, urban heat-island effect and related health problems. The traditional concreted 'piscinões' (built storm-water reservoirs) have already demonstrated that they are not effective in addressing the recurrent floods that occur in the city.

There are several challenges at the Jaguaré watershed that are common to most of the water basins of the city. Water quality and storm-water management are intrinsically related to buildings, natural resources, litter and interventions in watercourses, such as:

- land use and land cover change without planning;
- contamination of waters by sewage and industrial release, and by improper litter discharge in the vicinity of the watershed;
- slums and illegal occupation of vulnerable areas, many without proper sanitation systems;
- private and public settlements that don't follow the urban and environmental legislations, or where built before the laws were created;
- invasive plant species;
- erosion and risk of landslides in some parts of the river banks;
- canalisation of the creeks in engineered infrastructure, both opened and buried underground;
- inefficiency of government interventions in avoiding illegal occupation of the watercourses and flood-prone areas.



Figure 47. Before — as it is nowadays.  
After — Landscape transformation with built wetlands to restore ecological functions in a multifunctional park that offer multiple ecosystem services.

## Objectives

The nature-based project to restore ecological functions to the Jaguaré creek was developed to establish new concepts and guidelines to enhance the quality of the Pinheiros river and its tributaries. The Jaguaré creek is a pilot project that developed new technologies in multifunctional high-performance landscapes combining manifold urban issues with integrated long-term monitoring and management. The project has an innovative approach to addressing point pollution (sewage and industrial discharge) and diffuse pollution (caused by storm-water run-off). It is a pioneer project proposed for a megacity that is the financial and cultural core of the country. It aims to become a reference of hybrid nature-based and engineered solutions to build urban resilience, support sustainable development and offer quality of life and well-being to urban dwellers.

The Jaguaré renaturalisation project embraces the watershed with an integrated and systemic

approach. It aims to restore the ecological processes and functions of the remaining areas that are in the river floodplain and to relocate some occupations in flood-prone areas to create multifunctional wetlands to store, treat and infiltrate storm water, with multiple benefits to the city. There are many challenges due to the heavily transformed landscape and car-oriented urbanisation.

The primary target of the nature-based project to revitalise the Jaguaré creek is to develop a methodology to restore urban landscapes as infrastructures combining technology, urban planning and design, and advocacy. The main objectives are:

- to manage storm water, avoiding floods;
- to moderate local climate extremes;
- to provide a habitat for biodiversity;
- to offer an array of social-cultural benefits.

In order to achieve these goals, a double strategy was used.

- Intercept discharge of illegal sewage and industrial effluents into the drainage system.
- Control diffuse pollution and manage run-off through a series of multifunctional nature-based solutions, such as built wetlands, bioswales and rain gardens.

## Actions

The methodology used to develop the innovative project addresses combined strategies of technologies, urban planning and design, and advocacy. The project explores new possibilities to approach storm-water management and water quality with a landscape-friendly method, understanding the ecology of the

area with flexible and adaptive design. The 'learning-by-doing' tactic is key in this project, which aims to monitor landscape performance with multidisciplinary cooperation.

The project proposes an innovative approach to dealing with urban waters and enhancing the landscape with NBS, building a series of NBS instead of heavy infrastructure (known as piscinões in São Paulo, whose sole function is to store storm water during strong events).

## Stakeholder involvement

The project was led by the NGO Águas Claras do Rio Pinheiros (Clear Waters of Rio Pinheiros), which advocated for the quality of the urban waters and actively engaged stakeholders to:

- raise funds from private companies located in the vicinal region;
- engage academia to develop the plan and design;
- obtain financial support from the State Fund for Hydric Resources to enable the project's development.

Águas Claras do Rio Pinheiros (a non-profit organisation) organised the fund-raising and hired the University of São Paulo as the Foundation Hydraulic Technological Centre (FCTH) of the polytechnic school responsible for developing the hydrological models to accommodate the storm water and give the framework to the design by LabVerde (Landscape Architecture laboratory of the Architecture and Urbanism School).

## Implementation

The design project was carried out from 2015 to 2017 but has not yet been implemented.



Figure 48: The very green University City, next to Jaguaré Creek.



## Outcomes

The project is expected to offer multiple benefits:

- managing storm water in the nature-based retention and detention basins (built wetlands), bioswales and rain gardens along the Jaguaré creek;
- treating diffuse pollution before the contaminated water reaches the watercourse;
- mitigating urban heat-island effect;
- providing a habitat for biodiversity;
- offering multiple cultural and social benefits.

## Limiting factors and risks

Cultural and economic factors are limiting the continuity and implementation of the project as an experimental model that can be monitored and managed, and then be applied in other watersheds. There is no clear understanding of the multiple benefits of this nature-based alternative by the decision-makers or by the population, nor of the long-term economic gains that it might bring to the city. Also,

## Success factors

The interdisciplinary design is a successful experience that integrates strategies of technology, urban planning and design, and advocacy to propose a shift in the approach to dealing with storm-water floods and diffuse pollution.

the company that is responsible for the sewage collection and treatment has not demonstrated any interest in investing in new and more sustainable and multifunctional NBS.



Figure 49: Capybara in the Jaguaré Creek region.

## Lessons learnt

A holistic methodology to address the multiple aspects of urbanisation, such as housing, governance, waste management, sewage and diffuse pollution, is essential to shift the paradigm to introduce NBS that are flexible and adaptable over time. 'Learn by doing' is a concept that is fundamental for fail-safe projects because it allows for redundancies and enables adjustments over time, measuring successful results and adapting undesired outcomes in innovative ways.

The technical and design knowledge to develop projects based on NBS exists, but there is no real integration among different disciplines to concentrate on the implementation. There is too little information

and no synergies created among the decision-makers and funding agencies to enable the paradigm shift from grey to green solutions. Also, there is a need to educate and raise awareness among residents of the benefits that bioremediation and mimicking natural processes and flows offer to provide healthier, more sustainable and resilient cities for all.

## Contacts

José Rodolfo Scarati (FCTH)  
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## References

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